Relays

- subminiature
- miniature
- industrial
- interface
- installation
- programmable
- time
- monitoring
- plug-in sockets

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2016–2017

relpol® S.A.

Automation is our passion

The leading position of the manufacturer of electromagnetic relays in Europe provides for Relpol's presence in markets worldwide.

Applications, certifications

- **Areas of relay applications:**
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  - for industry – page 6
  - for photovoltaic systems – page 8
  - for railroad industry – page 9
- Programmable relays – page 10
- Time relays – page 11
- Monitoring relays – page 12

POLSKIE CENTRUM BADAŃ I CERTYFIKACJI S.A.
02-699 Warszawa, ul. Kłobucka 23A

CERTIFICATE OF INTEGRATED MANAGEMENT SYSTEM
QUALITY • ENVIRONMENT
No. JS - 174/4/2016

Relpol S.A.
ul. 11 Listopada 37, 68-200 Żary
and
Branch - ul. Browarna 11, 65-849 Zielona Góra

IQNet
THE INTERNATIONAL CERTIFICATION NETWORK
CERTIFICATE

IQNet and PCBC
hereby certify that the organization

Relpol S.A.
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for the following field of activities

• designing, manufacturing and trading of electromagnetic relays, relay sockets, stationary monitors for control of gamma and neutron radiation, digital protection, measurements, automatics, controls, communication and registration for power distribution stations,
• trading of electrotechnical components

has implemented and maintains an

Integrated Management System

which fulfills the requirements of the following standards

PN-EN ISO 9001:2009 and PN-EN ISO 14001:2005

Issued on: 2016-02-15
Validity date: 2019-09-15
PCBC certified since: 2007-02-20

Registration Number: PL - JS - 174/4/2016

Michael Grenkart
President of IQNet

Michał Piechowski, Ph.D.
President of PCBC

Innovative features of our technological solutions and reliability of our products are confirmed by numerous recognitions and certifications: BBJ, VDE, UL, CSA, EAC, LR, CCCs, AUCOTEAM GmbH, IK, RoHS and by prizes and awards.

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Relays
for electronics

Subminiature signal relays

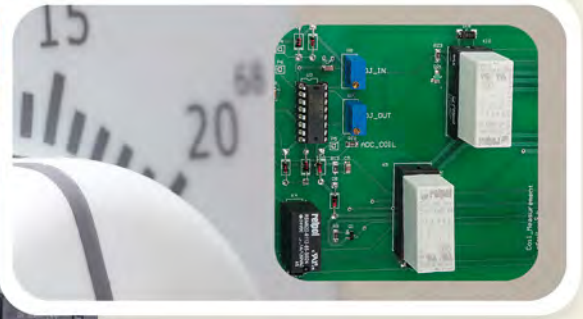
- I_n currents of contacts: 0,5 ... 3 A.
- Methods of mounting: PCB, SMT - depending on the type of relay.

Applications:

- telecommunication equipment,
- office equipment,
- measurement equipment and devices,
- medical apparatus and medical monitoring equipment,
- audiovisual equipment,
- driving simulators, flight simulators,
- slot machines,
- protection, monitoring and alarm equipment,
- industrial and consumer electronic goods.

RSM850 46
RSM850B ❶ 49
RSM822N 51
RSM954N 54
RSM957N 56

❶ **RSM850B** - bistable relays



Miniature relays

- I_n currents of contacts: 5 ... 20 A.
- Methods of mounting: PCB, SMT, in plug-in sockets - depending on the type of relay.

Applications:

- general control of electrical equipment,
- equipment for air-conditioning, refrigeration products, heating, ventilation, lighting,
- protection, monitoring and alarm equipment,
- control systems and devices for household equipment,
- time relays and time switches,
- monitoring relays,
- temperature controllers,
- PLCs,
- electrical automation systems - industrial and power-engineering automation,
- equipment for smart buildings and equipment for automation of buildings,
- other.

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RM85 ❷ 96
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RM87, RM87 sensitive .. 114
RM87N SMT 120
RM96 124
RM83 128
RMP84 132
RMP85 136
RA2 ❷ 140

❷ **RM85** for switching higher voltages
❸ **RA2** - automotive relays

Bistable relays - subminiature

- I_n currents of contacts: 0,5 A.
- Method of mounting: PCB.

Applications:

- for energy-saving control of electrical devices which are switched on and off with a change of the state of bistable relays via short supply of their coils,
- in electrical systems of battery-powered equipment,
- applications specified in description of subminiature relays.

Relays
for industry

Miniature industrial relays

- I_n currents of contacts: 5 ... 12 A.
- Methods of mounting:
  in plug-in sockets,
  direct on panel mounting, PCB
  - depending on the type of relay.

R2N 144
R3N 149
R4N 154
RY2 159
R2M 163

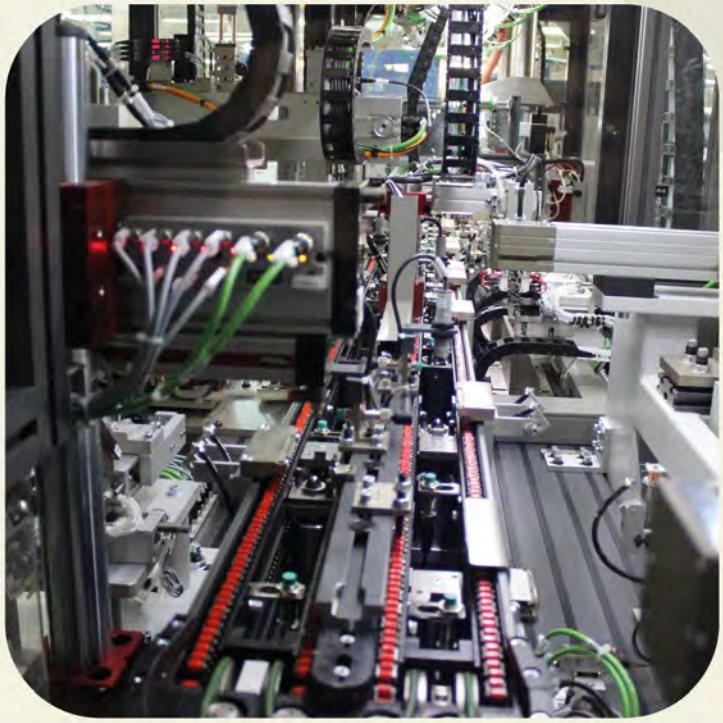
R15 - 2 CO 167
R15 - 3 CO 167
R15 - 4 CO 172
RUC 176
RUC-M 182
RG25 187
R2O 190
R3ON 193
R4ON 196
MT-PI-... 261

Industrial relays of small dimensions

- I_n currents of contacts: 10 ... 40 A.
- MT-PI-...: relays in modular covers.
- Methods of mounting:
  in plug-in sockets,
  direct on 35 mm rail mount,
  direct on panel mounting, PCB
  - depending on the type of relay.

Applications:

- general control of electrical equipment,
- industrial control systems,
- equipment for air-conditioning, refrigeration products, heating, ventilation, lighting,
- protection, monitoring and alarm equipment,
- control systems and devices for household equipment,
- electrical automation systems - industrial and power-engineering automation,
- building automation equipment (BMS),
- other.



Interface relays (relay coupling modules)

- I_n currents of contacts: 1 ... 16 A.
- Connections of wiring: screw terminals, spring terminals - depending on the type of relay.
- Methods of mounting:
  - PI84, PI85, PIR2, PIR3, PIR4: on 35 mm rail mount or on panel mounting,
  - PI6, PIR6W, PIR6WB: on 35 mm rail mount.

Applications:

- in applications with PLCs as input / output [I/O] separators,
- in industrial automation applications for isolation of input signals from output circuits,
- in electrical applications as universal interfaces between control and load, for medium load switching,
- applications specified in descriptions of relays - miniature industrial and industrial of small dimensions.

PI84 with socket GZT80 203
PI84 with socket GZM80 207
PI84 with socket GZMB80 211
PI85 with socket GZT80 215
PI85 with socket GZM80 219
PI85 with socket GZMB80 223
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PIR4 with socket GZM4 239
PI6-1P 243
PI6-1T 246
PIR6W-1P-... 248
PIR6W-1PS-... 252
PIR6WB-1PS-... 256

Relays for photovoltaic systems

- I_n currents of contacts: 16 ... 48 A.
- Methods of mounting: PCB, direct on 35 mm rail mount, in plug-in sockets, direct on panel mounting - depending on the type of relay.

Applications:

- there are two major applications of electromagnetic relays in solar systems, i.e. at the DC side they connect/disconnect the DC voltage generated by photovoltaic cells; at the AC side they connect/disconnect the entire system to/from power network,
- delivery of power to a public network is subject to special requirements as for the relays applied - the major ones are: contact clearance of min. 1,5 mm and resistance of the contact clearance to surge voltage of 2 500 V; all the requitrements are set out by the Standard DIN VDE 0126-1-1,
- for safety reasons solar systems must be equipped with an automatic system to disconnect the generator section from the AC network; the protection system is usually built in the DC/AC inverter and double-break disconnected - thus, these must be relays of the 2 NO contact configuration (each contact disconnects one line - one the phase line and the other the neutral line); two contacts connected in series are required for each line - thus, the circuit separation is performed by two two-contact electromagnetic relays,
- the RUC-M relays are designed for connecting high DC currents.

RG25 187
RS35 199
RS50 199
RUC 176
RUC-M 182
R20 190

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Relays for railroad industry

Interface relays

- I_n currents of contacts: 6 ... 16 A.
- Compliance with standards: PN-EN 50155, PN-EN 61373, PN-EN 60068.
- Method of mounting: on 35 mm rail mount.

PI84 with socket GZMB8O 211
PI85 with socket GZMB8O 223
PIR6WB-1PS-...-R 256

Electromagnetic relays

- I_n currents of contacts: 6 ... 16 A.
- Compliance with standards: PN-EN 50155, PN-EN 61373, PN-EN 60068.
- Methods of mounting: on 35 mm rail mount or on panel mounting.

R15 - 2 CO with socket PZ8 167
R15 - 3 CO with socket PZ11 167
RUC with socket GUC11 or GUC11S 176

Applications:

- electrical control systems,
- signalling systems,
- lighting systems,
- air-conditioning systems.

Programmable relays

- I_n currents of outputs: 0,5 ... 10 A.
- Available versions of NEED relays:
  - with LCD display:
    8 inputs / 4 outputs, 16 inputs / 8 outputs,
  - without display:
    8 inputs / 4 outputs, 16 inputs / 8 outputs,
  - with relay outputs,
  - with transistor outputs:
    I_n = 0,5 A (version 24 V DC),
  - with supply voltage:
    230 V AC, 12 V DC, 24 V DC, 220 V DC.
- NEED-MODBUS: communication modules NEED Master / ModBus RTU Slave.
- Methods of mounting:
  - NEED: on 35 mm rail mount or on panel mounting,
  - NEED-MODBUS: on 35 mm rail mount.

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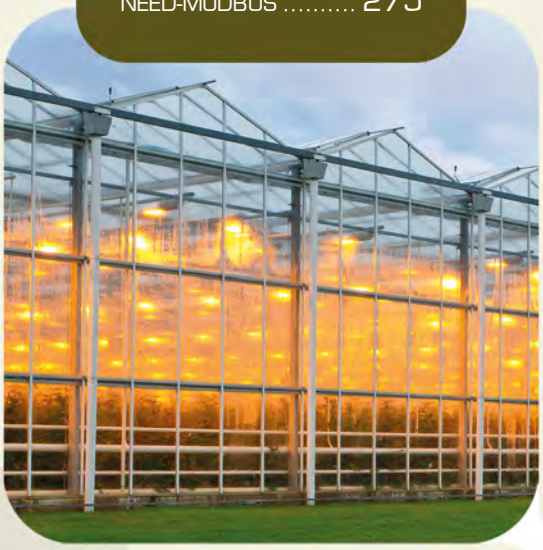

Applications:

- in industrial automation (device and process control),
- in ARC automation
- in BMS automation,
- in production management systems,
- in water systems,
- in air-conditioning, ventilation, heating systems,
- in lighting systems,
- various other applications.

Time relays

- I_n currents of outputs: 6 ... 16 A.
- Available versions:
  - in modular covers:
    MT-W...M (with LED display), MT series, TR series,
  - in industrial covers:
    TR4N series, T-R4, PIR15...T.
- Design features:
  - multifunctions,
  - single-functions,
  - with settings of T interval,
  - with independent settings of T1 and T2 intervals,
  - with independent settings of T1, T2 and T3 intervals (MT-W...M),
  - contacts / outputs: 1 CO, 2 CO, 3 CO, 4 CO - depending on the type of relay,
  - supply: universal AC/DC; specified voltage - depending on the type of relay.
- Methods of mounting: on 35 mm rail mount, on panel mounting, in plug-in sockets - depending on the type of relay.

Applications in low voltage systems:

- in industrial automation,
- in BMS automation,
- in air-conditioning, ventilation, heating systems,
- in protection, signalling, alarm systems,
- in lighting systems,
- various other applications.

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COM3 354

❹ **PIR15...T** with time module COM3

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Monitoring relays

- I_n currents of outputs: 5 A.
- Available versions:
  - in modular covers: MR-E series,
  - in industrial covers: MR-G series.
- Method of mounting: on 35 mm rail mount.

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MR-EU31UW1P 361
MR-EU3M1P..... 364
MR-EI1W1P..... 367
MR-ET1P..... 370
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MR-GI1M2P-TR2 385
MR-GI3M2P-TR2 388
MR-GT2P-TR2 391

Applications in low voltage systems:

- DC voltage monitoring,
- AC voltage monitoring in 1- and 3-phase network,
- DC current monitoring,
- AC current monitoring in 1- and 3-phase network,
- motor temperature monitoring.

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❷ **RA2** - automotive relays

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❶ **RSM850B** - bistable relays

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Relays basic information

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Electrical terminals						Coil / input				Type of relay	Number and type of contacts / outputs	Rated current
PCB	SMT	for sockets	connectors	screw terminals	spring terminals	AC	DC	AC/DC	bistable DC		CO - changeover NO - normally open NC - normally closed	[A] 5 / 10 / 15 / 20 / 50
Subminiature signal relays												
										RSM850	2 CO	2 A
										RSM850B	2 CO	2 A
										RSM822N	2 CO	3 A / 2 A (NO/NC)
										RSM954N	1 CO	3 A
										RSM957N	1 CO	1 A
Miniature relays												
										RM12	1 CO, 1 NO, 1 NC	8 A
										RM12N	1 CO, 1 NO	1 CO: 8 A, 1 NO: 10 A
										RM32N	1 CO, 1 NO	1 CO: 5 A / 5 A (NO/NC); 1 NO: 5 A, 10 A ❸
										RM45N	1 CO, 1 NO	1 CO: 5 A / 5 A (NO/NC); 1 NO: 5 A, 10 A ❸
										RM50N	1 CO, 1 NO	12 A
										RM51	1 CO, 1 NO	1 CO: 10 A / 7 A (NO/NC), 20 A ❸, 1 NO: 10 A, 20 A ❸
										RM699B	1 CO, 1 NO	$AgSnO_2$, AgNi: 6 A
										RM84	2 CO, 2 NO	8 A
										RM84 SMT	2 CO, 2 NO	8 A
										RM85	1 CO, 1 NO	16 A
										RM85 ❶	1 NO	16 A
										RM85 inrush	1 NO	16 A
										RM85 105 °C sensitive	1 NO	16 A
										RM85 SMT	1 CO, 1 NO	16 A
										RM85 faston	1 NO	20 A
										RM87	1 CO, 1 NO	12 A
										RM87 sensitive	1 NO	10 A
										RM87N SMT	1 CO, 1 NO	12 A
										RM96	1 CO, 1 NO, 1 NC	8 A
										RM83	1 CO, 1 NO, 1 NC	16 A
										RMP84	2 CO	8 A
										RMP85	1 CO	16 A
										RA2 ❷	1 CO, 1 NO, 2 NO	1 CO: 20 A / 12 A (NO/NC), 1 NO: 20 A

❶ **RM85** for switching higher voltages ❷ **RA2** - automotive relays (2 NO: 2 x 12,5 A) ❸ At lowered voltage

How to use the table:
Select the number and type of contacts, please. Then, select a relay depending on its rated current, type of terminals and coil voltage.

The ordering code structure provides for formulation of **numerous variants**. Not all of them are defined as standard ones and, thus, not all of them are included in the product line. However, **deliveries of special versions according to the customer's specification are possible**. Please, contact with Relpol S.A. or our local representatives for details.The data of the devices may be changed with no prior notice.

Electrical terminals						Coil / input				Type of relay	Number and type of contacts / outputs	Rated current					
PCB	SMT	for sockets	connectors	screw terminals	spring terminals	AC	DC	AC/DC	bistable DC		CO - changeover NO - normally open NC - normally closed	[A]	5	10	15	20	50
Industrial relays																	
										R2N	2 CO			12 A			
										R3N	3 CO			10 A			
										R4N	4 CO			7 A			
										RY2	2 CO			12 A			
										R2M	2 CO		5 A				
										R15 - 2 CO	2 CO			10 A			
										R15 - 3 CO	3 CO			10 A			
										R15 - 4 CO	4 CO			10 A			
										RUC	2 CO, 3 CO, 2 NO, 3 NO				16 A		
										RUC-M	1 NO, 2 NO				16 A		
										RG25	2 NO					25 A	
										R20	1 NO, 2 NO				2 NO: 25 A, 1 NO: 30 A		
										R30N	1 CO, 1 NO				1 CO: 30 A / 20 A (NO/NC), 1 NO: 30 A		
										R40N	1 CO, 1 NO				1 CO: 40 A / 30 A (NO/NC), 1 NO: 40 A		
										RS35	2 NO					35 A	
										RS50	2 NO						48 A
Interface relays																	
										PI84 with socket GZT80	2 CO			8 A			
										PI84 with socket GZM80	2 CO			8 A			
										PI84 with socket GZMB80	2 CO			8 A			
										PI85 with socket GZT80	1 CO				16 A ❺		
										PI85 with socket GZM80	1 CO				16 A ❺		
										PI85 with socket GZMB80	1 CO				10 A, 16 A ❺		
										PI85 inrush with socket GZT80	1 NO				16 A ❺		
										PIR2 with socket GZM2	2 CO				12 A		
										PIR3 with socket GZM3	3 CO			10 A			
										PIR4 with socket GZM4	4 CO			6 A			
										PI6-1P	1 CO			AgSnO$_2$: 6 A			
										PI6-1T	1 NO			1,2 A			
										PIR6W-1P-...	1 CO			AgSnO$_2$: 6 A			
										PIR6W-1PS-... ❹	1 CO, 1 NO				T, C: 1 A, O: 2 A, R (AgSnO$_2$): 6 A		
										PIR6WB-1PS-... ❹	1 CO, 1 NO				T, C: 1 A, O: 2 A, R (AgSnO$_2$): 6 A		

❹ **R** - operational electromagnetic relay type **RM699BV** in PIR6W.-1PS-...-R. **T/C/O** - operational solid state relays type **RSR30** in PIR6W.-1PS-...-T (or C or O) - see pages 77-81 and www.relpol.com.pl ❺ See pages 215-230.

How to use the table:
Select the number and type of contacts, please. Then, select a relay depending on its rated current, type of terminals and coil voltage.

The ordering code structure provides for formulation of **numerous variants**. Not all of them are defined as standard ones and, thus, not all of them are included in the product line. However, **deliveries of special versions according to the customer's specification are possible**. Please, contact with Relpol S.A. or our local representatives for details.The data of the devices may be changed with no prior notice.

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Electrical terminals						Coil / input				Type of relay	Number and type of contacts / outputs	Rated current					
PCB	SMT	for sockets	connectors	screw terminals	spring terminals	AC	DC	AC/DC	bistable DC		CO - changeover NO - normally open NC - normally closed	[A]	5	10	15	20	50
Installation relays																	
										MT-PI-...	1 CO, 2 CO, 1 NO, 2 NO	2 CO, 2 NO: 8 A, 1 CO, 1 NO: 16 A					
Programmable relays																	
										NEED-...-08-4R-.	4 NO	10 A					
										NEED-...-08-4T-.	4 NO	0,5 A					
										NEED-...-16-8R-.	8 NO	10 A					
										NEED-...-16-8T-.	8 NO	0,5 A					
										NEED-MODBUS							
Monitoring relays																	
										MR-EU1W1P	1 CO	5 A					
										MR-EU31UW1P	1 CO	5 A					
										MR-EU3M1P	1 CO	5 A					
										MR-EI1W1P	1 CO	5 A					
										MR-ET1P	1 CO	5 A					
										MR-GU1M2P-TR2	2 CO	3 A / 5 A ❻					
										MR-GU32P-TR2	2 CO	3 A / 5 A ❻					
										MR-GU3M2P-TR2	2 CO	3 A / 5 A ❻					
										MR-GU3M2P	2 CO	3 A / 5 A ❻					
										MR-GI1M2P-TR2	2 CO	3 A / 5 A ❻					
										MR-GI3M2P-TR2	2 CO	3 A / 5 A ❻					
										MR-GT2P-TR2	2 CO	3 A / 5 A ❻					

❻ 3 A - if the distance between the mounting relays is less than 5 mm; 5 A - if the distance between the mounting relays is greater than 5 mm.

How to use the table:
Select the number and type of contacts, please. Then, select a relay depending on its rated current, type of terminals and coil voltage.

The ordering code structure provides for formulation of **numerous variants**. Not all of them are defined as standard ones and, thus, not all of them are included in the product line. However, **deliveries of special versions according to the customer's specification are possible**. Please, contact with Relpol S.A. or our local representatives for details.The data of the devices may be changed with no prior notice.

Electrical terminals						Coil / input				Type of relay	Number and type of contacts / outputs	Rated current				
PCB	SMT	for sockets	connectors	screw terminals	spring terminals	AC	DC	AC/DC	bistable DC		CO - changeover NO - normally open NC - normally closed	[A] 5	10	15	20	50
Time relays																
										MT-W...M	1 CO		10 A			
										MT-TUA-...	1 CO		10 A			
										MT-TUB-...	1 CO		10 A			
										MT-TE-...	1 CO		10 A			
										MT-TWU-...	1 CO		10 A			
										MT-TBP-...	1 CO		10 A			
										MT-TER-…	1 CO		10 A			
										MT-TEA-…	1 CO		10 A			
										MT-TES-…	1 CO		10 A			
										MT-TEU-…	1 CO		10 A			
										MT-TIP-…	1 CO		10 A			
										MT-TSA-…	1 CO		10 A			
										MT-TWT-…	1 CO		10 A			
										MT-TSD-...	2 x 1 CO		10 A			
										TR-EM1P-UNI	1 CO		8 A			
										TR-EM2P-UNI	2 CO		8 A			
										TR-EI1P-UNI	1 CO		8 A			
										TR-EI2P-UNI	2 CO		8 A			
										TR-ES2P-UNI	2 x 1 CO		8 A			
										TR4N 1 CO	1 CO			16 A		
										TR4N 2 CO	2 CO		8 A			
										TR4N 4 CO	4 CO	6 A				
										T-R4	4 CO	6 A				
										PIR15...T with time module COM3	2 CO, 3 CO		10 A			
										COM3						

How to use the table:
Select the number and type of contacts, please. Then, select a relay depending on its rated current, type of terminals and coil voltage.

The ordering code structure provides for formulation of **numerous variants**. Not all of them are defined as standard ones and, thus, not all of them are included in the product line. However, **deliveries of special versions according to the customer's specification are possible**. Please, contact with Relpol S.A. or our local representatives for details.The data of the devices may be changed with no prior notice.

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Type of relay	Method of mounting				
	For PCB mounting	On panel mounting	35 mm rail mount (PN-EN 60715)	Cover with mounting flange - on panel mounting	Flat insert - faston (connectors)
Subminiature signal relays					
RSM850	direct	–	–	–	–
RSM850B	direct	–	–	–	–
RSM822N	direct	–	–	–	–
RSM954N	direct	–	–	–	–
RSM957N	direct	–	–	–	–
Miniature relays					
RM12	direct	–	–	–	–
RM12N	direct	–	–	–	–
RM32N	direct	–	–	–	–
RM45N	direct	–	–	–	–
RM50N	direct	–	–	–	–
RM51	direct	–	–	–	–
RM699BV, RSR30 ❶	direct	–	with socket	–	–
RM699BH	direct	–	–	–	–
RM84	direct, with socket	with socket	with socket	–	–
RM84 SMT	direct	–	–	–	–
RM85	direct, with socket	with socket	with socket	–	–
RM85 ❷	direct	–	–	–	–
RM85 inrush	direct, with socket	with socket	with socket	–	–
RM85 105 °C sensitive	direct, with socket	with socket	with socket	–	–
RM85 SMT	direct	–	–	–	–
RM85 faston	direct	–	–	–	6,3 x 0,8 mm
RM87	direct, with socket	with socket	with socket	–	–
RM87 sensitive	direct, with socket	with socket	with socket	–	–
RM87N SMT	direct	–	–	–	–
RM96 1 CO	direct	with socket	with socket	–	–
RM96 1 NO, 1 NC	direct	–	–	–	–
RM83	direct, with socket	–	–	–	–
RMP84	with socket	with socket	with socket	–	–
RMP85	with socket	with socket	with socket	–	–
RA2 ❸	direct	–	–	–	–

❶ Solid state relays type **RSR30** - see www.relpol.com.pl ❷ **RM85** for switching higher voltages ❸ **RA2** - automotive relays

Type of relay	Method of mounting				
	For PCB mounting	On panel mounting	35 mm rail mount (PN-EN 60715)	Cover with mounting flange - on panel mounting	Flat insert - faston (connectors)
Industrial relays					
R2N	with socket	with socket	with socket	–	–
R3N	–	with socket	with socket	–	–
R4N	direct, with socket	with socket	with socket	–	–
RY2	–	with socket	with socket	on request	4,8 x 0,5 mm
R2M	direct, with socket	with socket	with socket	–	–
R15 - 2 CO	direct	with socket	with socket	–	–
R15 - 3 CO	direct	with socket	with socket	–	–
R15 - 4 CO	–	with socket ❹	with socket	–	–
RUC faston 4,8x0,5	direct	with socket ❺ direct	with socket ❺ direct ❻	on request	4,8 x 0,5 mm
RUC faston 6,3x0,8	–	direct	direct ❻	on request	6,3 x 0,8 mm
RUC-M	direct	with socket ❺ direct	with socket ❺ direct ❻	on request	4,8 x 0,5 mm
RG25	–	–	direct	–	–
R20	–	direct	–	standard	6,3 x 0,8 mm
R30N	direct	–	–	–	–
R40N	direct	–	–	–	–
RS35	direct	–	–	–	–
RS50	direct	–	–	–	–
Interface relays					
PI84 with socket GZT80	–	direct	direct	–	–
PI84 with socket GZM80	–	direct	direct	–	–
PI84 with socket GZMB80	–	–	direct	–	–
PI85 with socket GZT80	–	direct	direct	–	–
PI85 with socket GZM80	–	direct	direct	–	–
PI85 with socket GZMB80	–	–	direct	–	–
PI85 inrush with socket GZT80	–	direct	direct	–	–
PIR2 with socket GZM2	–	direct	direct	–	–
PIR3 with socket GZM3	–	direct	direct	–	–
PIR4 with socket GZM4	–	direct	direct	–	–
PI6-1P	–	–	direct	–	–
PI6-1T	–	–	direct	–	–
PIR6W-1P-...	–	–	direct	–	–
PIR6W-1PS-...-❼	–	–	direct	–	–
PIR6WB-1PS-...-❼	–	–	direct	–	–

❹ Available socket to be mounted behind the assembly panel - **GZ14Z** ❺ For RUC faston 4,8 x 0,5 and RUC-M, with GUC11 or GUC11S socket, max. switching voltages and coil voltages of relays are limited to 250 V AC / DC ❻ Version with adaptor (V) or (H) ❼ **R** - operational electromagnetic relay type **RM699BV** in PIR6W.-1PS-...-R. **T/C/O** - operational solid state relays type **RSR30** in PIR6W.-1PS-...-T (or C or O) - see pages 77-81 and www.relpol.com.pl

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Type of relay	Method of mounting				
	For PCB mounting	On panel mounting	35 mm rail mount (PN-EN 60715)	Cover with mounting flange - on panel mounting	Flat insert - faston (connectors)
Installation relays					
MT-PI-...	–	–	direct	–	–
Programmable relays					
NEED-...-08-4…	–	direct	direct	–	–
NEED-...-16-8…	–	direct	direct	–	–
NEED-MODBUS	–	–	direct	–	–
Monitoring relays					
MR-EU1W1P	–	–	direct	–	–
MR-EU31UW1P	–	–	direct	–	–
MR-EU3M1P	–	–	direct	–	–
MR-EI1W1P	–	–	direct	–	–
MR-ET1P	–	–	direct	–	–
MR-GU1M2P-TR2	–	–	direct	–	–
MR-GU32P-TR2	–	–	direct	–	–
MR-GU3M2P-TR2	–	–	direct	–	–
MR-GU3M2P	–	–	direct	–	–
MR-GI1M2P-TR2	–	–	direct	–	–
MR-GI3M2P-TR2	–	–	direct	–	–
MR-GT2P-TR2	–	–	direct	–	–

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Type of relay	Method of mounting				
	For PCB mounting	On panel mounting	35 mm rail mount (PN-EN 60715)	Cover with mounting flange - on panel mounting	Flat insert - faston (connectors)
Time relays					
MT-W...M	–	–	direct	–	–
MT-TUA-...	–	–	direct	–	–
MT-TUB-...	–	–	direct	–	–
MT-TE-...	–	–	direct	–	–
MT-TWU-...	–	–	direct	–	–
MT-TBP-...	–	–	direct	–	–
MT-TER-…	–	–	direct	–	–
MT-TEA-…	–	–	direct	–	–
MT-TES-…	–	–	direct	–	–
MT-TEU-…	–	–	direct	–	–
MT-TIP-…	–	–	direct	–	–
MT-TSA-…	–	–	direct	–	–
MT-TWT-…	–	–	direct	–	–
MT-TSD-...	–	–	direct	–	–
TR-EM1P-UNI	–	–	direct	–	–
TR-EM2P-UNI	–	–	direct	–	–
TR-EI1P-UNI	–	–	direct	–	–
TR-EI2P-UNI	–	–	direct	–	–
TR-ES2P-UNI	–	–	direct	–	–
TR4N 1 CO	–	–	direct	–	–
TR4N 2 CO	–	–	direct	–	–
TR4N 4 CO	–	–	direct	–	–
T-R4	–	with socket	with socket	–	–
PIR15...T with time module COM3	–	direct	direct	–	–
COM3	–	–	with socket	–	–

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RSM850 **version PCB**	Subminiature relays - electromagnetic
 page 46	Contacts: 2 CO Rated load: **AC1 - 0,5 A / 125 V AC; DC1 - 2 A / 30 V DC** Coils: DC - 3 ... 24 V Mounting: for PCB
RSM850 **version SMT**	Subminiature relays - electromagnetic
 page 46	Contacts: 2 CO Rated load: **AC1 - 0,5 A / 125 V AC; DC1 - 2 A / 30 V DC** Coils: DC - 3 ... 24 V Mounting: for surface mounting SMT
RSM850B	Subminiature relays - electromagnetic; bistable with one coil
 page 49	Contacts: 2 CO Rated load: **AC1 - 0,5 A / 125 V AC; DC1 - 2 A / 30 V DC** Coils: DC - 3 ... 24 V Mounting: for PCB
RSM822N	Subminiature relays - electromagnetic
 page 51	Contacts: 2 CO Rated load: **AC1 - 0,6 A / 125 V AC; DC1 - 3 A / 2 A** (NO/NC) **/ 30 V DC** Coils: DC - 3 ... 24 V (sensitive), 48 V (standard) Mounting: for PCB
RSM954N	Subminiature relays - electromagnetic
 page 54	Contacts: 1 CO Rated load: **AC1 - 3 A / 125 V AC; DC1 - 3 A / 30 V DC** Coils: DC - 3 ... 24 V Mounting: for PCB

RSM957N

Subminiature relays - electromagnetic

page 56

Contacts: 1 CO

Rated load: **AC1 - 0,5 A / 125 V AC; DC1 - 1 A / 30 V DC**

Coils: DC - 3 ... 24 V (sensitive)

Mounting: for PCB

RM12

Miniature relays - electromagnetic

page 59

Contacts: 1 CO, 1 NO, 1 NC

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: DC - 5 ... 60 V

Mounting: for PCB

RM12N

Miniature relays - electromagnetic

page 62

Contacts: 1 CO, 1 NO

Rated load:
1 CO - **AC1 - 8 A / 250 V AC; DC1 - 8 A / 30 V DC**
1 NO - **AC1 - 10 A / 250 V AC; DC1 - 10 A / 30 V DC**

Coils: DC - 5 ... 24 V

Mounting: for PCB

RM32N

Miniature relays - electromagnetic

page 65

Contacts: 1 CO, 1 NO

Rated load:
1 CO (NO/NC) - **AC1 - 5 A / 5 A / 250 V AC; DC1 - 5 A / 5 A / 28 V DC**
1 NO - **AC1 - 5 A / 250 V AC, 10 A / 125 V AC; DC1 - 5 A / 28 V DC**

Coils: DC - 5 ... 24 V (sensitive, standard)

Mounting: for PCB

RM45N

Miniature relays - electromagnetic

page 68

Contacts: 1 CO, 1 NO

Rated load:
1 CO (NO/NC) - **AC1 - 5 A / 5 A / 250 V AC; DC1 - 5 A / 5 A / 28 V DC**
1 NO - **AC1 - 5 A / 250 V AC, 10 A / 125 V AC; DC1 - 5 A / 28 V DC**

Coils: DC - 5 ... 24 V (sensitive, standard)

Mounting: for PCB

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RM50N

Miniature relays - electromagnetic

page 71

Contacts: 1 CO, 1 NO

Rated load: **AC1 - 12 A / 125 V AC; DC1 - 12 A / 28 V DC**

Coils: DC - 5 ... 48 V

Mounting: for PCB

RM51

Miniature relays - electromagnetic

page 74

Contacts: 1 CO, 1 NO

Rated load:
1 CO (NO/NC) - **AC1 - 10 A / 7 A / 250 V AC; DC1 - 10 A / 7 A / 30 V DC**
1 NO - **AC1 - 10 A / 250 V AC, 20 A / 125 V AC; DC1 - 10 A / 30 V DC**

Coils: DC - 5 ... 48 V

Mounting: for PCB

RM699B

Miniature relays - electromagnetic

page 77

Contacts: 1 CO, 1 NO

Rated load: **AC1 - 6 A / 250 V AC; DC1 - 6 A / 30 V DC**

Coils: DC - 5 ... 60 V

Mounting: RM699BV - for PCB, for plug-in sockets
RM699BH - for PCB

Accessories: sockets - PI6W-1P **(page 410)**

RM84

Miniature relays - electromagnetic

page 82

Contacts: 2 CO, 2 NO

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: DC - 3 ... 110 V; AC - 12 ... 240 V

Available special versions: with increased contact gap, in transparent cover

Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZT80, GZM80, GZS80, GZF80; spring terminals sockets - GZMB80; sockets for PCB - EC 50, PW80, GD50 **(pages 396-398)**;
signalling / protecting modules type M... for sockets: GZT80, GZM80, GZS80, GZMB80

RM84 SMT

Miniature relays - electromagnetic

page 87

Contacts: 2 CO, 2 NO

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: DC - 3 ... 110 V; AC - 12 ... 240 V

Mounting: for surface mounting SMT

RM85

Miniature relays - electromagnetic

page 91

Contacts: 1 CO, 1 NO

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 3 ... 110 V; AC - 12 ... 240 V

Available special versions: with increased contact gap, in transparent cover

Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZT80, GZM80, GZS80, GZF80; spring terminals sockets - GZMB80; sockets for PCB - EC 50, PW80, GD50 **(pages 396-398)**; signalling / protecting modules type M... for sockets: GZT80, GZM80, GZS80, GZMB80

RM85 special version

Miniature relays - electromagnetic, for switching higher voltages - up to 480 V AC

page 96

Contacts: 1 NO

Rated load: **AC1 - 5 A / 480 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 3 ... 110 V

Mounting: for PCB

RM85 inrush

Miniature relays - electromagnetic

page 99

Contacts: 1 NO

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 3 ... 110 V

Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZT80, GZM80, GZS80, GZF80; spring terminals sockets - GZMB80; sockets for PCB - EC 50, PW80, GD50 **(pages 396-398)**; signalling / protecting modules type M... for sockets: GZT80, GZM80, GZS80, GZMB80

RM85 105 ºC sensitive

Miniature relays - electromagnetic, ambient temperature up to 105 ºC

page 103

Contacts: 1 NO

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 5 ... 48 V (sensitive)

Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZT80, GZM80, GZS80, GZF80; spring terminals sockets - GZMB80; sockets for PCB - EC 50, PW80, GD50 **(pages 396-398)**; signalling / protecting modules type M... for sockets: GZT80, GZM80, GZS80, GZMB80

RM85 SMT

Miniature relays - electromagnetic

page 107

Contacts: 1 CO, 1 NO

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 3 ... 110 V; AC - 12 ... 240 V

Mounting: for surface mounting SMT

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RM85 faston

Miniature relays - electromagnetic

page 111

Contacts: 1 NO

Rated load: **AC1 - 20 A / 250 V AC; DC1 - 20 A / 24 V DC**

Coils: DC - 5 ... 48 V (sensitive)

Mounting: for PCB, for flat insert connectors - faston 250 (6,3 x 0,8 mm)

RM87

Miniature relays - electromagnetic

page 114

Contacts: 1 CO, 1 NO

Rated load: **AC1 - 12 A / 250 V AC; DC1 - 12 A / 24 V DC**

Coils: DC - 3 ... 110 V; AC - 12 ... 240 V

Available special versions: with increased contact gap, in transparent cover

Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZT80, GZM80, GZS80, GZF80, GZT92, GZM92, GZS92; spring terminals sockets - GZMB80; sockets for PCB - EC 50, PW80, GD50, EC 35, GD35 **(pages 396-399)**; signalling / protecting modules type M... for sockets: GZT80, GZM80, GZS80, GZT92, GZM92, GZS92, GZMB80

RM87 sensitive

Miniature relays - electromagnetic

page 114

Contacts: 1 NO

Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**

Coils: DC - 5 ... 48 V (sensitive)

Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZT80, GZM80, GZS80, GZF80, GZT92, GZM92, GZS92; spring terminals sockets - GZMB80; sockets for PCB - EC 50, PW80, GD50, EC 35, GD35 **(pages 396-399)**; signalling / protecting modules type M... for sockets: GZT80, GZM80, GZS80, GZT92, GZM92, GZS92, GZMB80

RM87N SMT

Miniature relays - electromagnetic

page 120

Contacts: 1 CO, 1 NO

Rated load: **AC1 - 12 A / 250 V AC; DC1 - 12 A / 24 V DC**

Coils: DC - 3 ... 110 V; AC - 12 ... 240 V

Mounting: for surface mounting SMT

RM96

Miniature relays - electromagnetic

page 124

Contacts: 1 CO, 1 NO, 1 NC

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: DC - 5 ... 48 V

Mounting: 1 CO - for PCB, for plug-in sockets
1 NO, 1 NC - for PCB

Accessories: screw terminals sockets - ES 32 **(page 400)**;
signalling / protecting modules type M... for sockets ES 32

RM83

Miniature relays - electromagnetic

page 128

Contacts: 1 CO, 1 NO, 1 NC

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 5 ... 110 V (standard), 110 V (sensitive)

Available special versions: in transparent cover

Mounting: for PCB, for plug-in sockets

Accessories: sockets for PCB - EC 50, PW80, GD50 **(page 398)**

RMP84

Miniature relays - electromagnetic

page 132

Contacts: 2 CO

Rated load: **AC1 - 8 A / 250 V AC**

Coils: DC - 12 ... 110 V; AC - 24 ... 230 V

Additional features: standard - mechanical indicator (W), lockable front test button (T) option - light indicator - LED diode (L)
Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZF80; spring terminals sockets - GZMB80; sockets for PCB - EC 50, GD50 **(pages 397-398)**; signalling / protecting modules type M... for sockets: GZMB80

RMP85

Miniature relays - electromagnetic

page 136

Contacts: 1 CO

Rated load: **AC1 - 16 A / 250 V AC**

Coils: DC - 12 ... 110 V; AC - 24 ... 230 V

Additional features: standard - mechanical indicator (W), lockable front test button (T) option - light indicator - LED diode (L)
Mounting: for PCB, for plug-in sockets

Accessories: screw terminals sockets - GZF80; spring terminals sockets - GZMB80; sockets for PCB - EC 50, GD50 **(pages 397-398)**; signalling / protecting modules type M... for sockets: GZMB80

RA2

Miniature relays - automotive relays

page 140

Contacts: 1 CO, 1 NO, 2 NO

Rated current: 1 CO (NO/NC) - **20 A / 12 A;** 1 NO - **20 A;** 2 NO - **2 x 12,5 A**

Coils: DC - 5 ... 48 V

Mounting: for PCB

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R2N - contacts 2 CO

Industrial relays - electromagnetic

page 144

R3N - contacts 3 CO

page 149

R4N - contacts 4 CO

page 154

Contacts: 2 CO, 3 CO, 4 CO

Rated load:
2 CO - **AC1 - 12 A / 250 V AC; DC1 - 12 A / 24 V DC**
3 CO - **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
4 CO - **AC1 - 7 A / 230 V AC (VDE), 6 A / 250 V AC; DC1 - 6 A / 24 V DC**

Coils: DC - 5 ... 220 V; AC - 6 ... 240 V

Additional features:
standard - mechanical indicator (W), lockable front test button (T)
option - light indicator - LED diode (L), surge suppression element - diode (D)

Mounting:
R2N, **R3N** - for plug-in sockets
R4N - for plug-in sockets, for PCB

Accessories:
R2N - screw terminals sockets - GZT2, GZM2;
spring terminals sockets - GZMB2;
sockets for PCB - SU4/2D;
solder terminals sockets - SU4/2L, G4/2 **(pages 400-402)**

R3N - screw terminals sockets - GZT3, GZM3 **(page 402)**

R4N - screw terminals sockets - GZT4, GZM4, GZ4, GS4;
spring terminals sockets - GZMB4;
sockets for PCB - SU4D;
solder terminals sockets - SU4L, G4 **(pages 402-404)**

signalling / protecting modules type M... for sockets:
GZT2, GZM2, GZMB2, GZT3, GZM3, GZT4, GZM4, GZMB4

RY2

Industrial relays - electromagnetic

page 159

Contacts: 2 CO

Rated load: **AC1 - 12 A / 250 V AC; DC1 - 12 A / 30 V DC**

Coils: DC - 5 ... 220 V; AC - 6 ... 240 V

Additional features: option - light indicator - LED diode (L),
surge suppression element - diode (D)

Mounting: for plug-in sockets, for flat insert connectors - faston 187 (4,8 x 0,5 mm)
- direct on panel (cover with mounting flange)

Accessories: screw terminals sockets - GZY2G **(page 405)**

R2M

Industrial relays - electromagnetic

page 163

Contacts: 2 CO

Rated load: **AC1 - 5 A / 250 V AC; DC1 - 5 A / 24 V DC**

Coils: DC - 6 ... 110 V; AC - 6 ... 240 V

Mounting: for plug-in sockets, for PCB

Accessories: screw terminals sockets - GZ2; sockets for PCB - S2M;
solder terminals sockets - G2M **(page 405)**

R15 - contacts 2 CO

Industrial relays - electromagnetic

page 167

Contacts: 2 CO, 3 CO, 4 CO

Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**

Coils: DC - 6 ... 220 V; AC - 6 ... 240 V; DC - 0,1 ... 2,5 A; AC - 0,1 ... 4,5 A

Additional features:
R15 - 2 CO, 3 CO standard - mechanical indicator (W), lockable front test button (T)
R15 - 2 CO, 3 CO option - light indicator - LED diode (L),
surge suppression element - diode (D), varistor (V)
R15 - 4 CO option - test button without block functions (K),
light indicator - LED diode (L), surge suppression element - diode (D)

Mounting: for plug-in sockets

Accessories:
R15 - 2 CO - screw terminals sockets, for mounting: on 35 mm rail mount or on panel - PZ8, GZP8; on 35 mm rail mount - GZU8; on panel - GZ8; solder terminals sockets - GOP8 **(pages 406-407)**

R15 - 3 CO - screw terminals sockets, for mounting: on 35 mm rail mount or on panel - PS11, PZ11, GZP11; on 35 mm rail mount - GZU11; on panel - GZ11; solder terminals sockets - GOP11 **(pages 407-408)**

R15 - 4 CO - screw terminals sockets, for mounting: on 35 mm rail mount - GZ14U; on panel - GZ14; on panel, behind: GZ14Z; solder terminals sockets - GOP14 **(pages 408-409)**

R15 - contacts 3 CO

page 167

R15 - contacts 4 CO

page 172

RUC faston 4,8 x 0,5

Industrial relays - electromagnetic

page 176

Contacts: 2 CO, 3 CO, 2 NO, 3 NO
(available special versions 2 NO, 3 NO with contact gap ≥ 3 mm)

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 6 ... 220 V (standard), 12 ... 220 V (reinforced); AC - 6 … 400 V

Additional features: option - test button without block functions (K),
light indicator - LED diode (L)

Mounting:
RUC faston 4,8 x 0,5 - for plug-in sockets, direct on panel (cover with mounting flange), direct on 35 mm rail mount (cover with adaptors: vertical V, horizontal H)
RUC faston 6,3 x 0,8 - direct on panel (cover with mounting flange), direct on 35 mm rail mount (cover with adaptors: vertical V, horizontal H)
RUC - for PCB

Accessories: screw terminals sockets - GUC11, GUC11S **(page 410)**

RUC faston 6,3 x 0,8

page 176

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RUC-M
faston 4,8 x 0,5

Industrial relays - electromagnetic; with permanent magnet whose magnetic field blows the electric arc between the contacts; **for high DC loads**

page 182

Contacts: 1 NO (double-break), 2 NO

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 12 A** (1 NO); **4,5 A** (2 NO) **/ 220 V DC**

Coils: DC - 12 ... 220 V (reinforced); AC - 12 ... 240 V

Additional features: option - light indicator - LED diode (L)

Mounting: for plug-in sockets, direct on panel (cover with mounting flange), direct on 35 mm rail mount (cover with adaptors: vertical V, horizontal H), for PCB

Accessories: screw terminals sockets - GUC11, GUC11S **(page 410)**

RG25

Industrial relays - electromagnetic

page 187

Contacts: 2 NO

Rated load: **AC1 - 25 A / 400 V AC; DC1 - 25 A / 24 V DC**

Coils: DC - 12 ... 220 V; AC - 12 ... 400 V

Mounting: direct on 35 mm rail mount

R20

Industrial relays - electromagnetic

page 190

Contacts: 1 NO, 2 NO

Rated load:
1 NO - **AC1 - 30 A / 250 V AC**
2 NO - **AC1 - 25 A / 250 V AC**

Coils: DC - 12 ... 110 V; AC - 24 ... 230 V

Mounting: for flat insert connectors - faston 250 (6,3 x 0,8 mm)
- direct on panel (cover with mounting flange)

R30N

Industrial relays - electromagnetic

page 193

Contacts: 1 CO, 1 NO

Rated load:
1 CO (NO/NC) - **AC1 - 30 A / 20 A / 240 V AC; DC1 - 30 A / 20 A / 14 V DC**
1 NO - **AC1 - 30 A / 240 V AC; DC1 - 30 A / 14 V DC**

Coils: DC - 5 ... 110 V

Mounting: for PCB

R40N

Industrial relays - electromagnetic

page 196

Contacts: 1 CO, 1 NO

Rated load:
1 CO (NO/NC) - **AC1 - 40 A / 30 A / 240 V AC; DC1 - 40 A / 30 A / 30 V DC**
1 NO - **AC1 - 40 A / 240 V AC; DC1 - 40 A / 30 V DC**

Coils: DC - 5 ... 110 V; AC - 12 ... 220 V

Mounting: for PCB

RS35, RS50

Industrial relays - electromagnetic; to control power in photovoltaic systems which generate electric energy

page 199

Contacts: 2 NO

Rated load:
RS35 - **AC1 - 35 A / 250 V AC; DC1 - 35 A / 24 V DC**
RS50 - **AC1 - 48 A / 250 V AC; DC1 - 48 A / 24 V DC**

Coils: DC - 5 ... 110 V

Mounting: for PCB

PI84 - GZT80

Interface relays; with plug-in socket GZT80

page 203

Contacts: 2 CO

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: DC - 12 ... 110 V; AC - 12 ... 240 V

Set: electromagnetic relay RM84, plug-in socket GZT80, module type M..., clip GZT80-0040, description plate GZT80-0035

Mounting: direct on 35 mm rail mount or on panel

Accessories: interconnection strip ZGGZ80

PI84 - GZM80

Interface relays; with plug-in socket GZM80

page 207

Contacts: 2 CO

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: DC - 12 ... 110 V; AC - 12 ... 240 V

Set: electromagnetic relay RM84, plug-in socket GZM80, module type M..., clip GZT80-0040, description plate GZT80-0035

Mounting: direct on 35 mm rail mount or on panel

Accessories: interconnection strip ZGGZ80

PI84 - GZMB80

Interface relays; with plug-in socket GZMB80; spring terminals

page 211

Contacts: 2 CO

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: DC - 12 ... 110 V; AC - 12 ... 230 V

Set: electromagnetic relay RM84, plug-in socket GZMB80, module type M..., clip GZMB80-0040, description plate TR

Mounting: direct on 35 mm rail mount

PI85 - GZT80

Interface relays; with plug-in socket GZT80

page 215

Contacts: 1 CO

Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**

Coils: DC - 12 ... 110 V; AC - 12 ... 240 V

Set: electromagnetic relay RM85, plug-in socket GZT80, module type M..., clip GZT80-0040, description plate GZT80-0035

Mounting: direct on 35 mm rail mount or on panel

Accessories: interconnection strip ZGGZ80

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PI85 - GZM80	Interface relays; with plug-in socket GZM80
page 219	Contacts: 1 CO Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC** Coils: DC - 12 ... 110 V; AC - 12 ... 240 V Set: electromagnetic relay RM85, plug-in socket GZM80, module type M..., clip GZT80-0040, description plate GZT80-0035 Mounting: direct on 35 mm rail mount or on panel Accessories: interconnection strip ZGGZ80
PI85 - GZMB80	Interface relays; with plug-in socket GZMB80; spring terminals
page 223	Contacts: 1 CO Rated load: **AC1 - 10 A, 16 A / 250 V AC; DC1 - 16 A / 24 V DC** Coils: DC - 12 ... 110 V; AC - 12 ... 230 V Set: electromagnetic relay RM85, plug-in socket GZMB80, module type M..., clip GZMB80-0040, description plate TR Mounting: direct on 35 mm rail mount
PI85 inrush - GZT80	Interface relays; with plug-in socket GZT80
page 227	Contacts: 1 NO Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC** Coils: DC - 12 ... 110 V Set: electromagnetic relay RM85 inrush, plug-in socket GZT80, module type M..., clip GZT80-0040, description plate GZT80-0035 Mounting: direct on 35 mm rail mount or on panel Accessories: interconnection strip ZGGZ80
PIR2 - GZM2	Interface relays; with plug-in socket GZM2
page 231	Contacts: 2 CO Rated load: **AC1 - 12 A / 250 V AC; DC1 - 12 A / 24 V DC** Coils: DC - 12 ... 110 V; AC - 12 ... 230 V Set: electromagnetic relay R2N, plug-in socket GZM2, module type M..., clip GZT4-0040, description plate GZT4-0035 Mounting: direct on 35 mm rail mount or on panel Accessories: interconnection strip ZGGZ4
PIR3 - GZM3	Interface relays; with plug-in socket GZM3
page 235	Contacts: 3 CO Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC** Coils: DC - 12 ... 110 V; AC - 12 ... 230 V Set: electromagnetic relay R3N, plug-in socket GZM3, module type M..., clip GZT4-0040, description plate GZT4-0035 Mounting: direct on 35 mm rail mount or on panel Accessories: interconnection strip ZGGZ4

PIR4 - GZM4	Interface relays; with plug-in socket GZM4
page 239	Contacts: 4 CO Rated load: **AC1 - 6 A / 250 V AC; DC1 - 6 A / 24 V DC** Coils: DC - 12 ... 110 V; AC - 12 ... 230 V Set: electromagnetic relay R4N, plug-in socket GZM4, module type M..., clip GZT4-0040, description plate GZT4-0035 Mounting: direct on 35 mm rail mount or on panel Accessories: interconnection strip ZGGZ4
PI6-1P	Interface relays
page 243	Output circuit - contacts: 1 CO ($AgSnO_2$) Rated load: **AC1 - 6 A / 250 V AC; DC1 - 6 A / 30 V DC** Input circuit: DC - 12 ... 36 V; AC/DC - 24 ... 230 V Indicator: LED diode Mounting: direct on 35 mm rail mount Accessories: interconnection strip ZG20
PI6-1T	Interface relays
page 246	Output circuit - triac: 1 NO Rated load: **AC1 - 1,2 A / 400 V AC** Input circuit: DC - 5..32 V; AC/DC - 24 ... 230 V Indicator: LED diode Mounting: direct on 35 mm rail mount Accessories: interconnection strip ZG20
PIR6W-1P	Interface relays; with socket PI6W-1P -...
page 248	Output circuit - contacts: 1 CO (RM699BV - $AgSnO_2$) Rated load: **AC1 - 6 A / 250 V AC; DC1 - 6 A / 30 V DC** Input circuit: AC - 230 V; DC - 12 ... 36 V; AC/DC - 24 ... 230 V Indicator: LED diode Mounting: direct on 35 mm rail mount Accessories: interconnection strip ZG20
PIR6W-1PS	Interface relays; with universal socket PI6W-1PS -...
page 252	Output circuit - contacts: 1 CO (RM699BV - $AgSnO_2$); triac, transistor: 1 NO (RSR30) Rated load: 1 CO - **AC1 - 6 A / 250 V AC; DC1 - 6 A / 30 V DC** 1 NO (triac) - **AC1 - 1 A / 240 V AC;** 1 NO (transistor) - **DC1 - 1 A / 48 V DC, 2 A / 24 V DC** Input circuit: AC - 230 V; DC - 6 ... 60 V; AC/DC - 24 ... 230 V Indicator: LED diode Mounting: direct on 35 mm rail mount Accessories: interconnection strip ZG20

PIR6WB-1PS

Interface relays; with universal socket PI6WB-1PS -…; spring terminals

CAGE CLAMP®

page 256

Output circuit - contacts: 1 CO (RM699BV - $AgSnO_2$); triac, transistor: 1 NO (RSR30)

Rated load:
1 CO - **AC1 - 6 A / 250 V AC; DC1 - 6 A / 30 V DC**
1 NO (triac) - **AC1 - 1 A / 240 V AC;** 1 NO (transistor) - **DC1 - 1 A / 48 V DC, 2 A / 24 V DC**

Input circuit: AC - 230 V; DC - 6 ... 60 V; AC/DC - 24 ... 230 V

Indicator: LED diode

Mounting: direct on 35 mm rail mount

Accessories: interconnection strip ZG20

MT-PI

Installation relays; modular cover

page 261

Contacts: 1 CO, 2 CO, 1 NO, 2 NO

Rated load:
1 CO, 1 NO - **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC**
2 CO, 2 NO - **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Coils: 1 CO, 2 CO - DC - 12 ... 48 V; AC - 115 ... 230 V
1 NO, 2 NO - AC - 230 V; AC/DC - 12 ... 115 V

Indicator: LED diode

Mounting: direct on 35 mm rail mount

NEED-…-08-4…

Programmable relays

page 265

Outputs: 4 NO, relay or transistor

Rated load: contacts - **AC1 - 10 A / 250 V AC;** transistor - **DC1 - 0,5 A / 24 V DC**

Inputs: 6 digital + 2 analog-digital

Supply: DC - 12 V, 24 V, 220 V; AC - 230 V

Indicator: LCD display, LED diode

Mounting: direct on 35 mm rail mount or on panel

Accessories: cable NEED-PC-15B (or 15C), memory card NEED-M-4KB, software PC NEED (language LAD and STL)

NEED-…-16-8…

Programmable relays

page 269

Outputs: 8 NO, relay or transistor

Rated load: contacts - **AC1 - 10 A / 250 V AC;** transistor - **DC1 - 0,5 A / 24 V DC**

Inputs: 13 digital + 3 analog-digital

Supply: DC - 12 V, 24 V, 220 V; AC - 230 V

Indicator: LCD display, LED diode

Mounting: direct on 35 mm rail mount or on panel

Accessories: cable NEED-PC-15B (or 15C), memory card NEED-M-4KB, software PC NEED (language LAD and STL)

NEED-MODBUS

Communication modules NEED Master / ModBus RTU Slave

page 275

Input circuit: DC - 7…35 V; AC - 7....26 V

Mounting: direct on 35 mm rail mount

Appropriation: cooperation with NEED-... relays (reading and availability of the data, transmission of control commands, RTC clock setting)

MT-W...M

Time relays; modular cover; programming with two buttons only

page 277

Multifunctions - 25 time functions (Es, E, E(S), E(r), R, Wu, Wu(S), Wu(r), Ws, Wa, B, Wi, ER, EWs, EWa, EWu, WsWa, EWf, Wt, Pi, Pi(S), Pp, Pp(S), Est, Esp) + functions ON, OFF
Independent settings of T1, T2, T3 intervals (0,1 s ... 99 h 59 min. 59,9 s)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V; external control contact
Indicator: two digit LED display, LED diode
Mounting: direct on 35 mm rail mount

MT-TUA

Time relays; modular cover

page 284

Multifunctions - 7 time functions (E, Wu, Bp, T, R, Ws, Wa) + function ON / OFF
8 time ranges - settings of T interval (0,1 s ... 10 d)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V; external control contact
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TUB

Time relays; modular cover

page 287

Multifunctions - 7 time functions (B, Ra, Esf, Wi, Wst, Est, Esp) + function ON / OFF
8 time ranges - settings of T interval (0,1 s ... 10 d)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V; external control contact
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TE

Time relays; modular cover

page 290

Single-functions (E) + function ON / OFF
8 time ranges - settings of T interval (0,1 s ... 10 d)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TWU

Time relays; modular cover

page 293

Single-functions (Wu) + function ON / OFF
8 time ranges - settings of T interval (0,1 s ... 10 d)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TBP

Time relays; modular cover

page 296

Single-functions (Bp) + function ON / OFF
8 time ranges - settings of T interval (0,1 s ... 10 d)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TER

Time relays; modular cover

page 299

Single-functions (ER)
7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V; external control contact
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TEA

Time relays; modular cover

page 302

Single-functions (EWa)
7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V; external control contact
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TES

Time relays; modular cover

page 305

Single-functions (EWs)
7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V; external control contact
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TEU

Time relays; modular cover

page 308

Single-functions (EWu + NWu)
7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h)
Output circuit - contacts: 1 CO
Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**
Input circuit: AC/DC - 12...240 V; external control contact
Indicator: LED diode
Mounting: direct on 35 mm rail mount

MT-TIP	Time relays; modular cover
page 311	Single-functions (Ii + Ip) 7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h) Output circuit - contacts: 1 CO Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC** Input circuit: AC/DC - 12...240 V; external control contact Indicator: LED diode Mounting: direct on 35 mm rail mount
MT-TSA	Time relays; modular cover
page 314	Single-functions (WsWa) 7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h) Output circuit - contacts: 1 CO Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC** Input circuit: AC/DC - 12...240 V; external control contact Indicator: LED diode Mounting: direct on 35 mm rail mount
MT-TWT	Time relays; modular cover
page 317	Single-functions (Wt) 7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h) Output circuit - contacts: 1 CO Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC** Input circuit: AC/DC - 12...240 V; external control contact Indicator: LED diode Mounting: direct on 35 mm rail mount
MT-TSD	Time relays; modular cover
page 320	Star-Delta start-up 7 time ranges - settings of T1 interval: 0,05 s ... 1 h; T2 interval: 0,05 s ... 1 s Output circuit - contacts: 2 x 1 CO Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC** Input circuit: AC/DC - 12...240 V Indicator: LED diode Mounting: direct on 35 mm rail mount
TR-EM1P-UNI	Time relays; modular cover
page 323	Multifunctions - 7 time functions (E, Wu, Bp, R, Ws, Wa, Es) 7 time ranges - settings of T interval (0,1 s ... 100 h) Output circuit - contacts: 1 CO Rated load: **AC1 - 8 A / 250 V AC** Input circuit: AC/DC - 12...240 V; external control contact Indicator: LED diode Mounting: direct on 35 mm rail mount

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TR-EM2P-UNI	Time relays; modular cover
page 326	Multifunctions - 7 time functions (E, Wu, Bp, R, Ws, Wa, Es) 7 time ranges - settings of T interval (0,1 s ... 100 h) Output circuit - contacts: 2 CO Rated load: **AC1 - 8 A / 250 V AC** Input circuit: AC/DC - 12...240 V; external control contact Indicator: LED diode Mounting: direct on 35 mm rail mount
TR-EI1P-UNI	Time relays; modular cover
page 329	Single-functions - 2 settings (time functions: Ii, Ip) 7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h) Output circuit - contacts: 1 CO Rated load: **AC1 - 8 A / 250 V AC** Input circuit: AC/DC - 12...240 V Indicator: LED diode Mounting: direct on 35 mm rail mount
TR-EI2P-UNI	Time relays; modular cover
page 332	Multifunctions - 7 time functions (ER, EWs, EWu, Ip, Ii, WsWa, Wt) 7 time ranges - independent settings of T1 and T2 intervals (0,1 s ... 100 h) Output circuit - contacts: 2 CO Rated load: **AC1 - 8 A / 250 V AC** Input circuit: AC/DC - 12...240 V; external control contact Indicator: LED diode Mounting: direct on 35 mm rail mount
TR-ES2P-UNI	Time relays; modular cover
page 335	Star-Delta start-up; 4 time ranges - settings of T1 interval: 0,5 s ... 3 min.; T2 interval: 40 ms, 60 ms, 80 ms, 100 ms Output circuit - contacts: 2 x 1 CO Rated load: **AC1 - 8 A / 250 V AC** Input circuit: AC/DC - 12...240 V Indicator: LED diode Mounting: direct on 35 mm rail mount
TR4N - 1 CO	Time relays; compact cover
page 337	Multifunctions - 10 time functions (E, Wu, Bp, Bi, PWM, R, Ws, Wa, Esa, B) + function ON / OFF; 8 time ranges - settings of T interval (0,1 s ... 10 d) Output circuit - contacts: 1 CO Rated load: **AC1 - 16 A / 250 V AC; DC1 - 16 A / 24 V DC** Input circuit: AC - 115 ... 230 V; AC/DC - 12 ... 24 V; external control contact Indicator: LED diode Mounting: direct on 35 mm rail mount

TR4N - 2 CO

Time relays; compact cover

page 337

Multifunctions - 10 time functions (E, Wu, Bp, Bi, PWM, R, Ws, Wa, Esa, B)
+ function ON / OFF; 8 time ranges - settings of T interval (0,1 s ... 10 d)

Output circuit - contacts: 2 CO

Rated load: **AC1 - 8 A / 250 V AC; DC1 - 8 A / 24 V DC**

Input circuit: AC - 115 ... 230 V; AC/DC - 12 ... 24 V; external control contact

Indicator: LED diode

Mounting: direct on 35 mm rail mount

TR4N - 4 CO

Time relays; compact cover

page 341

Multifunctions - 10 time functions (E, Wu, Bp, Bi, PWM, R, Ws, Wa, Esa, B)
+ function ON / OFF; 8 time ranges - settings of T interval (0,1 s ... 10 d)

Output circuit - contacts: 4 CO

Rated load: **AC1 - 6 A / 250 V AC; DC1 - 6 A / 24 V DC**

Input circuit: AC - 115 ... 230 V; AC/DC - 12 ... 24 V; external control contact

Indicator: LED diode

Mounting: direct on 35 mm rail mount

T-R4 - GZM4

Time relays; with plug-in socket GZM4 or GZT4 or GZMB4

page 345

Single-functions - 4 versions (time functions: E, Wu, Bp, Bi)
7 time ranges - settings of T interval (0,1 s ... 100 h)

Output circuit - contacts: 4 CO

Rated load: **AC1 - 6 A / 230 V AC**

Input circuit: DC - 12 ... 24 V; AC - 24 ... 230 V

Indicator: LED diode; Mounting: for plug-in sockets

Accessories: screw terminals sockets, for mounting on 35 mm rail mount or on panel - GZM4, GZT4; spring terminals sockets, for mounting on 35 mm rail mount - GZMB4 **(pages 402-403)**

PIR15...T

Time relays; with time module COM3

page 349

Multifunctions - 8 time functions (E, Wu, Bp, Bi, R, Ws, Wa, Es)
8 time ranges - settings of T interval (0,1 s ... 10 d)

Output circuit - contacts: 2 CO, 3 CO

Rated load: **AC1 - 10 A / 250 V AC; DC1 - 10 A / 24 V DC**

Input circuit: DC - 24 ... 220 V; AC - 24 ... 240 V; external control contact

Set: electromagnetic relay R15 - 3 CO (2 CO), plug-in socket GZP11 (GZP8), time module COM3, clip GZP-0054, description plate GZP-0035

Indicator: LED diode; Mounting: direct on 35 mm rail mount or on panel

COM3

Universal time modules

page 354

Multifunctions - 8 time functions (E, Wu, Bp, Bi, R, Ws, Wa, Es)
8 time ranges - settings of T interval (0,1 s ... 10 d)

Output circuit - contacts: according to relays R15 - 3 CO (2 CO)

Input circuit: AC/DC - 12...240 V; external control contact

Indicator: LED diode

Mounting: combinable to relay R15 - 3 CO (2 CO) with plug-in socket GZP11 (GZP8)

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MR-EU1W1P	Monitoring relays; modular cover
page 358	Multifunctions (DC and AC voltage monitoring in 1-phase network, with adjustable thresholds) - 2 functions (UNDER, WIN) Output circuit - contacts: 1 CO Rated load: **AC1 - 5 A / 250 V AC** Measuring circuits: AC - 230 V, 24 V; DC - 24 V Input circuit (supply) = Measuring circuits (monitoring voltages) Indicator: LED diode Mounting: direct on 35 mm rail mount
MR-EU31UW1P	Monitoring relays; modular cover
page 361	Multifunctions (AC voltage monitoring in 1-phase network and 3-phase - 3(N)~ 400/230 V, with adjustable thresholds) - 5 functions (UNDER, UNDER+SEQ, WIN, WIN+SEQ, SEQ) Output circuit - contacts: 1 CO Rated load: **AC1 - 5 A / 250 V AC** Measuring circuits: AC - 230 V, 3(N)~ 400/230 V Input circuit (supply) = Measuring circuits (monitoring voltages) Indicator: LED diode Mounting: direct on 35 mm rail mount
MR-EU3M1P	Monitoring relays; modular cover
page 364	Multifunctions (AC voltage monitoring in 3-phase network - 3(N)~ 400/230 V) - 2 functions (SEQ, ASYM) Output circuit - contacts: 1 CO Rated load: **AC1 - 5 A / 250 V AC** Measuring circuits: AC - 3(N)~ 400/230 V Input circuit (supply) = Measuring circuits (monitoring voltages) Indicator: LED diode Mounting: direct on 35 mm rail mount
MR-EI1W1P	Monitoring relays; modular cover
page 367	Multifunctions (AC current monitoring in 1-phase network, with adjustable thresholds and adjustable hysteresis) - 6 functions (OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH) Output circuit - contacts: 1 CO Rated load: **AC1 - 5 A / 250 V AC** Measuring circuit: AC - 230 V; Monitoring current: max. 10 A / 230 V AC Input circuit (supply) = Measuring circuit Indicator: LED diode; Mounting: direct on 35 mm rail mount
MR-ET1P	Monitoring relays; modular cover
page 370	Single-functions (motor temperature monitoring) Output circuit - contacts: 1 CO Rated load: **AC1 - 5 A / 250 V AC** Measuring circuit: accompanied by motor PTC sensors or thermal switch Input circuit (supply): AC - 230 V Indicator: LED diode Mounting: direct on 35 mm rail mount

MR-GU1M2P-TR2	Monitoring relays; industrial cover
page 373	Multifunctions (DC and AC voltage monitoring in 1-phase network, with adjustable thresholds) - 6 functions (OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH) Output circuit - contacts: 2 CO Rated load: **AC1 - 3 A, 5 A / 250 V AC** Measuring circuits: AC/DC - 30 V, 60 V, 300 V Input circuit: AC - 12 ... 400 V AC (supply via TR2 transformer) Indicator: LED diode; Mounting: direct on 35 mm rail mount
MR-GU32P-TR2	Monitoring relays; industrial cover
page 376	Multifunctions (AC voltages monitoring in phases - 230 V, 3-phase network 3(N)~ 400/230 V, with adjustable thresholds) - 6 functions (OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH) Output circuit - contacts: 2 CO Rated load: **AC1 - 3 A, 5 A / 250 V AC** Measuring circuit: AC - 230 V Input circuit: AC - 12 ... 400 V AC (supply via TR2 transformer) Indicator: LED diode; Mounting: direct on 35 mm rail mount
MR-GU3M2P-TR2	Monitoring relays; industrial cover
page 379	Multifunctions (AC voltage monitoring in 3-phase network, with adjustable thresholds) - 6 functions (UNDER, UNDER+SEQ, WIN, WIN+SEQ, SEQ, ASYM) Output circuit - contacts: 2 CO Rated load: **AC1 - 3 A, 5 A / 250 V AC** Measuring circuits: AC - 3(N)~ 400/230 V Input circuit: AC - 12 ... 400 V AC (supply via TR2 transformer) Indicator: LED diode Mounting: direct on 35 mm rail mount
MR-GU3M2P	Monitoring relays; industrial cover
page 382	Multifunctions (AC voltage monitoring in 3-phase network) - 2 functions (SEQ, ASYM) Output circuit - contacts: 2 CO Rated load: **AC1 - 3 A, 5 A / 250 V AC** Measuring circuits: AC - 3(N)~ 400/230 V Input circuit (supply) = Measuring circuits (monitoring voltage) Indicator: LED diode Mounting: direct on 35 mm rail mount
MR-GI1M2P-TR2	Monitoring relays; industrial cover
page 385	Multifunctions (DC and AC current monitoring in 1-phase network, with adjustable thresholds) - 6 functions (OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH) Output circuit - contacts: 2 CO Rated load: **AC1 - 3 A, 5 A / 250 V AC** Measuring circuits: AC/DC - 0,1 A, 1 A, 10 A Input circuit: AC - 12 ... 400 V AC (supply via TR2 transformer) Indicator: LED diode; Mounting: direct on 35 mm rail mount

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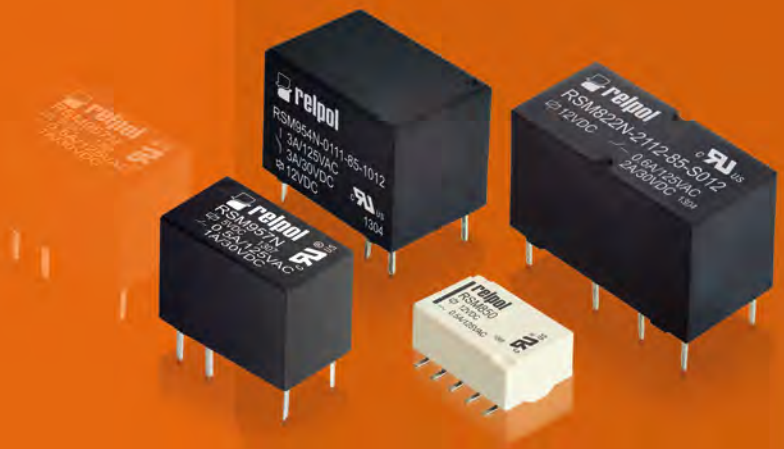
MR-GI3M2P-TR2	Monitoring relays; industrial cover
page 388	Multifunctions (AC current monitoring in 3-phase network, with adjustable thresholds) - 6 functions (OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH) Output circuit - contacts: 2 CO Rated load: **AC1 - 3 A, 5 A / 250 V AC** Measuring circuit: AC - 5 A Input circuit: AC - 12 ... 400 V AC (supply via TR2 transformer) Indicator: LED diode Mounting: direct on 35 mm rail mount
MR-GT2P-TR2	Monitoring relays; industrial cover
page 391	Single-functions (motor temperature monitoring) Output circuit - contacts: 2 CO Rated load: **AC1 - 3 A, 5 A / 250 V AC** Measuring circuit: accompanied by motor PTC sensors Input circuit: AC - 12 ... 400 V AC (supply via TR2 transformer) Indicator: LED diode Mounting: direct on 35 mm rail mount

Relays
subminiature signal



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Subminiature relays are applied in e.g. telecommunication devices, office equipment, alarm systems, measurement devices, medical monitoring devices, AV devices, control sensors.

Their major features which provide for their applications in electronic circuits as interface-control units are: miniature dimensions, high switching capacity, high resistance of the cover to difficult operating conditions, wide range of control voltages.

Space-saving of the electronic plates, low power consumption of the control circuits, a few applicable mounting technologies are only few of the advantages offered by the aforementioned features.

They meet the requirements of RoHS Directive.
The relays are recognized and certified by:

RSM850 46
RSM850B 49
RSM822N 51
RSM954N 54
RSM957N 56

version PCB ❷

version SMT ❸

- Polarized, monostable relays
- DC coils of up to 24 V DC, low coil power 0,14 ... 0,20 W
- For PCB • Sealed, for wave soldering and cleaning
- Dielectric strength 1000 Vrms
- Applications: for telecommunication devices, office equipment, alarm systems, measuring instruments, medical monitoring devices, AV devices, control sensors
- Conforms to FCC Part 68 - 1500 V - lightning surge
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgPd/Au flash gold plating**
Rated / max. switching voltage	AC	125 V / 250 V
Min. switching voltage		10 mV ❶
Rated load	AC1	0,5 A / 125 V AC
	DC1	2 A / 30 V DC
Min. switching current		0,01 mA ❶
Rated current		2 A
Max. breaking capacity	AC1	62,5 VA
Contact resistance		≤ 50 mΩ

Coil data

Rated voltage	DC	3 ... 24 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,14 W 3 ... 12 V 0,20 W 24 V

Insulation according to PN-EN 60664-1

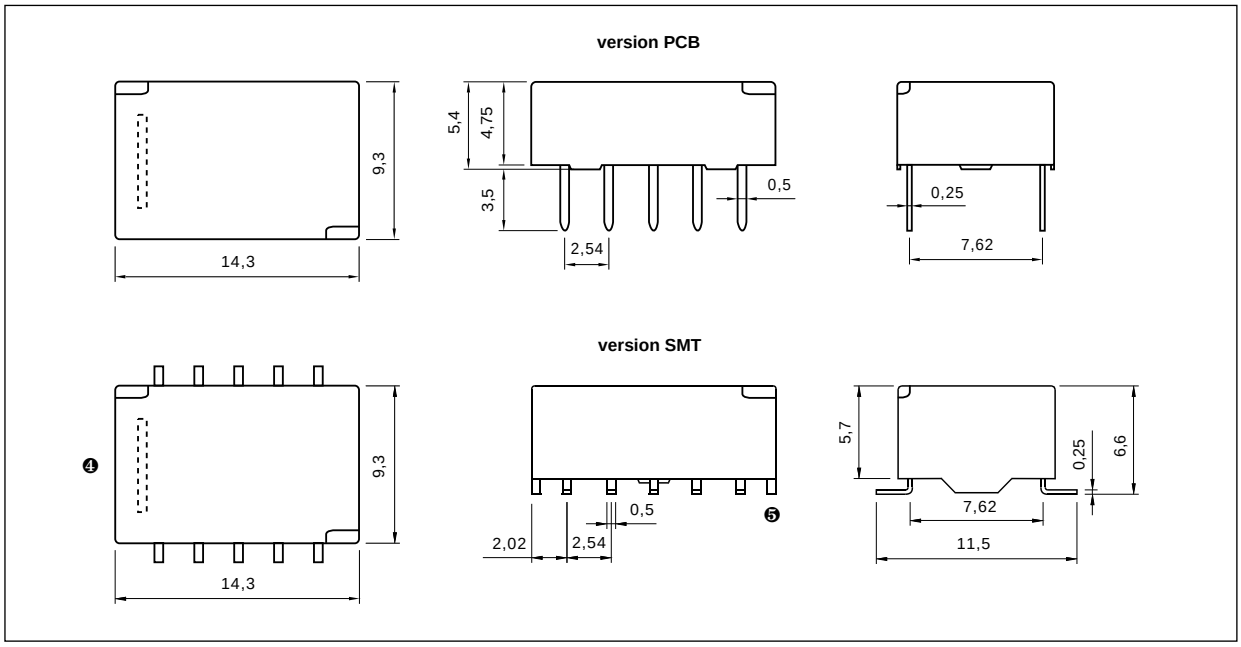
Insulation resistance		1 000 MΩ 500 V DC, 60 s
Dielectric strength		
• between coil and contacts		1 000 V AC type of insulation: basic
• contact clearance		1 000 V AC type of clearance: micro-disconnection
• pole - pole		1 000 V AC type of insulation: basic
Contact - coil distance		
• clearance		≥ 0,5 mm
• creepage		≥ 0,9 mm

General data

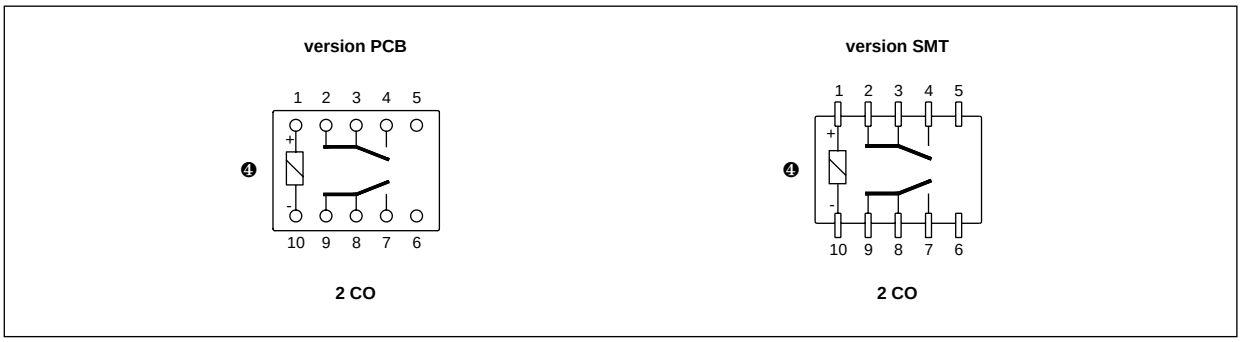
Operating / release time (typical values)		3 ms / 3 ms
Electrical life		
• resistive AC1	1 200 cycles/hour	10^5 0,5 A, 125 V AC
• resistive DC1	1 200 cycles/hour	2×10^5 1 A, 30 V DC
Mechanical life	10 800 cycles/hour	10^8
Dimensions (L x W x H)		PCB: 14,3 x 9,3 x 5,4 mm ❷ SMT: 14,3 x 9,3 x 6,6 mm ❸
Weight		1,5 g
Ambient temperature	• operating	PCB: -40...+70 °C SMT: -40...+85 °C
Cover protection category		IP 64 PN-EN 60529
Shock resistance		10 g
Vibration resistance		3 mm DA (constant amplitude) 10...55 Hz
Solder bath temperature		PCB: max. 235 °C SMT: max. 215 °C
Soldering time		max. 3 s

The data in bold type relate to the standard versions of the relays. ❶ Values refer to new relays, which have not been used for signals exceeding the maximum 10 mA and/or 6 V (DC or AC). After the current exceeds 10 mA and/or 6 V (DC or AC) relay can not be used for signals with the minimum values indicated in the technical data sheet. ❷ For version PCB: cover - black colour. ❸ For version SMT: cover - white colour.

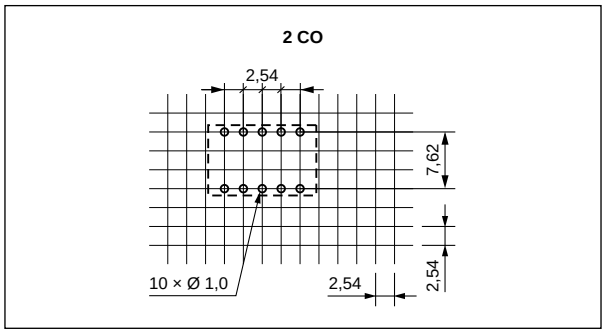
Dimensions



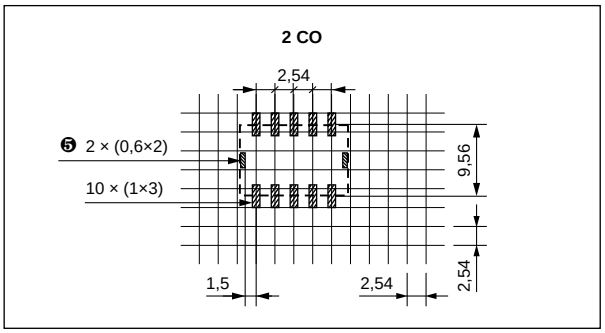
Connection diagrams (pin side view)



Pinout - version PCB (solder side view)



Soldering areas - version SMT (solder side view)



❹ Coil terminals position is indicated by the vertical strip on the relay cover. ❺ Temporary glue pad on PCB.

Mounting

Relays **RSM850** are designed for: • direct PCB mounting • surface mounting SMT.

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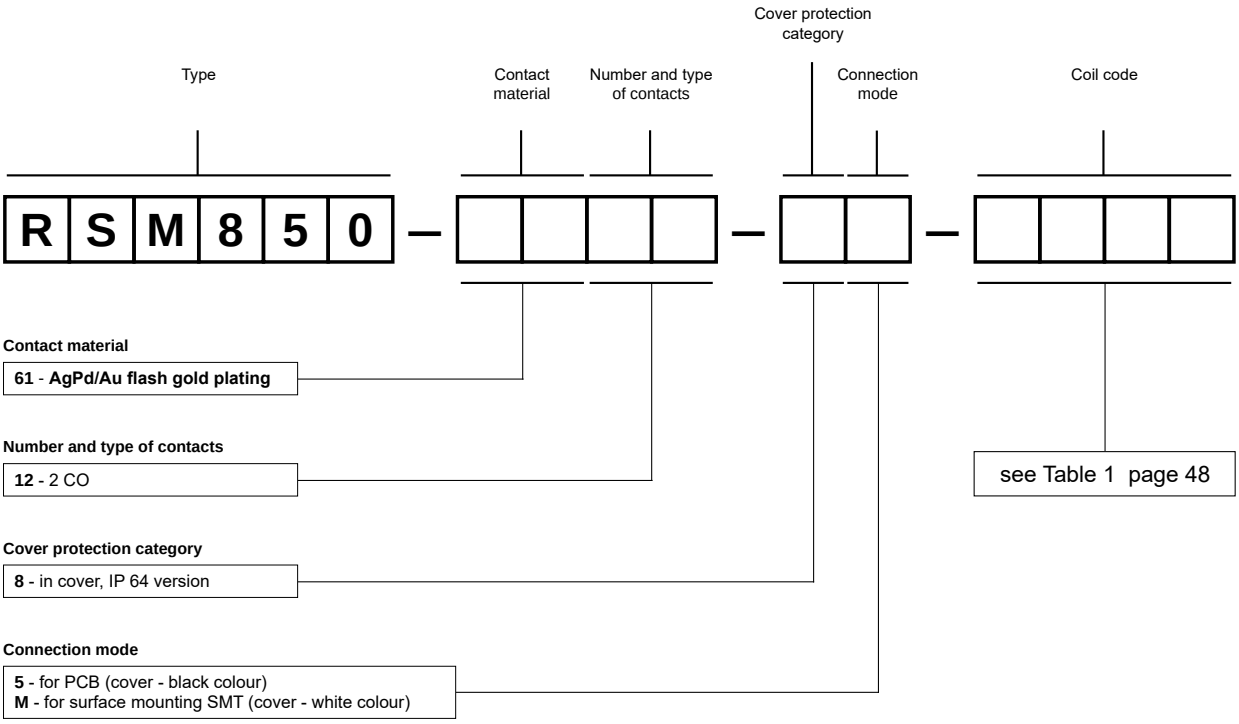
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	64,3	± 10%	2,25	7,5
1005	5	178	± 10%	3,75	12,5
1006	6	257	± 10%	4,50	15,0
1009	9	579	± 10%	6,75	22,5
1012	12	1 028	± 10%	9,00	30,0
1024	24	2 880	± 10%	18,00	48,0

Ordering codes



Examples of ordering codes:

RSM850-6112-85-1012 relay **RSM850**, for PCB, two changeover contacts, contact material AgPd/Au flash gold plating, coil voltage 12 V DC, in cover (black colour) IP 64

RSM850-6112-8M-1048 relay **RSM850**, for surface mounting SMT, two changeover contacts, contact material AgPd/Au flash gold plating, coil voltage 48 V DC, in cover (white colour) IP 64

BISTABLE
1-COIL

- Polarized, bistable relays with one coil
- DC coils of up to 24 V DC, low coil power 0,10 ... 0,15 W
- For PCB • Sealed, for wave soldering and cleaning
- Dielectric strength 1000 Vrms
- Applications: for telecommunication devices, office equipment, alarm systems, measuring instruments, medical monitoring devices, AV devices, control sensors
- Conforms to FCC Part 68 - 1500 V - lightning surge
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgPd/Au flash gold plating**
Rated / max. switching voltage	AC	125 V / 250 V
Min. switching voltage		10 mV ❶
Rated load	AC1	0,5 A / 125 V AC
	DC1	2 A / 30 V DC
Min. switching current		0,01 mA ❶
Rated current		2 A
Max. breaking capacity	AC1	62,5 VA
Contact resistance		≤ 50 mΩ

Coil data

Rated voltage	DC	3 ... 24 V
Must release voltage		-0,75 U_n ... -$U_{max.}$ ❷
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,10 W 3 ... 12 V 0,15 W 24 V

Insulation according to PN-EN 60664-1

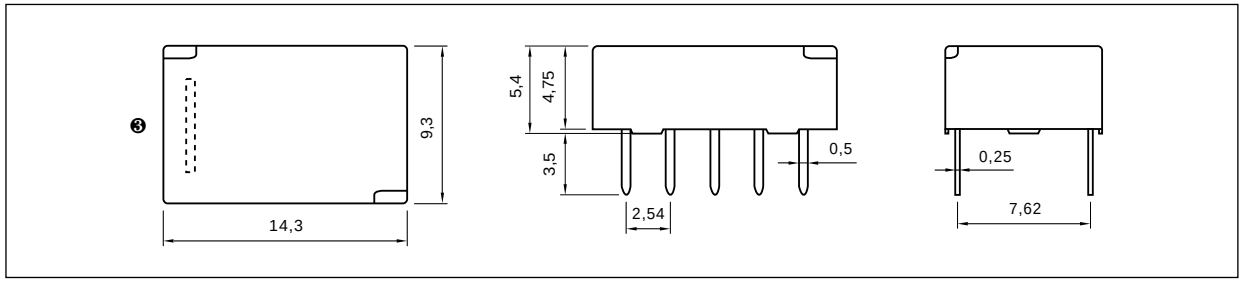
Insulation resistance		1 000 MΩ 500 V DC, 60 s
Dielectric strength		
• between coil and contacts		1 000 V AC type of insulation: basic
• contact clearance		1 000 V AC type of clearance: micro-disconnection
• pole - pole		1 000 V AC type of insulation: basic
Contact - coil distance		
• clearance		≥ 0,5 mm
• creepage		≥ 0,9 mm

General data

Operating / release time (typical values)		3 ms / 3 ms
Electrical life		
• resistive AC1	1 200 cycles/hour	10^5 0,5 A, 125 V AC
• resistive DC1	1 200 cycles/hour	2×10^5 1 A, 30 V DC
Mechanical life	10 800 cycles/hour	10^8
Dimensions (L x W x H)		14,3 x 9,3 x 5,4 mm
Weight		1,5 g
Ambient temperature	• operating	-40...+70 °C
Cover protection category		IP 64 PN-EN 60529
Shock resistance		10 g
Vibration resistance		3 mm DA (constant amplitude) 10...55 Hz
Solder bath temperature		max. 235 °C
Soldering time		max. 3 s

The data in bold type relate to the standard versions of the relays. ❶ Values refer to new relays, which have not been used for signals exceeding the maximum 10 mA and/or 6 V (DC or AC). After the current exceeds 10 mA and/or 6 V (DC or AC) relay can not be used for signals with the minimum values indicated in the technical data sheet. ❷ Must release voltage are the values of the operating supply voltage range of opposite polarization, specified in Table 1. ❸ Coil terminals position is indicated by the vertical strip on the relay cover.

Dimensions



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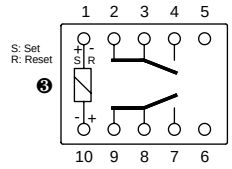
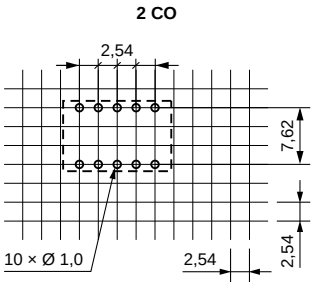
Connection diagram (pin side view)



❸ Coil terminals position is indicated by the vertical strip on the relay cover.

Pinout (solder side view)



Mounting

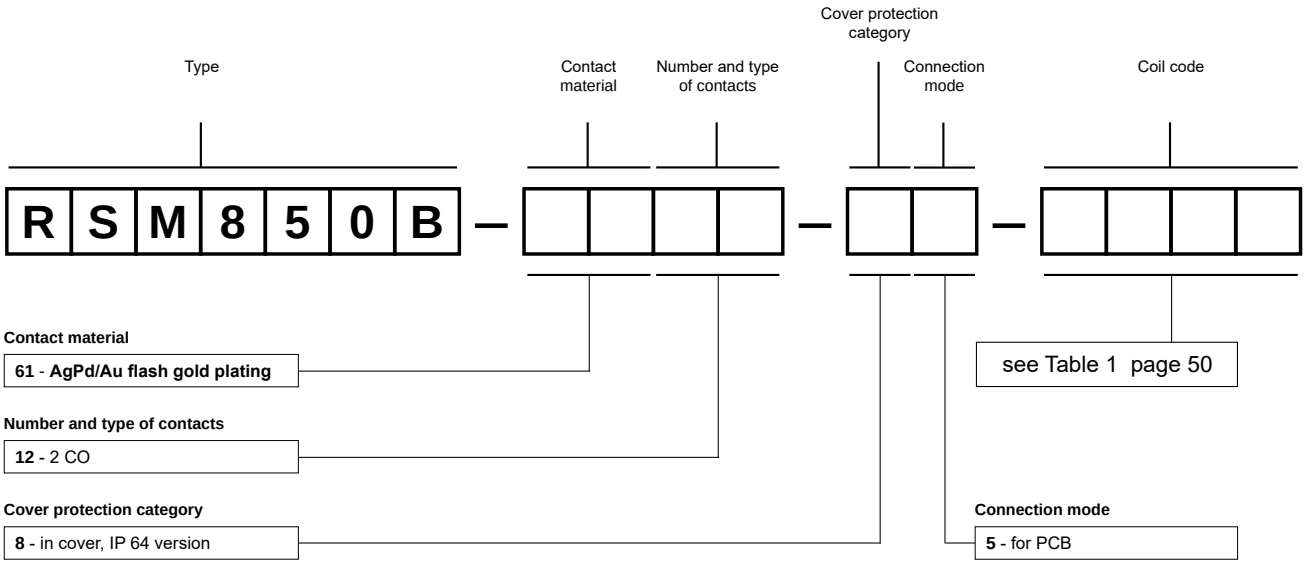
Relays **RSM850B** are designed for direct PCB mounting.

Coil data - DC voltage version

Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	90	± 10%	2,25	8,7
1005	5	250	± 10%	3,75	14,5
1006	6	360	± 10%	4,50	17,4
1009	9	810	± 10%	6,75	26,1
1012	12	1 440	± 10%	9,00	34,8
1024	24	3 840	± 10%	18,00	57,6

Ordering codes



Example of ordering code:

RSM850B-6112-85-1012 bistable relay **RSM850B** with one coil, for PCB, two changeover contacts, contact material AgPd/Au flash gold plating, coil voltage 12 V DC, in cover IP 64

- Subminiature monostable relays for switching low loads
- DC coils - standard and sensitive of up to 48 V DC, low coil power 0,20 W (sensitive version) or 0,30 W (standard version) • For PCB
- Sealed, for wave soldering and cleaning • Double bifurcated contact
- Applications: for telecommunication devices, office equipment, alarm systems, measuring instruments, medical monitoring devices, AV devices, control sensors
- Conforms to FCC Part 68 - 1500 V - lightning surge
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi/Au flash gold plating**
Rated / max. switching voltage	AC	125 V / 250 V
Min. switching voltage		10 mV ❶
Rated load	AC1	0,6 A / 125 V AC
	DC1	3 A / 2 A (NO/NC) / 30 V DC
Min. switching current		1 mA ❶
Rated current		0,6 A / 125 V AC 2 A / 30 V DC
Max. breaking capacity	AC1	125 VA
Contact resistance		≤ 100 mΩ

Coil data

Rated voltage	DC	3 ... 24 V sensitive version	48 V standard version
Must release voltage		DC: ≥ 0,1 U_n	
Operating range of supply voltage		see Tables 1, 2	
Rated power consumption	DC	0,20 W sensitive version	0,30 W standard version

Insulation according to PN-EN 60664-1

Insulation resistance	> 1 000 MΩ	500 V DC, 60 s
Dielectric strength		
• between coil and contacts	1 000 V AC	type of insulation: basic (1500 V AC; 1,2 / 50 µs)
• contact clearance	1 000 V AC	type of clearance: micro-disconnection (1500 V AC; 1,2 / 50 µs)
• pole - pole	1 000 V AC	type of insulation: basic (1500 V AC; 1,2 / 50 µs)
Contact - coil distance		
• clearance	≥ 1,3 mm	
• creepage	≥ 1,5 mm	

General data

Operating / release time (typical values)		4,5 ms / 1,5 ms	
Electrical life (number of cycles)			
• resistive AC1	1 800 cycles/hour	10^5	0,6 A, 125 V AC
• resistive DC1	1 800 cycles/hour	10^5	2 A, 30 V DC
Mechanical life	18 000 cycles/hour	10^8	
Dimensions (L x W x H)		20,5 x 10,2 x 12,5 mm	
Weight		4,5 g	
Ambient temperature	• operating	-30...+90 °C sensitive version	-30...+80 °C standard version
Cover protection category		IP 64	PN-EN 60529
Shock resistance		10 g	
Vibration resistance		1,5 mm DA (constant amplitude)	10...55 Hz
Solder bath temperature		max. 235 °C	
Soldering time		max. 3,5 s	

The data in bold type relate to the standard versions of the relays.
❶ Reference value, relays previously tested and used at the resistance load of more than 10 mA / 6 V DC or at the peak AC voltage are not recommended for later switching of low level signals.

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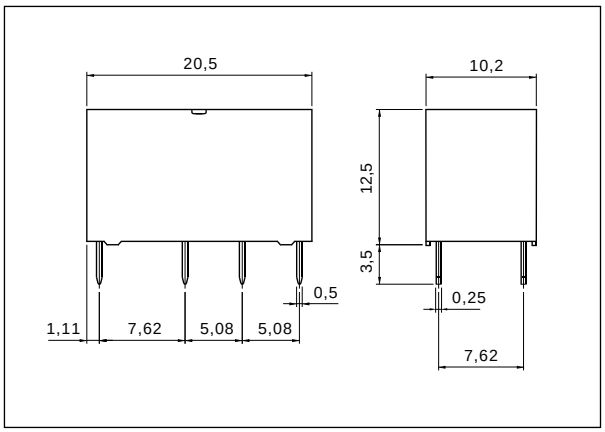
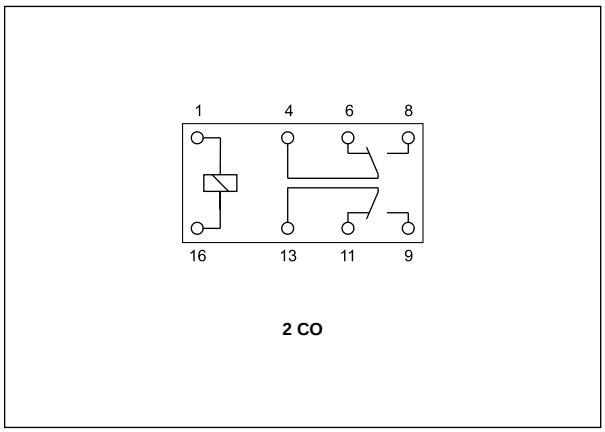
Dimensions

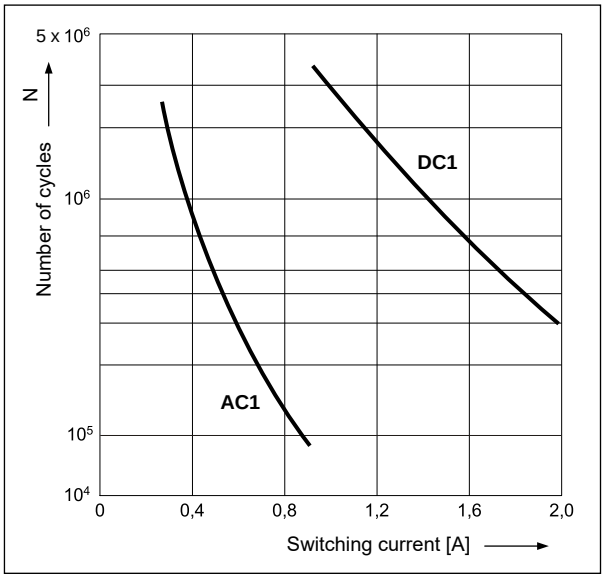


Connection diagram (pin side view)



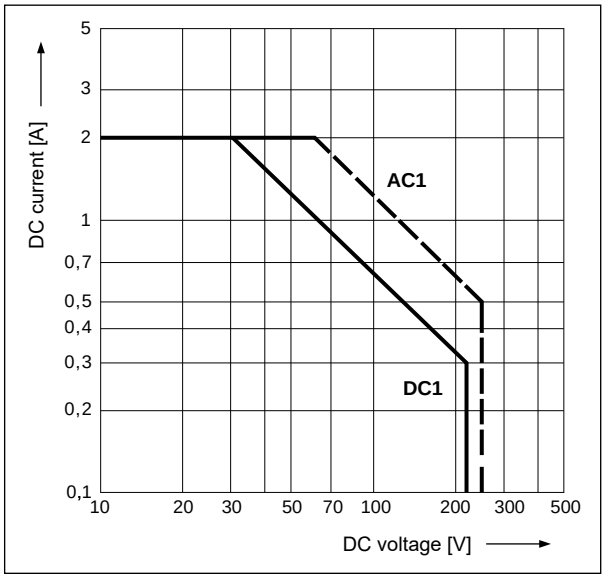
Electrical life at AC resistive current. Switching frequency: 1 800 cycles/hour

Fig. 1

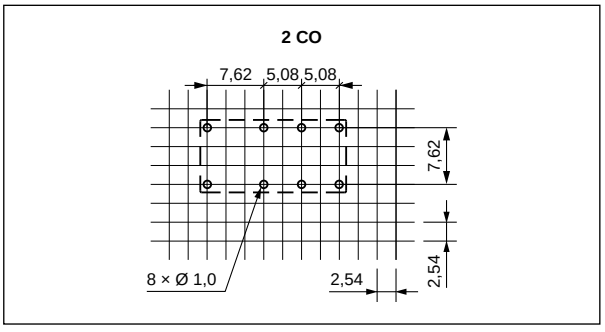


Max. DC resistive load breaking capacity

Fig. 2



Pinout (solder side view)



Mounting

Relays **RSM822N** are designed for direct PCB mounting.

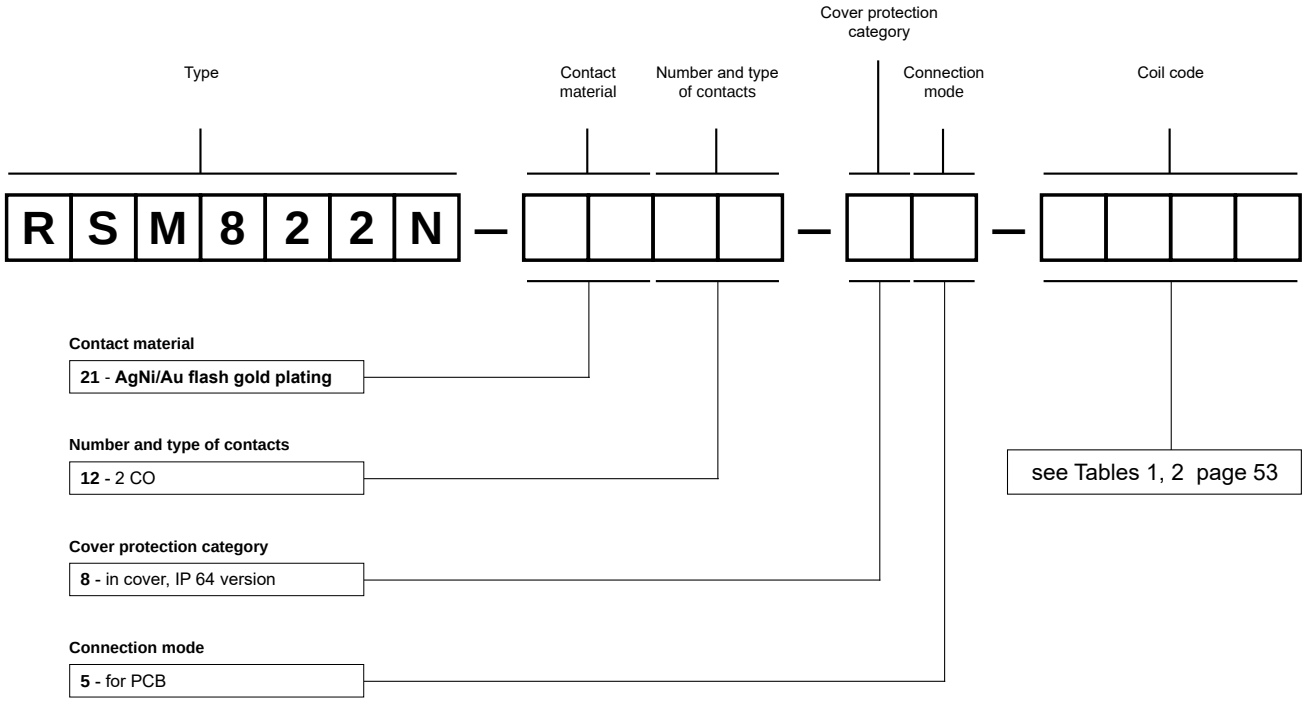
Coil data - DC voltage version, sensitive — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S003	3	45	± 10%	2,1	6,5
S005	5	125	± 10%	3,5	10,8
S006	6	180	± 10%	4,2	13,0
S009	9	405	± 10%	6,3	19,5
S012	12	720	± 10%	8,4	26,5
S024	24	2 880	± 10%	16,8	52,9

Coil data - DC voltage version, standard — Table 2

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1048	48	7 680	± 10%	33,6	84,9

Ordering codes



Examples of ordering codes:

RSM822N-2112-85-S005 relay **RSM822N**, for PCB, two changeover contacts, contact material AgNi/Au flash gold plating, sensitive coil voltage 5 V DC, in cover IP 64

RSM822N-2112-85-1048 relay **RSM822N**, for PCB, two changeover contacts, contact material AgNi/Au flash gold plating, standard coil voltage 48 V DC, in cover IP 64

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- Subminiature monostable relays
- DC coils of up to 24 V DC, low coil power 0,36 W
- For PCB
- Sealed, for wave soldering and cleaning
- Small dimensions, light weight
- Applications: for telecommunication devices, household electrical appliance, office equipment, etc.
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO
Contact material		**Ag/Au flash gold plating**
Rated / max. switching voltage	AC	125 V / 220 V
Min. switching voltage		6 V
Rated load	AC1	3 A / 125 V AC
	DC1	3 A / 30 V DC
Min. switching current		50 mA
Rated current		3 A
Max. breaking capacity	AC1	375 VA
Contact resistance		≤ 50 mΩ

Coil data

Rated voltage	DC	3 ... 24 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,36 W

Insulation according to PN-EN 60664-1

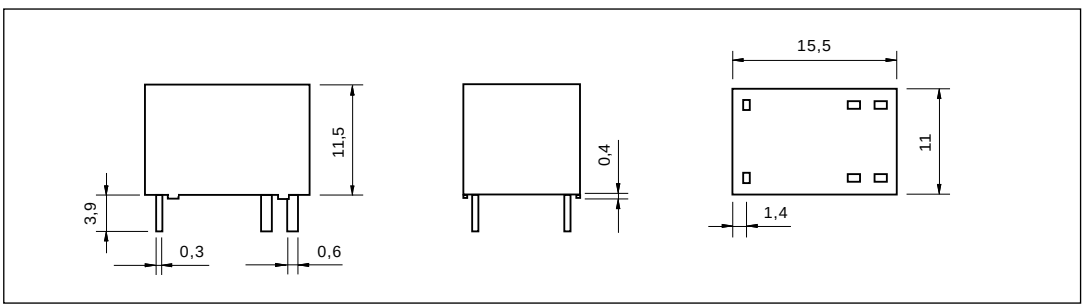
Insulation resistance	100 MΩ	500 V DC, 60 s
Dielectric strength		
• between coil and contacts	1 000 V AC	type of insulation: basic
• contact clearance	500 V AC	type of clearance: micro-disconnection
Contact - coil distance		
• clearance	≥ 1,2 mm	
• creepage	≥ 2 mm	

General data

Operating / release time (typical values)		5 ms / 5 ms	
Electrical life (number of cycles)			
• resistive AC1	1 800 cycles/hour	10^5	3 A, 125 V AC
• resistive DC1	1 800 cycles/hour	10^5	3 A, 30 V DC
Mechanical life	18 000 cycles/hour	10^7	
Dimensions (L x W x H)		15,5 x 11 x 11,5 mm	
Weight		3,5 g	
Ambient temperature	• operating	-25...+55 °C	
Cover protection category		IP 64	PN-EN 60529
Shock resistance		10 g	
Vibration resistance		1,5 mm DA (constant amplitude)	10...55 Hz
Solder bath temperature		max. 235 °C	
Soldering time		max. 3,5 s	

The data in bold type relate to the standard versions of the relays.

Dimensions



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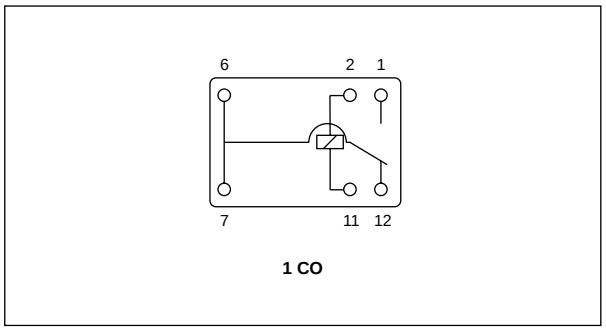
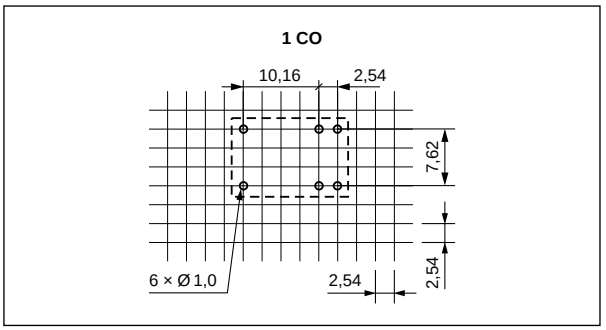
Connection diagram (pin side view)



Pinout (solder side view)



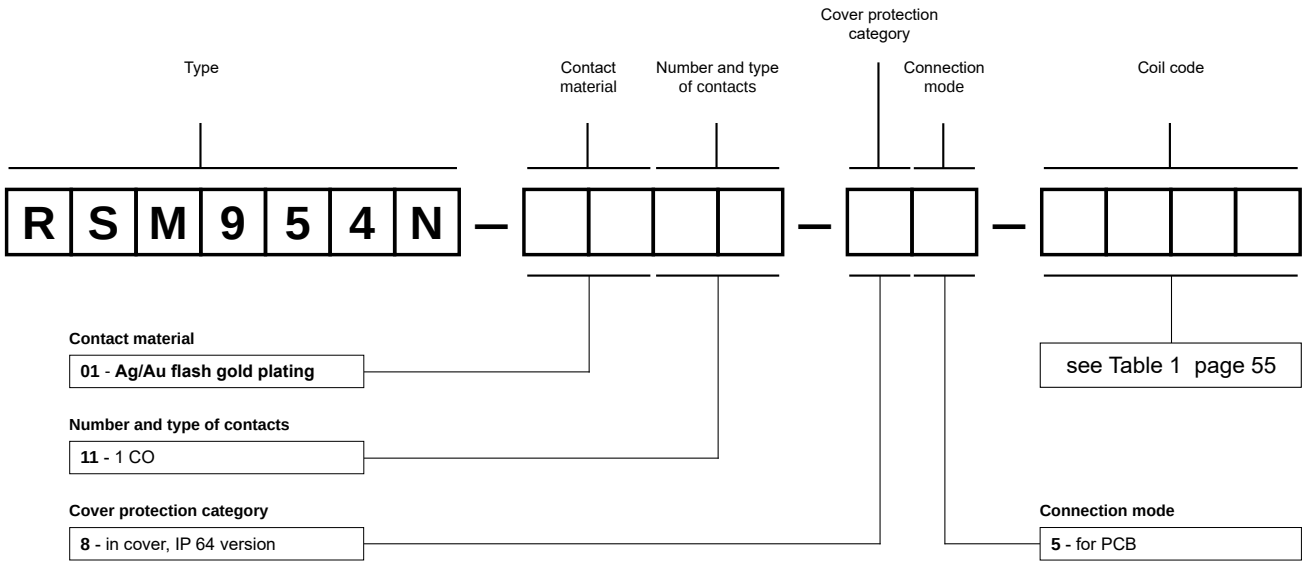
Mounting

Relays **RSM954N** are designed for direct PCB mounting.

Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	25	± 10%	2,25	3,3
1005	5	75	± 10%	3,75	5,5
1006	6	100	± 10%	4,50	6,6
1009	9	225	± 10%	6,75	9,9
1012	12	400	± 10%	9,00	13,2
1024	24	1 600	± 10%	18,00	26,5

Ordering codes



Example of ordering code:

RSM954N-0111-85-1005 relay **RSM954N**, for PCB, one changeover contact, contact material Ag/Au flash gold plating, coil voltage 5 V DC, in cover IP 64

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relpol ® S.A.

- Subminiature monostable relays
- DC coils - sensitive of up to 24 V DC, low coil power 0,15 W
- For PCB
- Sealed, for wave soldering and cleaning
- Small dimensions, light weight
- Applications: for telecommunication devices, household electrical appliance, office equipment, etc.
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO
Contact material		**Ag/Au flash gold plating**
Rated / max. switching voltage	AC	125 V / 220 V
Min. switching voltage		6 V
Rated load	AC1	0,5 A / 125 V AC
	DC1	1 A / 30 V DC
Min. switching current		50 mA
Rated current		1 A
Max. breaking capacity	AC1	62,5 VA
Contact resistance		≤ 100 mΩ

Coil data

Rated voltage	DC	3 ... 24 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,15 W

Insulation according to PN-EN 60664-1

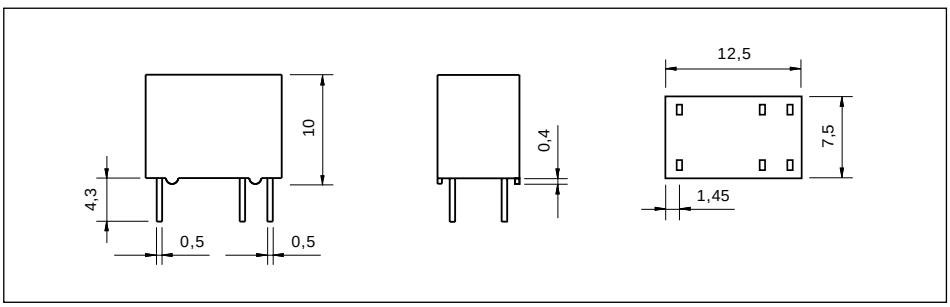
Insulation resistance	> 1 000 MΩ	500 V DC, 60 s
Dielectric strength		
• between coil and contacts	1 000 V AC	type of insulation: basic
• contact clearance	400 V AC	type of clearance: micro-disconnection
Contact - coil distance		
• clearance	≥ 0,6 mm	
• creepage	≥ 0,6 mm	

General data

Operating / release time (typical values)		5 ms / 5 ms	
Electrical life (number of cycles)			
• resistive AC1	1 800 cycles/hour	10^5	0,5 A, 125 V AC
• resistive DC1	1 800 cycles/hour	10^5	1 A, 30 V DC
Mechanical life	18 000 cycles/hour	5 x 10^6	
Dimensions (L x W x H)		12,5 x 7,5 x 10 mm	
Weight		2,2 g	
Ambient temperature	• operating	-30...+70 °C	
Cover protection category		IP 64	PN-EN 60529
Shock resistance		10 g	
Vibration resistance		3,3 mm DA (constant amplitude)	10...55 Hz
Solder bath temperature		max. 235 °C	
Soldering time		max. 3,5 s	

The data in bold type relate to the standard versions of the relays.

Dimensions



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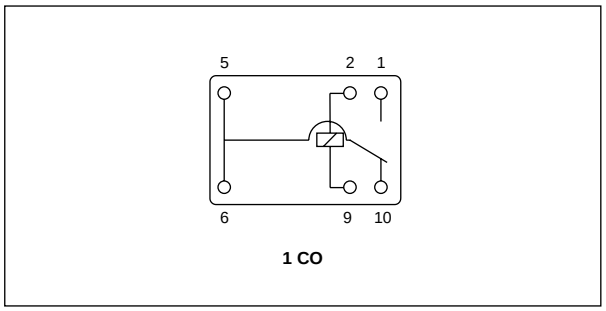
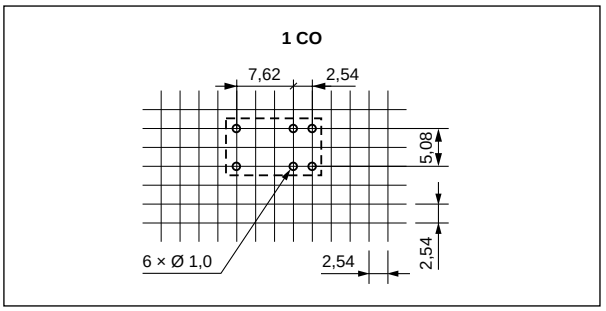
Connection diagram (pin side view)



Pinout (solder side view)



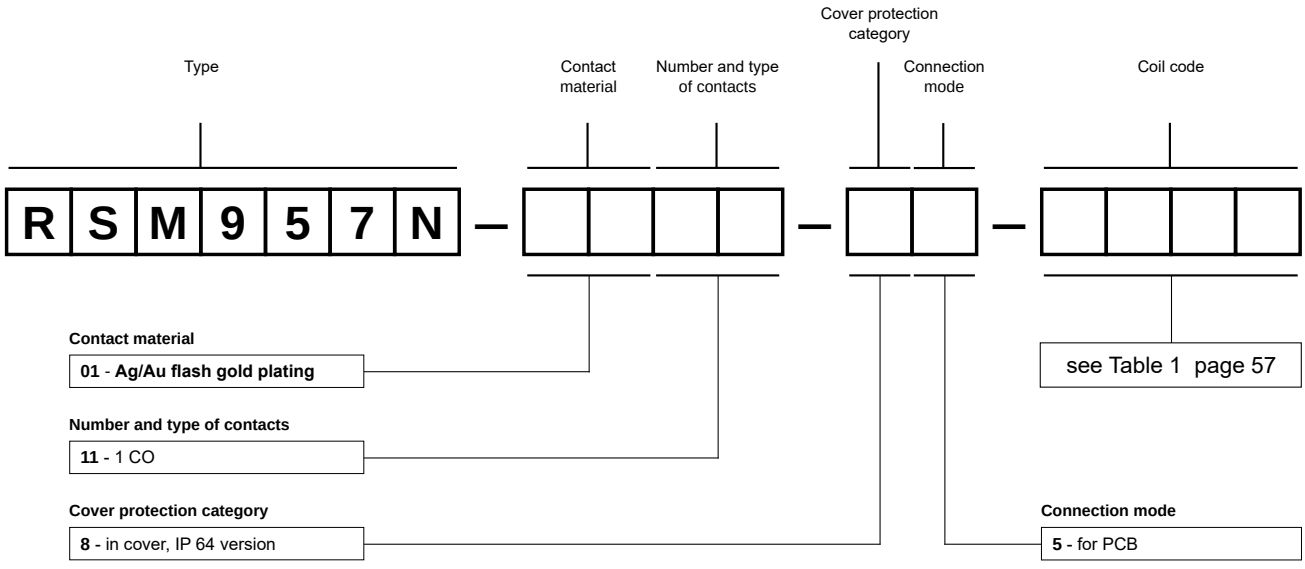
Mounting

Relays **RSM957N** are designed for direct PCB mounting.

Coil data - DC voltage version, sensitive — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S003	3	60	± 10%	2,4	6
S005	5	166,7	± 10%	4,0	10
S006	6	240	± 10%	4,8	12
S009	9	540	± 10%	7,2	18
S012	12	960	± 10%	9,6	24
S024	24	3 840	± 10%	19,2	48

Ordering codes



Example of ordering code:

RSM957N-0111-85-S005 relay **RSM957N**, for PCB, one changeover contact, contact material Ag/Au flash gold plating, sensitive coil voltage 5 V DC, in cover IP 64

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Relays
miniature

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Owing to their universality, miniature relays may be applied in alarm systems, as interface systems in industrial automation, power-electric systems, lighting control systems (e.g. in daylight-saving switches), staircase lighting control systems, emergency lighting control systems, time relays as their output terminals, control systems of household and catering industry equipment, and in numerous electric systems.
This type of relay is of high quality and reliability.

The basic features of the miniature relays are: wide range of coil voltages, AC and DC coils, rated contact switching currents up to 20 A (depending on the relay type), height from 10,5 to 26 mm (depending on the relay type), high electric strength of the insulation, possibility of mounting on PCB, SMT and in plug-in sockets. RM84 and RM85 relays are the basis for the interface relays of PI84 and PI85 types which are described in the section of ”Interface relays”.

They meet the requirements of RoHS Directive.
The relays are recognized and certified by:

RM12 59
RM12N 62
RM32N 65
RM45N 68
RM50N 71
RM51 74
RM699B 77
RM84 82
RM84 SMT 87
RM85 91
RM85
for switching higher voltages ... 96
RM85 inrush 99
RM85 105 °C sensitive .. 103
RM85 SMT 107
RM85 faston 111
RM87, RM87 sensitive .. 114
RM87N SMT 120
RM96 124
RM83 128
RMP84 132
RMP85 136
RA2 140

RM12 1 CO RM12 1 NO / 1 NC

NEW

- DC coils - of up to 60 V DC
- 5000 V / 8 mm reinforced insulation
- For PCB
- Terminals: 3,2 mm for version 1 CO,
  5,04 mm for version 1 NO and 1 NC
- Compliance with standards: PN-EN 61810-1, PN-EN 60730-1, PN-EN 60335-1, UL 508, CSA 22.2 No.14-95
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO, 1 NC
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$, $AgSnO_2$/Au hard gold plating
Rated / max. switching voltage	AC	250 V / 400 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating 10 V $AgSnO_2$, 5 V $AgSnO_2$/Au hard gold plating
Rated load	AC1 DC1	8 A / 250 V AC 8 A / 24 V DC
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating 10 mA $AgSnO_2$, 2 mA $AgSnO_2$/Au hard gold plating
Max. inrush current		10 A
Rated current		8 A
Max. breaking capacity	AC1	2000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating 1 W $AgSnO_2$, 0,05 W $AgSnO_2$/Au hard gold plating
Contact resistance		≤ 100 mΩ 100 mA, 24 V
Max. operating frequency • at rated load • no load	 AC1	 600 cycles/hour 18 000 cycles/hour

Coil data

Rated voltage	DC	5 ... 60 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Must operate voltage		≤ 0,7 U_n
Rated power consumption	DC	0,25 W

Insulation according to PN-EN 60664-1

Insulation rated voltage		400 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III IEC 61810-5
Insulation pollution degree		3
Flammability class		V-0 UL94
Insulation group (contact plate)		IIIa
Tracking resistance category		2 UL508
Dielectric strength	• between coil and contacts • contact clearance	5 000 V AC 1 min., type of insulation: reinforced 1 000 V AC 1 min., type of clearance: micro-disconnection
Contact - coil distance	• clearance • creepage	≥ 8 mm ≥ 8 mm

General data

Operating / release time (typical values)		10 ms / 5 ms
Electrical life (number of cycles)	• resistive AC1 • resistive DC1	> 4 x 10^4 1 NO, 8 A, 250 V AC, 70 °C > 2,5 x 10^4 1 CO, 8 A, 250 V AC, 85 °C > 10^4 1 NO, 10 A, 250 V AC, 85 °C > 10^5 8 A, 24 V DC
Mechanical life	18 000 cycles/hour	10^7
Load according to UL 508		10 A 277 V AC, general purpose 0,5 HP 240 V AC, single-phase motor B300 inductive load (Pilot Duty)
Dimensions (L x W x H)		28,5 x 10,1 x 12,5 mm
Weight		8 g
Ambient temperature	• storage • operating	-40...+85 °C -40...+85 °C
Cover protection category		IP 40 or **IP 67** PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance	(NO/NC)	10 g / 5 g

The data in bold type relate to the standard versions of the relays.

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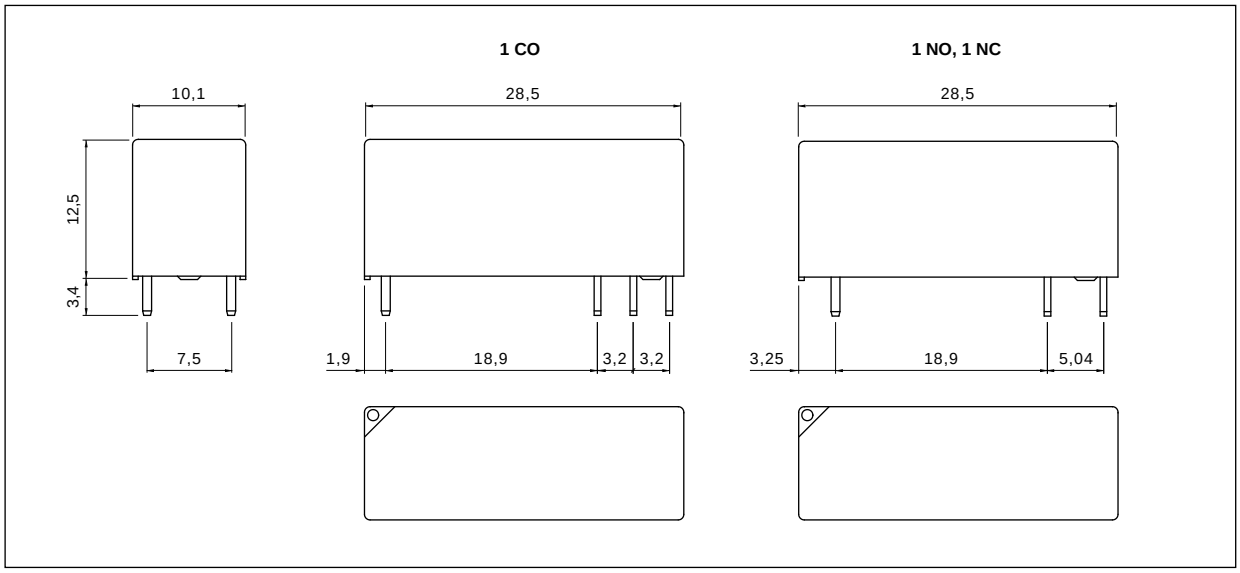
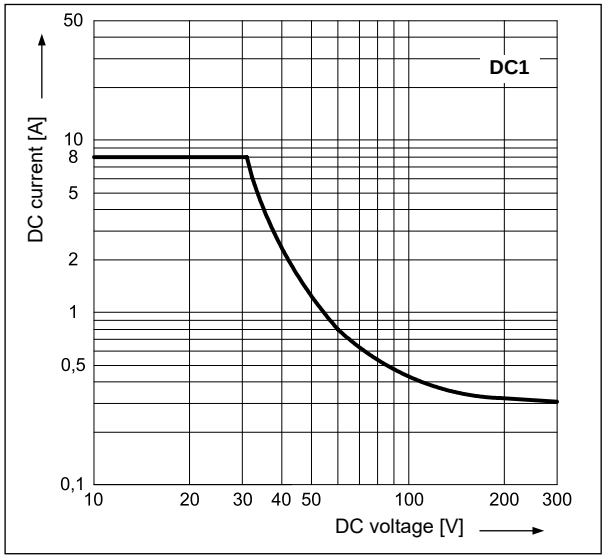
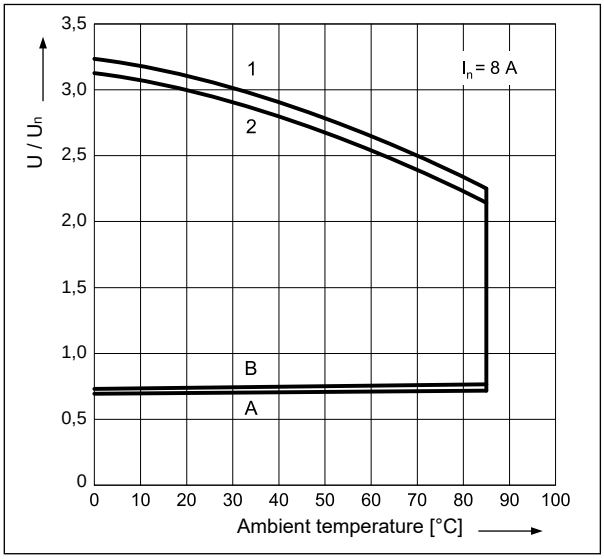
Dimensions



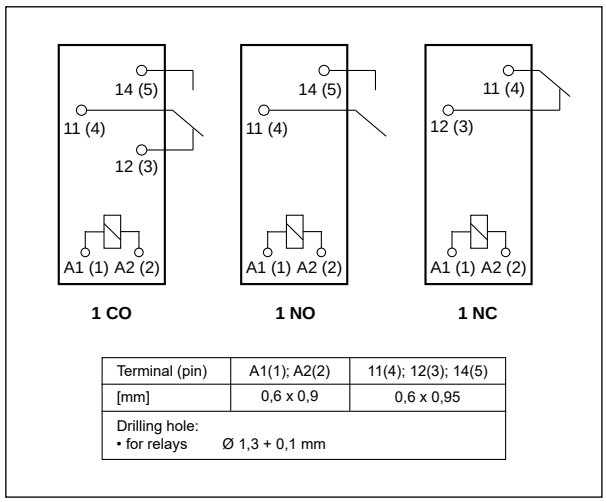
Max. DC resistive load breaking capacity Fig. 1



Coil operating range - DC Fig. 2



Connection diagrams (pin side view)

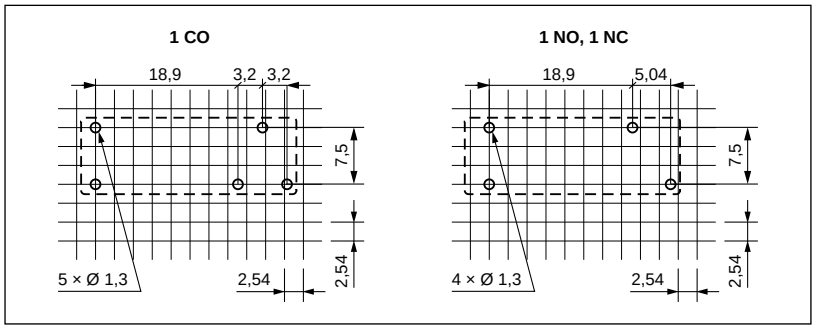


Terminal (pin)	A1(1); A2(2)	11(4); 12(3); 14(5)
[mm]	0,6 x 0,9	0,6 x 0,95
Drilling hole: • for relays	Ø 1,3 + 0,1 mm	

Description of Fig. 2

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - rated load

Pinout (solder side view)



Mounting

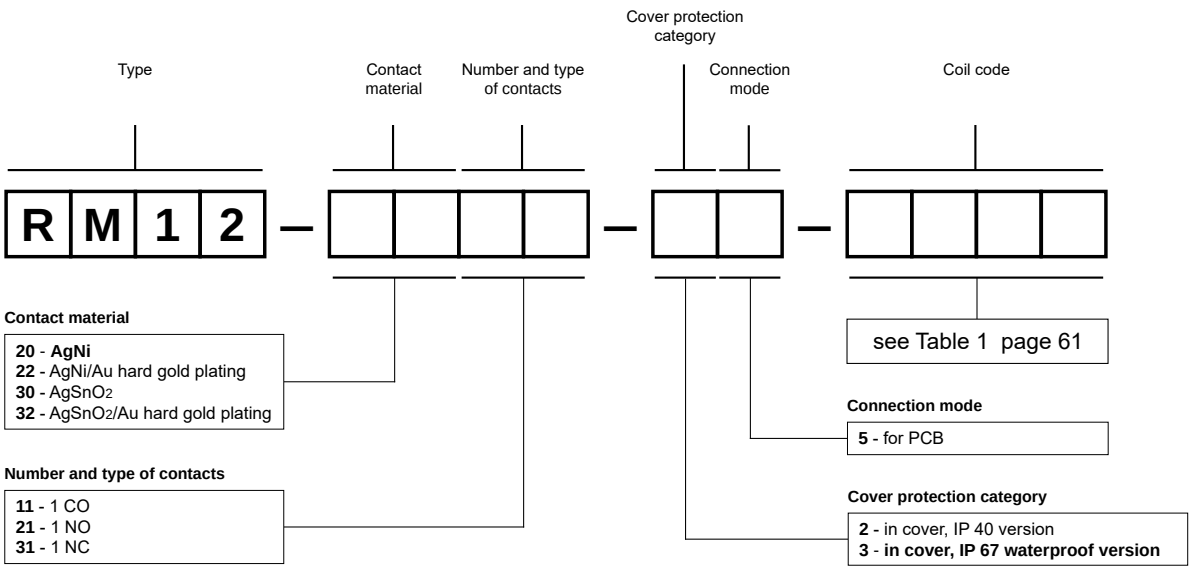
Relays **RM12** are designed for direct PCB mounting.

Coil data - DC voltage version

Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	102	± 10%	3,5	15,0
1006	6	144	± 10%	4,2	18,0
1009	9	330	± 10%	6,3	27,0
1012	12	580	± 10%	8,4	36,0
1018	18	1 300	± 10%	12,6	54,0
1024	24	2 300	± 10%	16,8	72,0
1048	48	9 340	± 10%	33,6	144,0
1060	60	14 000	± 10%	42,0	180,0

Ordering codes



Examples of ordering codes:

RM12-2011-35-1012 relay **RM12**, for PCB, one changeover contact, contact material AgNi, coil voltage 12 V DC, in cover IP 67

RM12-3031-25-1024 relay **RM12**, for PCB, one normally closed contact, contact material $AgSnO_2$, coil voltage 24 V DC, in cover IP 40

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- DC coils - of up to 24 V DC, low coil power 0,22 ... 0,25 W
- For PCB
- Small dimensions, light weight
- Applications: for household electrical appliance, automation systems, electrical equipment, instrument and meter, telecommunication devices, remote control facilities
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO	
Contact material		**AgNi**, $AgSnO_2$	
Rated / max. switching voltage	AC	250 V / 440 V	
Min. switching voltage		6 V	
Rated load	AC1	1 CO: 8 A / 250 V AC	1 NO: 10 A / 250 V AC
	DC1	1 CO: 8 A / 30 V DC	1 NO: 10 A / 30 V DC
Min. switching current		100 mA	
Rated current		10 A	
Max. breaking capacity	AC1	2 500 VA	
Contact resistance		≤ 100 mΩ	

Coil data

Rated voltage	DC	5 ... 24 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,22 ... 0,25 W

Insulation according to PN-EN 60664-1

Insulation resistance	> 1 000 MΩ	500 V DC, 60 s
Dielectric strength		
• between coil and contacts	5 000 V AC	type of insulation: reinforced
• contact clearance	1 000 V AC	type of clearance: micro-disconnection
Contact - coil distance		
• clearance	≥ 8 mm	
• creepage	≥ 8 mm	

General data

Operating / release time (typical values)		10 ms / 5 ms	
Electrical life (number of cycles)			
• resistive AC1	1 800 cycles/hour	10^5	10 A, 250 V AC
• resistive DC1	1 800 cycles/hour	10^5	10 A, 30 V DC
Mechanical life	18 000 cycles/hour	10^7	
Dimensions (L x W x H)		28,7 x 10,3 x 12,7 mm	
Weight		8 g	
Ambient temperature	• operating	-40...+85 °C	
Cover protection category		IP 40 or **IP 67**	PN-EN 60529
Environmental protection		RTII or **RTIII**	PN-EN 116000-3
Shock resistance		10 g	
Vibration resistance		1 NO: 0,80 mm DA (without coil voltage)	10...55 Hz
		1 NC: 1,65 mm DA (constant amplitude)	10...55 Hz
Solder bath temperature		max. 260 °C	
Soldering time		max. 3 s	

The data in bold type relate to the standard versions of the relays.

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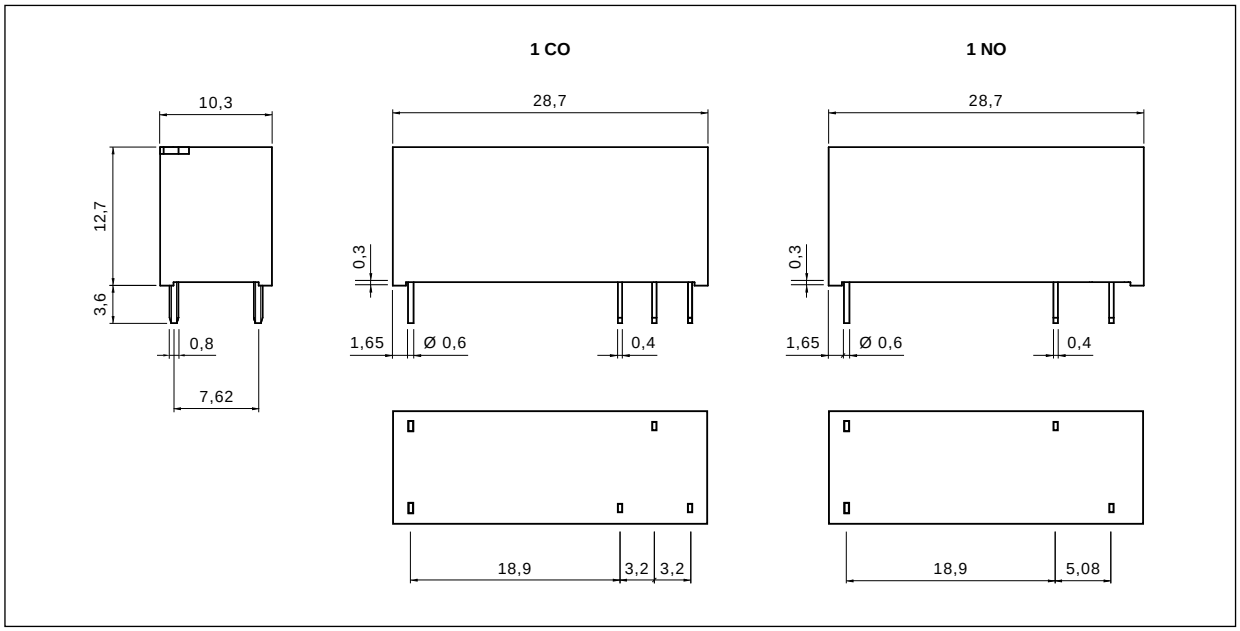
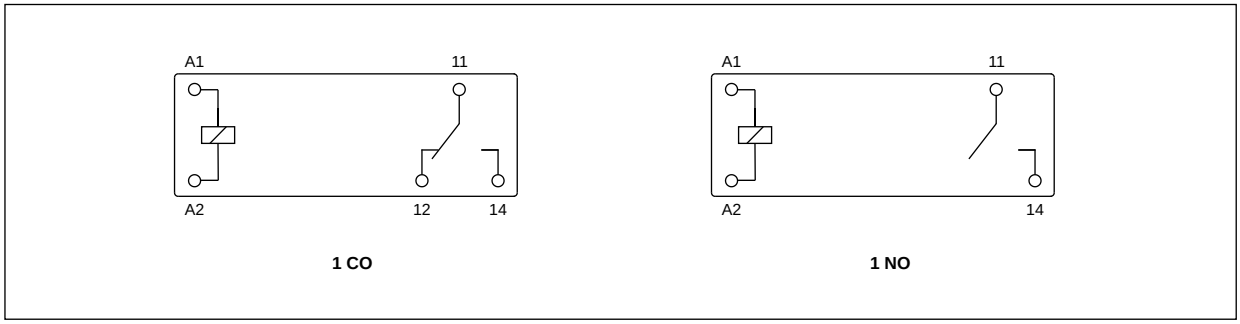
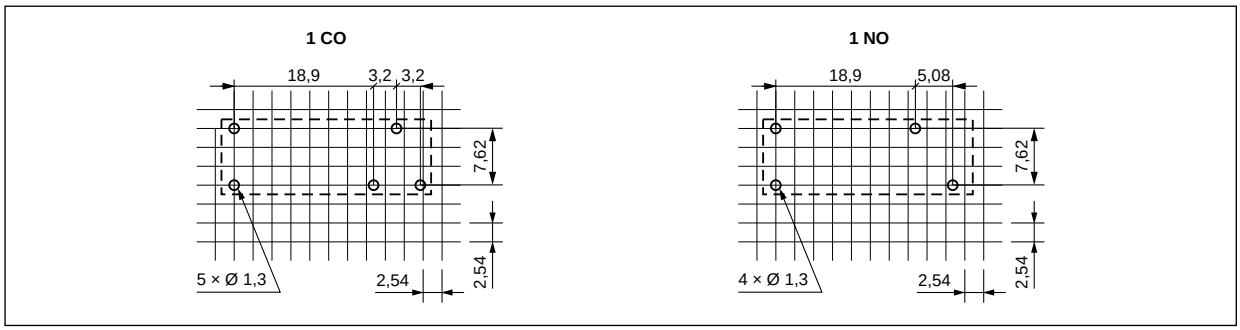
Dimensions



Connection diagrams (pin side view)



Pinout (solder side view)



Mounting

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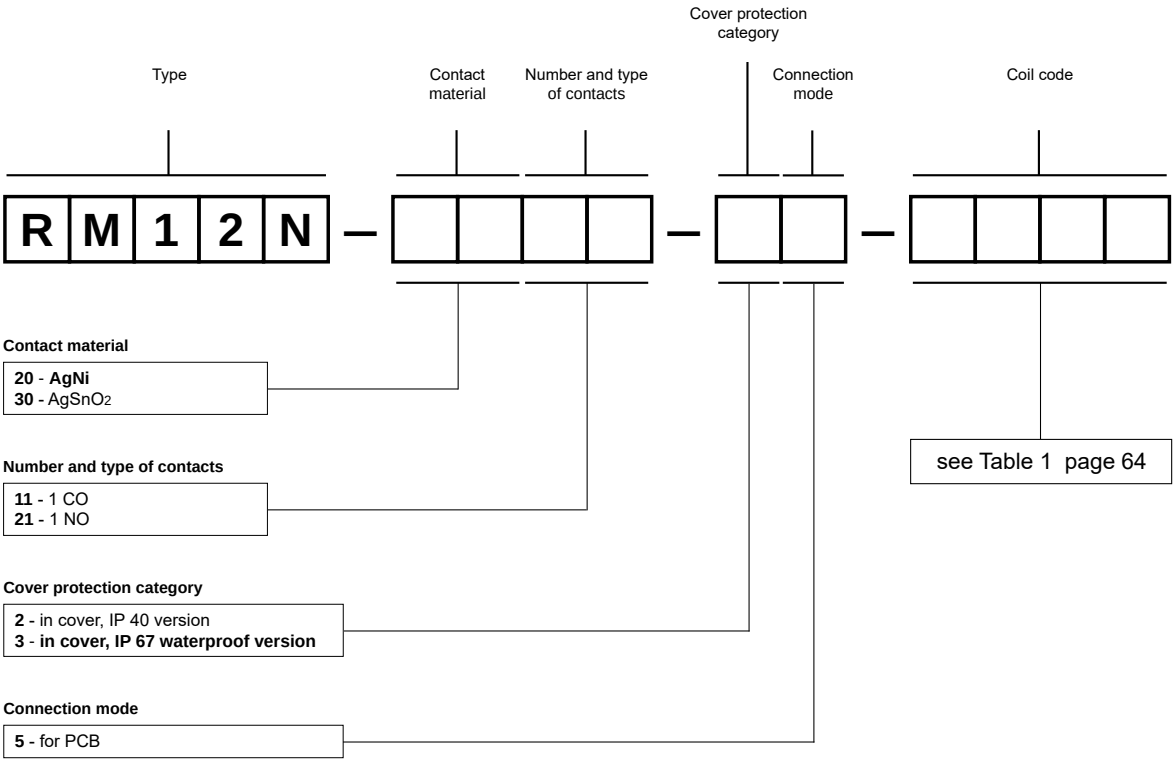
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	113	± 10%	3,5	6,5
1009	9	360	± 10%	6,3	11,7
1012	12	620	± 10%	8,4	15,6
1018	18	1 295	± 10%	12,7	23,4
1024	24	2 350	± 10%	16,8	31,2

Ordering codes



Examples of ordering codes:

RM12N-2011-35-1012 relay **RM12N**, for PCB, one changeover contact, contact material AgNi, coil voltage 12 V DC, in cover IP 67

RM12N-3021-25-1024 relay **RM12N**, for PCB, one normally open contact, contact material $AgSnO_2$, coil voltage 24 V DC, in cover IP 40

- DC coils - of up to 24 V DC, low coil power 0,20 W (sensitive version) or 0,45 W (standard version)
- For PCB • Very small dimensions, light weight
- High load up to 10 A / 125 V AC ❶
- Applications: for household electrical appliance, automation systems, electrical equipment, instrument and meter, telecommunication devices, remote control facilities, light controllers, etc.
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO	
Contact material		**$AgSnO_2$**	
Rated / max. switching voltage	AC	250 V / 277 V	
Min. switching voltage		5 V	
Rated load	AC1	1 CO: 5 A / 5 A (NO/NC) / 250 V AC	1 NO: 5 A / 250 V AC
		1 CO: 10 A / 125 V AC ❶	1 NO: 10 A / 125 V AC
	DC1	1 CO: 5 A / 5 A (NO/NC) / 28 V DC	1 NO: 5 A / 28 V DC
Rated current		5 A	
Max. breaking capacity	AC1	1 250 VA	
	AC3	186 W 0,25 HP UL 508 (single-phase motor)	
Contact resistance		≤ 100 mΩ	

Coil data

Rated voltage	DC	5 ... 24 V
Must release voltage		DC: ≥ 0,05 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	DC	0,20 W sensitive version ❶ 0,45 W standard version

Insulation according to PN-EN 60664-1

Insulation resistance	100 MΩ 500 V DC, 60 s
Dielectric strength	
• between coil and contacts	2 500 V AC type of insulation: basic
• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Operating / release time (typical values)		8 ms / 5 ms	
Electrical life (number of cycles)			
• resistive AC1	1 800 cycles/hour	10^5 1 CO: 5 A / 5 A (NO/NC), 250 V AC	1 NO: 5 A, 250 V AC
• resistive DC1	1 800 cycles/hour	10^5 1 CO: 5 A / 5 A (NO/NC), 28 V DC	1 NO: 5 A, 28 V DC
Mechanical life	18 000 cycles/hour	10^7	
Dimensions (L x W x H)		18,8 x 10,6 x 15,3 mm	
Weight		6 g	
Ambient temperature	• operating	-40...+70 °C	
Cover protection category		IP 64 PN-EN 60529	
Shock resistance		10 g	
Vibration resistance		1,5 mm DA (constant amplitude) 10...55 Hz	
Solder bath temperature		max. 235 °C	
Soldering time		max. 3 s	

The data in bold type relate to the standard versions of the relays.
❶ Only for contacts 1 NO

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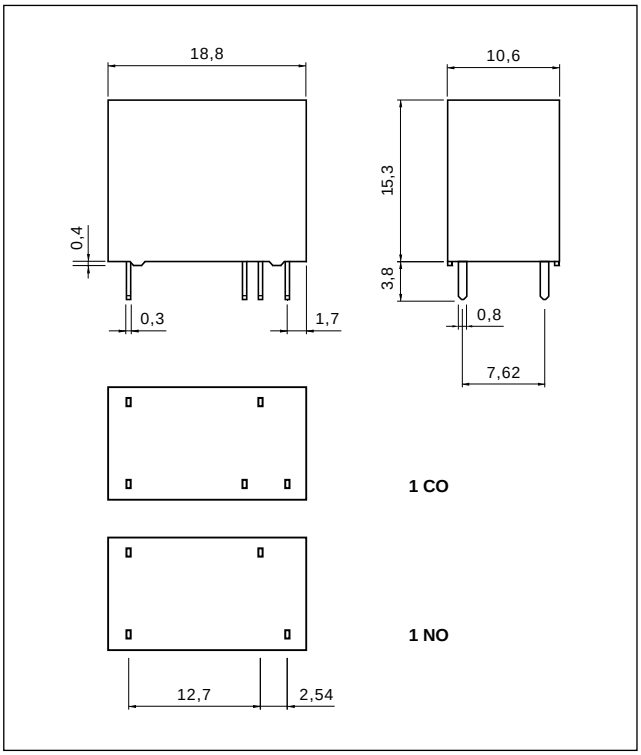
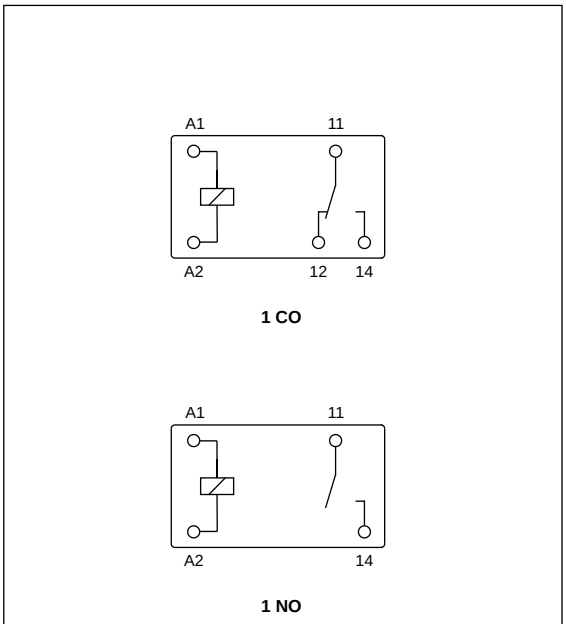
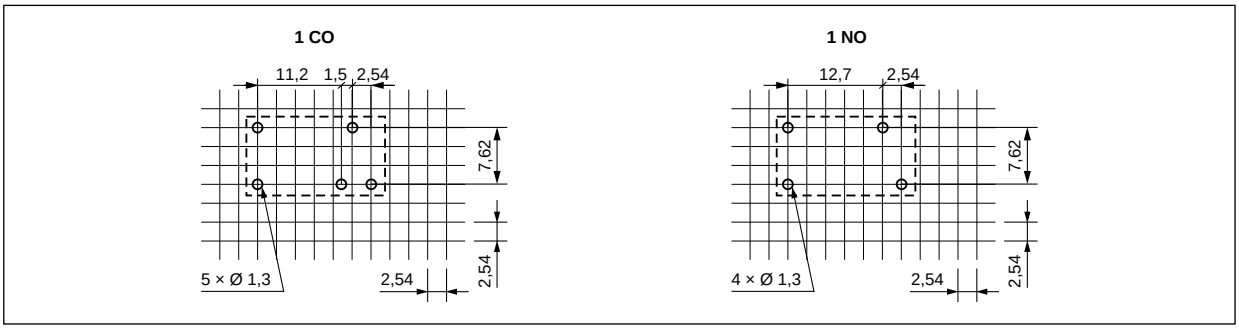
Dimensions



Connection diagrams (pin side view)



Pinout (solder side view)



Mounting

Relays **RM32N** are designed for direct PCB mounting.

Coil data - DC voltage version, sensitive — Table 1

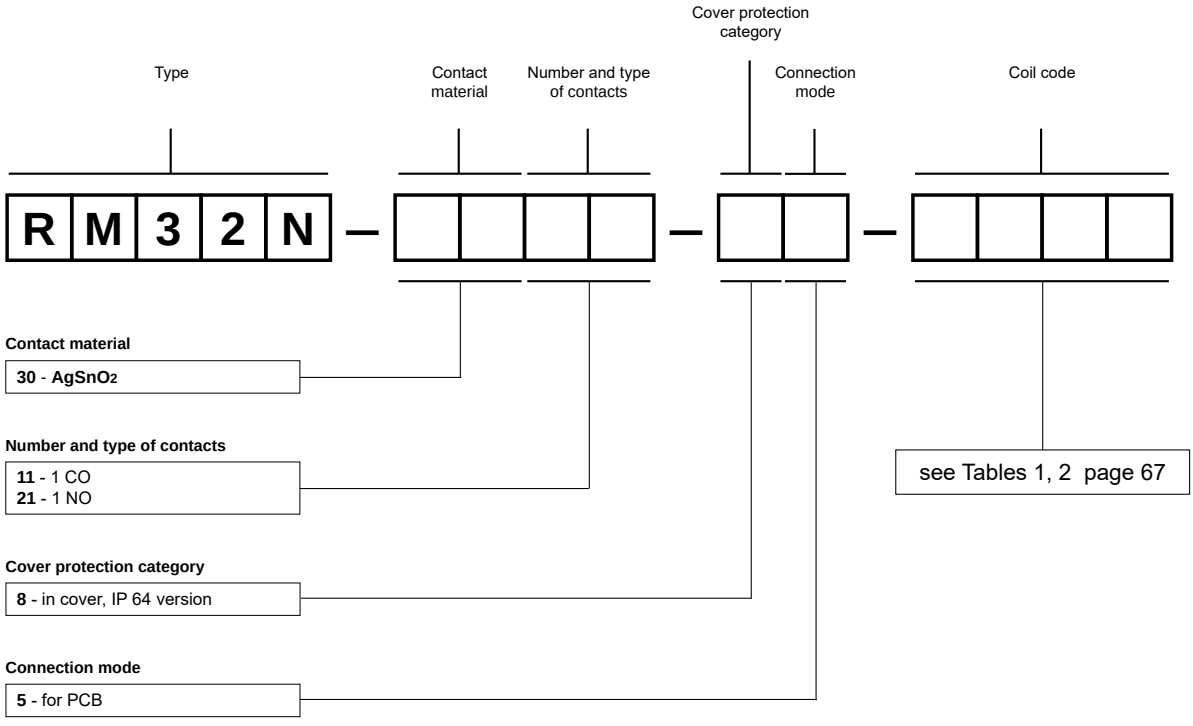
Coil code ❶	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S005	5	125	± 10%	3,75	6,5
S009	9	405	± 10%	6,75	11,7
S012	12	720	± 10%	9,00	15,6
S018	18	1 620	± 10%	13,50	23,4
S024	24	2 880	± 10%	18,00	31,2

❶ Only for contacts 1 NO

Coil data - DC voltage version, standard — Table 2

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	56	± 10%	3,75	6,5
1009	9	180	± 10%	6,75	11,7
1012	12	320	± 10%	9,00	15,6
1018	18	720	± 10%	13,50	23,4
1024	24	1 280	± 10%	18,00	31,2

Ordering codes



Examples of ordering codes:

RM32N-3021-85-S018 relay **RM32N**, for PCB, one normally open contact, contact material $AgSnO_2$, sensitive coil voltage 18 V DC, in cover IP 64

RM32N-3011-85-1024 relay **RM32N**, for PCB, one changeover contact, contact material $AgSnO_2$, standard coil voltage 24 V DC, in cover IP 64

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- DC coils - of up to 24 V DC, low coil power 0,20 W (sensitive version) or 0,45 W (standard version)
- For PCB • Very small dimensions, light weight
- High load up to 10 A / 125 V AC ❶
- Applications: for household electrical appliance, automation systems, electrical equipment, instrument and meter, telecommunication devices, remote control facilities, light controllers, etc.
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO	
Contact material		**$AgSnO_2$**	
Rated / max. switching voltage	AC	250 V / 277 V	
Min. switching voltage		5 V	
Rated load	AC1	1 CO: 5 A / 5 A (NO/NC) / 250 V AC	1 NO: 5 A / 250 V AC
		1 CO: 10 A / 125 V AC ❶	1 NO: 10 A / 125 V AC
	DC1	1 CO: 5 A / 5 A (NO/NC) / 28 V DC	1 NO: 5 A / 28 V DC
Rated current		5 A	
Max. breaking capacity	AC1	1 250 VA	
	AC3	186 W 0,25 HP UL 508 (single-phase motor)	
Contact resistance		≤ 100 mΩ	

Coil data

Rated voltage	DC	5 ... 24 V
Must release voltage		DC: ≥ 0,05 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	DC	0,20 W sensitive version ❶ 0,45 W standard version

Insulation according to PN-EN 60664-1

Insulation resistance	100 MΩ 500 V DC, 60 s
Dielectric strength	
• between coil and contacts	4 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Operating / release time (typical values)		8 ms / 5 ms	
Electrical life (number of cycles)			
• resistive AC1	1 800 cycles/hour	10^5 1 CO: 5 A / 5 A (NO/NC), 250 V AC	1 NO: 5 A, 250 V AC
• resistive DC1	1 800 cycles/hour	10^5 1 CO: 5 A / 5 A (NO/NC), 28 V DC	1 NO: 5 A, 28 V DC
Mechanical life	18 000 cycles/hour	10^7	
Dimensions (L x W x H)		20,5 x 10,6 x 15,6 mm	
Weight		7 g	
Ambient temperature	• operating	-40...+70 °C	
Cover protection category		IP 64 PN-EN 60529	
Shock resistance		10 g	
Vibration resistance		1,5 mm DA (constant amplitude) 10...55 Hz	
Solder bath temperature		max. 235 °C	
Soldering time		max. 3 s	

The data in bold type relate to the standard versions of the relays.
❶ Only for contacts 1 NO

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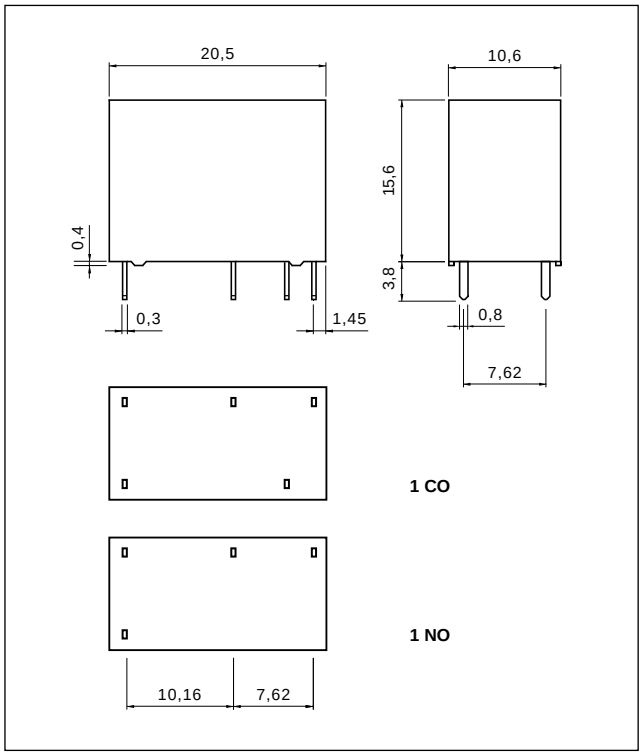
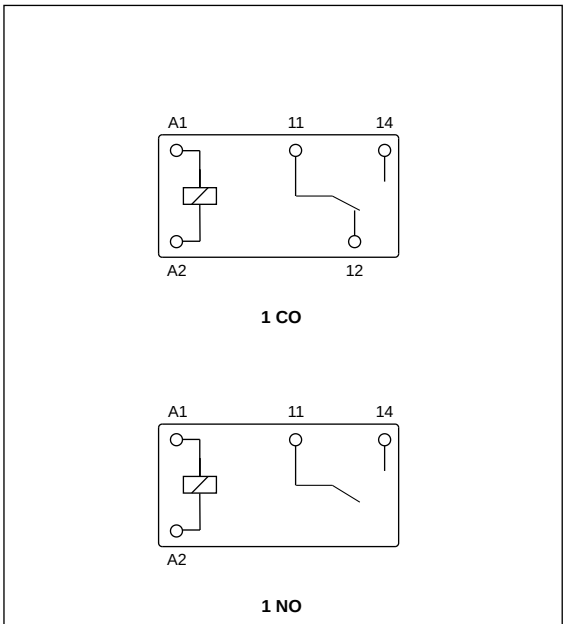
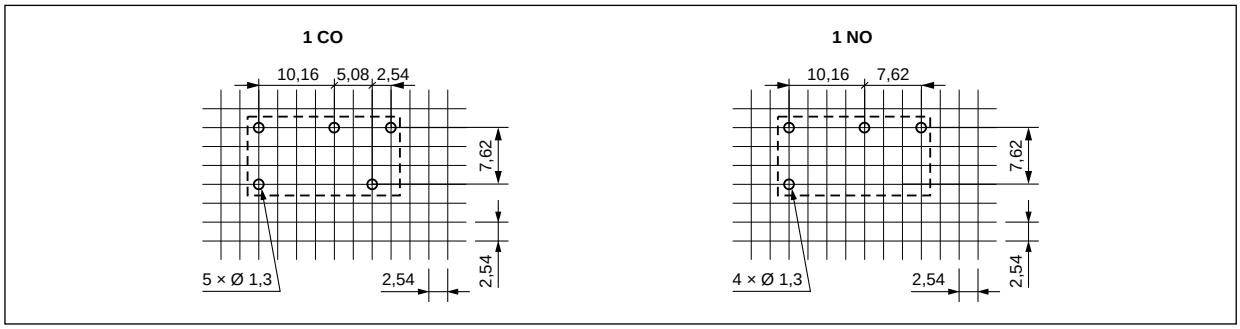
Dimensions



Connection diagrams (pin side view)



Pinout (solder side view)



Mounting

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Coil data - DC voltage version, sensitive — Table 1

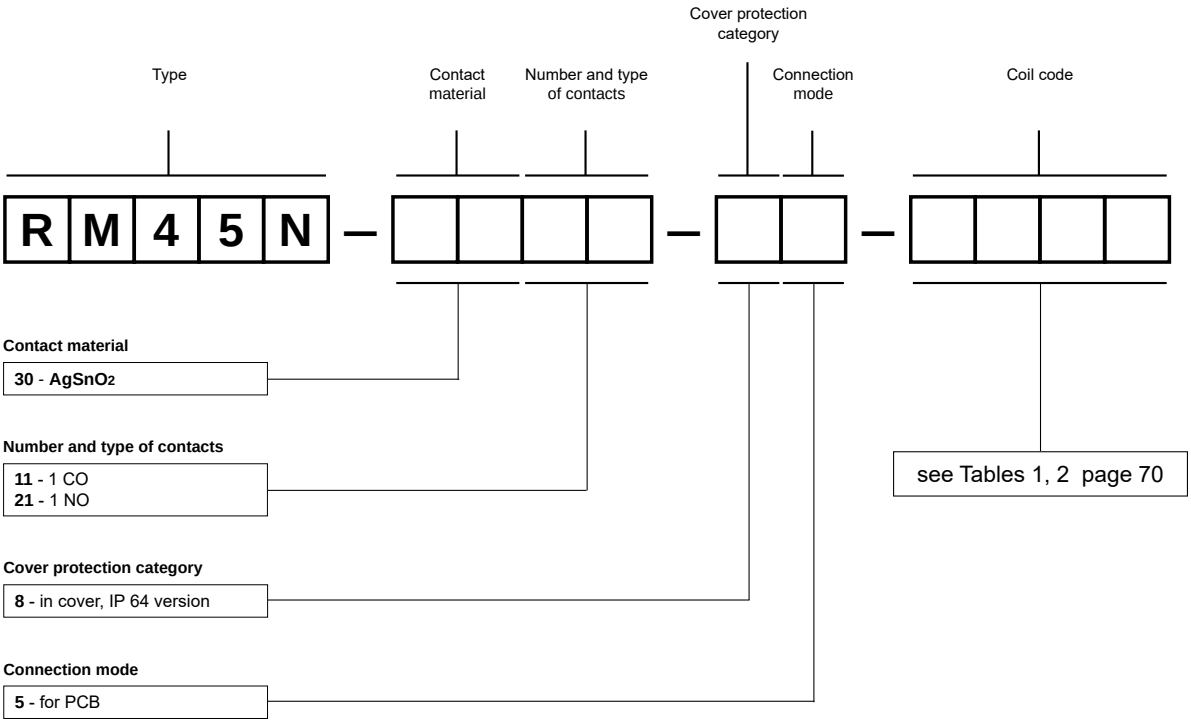
Coil code ❶	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S005	5	125	± 10%	3,75	5,5
S009	9	405	± 10%	6,75	9,9
S012	12	720	± 10%	9,00	13,2
S024	24	2 880	± 10%	18,00	26,4

❶ Only for contacts 1 NO

Coil data - DC voltage version, standard — Table 2

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	56	± 10%	3,75	5,5
1009	9	180	± 10%	6,75	9,9
1012	12	320	± 10%	9,00	13,2
1024	24	1 280	± 10%	18,00	26,4

Ordering codes



Examples of ordering codes:

RM45N-3021-85-S012 relay **RM45N**, for PCB, one normally open contact, contact material $AgSnO_2$, sensitive coil voltage 12 V DC, in cover IP 64

RM45N-3011-85-1024 relay **RM45N**, for PCB, one changeover contact, contact material $AgSnO_2$, standard coil voltage 24 V DC, in cover IP 64

- DC coils - of up to 48 V DC, low coil power 0,36 W
- For PCB
- Small dimensions, light weight
- Switching current up to 12 A
- Applications: for household electrical appliance, automation control, telecommunication devices, machinery electrical equipment
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO
Contact material		**$AgSnO_2$**, AgCdO ❶
Rated / max. switching voltage	AC	125 V / 277 V
	DC	110 V / 110 V
Min. switching voltage		5 V
Rated load	AC1	12 A / 125 V AC
	DC1	12 A / 28 V DC
Min. switching current		15 mA
Rated current		12 A
Max. breaking capacity	AC1	1 500 VA
	AC3	250 W 0,33 HP UL 508 (single-phase motor)
Contact resistance		≤ 100 mΩ

Coil data

Rated voltage	DC	5 ... 48 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,36 W

Insulation according to PN-EN 60664-1

Insulation resistance	250 MΩ 500 V DC, 60 s
Dielectric strength	
• between coil and contacts	1 500 V AC type of insulation: basic
• contact clearance	750 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 1,9 mm
• creepage	≥ 1,9 mm

General data

Operating / release time (typical values)		10 ms / 5 ms
Electrical life (number of cycles)		
• resistive AC1	1 800 cycles/hour	10^5 12 A, 125 V AC
• resistive DC1	1 800 cycles/hour	10^5 12 A, 28 V DC
Mechanical life	18 000 cycles/hour	10^7
Dimensions (L x W x H)		19,5 x 15,6 x 15,3 mm
Weight		9,5 g
Ambient temperature	• operating	-55...+85 °C
Cover protection category		IP 64 PN-EN 60529
Shock resistance		10 g
Vibration resistance		1,5 mm DA (constant amplitude) 10...55 Hz
Solder bath temperature		max. 235 °C
Soldering time		max. 3 s

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU.

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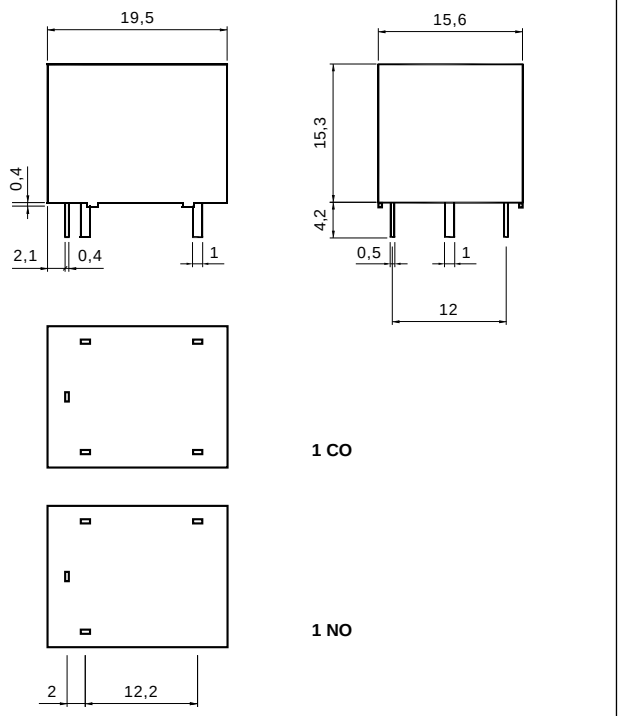
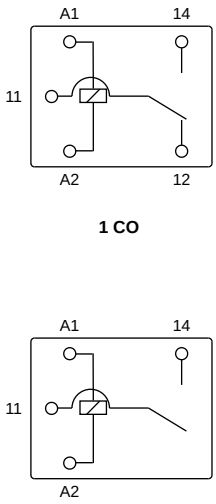
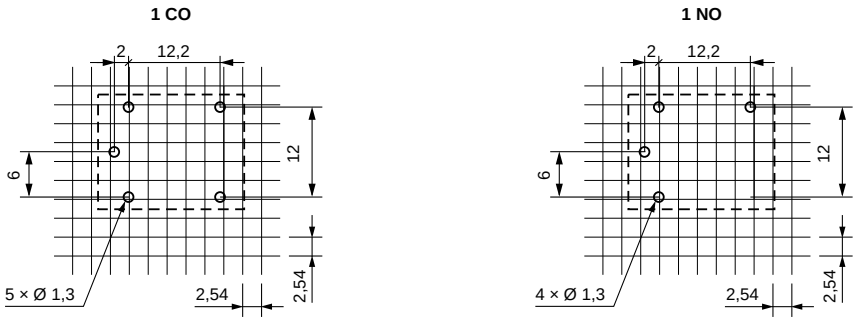
Dimensions



Connection diagrams (pin side view)



Pinout (solder side view)



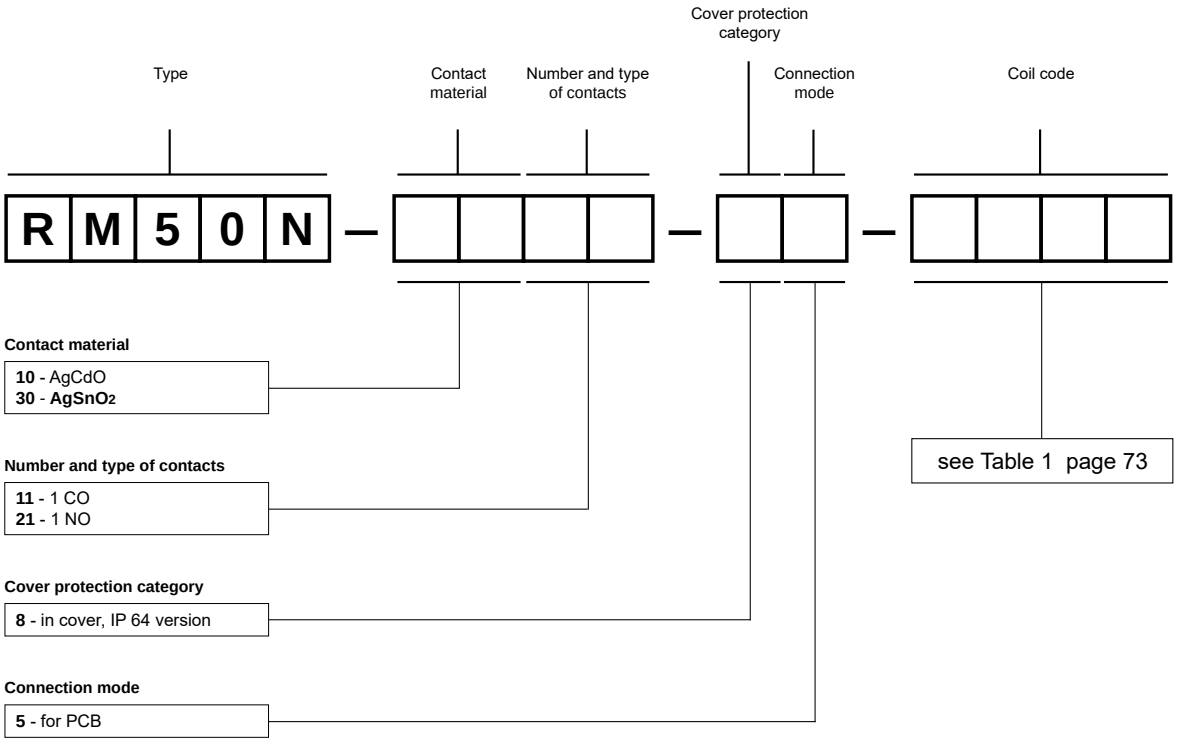
Mounting

Relays **RM50N** are designed for direct PCB mounting.

Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	70	± 10%	3,75	6,5
1009	9	225	± 10%	6,75	11,7
1012	12	400	± 10%	9,00	15,6
1024	24	1 600	± 10%	18,00	31,2
1048	48	6 400	± 10%	36,00	62,4

Ordering codes



Examples of ordering codes:

RM50N-3011-85-1012 relay **RM50N**, for PCB, one changeover contact, contact material $AgSnO_2$, coil voltage 12 V DC, in cover IP 64

RM50N-1021-85-1024 relay **RM50N**, for PCB, one normally open contact, contact material AgCdO, coil voltage 24 V DC, in cover IP 64

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- DC coils - of up to 48 V DC, insulation class F: 155 °C
- For PCB
- Small dimensions
- High switching capacity
- Applications: for household electrical appliance, automation systems, electronic equipment, instrument and meter, telecommunication devices, remote control facilities
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO	
Contact material		**$AgSnO_2$**	
Rated / max. switching voltage	AC	250 V / 277 V	
Min. switching voltage		5 V	
Rated load	AC1	1 CO: 10 A / 7 A (NO/NC) / 250 V AC	1 NO: 10 A / 250 V AC
		1 CO: 20 A / 20 A (NO/NC) / 125 V AC	1 NO: 20 A / 125 V AC
	DC1	1 CO: 10 A / 7 A (NO/NC) / 30 V DC	1 NO: 10 A / 30 V DC
Min. switching current		15 mA	
Rated current		10 A	
Max. breaking capacity	AC1	3 000 VA	
	AC3	1 CO: 750 W / 375 W (NO/NC)	1 NO: 750 W
		1 CO: 1,0 HP / 0,5 HP (NO/NC) UL 508 (single-phase motor)	1 NO: 1,0 HP UL 508 (single-phase motor)
Contact resistance		≤ 100 mΩ	

Coil data

Rated voltage	DC	5 ... 48 V
Must release voltage		DC: ≥ 0,05 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,36 W

Insulation according to PN-EN 60664-1

Rated surge voltage	4 000 V	1,2 / 50 µs
Insulation resistance	250 MΩ	500 V DC, 60 s
Dielectric strength		
• between coil and contacts	2 500 V AC	type of insulation: basic
• contact clearance	1 000 V AC	type of clearance: micro-disconnection
Contact - coil distance		
• clearance	≥ 1,9 mm	
• creepage	≥ 1,9 mm	

General data

Operating / release time (typical values)		15 ms / 10 ms	
Electrical life (number of cycles)			
• resistive AC1	1 800 cycles/hour	10^5 1 CO: 10 A / 7 A (NO/NC), 250 V AC	1 NO: 10 A, 250 V AC
• resistive DC1	1 800 cycles/hour	10^5 1 CO: 10 A / 7 A (NO/NC), 30 V DC	1 NO: 10 A, 30 V DC
Mechanical life	18 000 cycles/hour	10^7	
Dimensions (L x W x H)		19,5 x 16 x 17,1 mm	
Weight		10 g	
Ambient temperature	• operating	-40...+85 °C	
Cover protection category		IP 64 PN-EN 60529	
Shock resistance		10 g	
Vibration resistance		1,0 mm DA (constant amplitude) 10...55 Hz	
Solder bath temperature		max. 235 °C	
Soldering time		max. 3 s	

The data in bold type relate to the standard versions of the relays.

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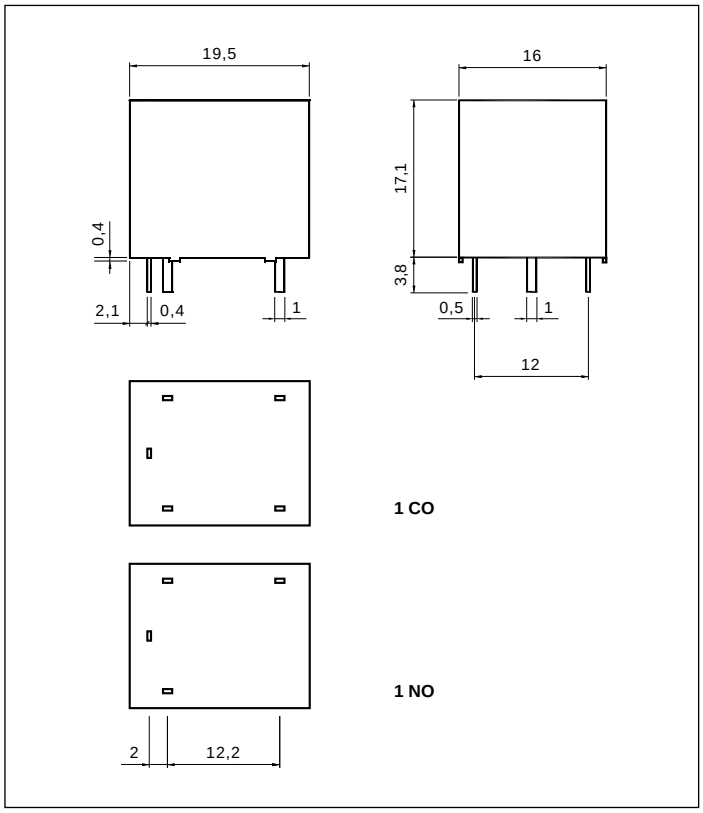
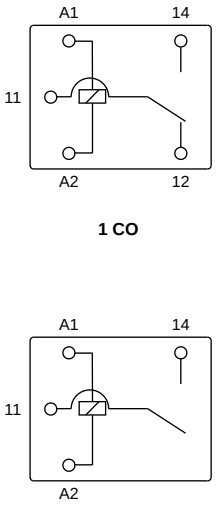
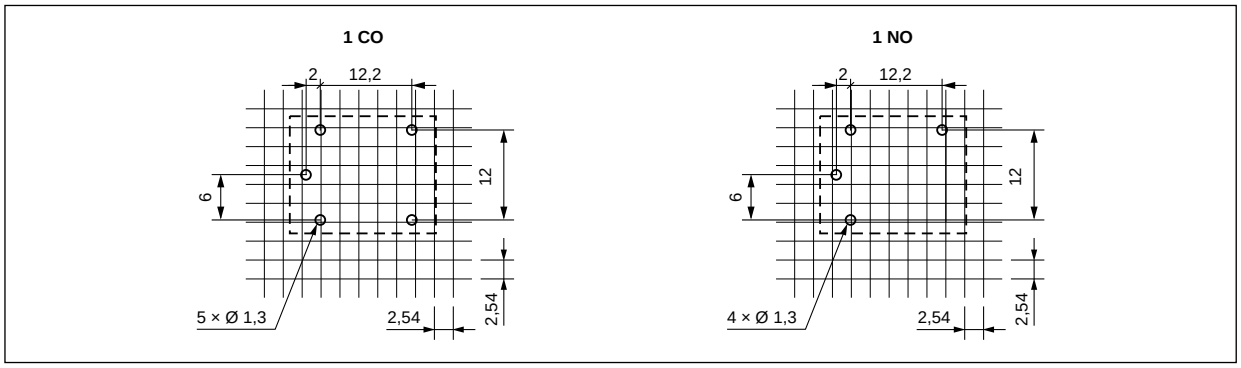
Dimensions



Connection diagrams (pin side view)



Pinout (solder side view)



Mounting

Relays **RM51** are designed for direct PCB mounting.

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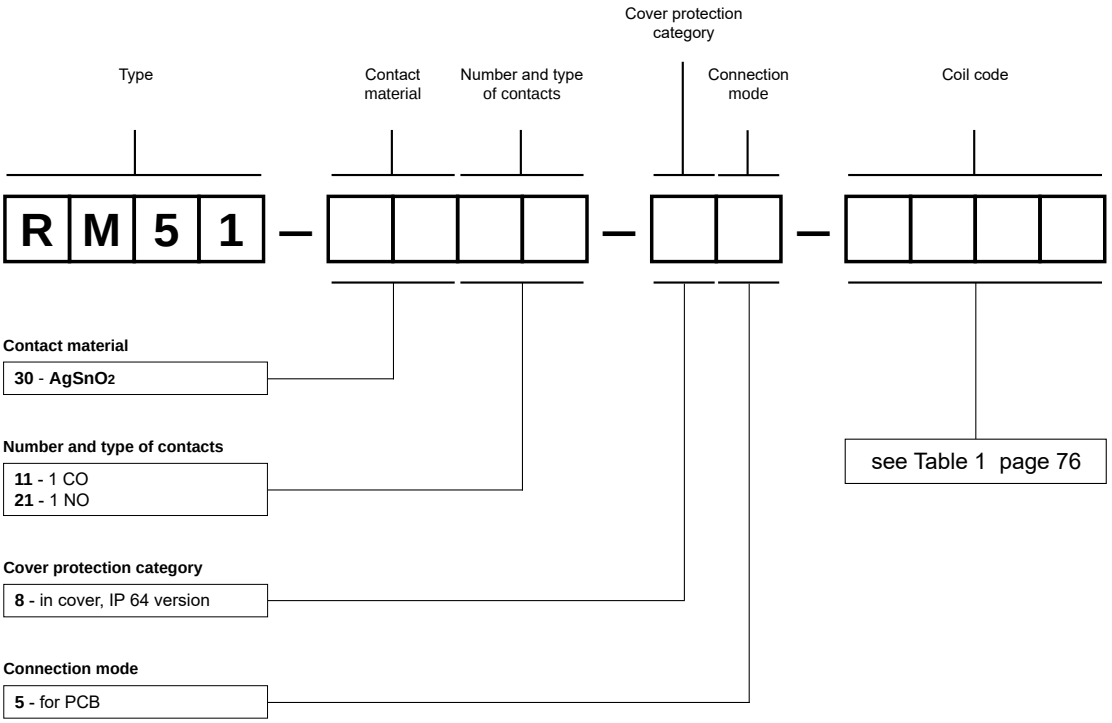
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	69	± 10%	3,75	6,5
1009	9	225	± 10%	6,75	11,7
1012	12	400	± 10%	9,00	15,6
1024	24	1 600	± 10%	18,00	31,2
1048	48	6 400	± 10%	36,00	62,4

Ordering codes

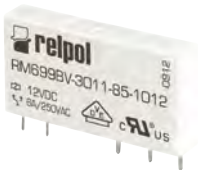


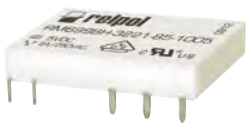
Examples of ordering codes:

RM51-3011-85-1012 relay **RM51**, for PCB, one changeover contact, contact material $AgSnO_2$, coil voltage 12 V DC, in cover IP 64

RM51-3021-85-1048 relay **RM51**, for PCB, one normally open contact, contact material $AgSnO_2$, coil voltage 48 V DC, in cover IP 64

Version (V) Version (H)





- Cover width only 5,0 mm
- Sealed for soldering and cleaning
- **Terminals arrangement: vertical version (V) and horizontal version (H)**
- Applications: for PLC's, industrial machinery, time relays, counters, temperature adjusters, measurement instruments, office equipment, etc.
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO	
Contact material		**$AgSnO_2$**, AgNi	$AgSnO_2$/Au hard gold plating ❶ AgNi/Au hard gold plating ❶
Max. switching voltage		400 V AC / 250 V DC	30 V AC / 36 V DC ❶
Min. switching voltage		10 V	5 V
Rated load	AC1 AC3 DC1	6 A / 250 V AC 186 W (single-phase motor) 6 A / 30 V DC; 0,15 A / 250 V DC	0,05 A / 30 V AC ❶ 186 W (single-phase motor) 0,05 A / 36 V DC ❶
Min. switching current		100 mA	10 mA
Max. inrush current		10 A 20 ms	0,1 A 20 ms ❶
Rated current		6 A	0,05 A ❶
Max. breaking capacity	AC1	1 500 VA	1,2 VA ❶
Min. breaking capacity		1 W	0,05 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V	≤ 30 mΩ 10 mA, 5 V
Max. operating frequency • at rated load • no load	AC1	 360 cycles/hour 72 000 cycles/hour	

Coil data

Rated voltage	DC	5 ... 60 V	
Must release voltage		DC: ≥ 0,05 U_n	
Operating range of supply voltage		see Table 1	
Rated power consumption	DC	0,17 W 5 ... 24 V	0,21 W 48, 60 V

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC	
Rated surge voltage	6 000 V 1,2 / 50 µs	
Overvoltage category	III	
Dielectric strength • between coil and contacts • contact clearance	 4 000 V AC 1 000 V AC	 type of insulation: reinforced type of clearance: micro-disconnection
Contact - coil distance • clearance • creepage	 ≥ 6 mm ≥ 8 mm	

General data

Operating / release time (typical values)	8 ms / 4 ms	
Electrical life (number of cycles) • resistive AC1 • inductive AC3	 the NO and NC contact loaded (bilateral load): see Fig. 1 the NO contact loaded: > 3×10^4 6 A, 250 V AC 6×10^3 186 W (single-phase motor), AgNi	
Mechanical life (cycles)	> 10^7	
Dimensions (L x W x H)	28 x 5 x 15 mm	
Weight	6 g	
Ambient temperature	• storage • operating	-40...+85 °C -40...+85 °C
Cover protection category	IP 64	PN-EN 60529
Environmental protection	RTIII	PN-EN 116000-3
Relative humidity	5...85%	
Shock resistance	5 g	
Vibration resistance	5 g 10...55 Hz	
Solder bath temperature	max. 260 °C	
Soldering time	max. 5 s	

The data in bold type relate to the standard versions of the relays. ❶ For gold-plated contacts - when the maximum values given have been exceeded, the gold layer is destroyed. Then, the advantages of gold-plating disappear and the values are as for $AgSnO_2$, AgNi contacts (see beside), and electrical life of these contacts may be shorter than of normal contacts.

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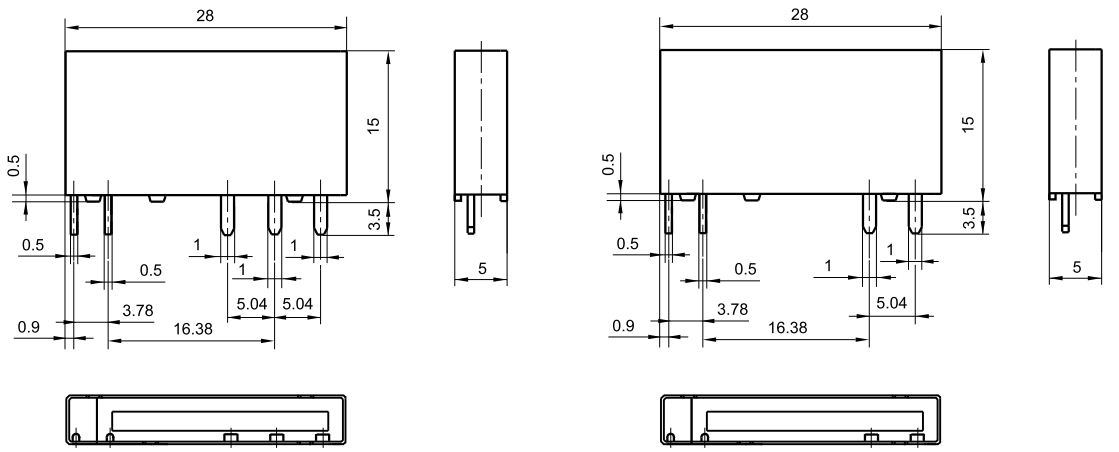
Dimensions

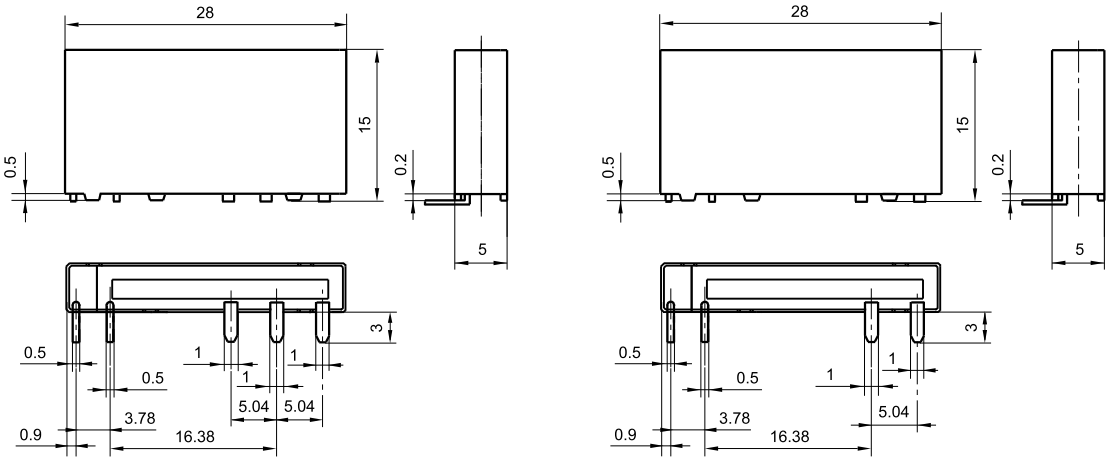
vertical version (V)



1 CO

1 NO

horizontal version (H)



1 CO

1 NO

Mounting

Relays **RM699B vertical version (V)** are designed for: • direct PCB mounting • sockets **PI6W-1P**, 35 mm rail mount acc. to PN-EN 60715 (see page 410).

Relays **RM699B horizontal version (H)** are designed for direct PCB mounting.

PI6W-1P

Plug-in sockets
for relays
RM699BV
or RSR30

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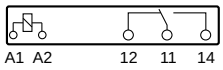
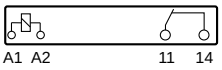
Connection diagrams (pin side view)

vertical version (V)

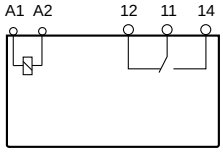


1 CO

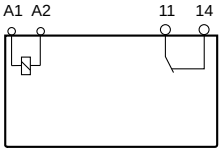


1 NO

horizontal version (H)



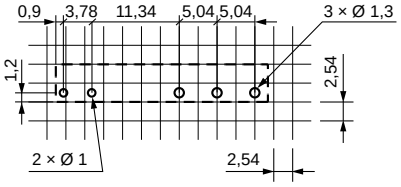
1 CO



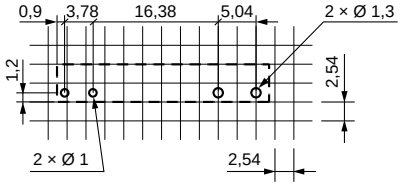
1 NO

Pinout (solder side view)

vertical version (V)

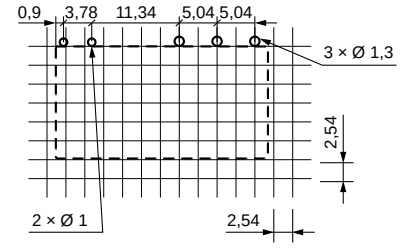


1 CO

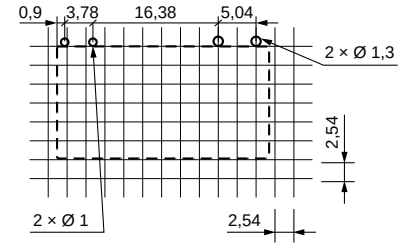


1 NO

horizontal version (H)



1 CO



1 NO

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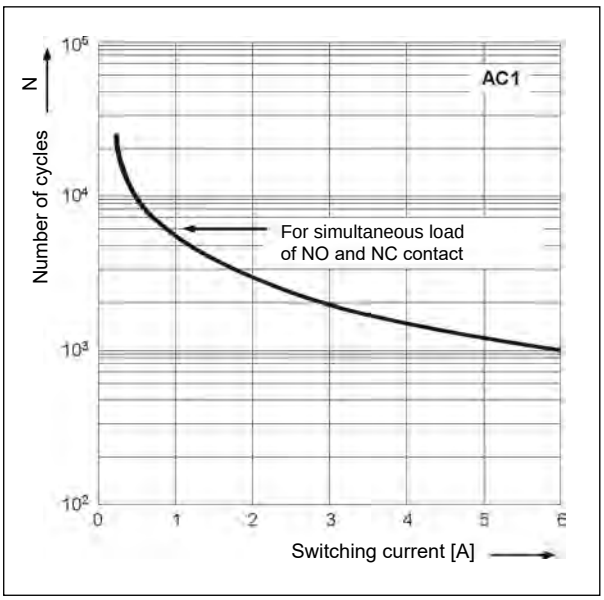
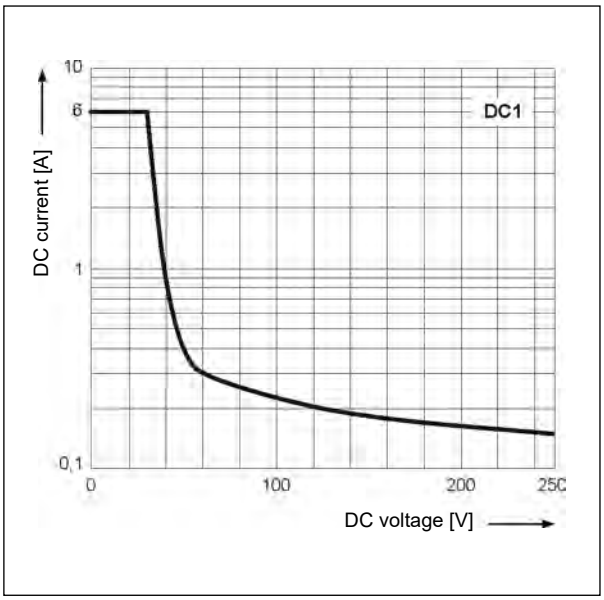
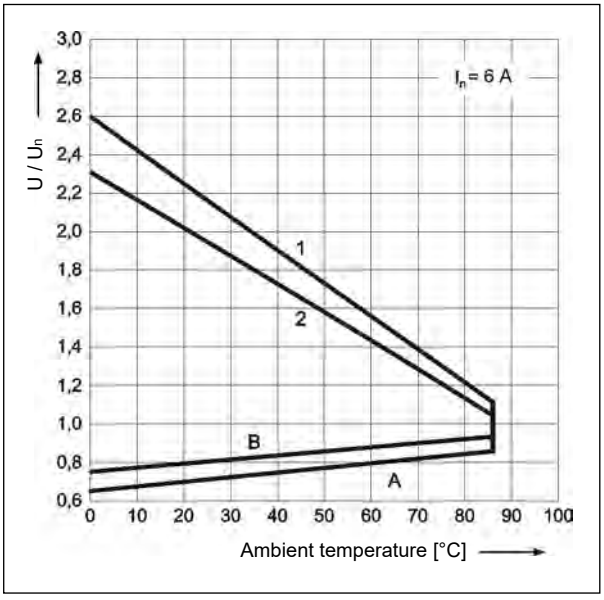
Electrical life at AC resistive current. Switching frequency: 360 cycles/hour Fig. 1



Max. DC resistive load breaking capacity Fig. 2



Coil operating range - DC Fig. 3



Description of Fig. 3

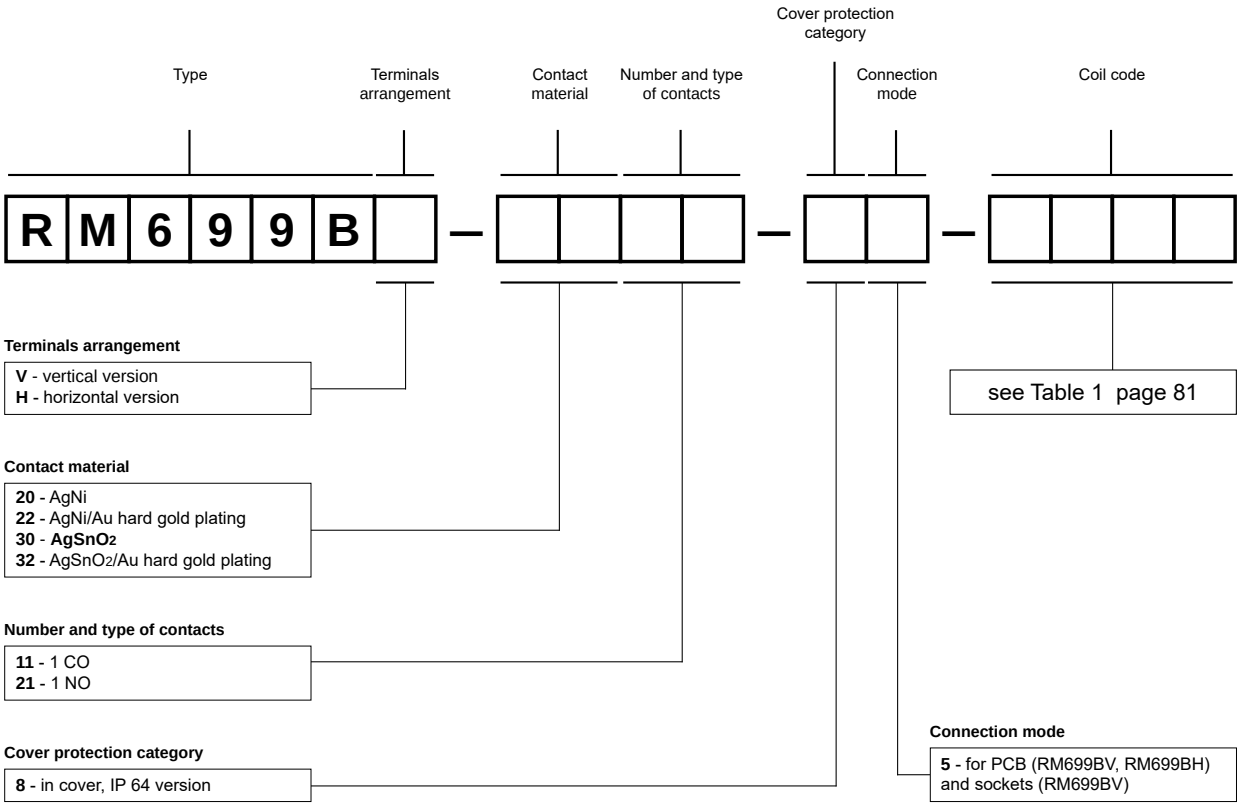
A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - rated load

Coil data - DC voltage version

Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	147	± 10%	3,75	7,5
1006	6	212	± 10%	4,5	9,0
1009	9	476	± 10%	6,75	13,0
1012	12	848	± 10%	9,0	18,0
1024	24	3 390	± 15%	18,0	36,0
1048	48	10 600	± 15%	36,0	72,0
1060	60	20 500	± 15%	45,0	90,0

Ordering codes



Examples of ordering code:

RM699BV-3011-85-1012 relay **RM699B**, vertical version, for PCB and sockets, one changeover contact, contact material $AgSnO_2$, coil voltage 12 V DC, in cover IP 64

RM699BH-2021-85-1005 relay **RM699B**, horizontal version, for PCB, one normally open contact, contact material AgNi, coil voltage 5 V DC, in cover IP 64

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RM84

RM84-...-01 ❶

- Cadmium - free contacts • Height 15,7 mm
- 5000 V / 10 mm reinforced insulation
- For PCB and plug-in sockets
- Accessories: sockets and modules • AC and DC coils
- Available special versions: with transparent cover ❶; with the increased dielectric strength of the contact clearance ❷
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO, 2 NO ❷
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	8 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	550 W (single-phase motor)
	DC1	8 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		15 A $AgSnO_2$
Rated current		8 A
Max. breaking capacity	AC1	2 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	3 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

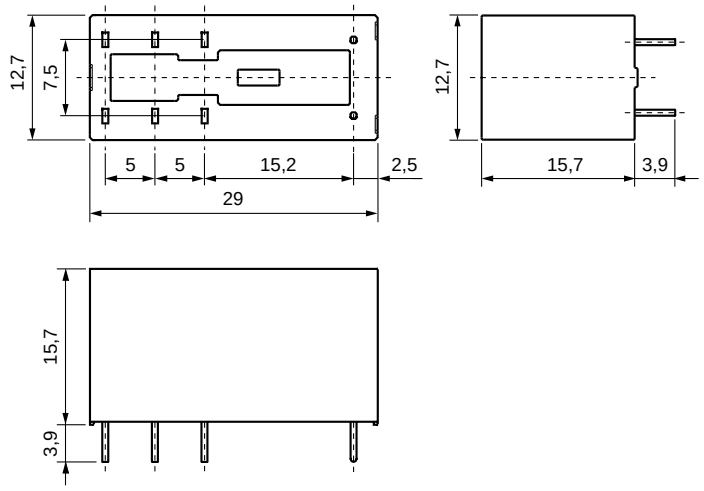
Insulation rated voltage		400 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength	• between coil and contacts	5 000 V AC type of insulation: reinforced
	• contact clearance	1 000 V AC type of clearance: micro-disconnection
		2 000 V AC contacts 2 NO, type of clearance: full-disconnection ❷
	• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	• clearance	≥ 10 mm
	• creepage	≥ 10 mm

General data

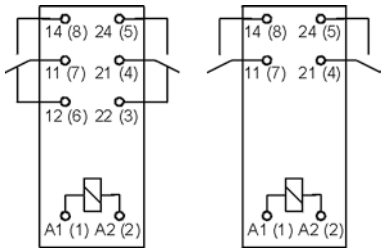
Operating / release time (typical values)		7 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		> 10^5 8 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,15 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H) / Weight		29 x 12,7 x 15,7 mm / 14 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C -20...+70 °C ❶
Cover protection category		IP 40 ❶ or **IP 67** PN-EN 60529
Environmental protection		RTII ❶ or **RTIII** PN-EN 116000-3
Shock resistance		20 g
Vibration resistance	(NO/NC)	10 g / 5 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays. ❶ Relate to the special versions - relays with transparent cover, only available with IP 40 and RTII, operating temperature -20...+70 °C. See "Ordering codes". ❷ Relate to the special versions - relays with two normally open contacts 2 NO, with increased contact gap - dielectric strength 2000 V AC, only available with DC coils. See "Ordering codes".

Dimensions



Connection diagrams (pin side view)



2 CO **2 NO**

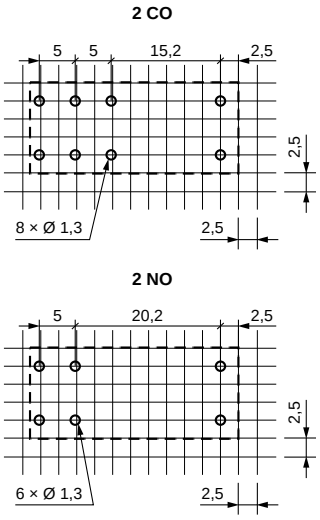
Terminal (pin)	A1(1); A2(2)	22(3); 21(4); 24(5); 12(6); 11(7); 14(8)
[mm]	Ø 0,6	0,5 x 0,9
Drilling hole: • for relays • for sockets	 Ø 1,3 + 0,1 mm Ø 1,5 + 0,1 mm	

Mounting

Relays **RM84** ❸ are designed for: • direct PCB mounting • screw terminals plug-in sockets **GZT80** ❹ and **GZM80** ❹ with clip **GZT80-0040** or **GZM80-0041**; sockets **GZS80** ❹ with clip **GZS-0040** or **GZM80-0041**; sockets **GZF80** with clip **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • spring terminals plug-in sockets **GZMB80** ❺ with clip **GZMB80-0040** or **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** ❻ are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 50** with clip **MP16-2**, MH16-2; plug-in sockets **PW80** with clip **MH16-2**; plug-insockets **GD50** with clip **MP16-2**, GD-0016, MH16-2.

❸ Relate to the special versions - relays with transparent cover: the distance of min. 5 mm between the mounting relays. ❹ Plug-in sockets **GZT80**, **GZM80**, **GZS80** may be linked with interconnection strip type **ZGGZ80** (see page 418). ❺ For sockets **GZMB80** - see page 397 (wire connection). ❻ For sockets **GZF80** not applicable modules type **M...**

Pinout (solder side view)



GZF80

Screw terminals plug-in socket for RM84, RM85..., RM87L, RM87P, RMP84, RMP85 - see page 397

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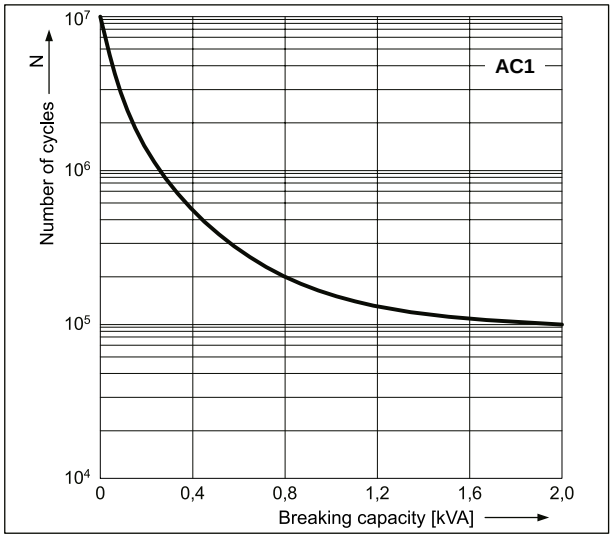
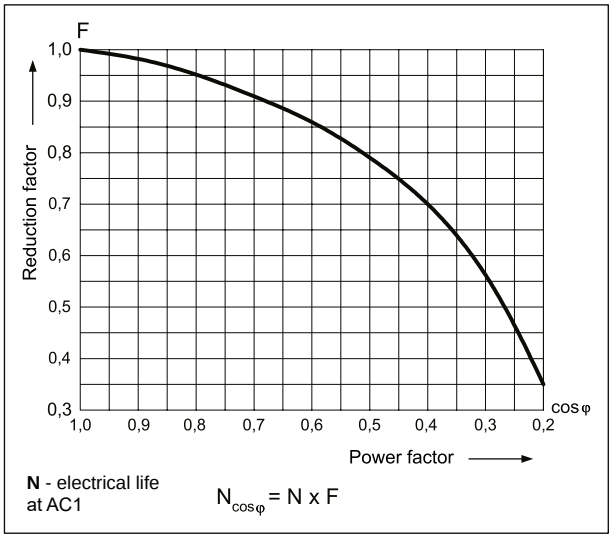
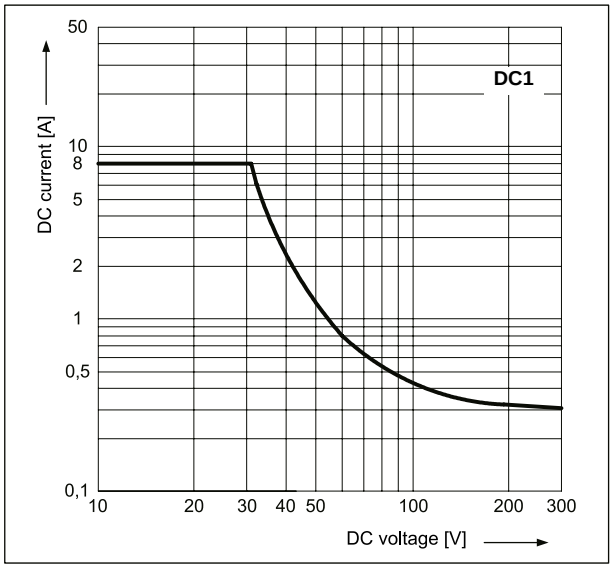
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour — Fig. 1



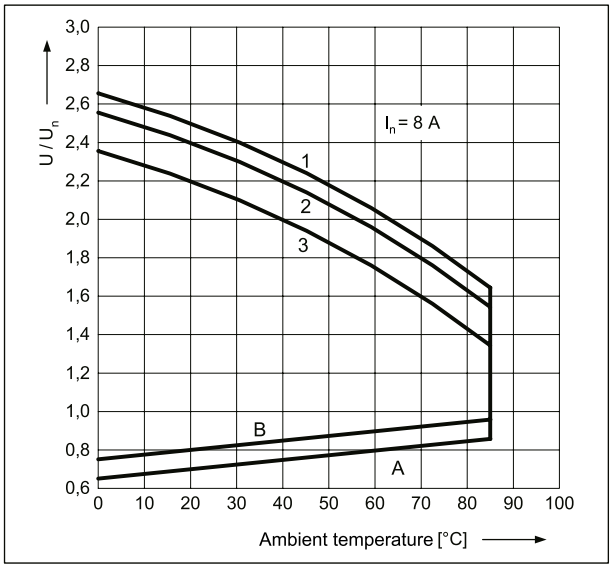
Electrical life reduction factor at AC inductive load — Fig. 2



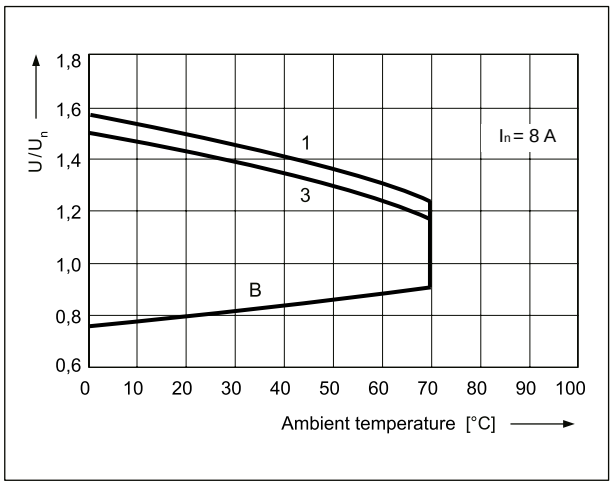
Max. DC resistive load breaking capacity — Fig. 3



Coil operating range - DC — Fig. 4



Coil operating range - AC 50 Hz — Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	**12**	**360**	**± 10%**	**8,4**	**30,6**
1018	18	710	± 10%	12,6	45,9
1024	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
5012	12	100	± 10%	9,6	13,2
5024	**24**	**400**	**± 10%**	**19,2**	**28,8**
5048	48	1 550	± 10%	38,4	57,6
5060	60	2 600	± 10%	48,0	72,0
5110	110	8 900	± 10%	88,0	132,0
5115	115	9 600	± 10%	92,0	138,0
5120	120	10 200	± 10%	96,0	144,0
5220	220	35 500	± 10%	176,0	264,0
5230	**230**	**38 500**	**± 10%**	**184,0**	**276,0**
5240	240	42 500	± 15%	192,0	288,0

The data in bold type relate to the standard versions of the relays.

Interface relays PI84 (PI85)

set: relay RM84 (RM85) + socket GZT80 (GZM80, GZMB80) - see pages 203-230

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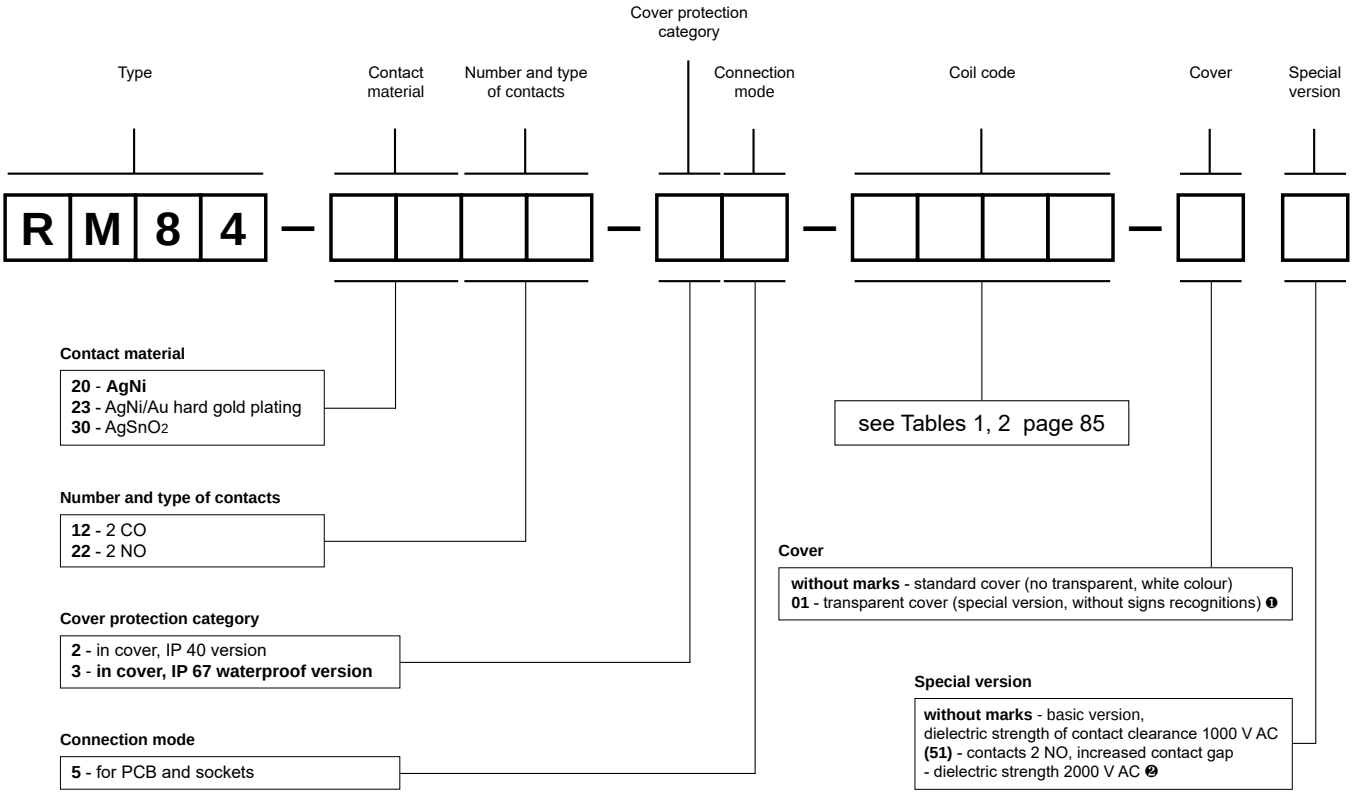
Ordering codes



❶ **01**: special version - relay with transparent cover, only available with IP 40 and RTII, operating temperature -20...+70 °C ❷ **(51)**: special version - relay with two normally open contacts 2 NO, with increased contact gap - dielectric strength 2000 V AC, only available with DC coil

Examples of ordering code:

RM84-3012-25-5024 relay **RM84**, for PCB and sockets, two changeover contacts,contact material $AgSnO_2$, coil voltage 24 V AC 50/60 Hz, in standard cover (no transparent, white colour) IP 40

RM84-2012-25-1012-01 relay **RM84**, for PCB and sockets, two changeover contacts, contact material AgNi, coil voltage 12 V DC with transparent cover (special version, without signs recognitions) IP 40

RM84-2322-35-1024 (51) relay **RM84**, special version with increased contact gap, for PCB and sockets, two normally open contacts, contact material AgNi/Au hard gold plating, coil voltage 24 V DC, in standard cover (no transparent, white colour) IP 67

- Cadmium - free contacts
- Height 17,7 mm
- 5000 V / 10 mm reinforced insulation
- **For surface mounting SMT** - for manual soldering
- AC and DC coils
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO, 2 NO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	8 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	550 W (single-phase motor)
	DC1	8 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		15 A $AgSnO_2$
Rated current		8 A
Max. breaking capacity	AC1	2 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	3 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	400 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		$> 10^5$ 8 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		$> 10^5$ 0,15 A, 220 V DC
Mechanical life (cycles)		$> 3 \times 10^7$
Dimensions (L x W x H)		29 x 13,2 x 17,7 mm
Weight		14 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		20 g
Vibration resistance	(NO/NC)	10 g / 5 g 10...150 Hz
Soldering temperature		max. 350 °C
Soldering time		max. 3 s

The data in bold type relate to the standard versions of the relays.

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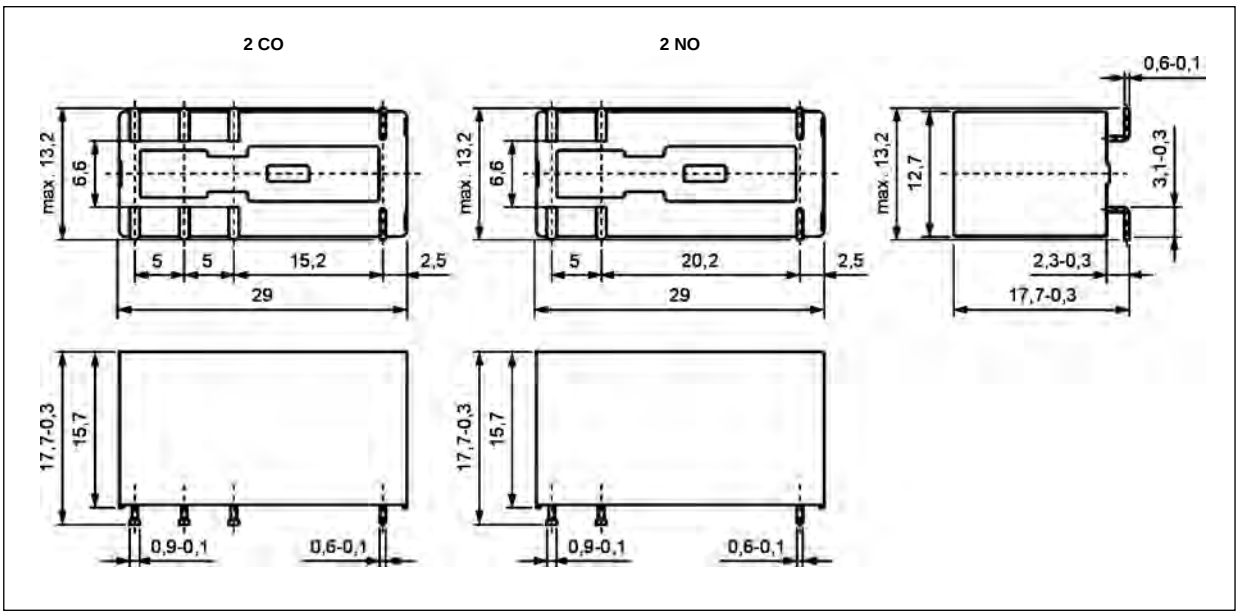
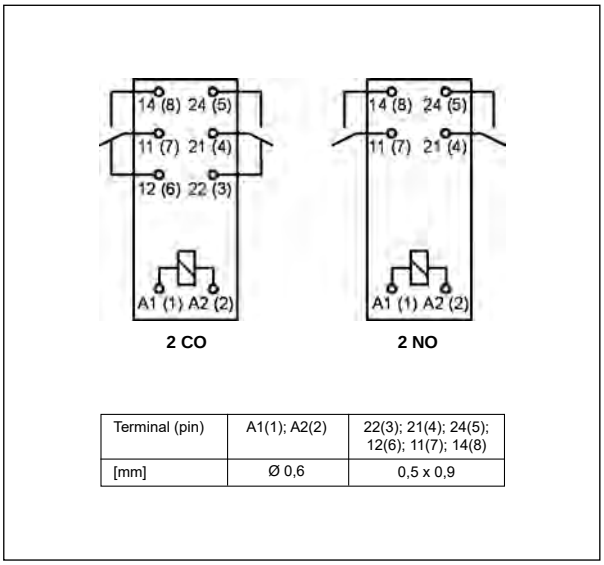
Dimensions

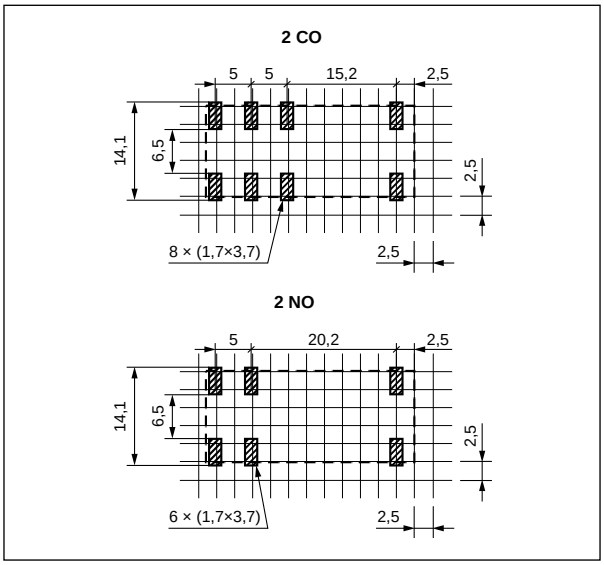


Connection diagrams (pin side view)



Terminal (pin)	A1(1); A2(2)	22(3); 21(4); 24(5); 12(6); 11(7); 14(8)
[mm]	Ø 0,6	0,5 x 0,9

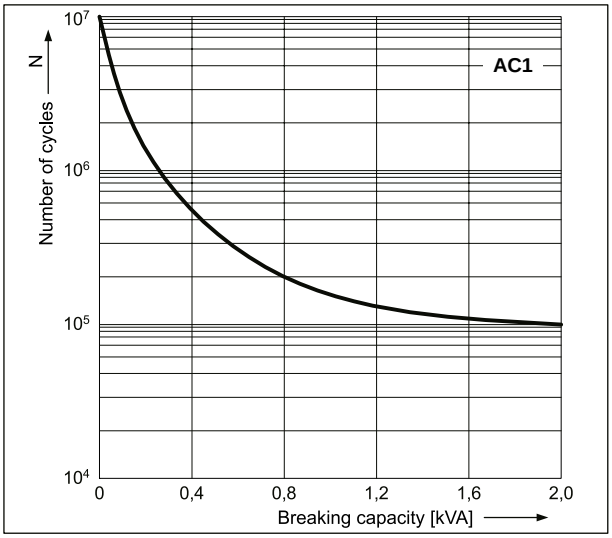
Soldering areas (solder side view)



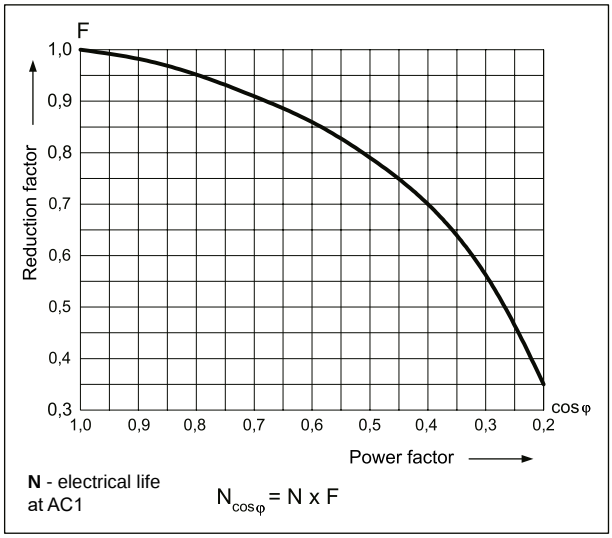
Mounting

Relays **RM84 SMT** are designed for surface mounting SMT - for manual soldering.

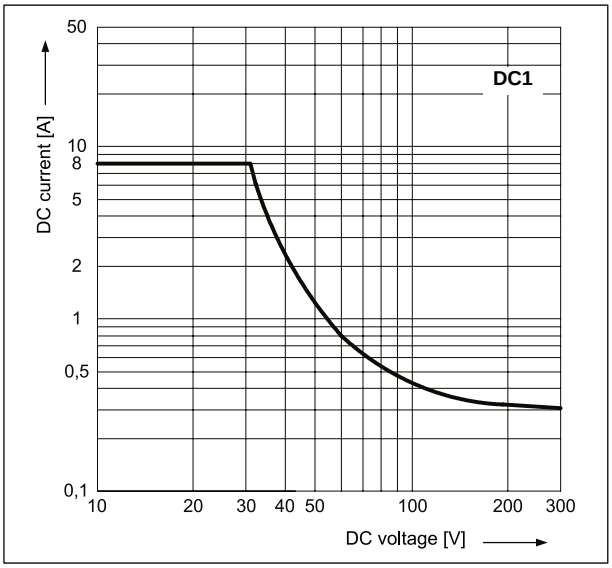
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



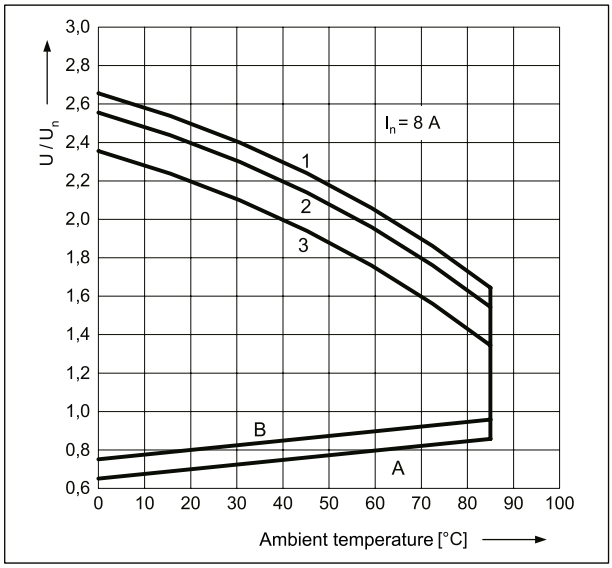
Electrical life reduction factor at AC inductive load Fig. 2



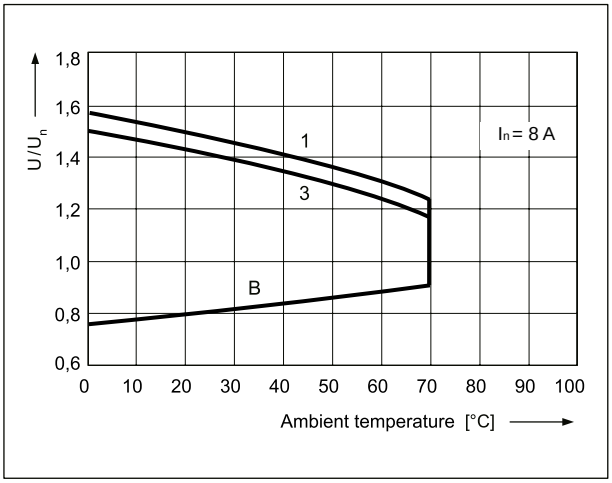
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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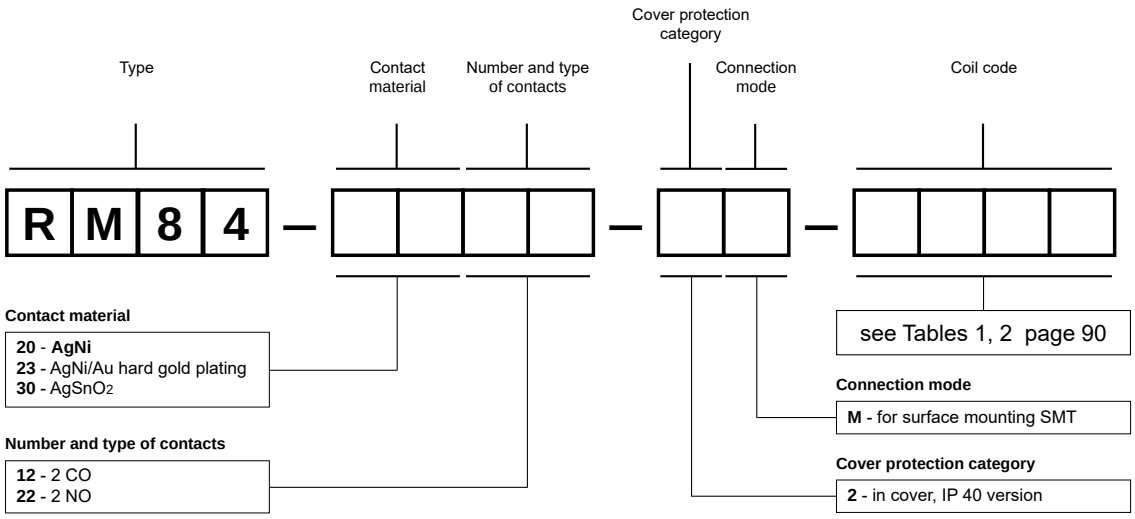
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	12	360	± 10%	8,4	30,6
1018	18	710	± 10%	12,6	45,9
1024	24	1 440	± 10%	16,8	61,2
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

Coil data - AC 50/60 Hz voltage version Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
5012	12	100	± 10%	9,6	13,2
5024	24	400	± 10%	19,2	28,8
5048	48	1 550	± 10%	38,4	57,6
5060	60	2 600	± 10%	48,0	72,0
5110	110	8 900	± 10%	88,0	132,0
5115	115	9 600	± 10%	92,0	138,0
5120	120	10 200	± 10%	96,0	144,0
5220	220	35 500	± 10%	176,0	264,0
5230	230	38 500	± 10%	184,0	276,0
5240	240	42 500	± 15%	192,0	288,0

Ordering codes



Examples of ordering code:

RM84-2012-2M-1024 relay **RM84 SMT**, for surface mounting SMT, two changeover contacts, contact material AgNi, coil voltage 24 V DC, in cover IP 40

RM84-2322-2M-5012 relay **RM84 SMT**, for surface mounting SMT, two normally open contacts, contact material AgNi/Au hard gold plating, coil voltage 12 V AC 50/60 Hz, in cover IP 40

RM85

RM85-...-01 ❶

- Cadmium - free contacts • Height 15,7 mm
- 5000 V / 10 mm reinforced insulation
- For PCB and plug-in sockets
- Accessories: sockets and modules • AC and DC coils
- Available special versions: with transparent cover ❶; with the increased dielectric strength of the contact clearance ❷
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO ❷
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	16 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		30 A $AgSnO_2$
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	3 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage		400 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength	• between coil and contacts	5 000 V AC type of insulation: reinforced
	• contact clearance	1 000 V AC type of clearance: micro-disconnection
		2 000 V AC contact 1 NO, type of clearance: full-disconnection ❷
Contact - coil distance	• clearance	≥ 10 mm
	• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		> 0,7 x 10^5 16 A, 250 V AC
		> 10^4 20 A, 250 V AC, 85 °C (RM85-3021-25-1...)
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,15 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H) / Weight		29 x 12,7 x 15,7 mm / 14 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C -20...+70 °C ❶
Cover protection category		IP 40 ❶ or **IP 67** PN-EN 60529
Environmental protection		RTII ❶ or **RTIII** PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays. ❶ Relate to the special versions - relays with transparent cover, only available with IP 40 and RTII, operating temperature -20...+70 °C. See "Ordering codes". ❷ Relate to the special versions - relays with one normally open contact 1 NO, with increased contact gap - dielectric strength 2000 V AC, only available with DC coils. See "Ordering codes".

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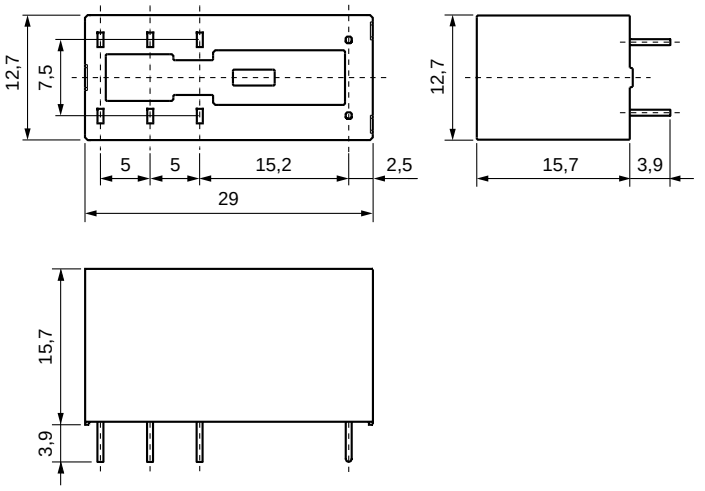
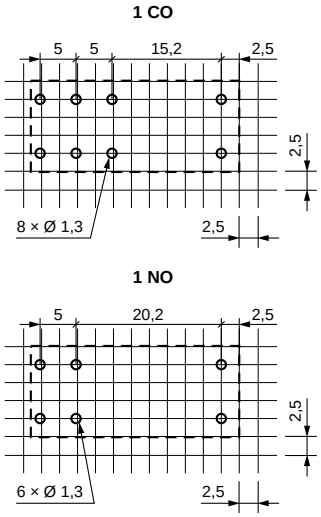
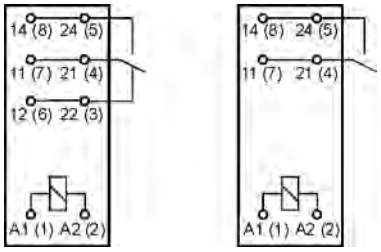
Dimensions



Pinout (solder side view)



Connection diagrams (pin side view)

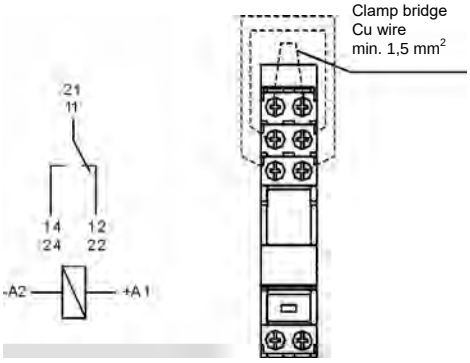


1 CO **1 NO**

Terminal (pin)	A1(1); A2(2)	22(3); 21(4); 24(5); 12(6); 11(7); 14(8)
[mm]	Ø 0,6	0,5 x 0,9
Drilling hole: • for relays • for sockets	 Ø 1,3 + 0,1 mm Ø 1,5 + 0,1 mm	

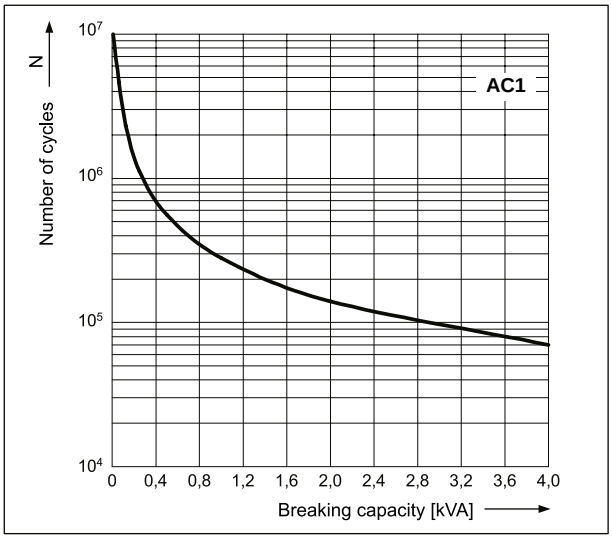
RM85 terminals are doubled for each contact.
Both terminals are to be used while connecting to load.

Connection of GZ... sockets

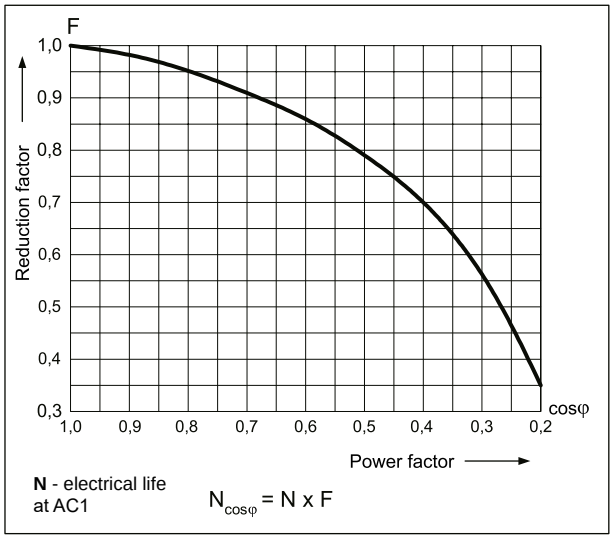


Note: Loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24. Loads up to 12 A or 10 A do not require bridging of common terminals (such bridges may be fixed, however).

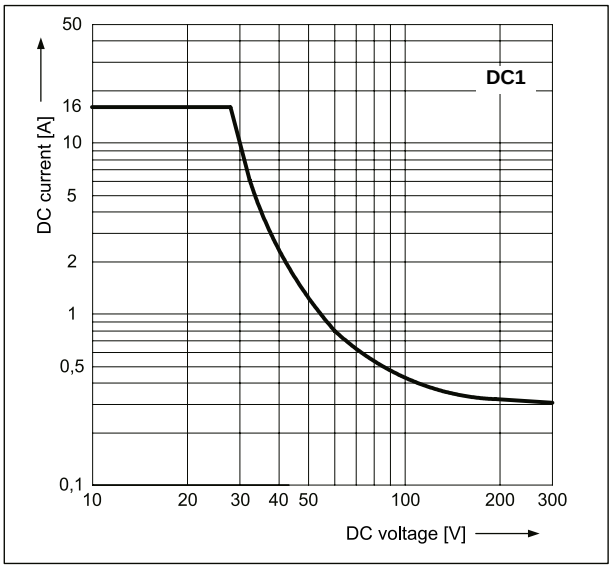
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour — Fig. 1



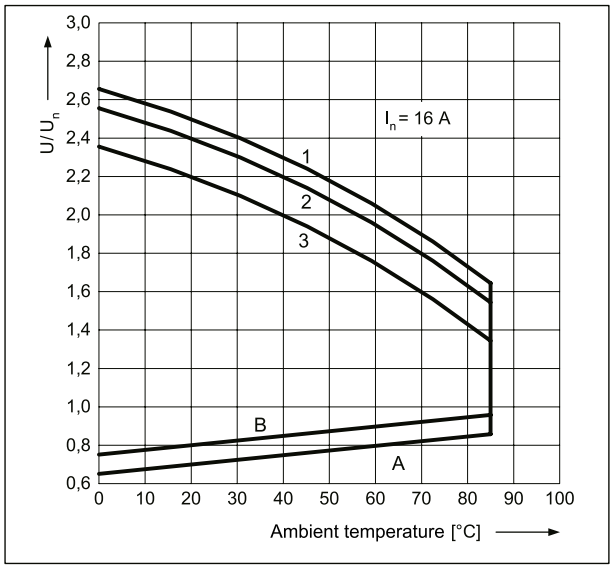
Electrical life reduction factor at AC inductive load — Fig. 2



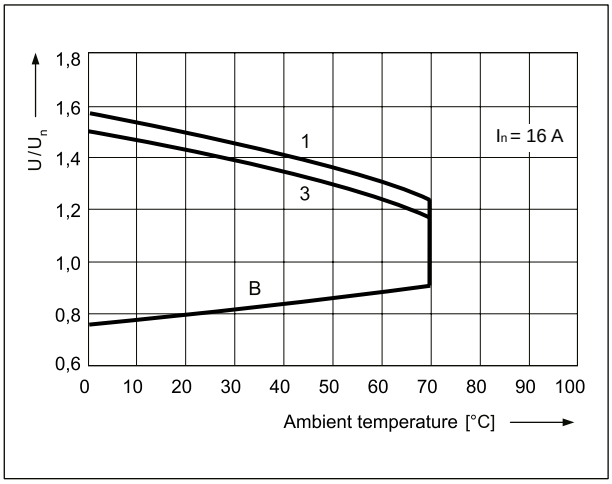
Max. DC resistive load breaking capacity — Fig. 3



Coil operating range - DC — Fig. 4



Coil operating range - AC 50 Hz — Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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Mounting

Relays **RM85** ❸ are designed for: • direct PCB mounting • screw terminals plug-in sockets **GZT80** ❹ ❺ and **GZM80** ❹ ❺ with clip **GZT80-0040** or **GZM80-0041**; sockets **GZS80** ❹ ❺ with clip **GZS-0040** or **GZM80-0041**; sockets **GZF80** ❹ with clip **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • spring terminals plug-in sockets **GZMB80** ❹ ❻ with clip **GZMB80-0040** or **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** ❼ are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 50** with clip **MP16-2**, MH16-2; plug-in sockets **PW80** with clip **MH16-2**; plug-in sockets **GD50** with clip **MP16-2**, GD-0016, MH16-2.

❸ Relate to the special versions - relays with transparent cover: the distance of min. 5 mm between the mounting relays. ❹ Loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24 - see page 92. ❺ Plug-in sockets **GZT80**, **GZM80**, **GZS80** may be linked with interconnection strip type **ZGGZ80** (see page 418). ❻ For sockets **GZMB80** - see page 397 (wire connection). ❼ For sockets **GZF80** not applicable modules type **M...**

Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	**12**	**360**	**± 10%**	**8,4**	**30,6**
1018	18	710	± 10%	12,6	45,9
1024	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

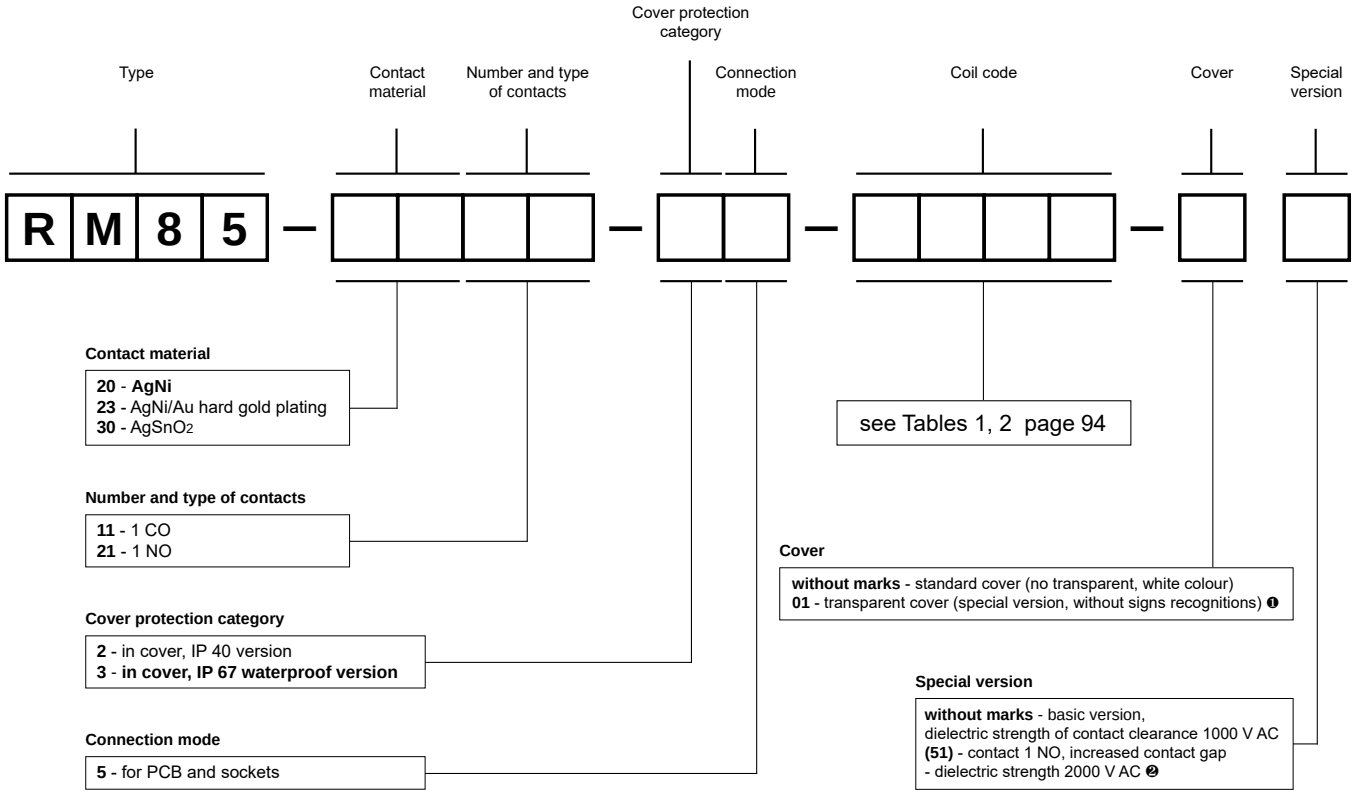
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
5012	12	100	± 10%	9,6	13,2
5024	**24**	**400**	**± 10%**	**19,2**	**28,8**
5048	48	1 550	± 10%	38,4	57,6
5060	60	2 600	± 10%	48,0	72,0
5110	110	8 900	± 10%	88,0	132,0
5115	115	9 600	± 10%	92,0	138,0
5120	120	10 200	± 10%	96,0	144,0
5220	220	35 500	± 10%	176,0	264,0
5230	**230**	**38 500**	**± 10%**	**184,0**	**276,0**
5240	240	42 500	± 15%	192,0	288,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



❶ **01**: special version - relay with transparent cover, only available with IP 40 and RTII, operating temperature -20...+70 °C ❷ **(51)**: special version - relay with one normally open contact 1 NO, with increased contact gap - dielectric strength 2000 V AC, only available with DC coil

Examples of ordering code:

RM85-3011-25-5024 relay **RM85**, for PCB and sockets, one changeover contact, contact material $AgSnO_2$, coil voltage 24 V AC 50/60 Hz, in standard cover (no transparent, white colour) IP 40

RM85-2011-25-1012-01 relay **RM85**, for PCB and sockets, one changeover contact, contact material AgNi, coil voltage 12 V DC, with transparent cover (special version, without signs recognitions) IP 40

RM85-2321-35-1024 (51) relay **RM85**, special version with increased contact gap, for PCB and sockets, one normally open contact, contact material AgNi/Au hard gold plating, coil voltage 24 V DC, in standard cover (no transparent, white colour) IP 67

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- **Switching voltage 480 V AC**
- Contact gap: 0,6 mm
- Cadmium - free contacts
- Height 15,7 mm
- 5000 V / 10 mm reinforced insulation
- For PCB • DC coils
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 NO
Contact material		**$AgSnO_2$**
Rated / max. switching voltage	AC	250 V / 480 V
Min. switching voltage		10 V
Rated load (capacity)	AC1	5 A / 480 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		10 mA
Max. inrush current		30 A
Rated current		16 A / 250 V AC
Max. breaking capacity	AC1	2 400 VA
Min. breaking capacity		1 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V
Max. operating frequency		
• at rated load	AC1	360 cycles/hour
• no load		3 600 cycles/hour

Coil data

Rated voltage	DC	3 ... 110 V
Must release voltage		≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

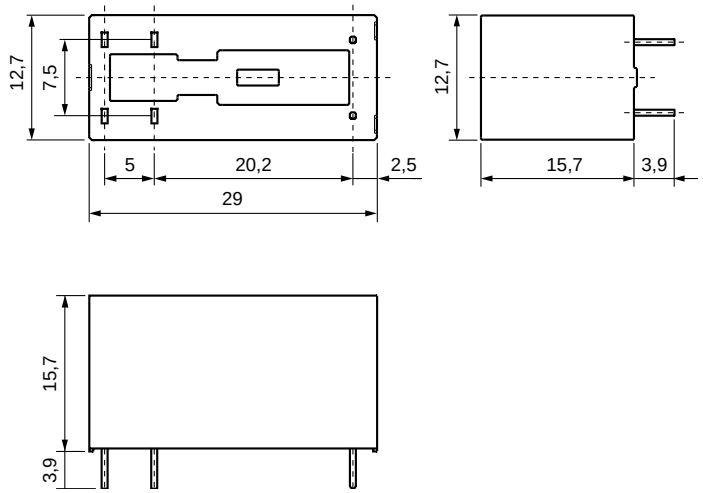
Insulation rated voltage	480 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	2
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	2 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

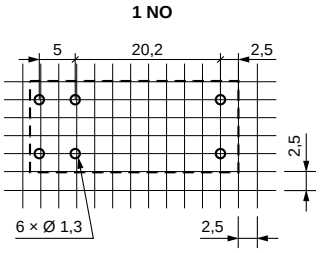
Operating / release time (typical values)		7 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		> 4 x 10^4 5 A, 480 V AC
Mechanical life	3 600 cycles/hour	> 3 x 10^7
Electromagnetic load according to UL 508		Heavy Pilot Duty 480 V AC, 15 A make / 1,5 A break
Dimensions (L x W x H)		29 x 12,7 x 15,7 mm
Weight		14 g
Ambient temperature	• storage	-40...+85 °C
	• operating	-40...+85 °C
Cover protection category		IP 40 or **IP 67** PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays.

Dimensions



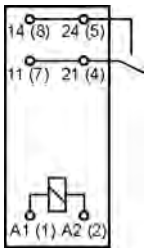
Pinout (solder side view)



Mounting

Relays **RM85 for switching higher voltages** are designed for direct PCB mounting.

Connection diagram (pin side view)



1 NO

Terminal (pin)	A1(1); A2(2)	21(4); 24(5); 11(7); 14(8)
[mm]	Ø 0,6	0,5 x 0,9
Drilling hole: • for relays	Ø 1,3 + 0,1 mm	

RM85 for switching higher voltages terminals are doubled for each contact. Both terminals are to be used while connecting to load.

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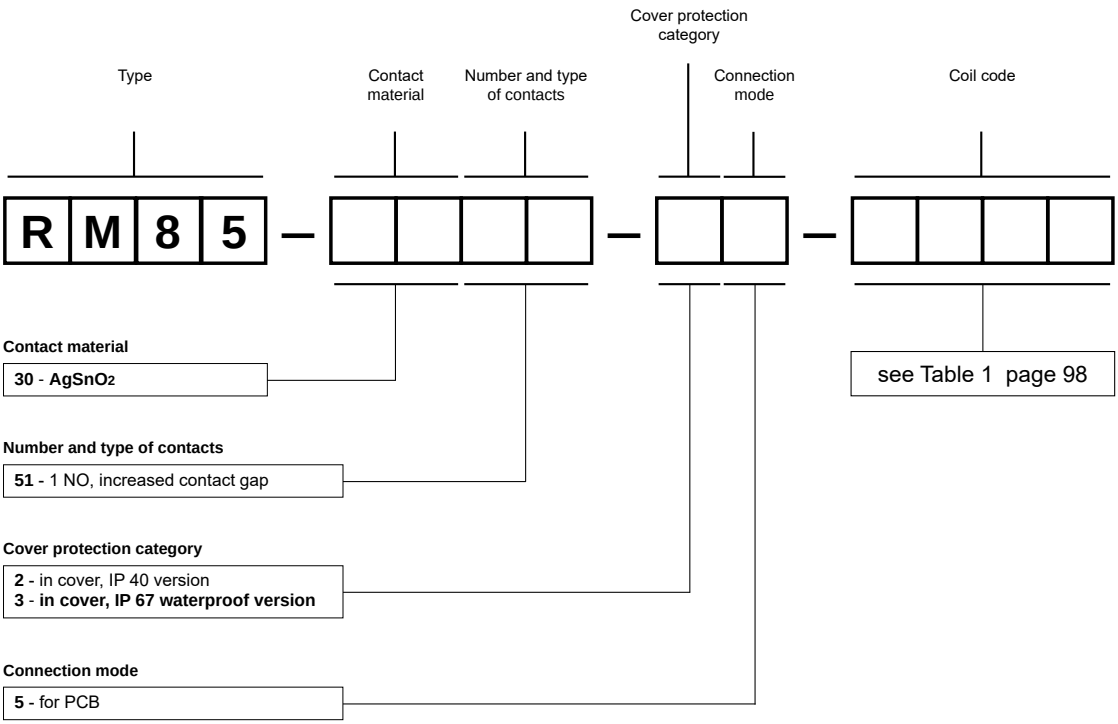
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	**12**	**360**	**± 10%**	**8,4**	**30,6**
1018	18	710	± 10%	12,6	45,9
1024	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Example of ordering code:

RM85-3051-35-1012 relay **RM85**, with increased contact gap, for PCB, one normally open contact, contact material $AgSnO_2$, coil voltage 12 V DC, in cover IP 67

- Cadmium - free contacts • Height 15,7 mm • **Resistance to inrush current 80 A (20 ms)** • 5000 V / 10 mm reinforced insulation
- For PCB and plug-in sockets
- DC coils • Accessories: sockets and modules
- Applications: for motor operation control, lighting, electromagnetic valves, and many other applications
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 NO
Contact material		**$AgSnO_2$**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V
Rated load (capacity)	AC1	16 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 2)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		10 mA
Max. inrush current		80 A 20 ms
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		1 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	DC	3 ... 110 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1 and Fig. 3
Rated power consumption	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	400 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		8 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1	600 cycles/hour	> 10^5 16 A, 250 V AC
• cosφ		see Fig. 1
• resistive DC1	600 cycles/hour	> 10^5 16 A, 24 V DC
• inductive AC3, I = 3,5 A		> 2,5 x 10^5
• at incandescent lamp load, 1000 W		> 0,9 x 10^5
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		29 x 12,7 x 15,7 mm
Weight		14 g
Ambient temperature	• storage	-40...+85 °C
	• operating	-40...+85 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays.

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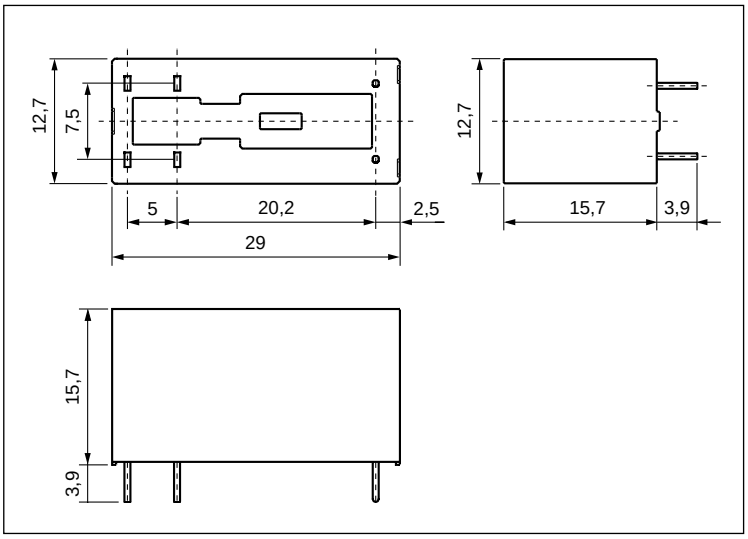
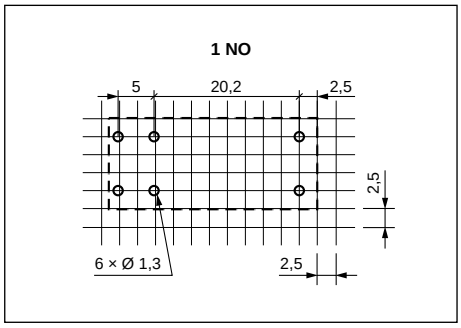
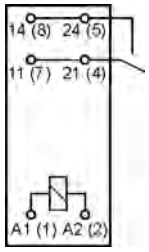
Dimensions



Pinout (solder side view)



Connection diagram (pin side view)

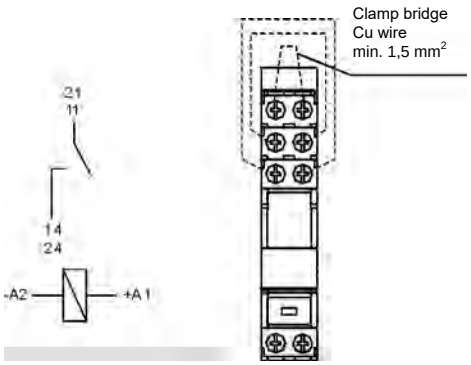


1 NO

Terminal (pin)	A1(1); A2(2)	21(4); 24(5); 11(7); 14(8)
[mm]	Ø 0,6	0,5 x 0,9
Drilling hole: • for relays • for sockets	 Ø 1,3 + 0,1 mm Ø 1,5 + 0,1 mm	

RM85 inrush terminals are doubled for each contact. Both terminals are to be used while connecting to load.

Connection of GZ... sockets



Note: Loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 14 with 24. Loads up to 12 A or 10 A do not require bridging of common terminals (such bridges may be fixed, however).

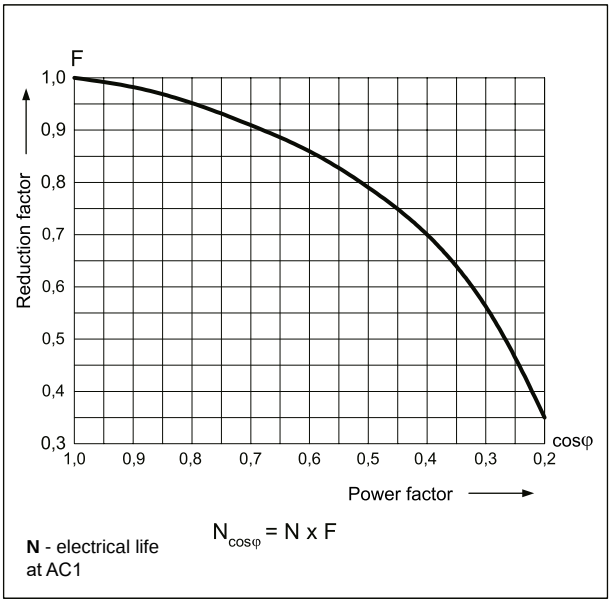
Mounting

Relays **RM85 inrush** are designed for: • direct PCB mounting • screw terminals plug-in sockets **GZT80** ❶ ❷ and **GZM80** ❶ ❷ with clip **GZT80-0040** or **GZM80-0041**; sockets **GZS80** ❶ ❷ with clip **GZS-0040** or **GZM80-0041**; sockets **GZF80** ❶ with clip **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • spring terminals plug-in sockets **GZMB80** ❶ ❸ with clip **GZMB80-0040** or **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** ❹ are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 50** with clip **MP16-2**, MH16-2; plug-in sockets **PW80** with clip **MH16-2**; plug-in sockets **GD50** with clip **MP16-2**, GD-0016, MH16-2.

❶ Loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 14 with 24 - see page 100. ❷ Plug-in sockets **GZT80**, **GZM80**, **GZS80** may be linked with interconnection strip type **ZGGZ80** (see page 418). ❸ For sockets **GZMB80** - see page 397 (wire connection). ❹ For sockets **GZF80** not applicable modules type **M...**

Electrical life reduction factor at AC inductive load

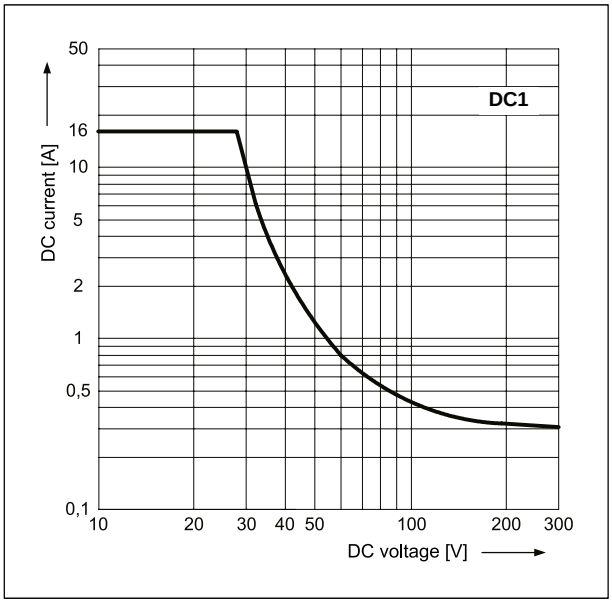
Fig. 1



N - electrical life at AC1

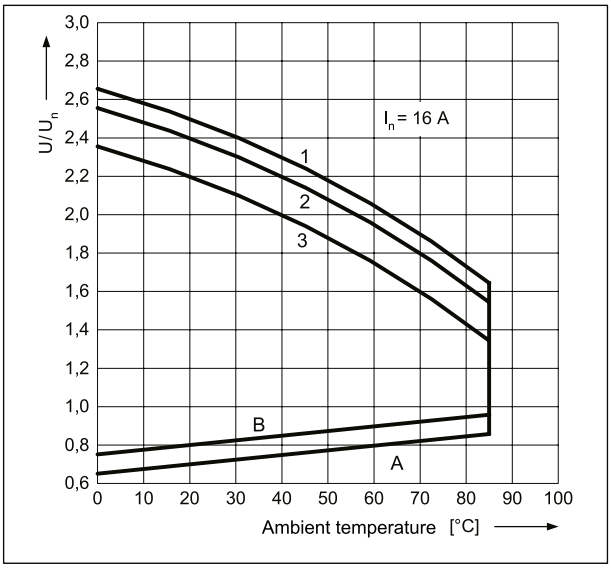
Max. DC resistive load breaking capacity

Fig. 2



Coil operating range - DC

Fig. 3



Description of Fig. 3

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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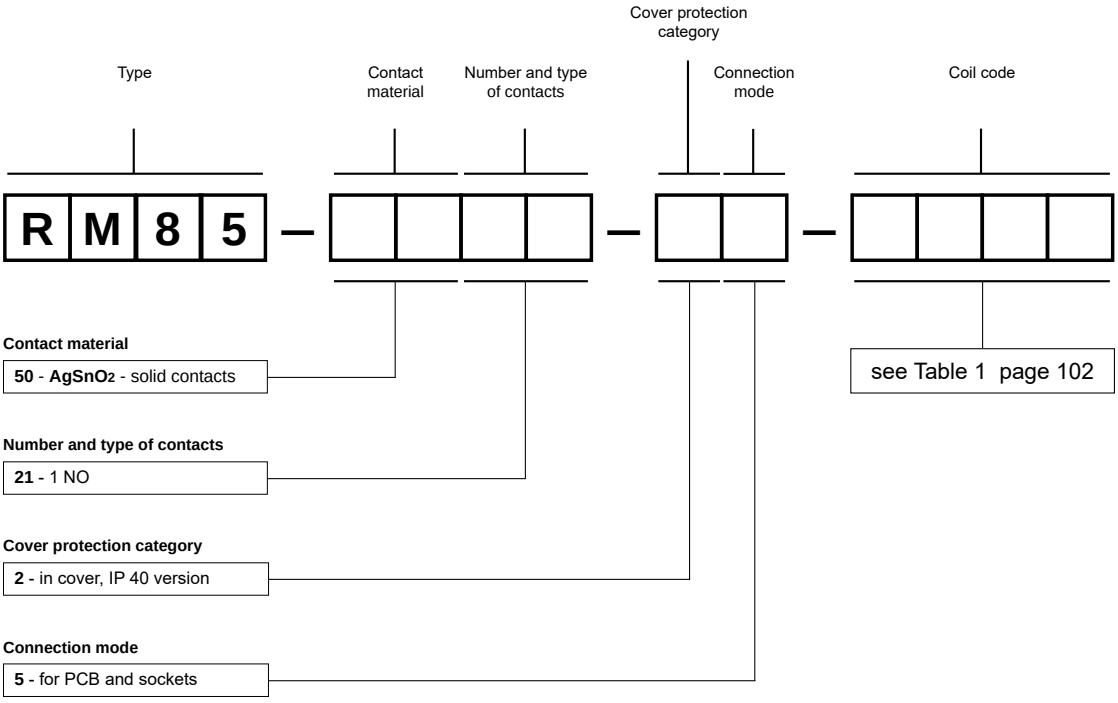
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	**12**	**360**	**± 10%**	**8,4**	**30,6**
1018	18	710	± 10%	12,6	45,9
1024	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Example of ordering code:

RM85-5021-25-1012 relay **RM85 inrush**, for PCB and sockets, one normally open contact, contact material $AgSnO_2$ - solid contacts, coil voltage 12 V DC, in cover IP 40

- For PCB and plug-in sockets
- Accessories: sockets and modules
- DC coils - sensitive
- Ambient temperature up to 105 °C
- Applications: in household equipment, in temperature controlers
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 NO
Contact material		AgNi, AgNi/Au hard gold plating, **AgSnO2**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	16 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 2)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		30 A $AgSnO_2$
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	DC	5 ... 48 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1 and Fig. 3
Rated power consumption	DC	0,25 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	400 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		8 ms / 3 ms
Electrical life (number of cycles)	• resistive AC1	$> 10^5$ 16 A, 230 V AC, 70 °C
		$> 2 \times 10^4$ 16 A, 230 V AC, 105 °C
		$> 1,7 \times 10^5$ 10 A, 230 V AC, 105 °C
		$> 2,8 \times 10^5$ 8 A, 230 V AC, 105 °C
		$> 3,2 \times 10^5$ 6 A, 230 V AC, 105 °C
	• cosφ	see Fig. 1
	• DC L/R=40 ms	$> 10^5$ 0,15 A, 220 V DC
Mechanical life (cycles)		$> 3 \times 10^7$
Dimensions (L x W x H)		29 x 12,7 x 15,7 mm
Weight		14 g
Ambient temperature	• storage	-40...+105 °C
	• operating	-40...+105 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays.

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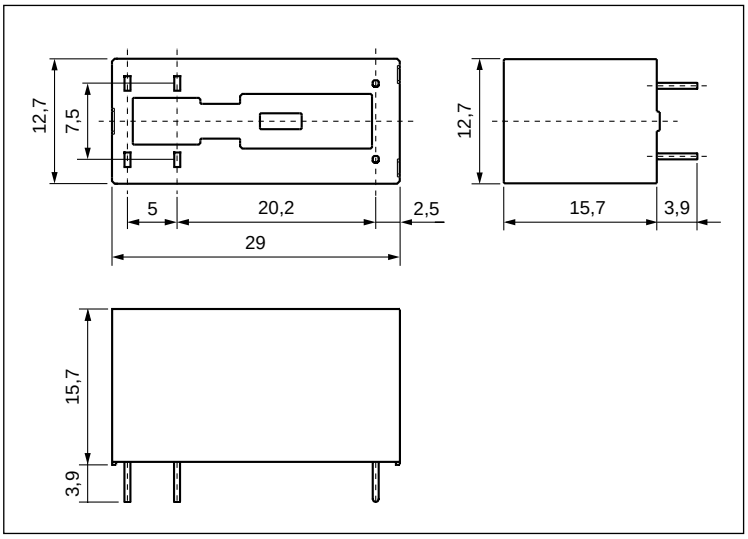
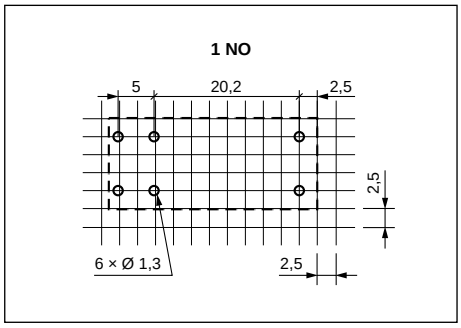
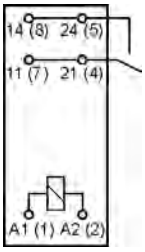
Dimensions



Pinout (solder side view)



Connection diagram (pin side view)

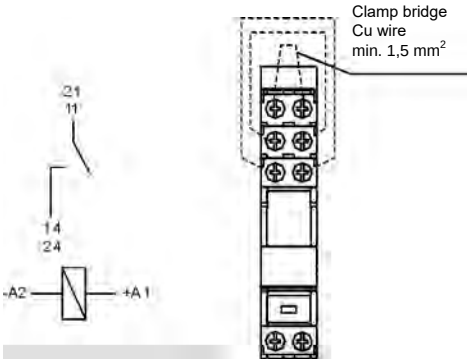


1 NO

Terminal (pin)	A1(1); A2(2)	21(4); 24(5); 11(7); 14(8)
[mm]	Ø 0,6	0,5 x 0,9
Drilling hole: • for relays • for sockets	 Ø 1,3 + 0,1 mm Ø 1,5 + 0,1 mm	

RM85 105 °C sensitive terminals are doubled for each contact. Both terminals are to be used while connecting to load.

Connection of GZ... sockets



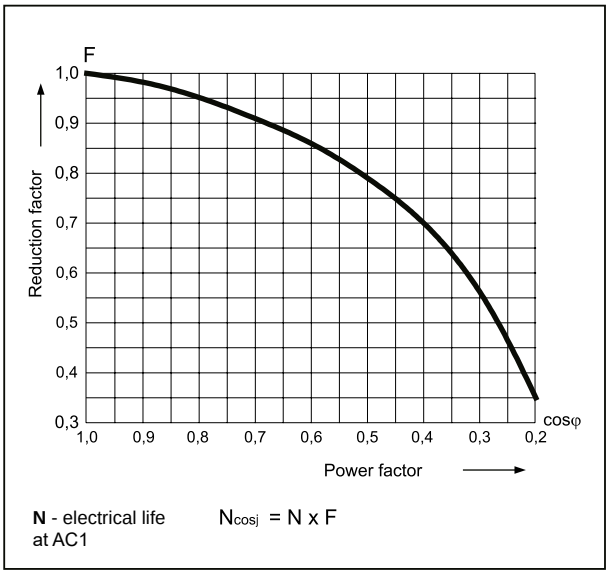
Note: Loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 14 with 24. Loads up to 12 A or 10 A do not require bridging of common terminals (such bridges may be fixed, however).

Mounting

Relays **RM85 105 °C sensitive** are designed for: • direct PCB mounting • screw terminals plug-in sockets **GZT80** ❶ ❷ and **GZM80** ❶ ❷ with clip **GZT80-0040** or **GZM80-0041**; sockets **GZS80** ❶ ❷ with clip **GZS-0040** or **GZM80-0041**; sockets **GZF80** ❶ with clip **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • spring terminals plug-in sockets **GZMB80** ❶ ❸ with clip **GZMB80-0040** or **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** ❹ are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 50** with clip **MP16-2**, MH16-2; plug-in sockets **PW80** with clip **MH16-2**; plug-in sockets **GD50** with clip **MP16-2**, GD-0016, MH16-2.

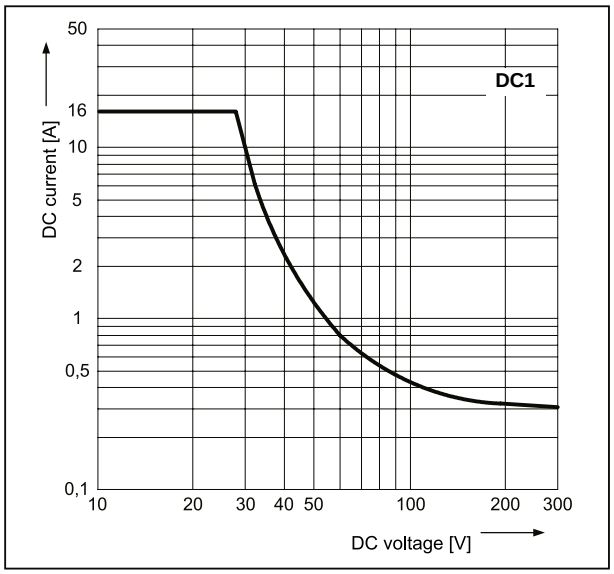
❶ Loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 14 with 24 - see page 104. ❷ Plug-in sockets **GZT80**, **GZM80**, **GZS80** may be linked with interconnection strip type **ZGGZ80** (see page 418). ❸ For sockets **GZMB80** - see page 397 (wire connection). ❹ For sockets **GZF80** not applicable modules type **M...**

Electrical life reduction factor at AC inductive load — Fig. 1

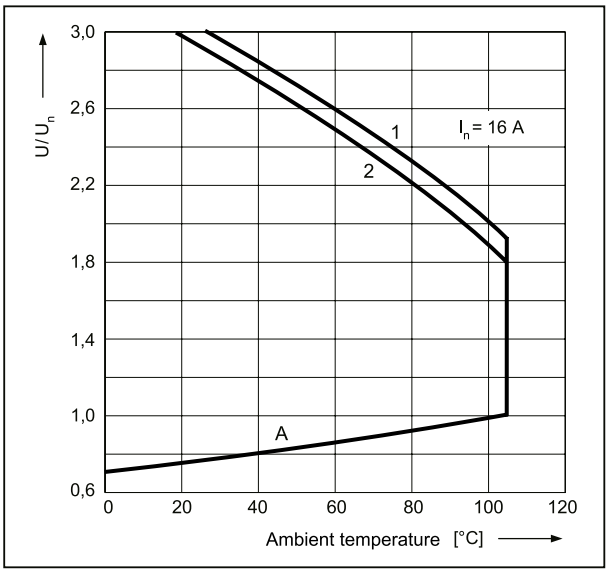


N - electrical life at AC1 $N_{cosj} = N \times F$

Max. DC resistive load breaking capacity — Fig. 2



Coil operating range - DC — Fig. 3



Description of Fig. 3

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - rated load

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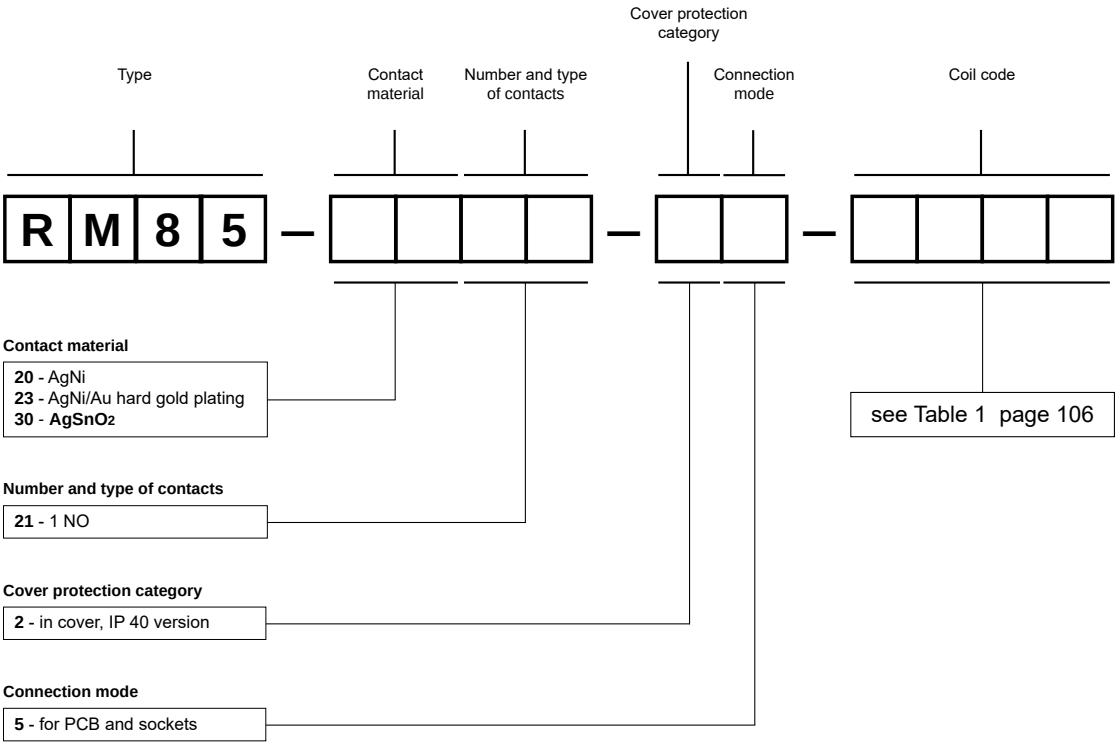
Coil data - DC voltage version, sensitive Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S005	5	102	± 10%	3,75	15,0
S006	6	144	± 10%	4,50	18,0
S009	9	330	± 10%	6,75	27,0
S010	10	380	± 10%	7,50	30,0
S012	12	580	± 10%	9,00	36,0
S018	18	1 300	± 10%	13,50	54,0
S024	24	2 300	± 10%	18,00	72,0
S048	48	9 340	± 10%	36,00	144,0

Ordering codes



Examples of ordering code:

RM85-3021-25-S012 relay **RM85 105 ºC sensitive**, for PCB and sockets, one normally open contact, contact material $AgSnO_2$, sensitive coil voltage 12 V DC, in cover IP 40

RM85-2321-25-S005 relay **RM85 105 ºC sensitive**, for PCB and sockets, one normally open contact, contact material AgNi/Au hard gold plating, sensitive coil voltage 5 V DC, in cover IP 40

- Cadmium - free contacts
- Height 17,7 mm
- 5000 V / 10 mm reinforced insulation
- **For surface mounting SMT** - for manual soldering
- AC and DC coils
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	16 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		30 A $AgSnO_2$
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	3 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	400 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		> 0,7 x 10^5 16 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,15 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		29 x 13,2 x 17,7 mm
Weight		14 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz
Soldering temperature		max. 350 °C
Soldering time		max. 3 s

The data in bold type relate to the standard versions of the relays.

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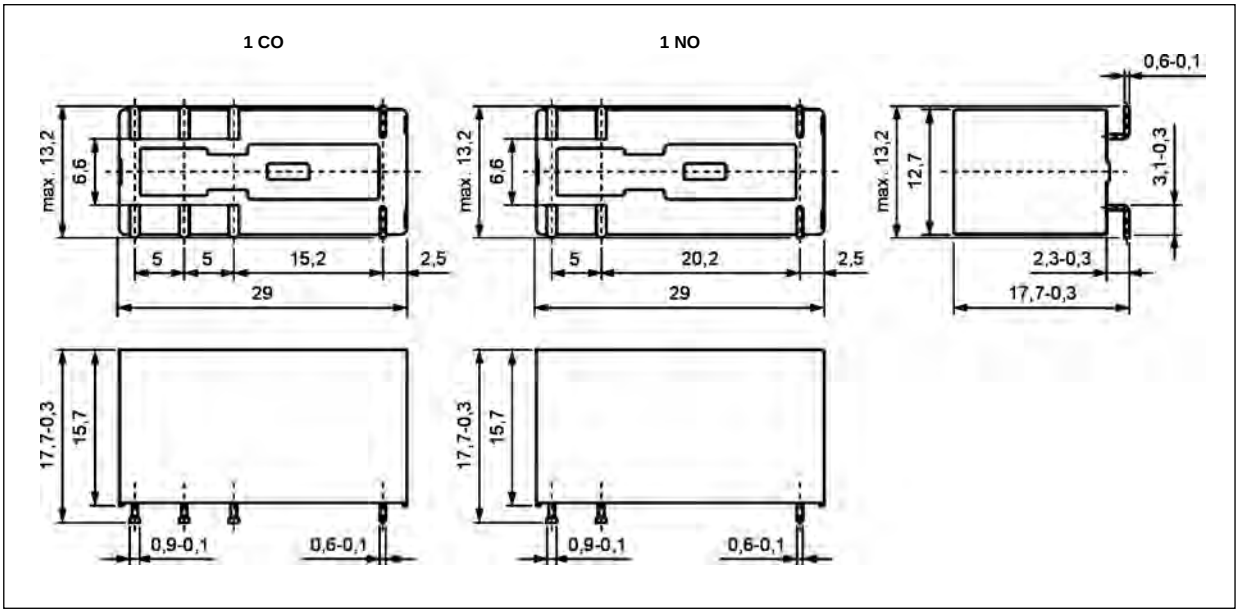
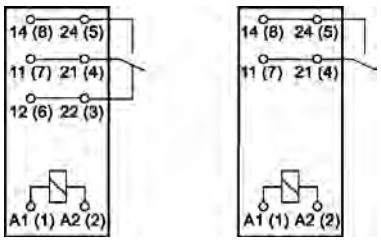
Dimensions



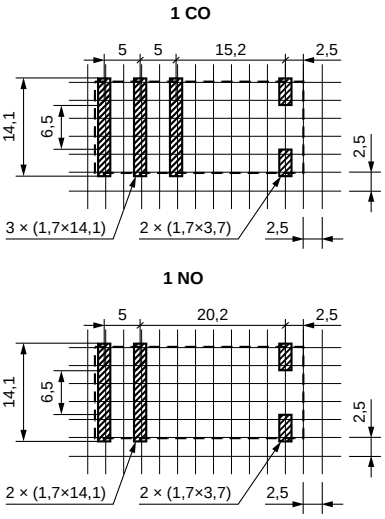
Connection diagrams (pin side view)



Terminal (pin)	A1(1); A2(2)	22(3); 21(4); 24(5); 12(6); 11(7); 14(8)
[mm]	Ø 0,6	0,5 x 0,9

RM85 SMT terminals are doubled for each contact.
Both terminals are to be used while connecting to load.

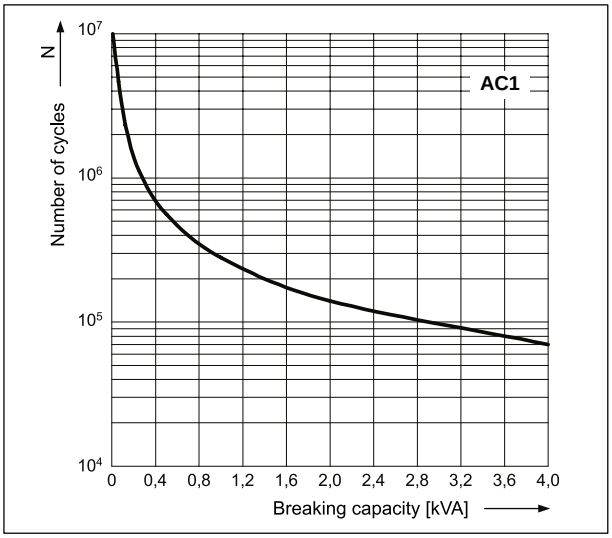
Soldering areas (solder side view)



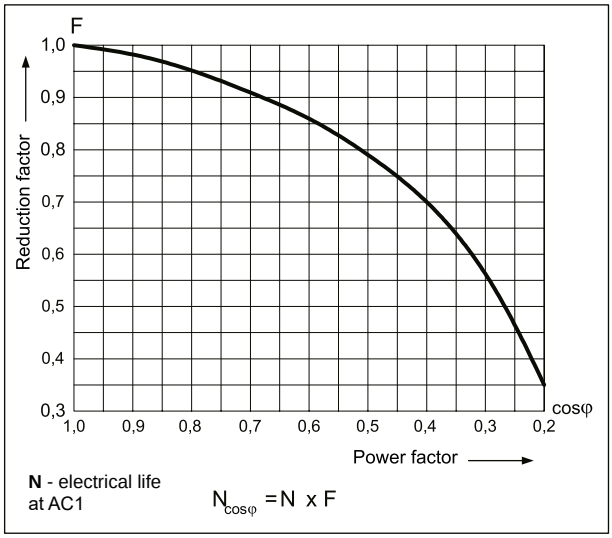
Mounting

Relays **RM85 SMT** are designed for surface mounting SMT - for manual soldering.

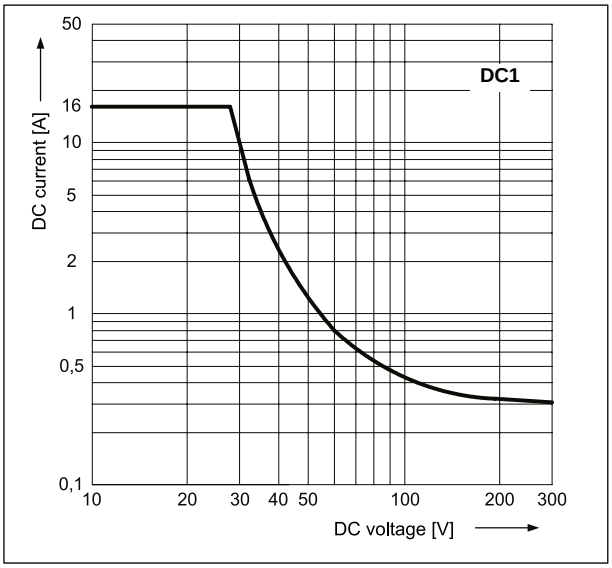
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour — Fig. 1



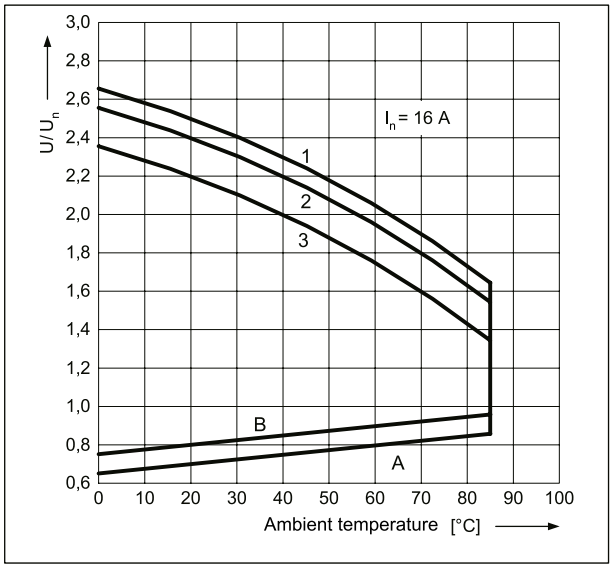
Electrical life reduction factor at AC inductive load — Fig. 2



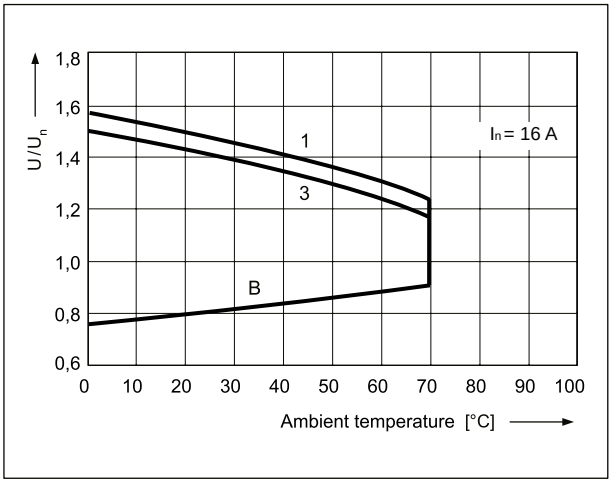
Max. DC resistive load breaking capacity — Fig. 3



Coil operating range - DC — Fig. 4



Coil operating range - AC 50 Hz — Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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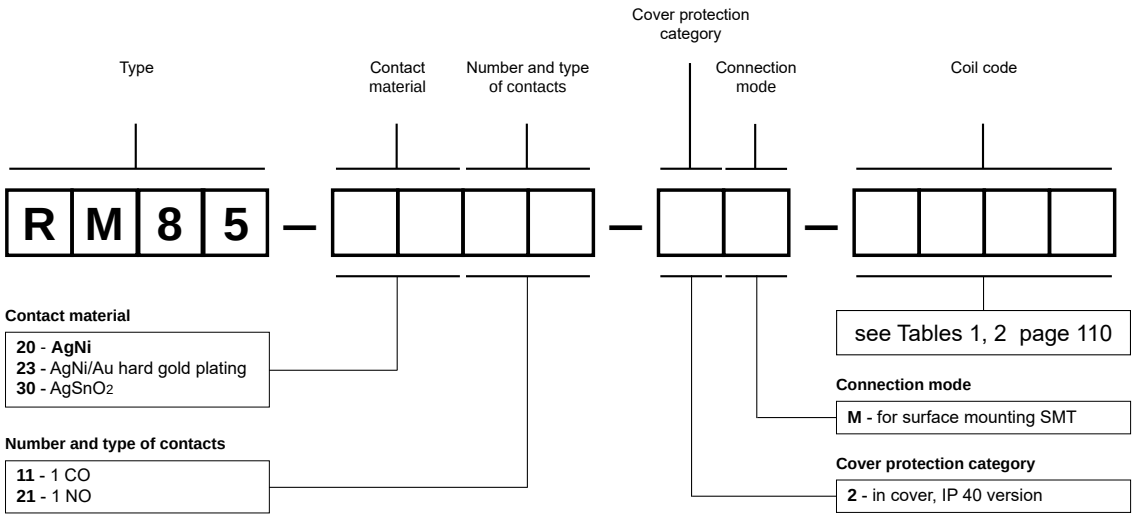
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	12	360	± 10%	8,4	30,6
1018	18	710	± 10%	12,6	45,9
1024	24	1 440	± 10%	16,8	61,2
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

Coil data - AC 50/60 Hz voltage version Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
5012	12	100	± 10%	9,6	13,2
5024	24	400	± 10%	19,2	28,8
5048	48	1 550	± 10%	38,4	57,6
5060	60	2 600	± 10%	48,0	72,0
5110	110	8 900	± 10%	88,0	132,0
5115	115	9 600	± 10%	92,0	138,0
5120	120	10 200	± 10%	96,0	144,0
5220	220	35 500	± 10%	176,0	264,0
5230	230	38 500	± 10%	184,0	276,0
5240	240	42 500	± 15%	192,0	288,0

Ordering codes

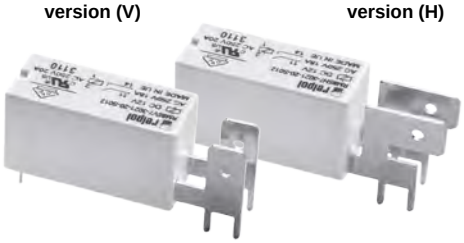


Examples of ordering code:

RM85-2011-2M-1024 relay **RM85 SMT**, for surface mounting SMT, one changeover contact, contact material AgNi, coil voltage 24 V DC, in cover IP 40

RM85-2321-2M-5012 relay **RM85 SMT**, for surface mounting SMT, one normally open contact, contact material AgNi/Au hard gold plating, coil voltage 12 V AC 50/60 Hz, in cover IP 40

version (V) version (H)



• Cadmium - free contacts • Height 15,7 mm • 5000 V / 10 mm reinforced insulation • **Coil terminals for PCB, contacts terminals for PCB and flat insert connectors - faston 250 (6,3 x 0,8 mm), faston arrangement: vertical version (V) and horizontal version (H)** • DC coils - sensitive • Ambient temperature up to 105 °C • Applications: for control of operation of heating elements and motors of household equipment and catering industry devices, for control of electromagnetic valves, in many other applications • Compliance with standard PN-EN 60335-1
• Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 NO
Contact material		**$AgSnO_2$**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V
Rated load (capacity)	AC1	20 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	20 A / 24 V DC
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		10 mA
Max. inrush current		30 A
Rated current		20 A
Max. breaking capacity	AC1	5 000 VA
Min. breaking capacity		1 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	DC	5 ... 48 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,25 W

Insulation according to PN-EN 60664-1

Insulation rated voltage		400 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength		
• between coil and contacts		5 000 V AC type of insulation: reinforced
• contact clearance		1 000 V AC type of clearance: micro-disconnection
Contact - coil distance		
• clearance		≥ 10 mm
• creepage		≥ 10 mm

General data

Operating / release time (typical values)		8 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		> 2 x 10^4 20 A, 250 V AC, 85 °C
		> 1,5 x 10^5 10 A, 250 V AC, 105 °C
• cosφ		see Fig. 1
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		vertical version (V): 40,5 x 12,7 x 15,7 mm
		horizontal version (H): 44,5 x 12,7 x 15,7 mm
Weight		16 g
Ambient temperature	• storage	-40...+105 °C
	• operating	-40...+105 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays.

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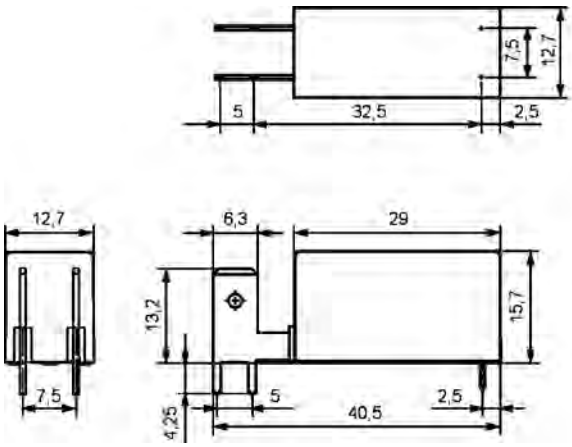
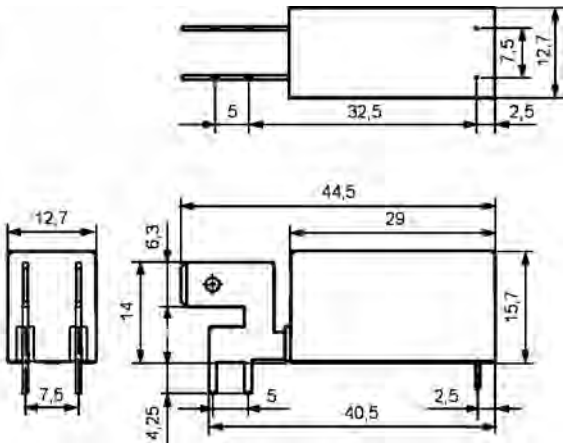
Dimensions

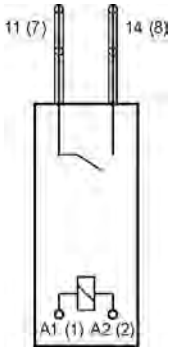
vertical version (V)



horizontal version (H)



Connection diagram (pin side view)

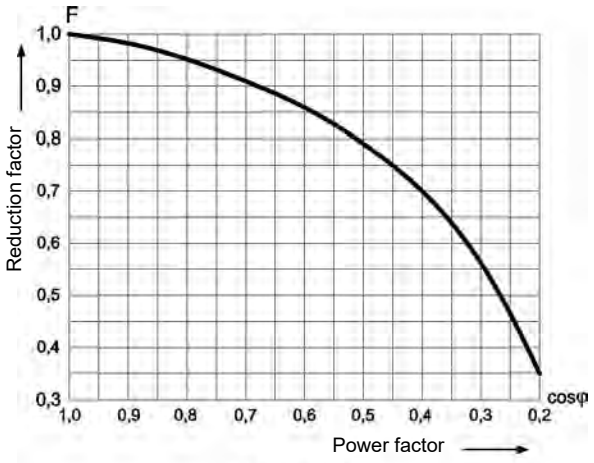


1 NO

Terminal (pin)	A1(1); A2(2)	11(7); 14(8)
[mm]	Ø 0,6	1,2 x 0,8 faston 6,3 x 0,8
Drilling hole: • for relays	Ø 1,3 + 0,1 mm	

Electrical life reduction factor at AC inductive load

Fig. 1

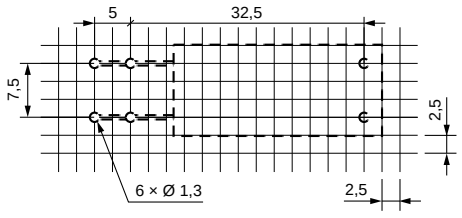


N - electrical life at AC1

$N_{cos\varphi} = N \times F$

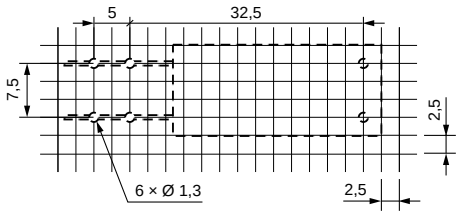
Pinout (solder side view)

vertical version (V)



1 NO

horizontal version (H)



1 NO

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Mounting

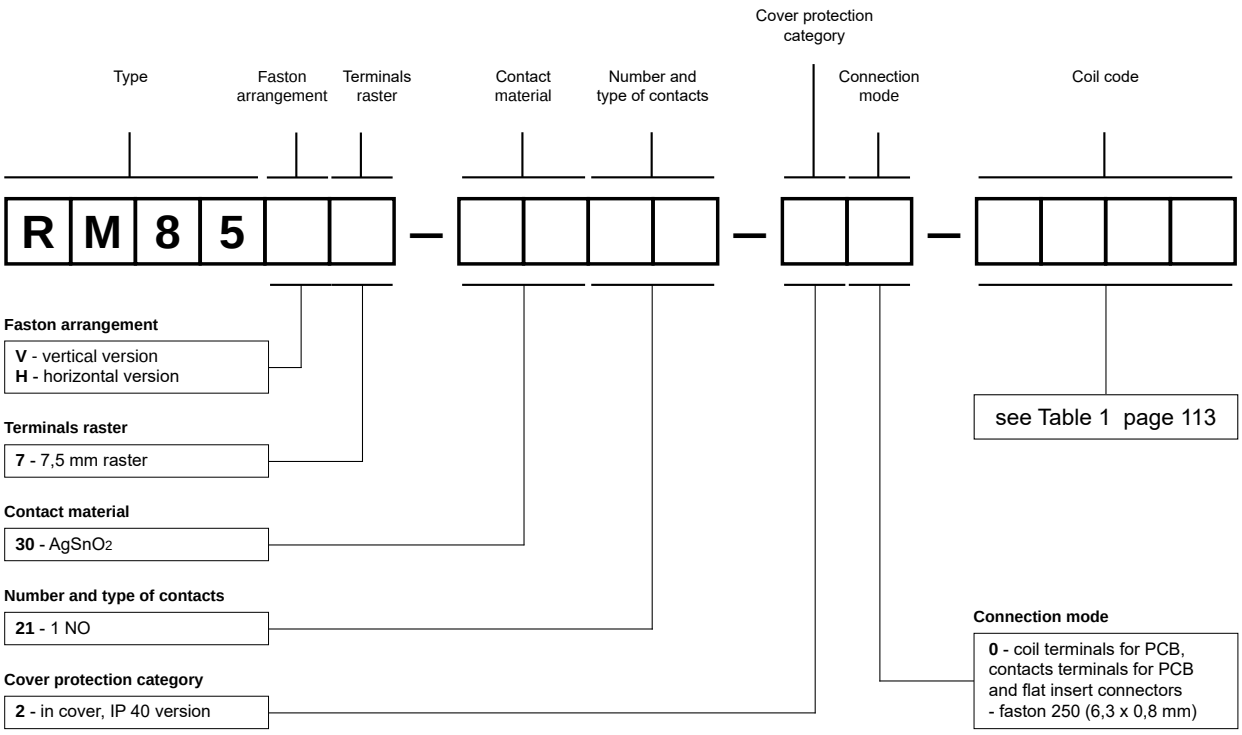
Relays **RM85 faston** are designed for: • direct PCB mounting • connection of load with flat insert connectors - faston 250 (6,3 x 0,8 mm).

Coil data - DC voltage version, sensitive — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S005	5	102	± 10%	3,75	15,0
S006	6	144	± 10%	4,50	18,0
S009	9	330	± 10%	6,75	27,0
S010	10	380	± 10%	7,50	30,0
S012	**12**	**580**	**± 10%**	**9,00**	**36,0**
S018	18	1 300	± 10%	13,50	54,0
S024	**24**	**2 300**	**± 10%**	**18,00**	**72,0**
S048	48	9 340	± 10%	36,00	144,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Example of ordering code:

RM85V7-3021-20-S012 relay **RM85 faston**, vertical version, coil terminals for PCB, contacts terminals for PCB and flat insert connectors - faston 250 (6,3 x 0,8 mm), 7,5 mm terminals raster, one normally open contact, contact material $AgSnO_2$, sensitive coil voltage 12 V DC, in cover IP 40

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RM87N-...-01 ❶ RM87N sensitive

- Cadmium - free contacts • Height 15,7 mm
- 5000 V / 10 mm reinforced insulation • For PCB and plug-in sockets
- Accessories: sockets and modules • **AC and DC coils - standard (RM87), DC coils - sensitive (RM87 sensitive)**
- Available special versions: with transparent cover ❶; with the increased dielectric strength of the contact clearance ❷
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data		**RM87** - standard version	**RM87 sensitive** - sensitive version
Number and type of contacts		1 CO, 1 NO ❷	1 NO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$	
Rated / max. switching voltage	AC	250 V / 440 V	
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$	
Rated load (capacity)	AC1	12 A / 250 V AC	10 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)	
	AC3	750 W (single-phase motor)	
	DC1	12 A / 24 V DC (see Fig. 3)	10 A / 24 V DC (see Fig. 4)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)	
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$	
Max. inrush current		25 A $AgSnO_2$	20 A $AgSnO_2$
Rated current		12 A	10 A
Max. breaking capacity	AC1	3 000 VA	2 500 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$	
Contact resistance		≤ 100 mΩ	
Max. operating frequency			
• at rated load	AC1	600 cycles/hour	
• no load		72 000 cycles/hour	
Coil data			
Rated voltage	50/60 Hz AC	12 ... 240 V	–
	DC	3 ... 110 V	5 ... 48 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n	
Operating range of supply voltage		see Tables 1, 3 and Fig. 5, 7	see Table 2 and Fig. 6
Rated power consumption	AC	0,75 VA	–
	DC	0,4 ... 0,48 W	0,25 W
Insulation according to PN-EN 60664-1			
Insulation rated voltage		400 V AC	
Rated surge voltage		4 000 V 1,2 / 50 µs	
Overvoltage category		III	
Insulation pollution degree		3	
Dielectric strength	• between coil and contacts	5 000 V AC	type of insulation: reinforced
	• contact clearance	1 000 V AC	type of clearance: micro-disconnection
		2 000 V AC	contact 1 NO, type of clearance: full-disconnection ❷
Contact - coil distance	• clearance	≥ 10 mm	
	• creepage	≥ 10 mm	
General data			
Operating / release time (typical values)		7 ms / 3 ms	
Electrical life (number of cycles)			
• resistive AC1		> 10^5 12 A, 250 V AC	> 1,7 x 10^5 10 A, 250 V AC
• cosφ		see Fig. 2	
• DC L/R=40 ms		> 10^5 0,15 A, 220 V DC	
Mechanical life (cycles)		> 3 x 10^7	
Dimensions (L x W x H) / Weight		29 x 12,7 x 15,7 mm / 14 g	
Ambient temperature	• storage	-40...+85 °C	
	• operating	AC: -40...+70 °C DC: -40...+85 °C	-20...+70 °C ❶
Cover protection category		IP 40 ❶ or **IP 67**	PN-EN 60529
Environmental protection		RTII ❶ or **RTIII**	PN-EN 116000-3
Shock resistance		30 g	
Vibration resistance		10 g 10...150 Hz	
Solder bath temperature		max. 270 °C	
Soldering time		max. 5 s	

The data in bold type relate to the standard versions of the relays. ❶ Relate to the special versions - relays with transparent cover, only available with IP 40 and RTII, operating temperature -20...+70 °C. See "Ordering codes". ❷ Relate to the special versions - relays with one normally open contact 1 NO, with increased contact gap - dielectric strength 2000 V AC, only available with DC coils. See "Ordering codes".

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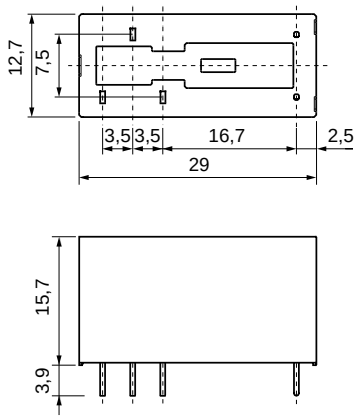
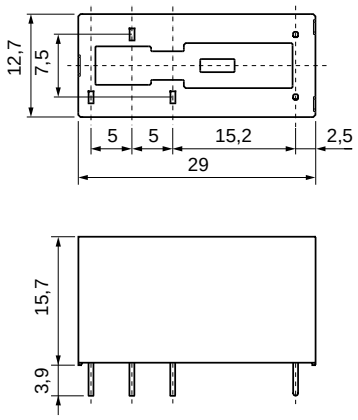
Dimensions

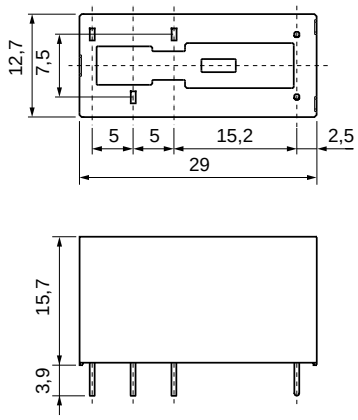
RM87N - 1 CO (standard version)



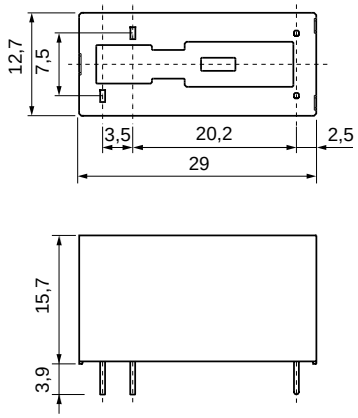
RM87L - 1 CO (standard version)



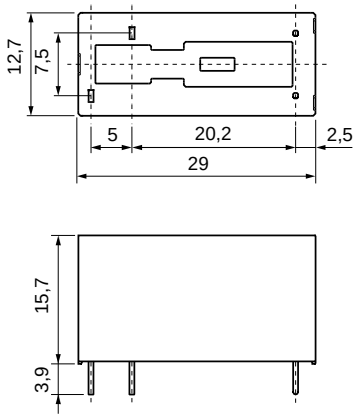
RM87P - 1 CO (standard version)



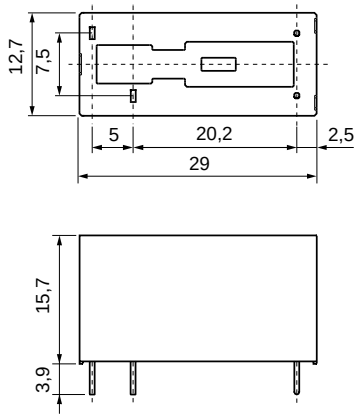
RM87N, RM87N sensitive - 1 NO



RM87L, RM87L sensitive - 1 NO

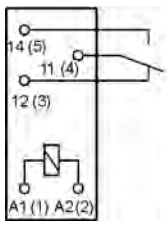


RM87P, RM87P sensitive - 1 NO



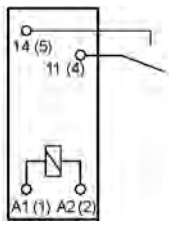
Connection diagrams (pin side view)

RM87N



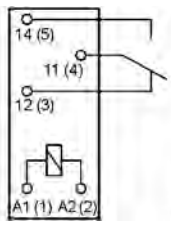
1 CO

RM87N, RM87N sensitive



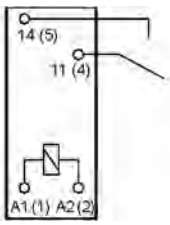
1 NO

RM87L



1 CO

RM87L, RM87L sensitive



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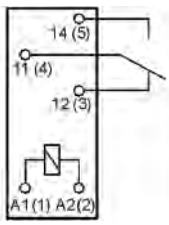
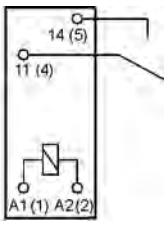
RM87P



1 CO

RM87P, RM87P sensitive



1 NO

Terminal (pin)	A1(1); A2(2)	12(3); 11(4); 14(5)
[mm]	Ø 0,6	0,5 x 0,9
Drilling hole: • for relays • for sockets	 Ø 1,3 + 0,1 mm Ø 1,5 + 0,1 mm	

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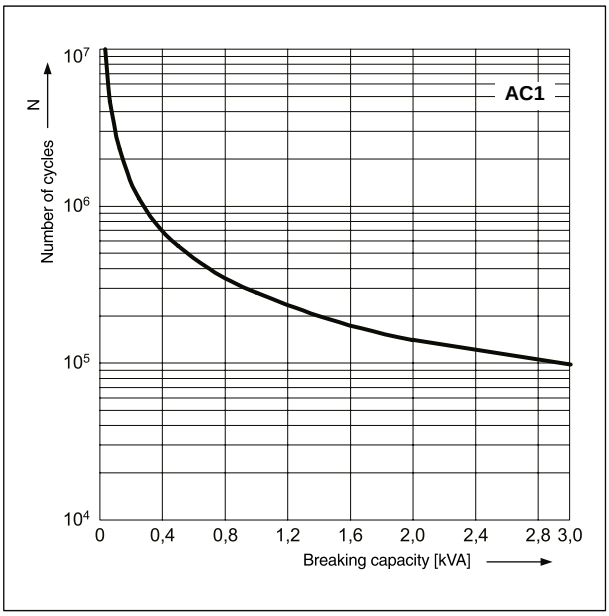
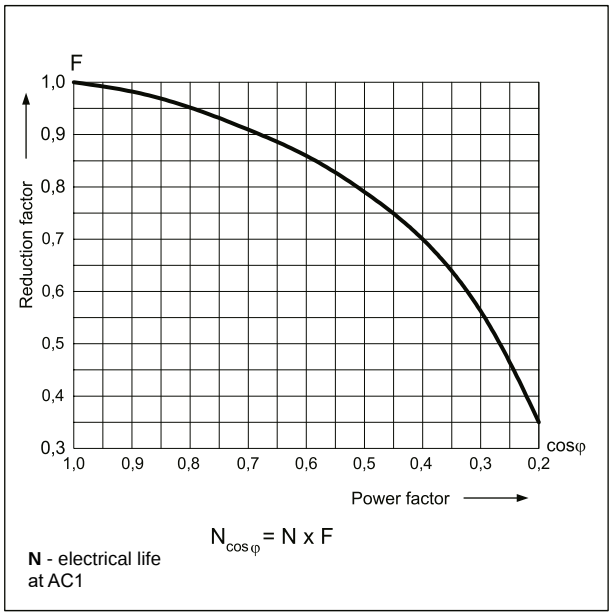
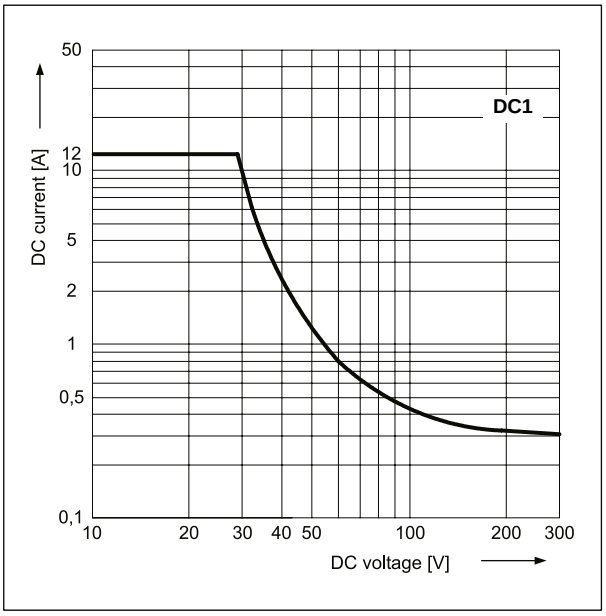
Electrical life at AC resistive load.
Switching frequency: 600 cycles/hour Fig. 1



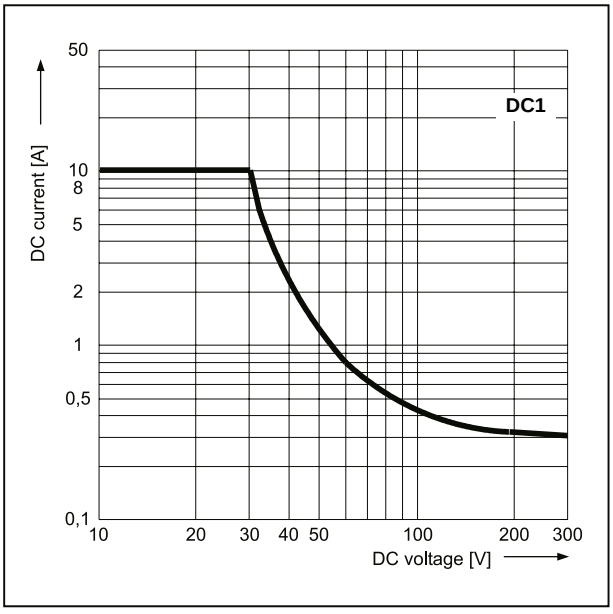
Electrical life reduction factor
at AC inductive load Fig. 2



Max. DC resistive load breaking capacity
- standard version Fig. 3



Max. DC resistive load breaking capacity
- sensitive version Fig. 4

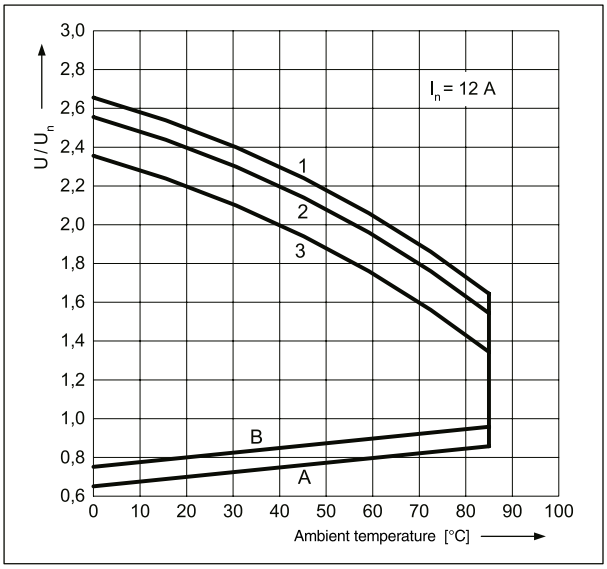


GZMB80

Spring terminals
plug-in socket
for RM84, RM85...,
RM87L, RM87P,
RMP84, RMP85
- see page 397

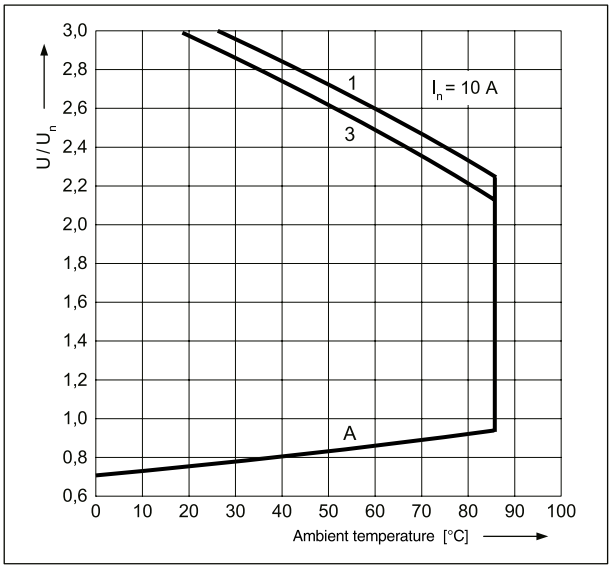
Coil operating range - DC
- standard version

Fig. 5



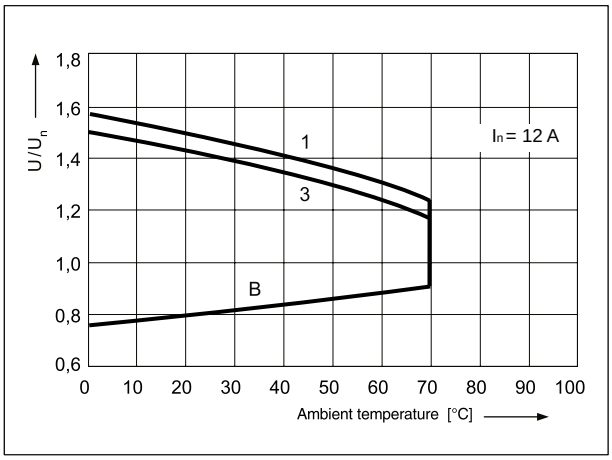
Coil operating range - DC
- sensitive version

Fig. 6



Coil operating range - AC 50 Hz

Fig. 7

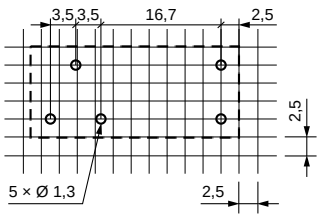


Description of Fig. 5, 6 and 7

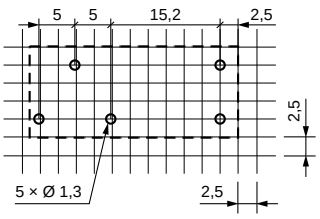
A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

Pinout (solder side view)

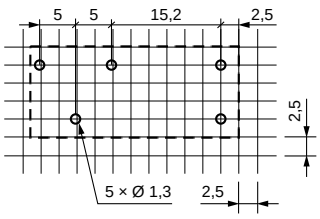
RM87N - 1 CO (standard version)



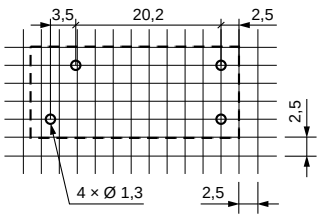
RM87L - 1 CO (standard version)



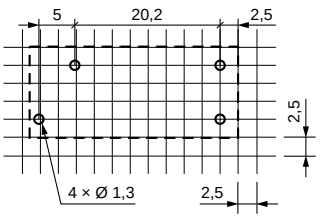
RM87P - 1 CO (standard version)



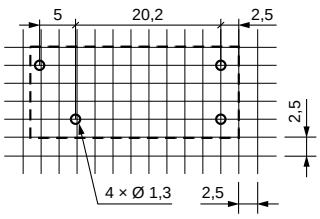
RM87N, RM87N sensitive - 1 NO



RM87L, RM87L sensitive - 1 NO



RM87P, RM87P sensitive - 1 NO



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Coil data - DC voltage version, **RM87** - standard version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	12	360	± 10%	8,4	30,6
1018	18	710	± 10%	12,6	45,9
1024	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

The data in bold type relate to the standard versions of the relays.

Coil data - DC voltage version, **RM87 sensitive** - sensitive version — Table 2

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S005	5	102	± 10%	3,75	15,0
S006	6	144	± 10%	4,50	18,0
S009	9	330	± 10%	6,75	27,0
S010	10	400	± 10%	7,50	30,0
S012	12	580	± 10%	9,00	36,0
S018	18	1 300	± 10%	13,50	54,0
S024	24	2 300	± 10%	18,00	72,0
S048	48	9 340	± 10%	36,00	144,0

Coil data - AC 50/60 Hz voltage version, **RM87** - standard version — Table 3

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
5012	12	100	± 10%	9,6	13,2
5024	**24**	**400**	**± 10%**	**19,2**	**28,8**
5048	48	1 550	± 10%	38,4	57,6
5060	60	2 600	± 10%	48,0	72,0
5110	110	8 900	± 10%	88,0	132,0
5115	115	9 600	± 10%	92,0	138,0
5120	120	10 200	± 10%	96,0	144,0
5220	220	35 500	± 10%	176,0	264,0
5230	**230**	**38 500**	**± 10%**	**184,0**	**276,0**
5240	240	42 500	± 15%	192,0	288,0

The data in bold type relate to the standard versions of the relays.

Mounting

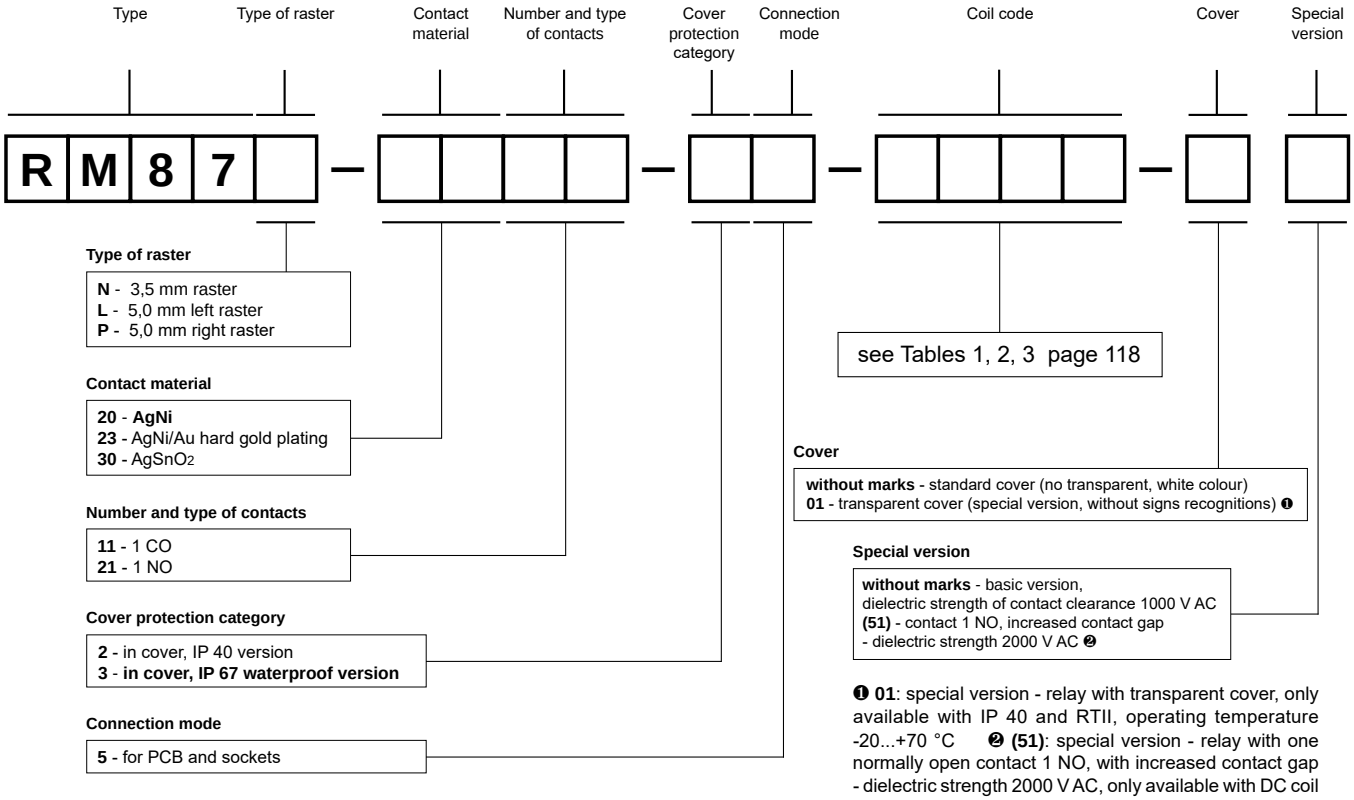
Relays **RM87N** ❸, **RM87N sensitive** are designed for: • direct PCB mounting • screw terminals plug-in sockets **GZT92** ❹ and **GZM92** ❹ with clip **GZT80-0040** or **GZM80-0041**; sockets **GZS92** ❹ with clip **GZS-0040** or **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw. Signalling / protecting modules **type M...** are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 35** with clip **MP16-2**, MH16-2; plug-in sockets **GD35** with clip **MP16-2**, GD-0016, MH16-2.

Relays **RM87L** ❸, **RM87L sensitive**, **RM87P** ❸, **RM87P sensitive** are designed for: • direct PCB mounting • screw terminals plug-in sockets **GZT80** ❹ and **GZM80** ❹ with clip **GZT80-0040** or **GZM80-0041**; sockets **GZS80** ❹ with clip **GZS-0040** or **GZM80-0041**; sockets **GZF80** with clip **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • spring terminals plug-in sockets **GZMB80** ❺ with clip **GZMB80-0040** or **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** ❻ are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 50** with clip **MP16-2**, MH16-2; plug-in sockets **PW80** with clip **MH16-2**; plug-in sockets **GD50** with clip **MP16-2**, GD-0016, MH16-2.

❸ Relate to the special versions - relays with transparent cover: the distance of min. 5 mm between the mounting relays. ❹ Plug-in sockets **GZT92**, **GZM92**, **GZS92** and **GZT80**, **GZM80**, **GZS80** may be linked with interconnection strip type **ZGGZ80** (see page 418). ❺ For sockets **GZMB80** - see page 397 (wire connection). ❻ For sockets **GZF80** not applicable modules type **M...**

Ordering codes

RM87 sensitive - sensitive version: relays only available with one normally open contact.



❶ **01**: special version - relay with transparent cover, only available with IP 40 and RTII, operating temperature -20...+70 °C ❷ **(51)**: special version - relay with one normally open contact 1 NO, with increased contact gap - dielectric strength 2000 V AC, only available with DC coil

Examples of ordering code:

RM87N-2011-25-1012-01 relay **RM87N**, 3,5 mm raster, for PCB and sockets, one changeover contact, contact material AgNi, coil voltage 12 V DC, with transparent cover (special version, without signs recognitions) IP 40

RM87N-2021-35-1024 (51) relay **RM87N**, special version with increased contact gap, 3,5 mm raster, for PCB and sockets, one normally open contact, contact material AgNi, coil voltage 24 V DC, in standard cover (no transparent, white colour) IP 67

RM87P-3021-25-S012 relay **RM87P sensitive**, 5 mm right raster, for PCB and sockets, one normally open contact, contact material $AgSnO_2$, sensitive coil voltage 12 V DC, in standard cover (no transparent, white colour) IP 40

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- Cadmium - free contacts
- Height 17,7 mm
- 5000 V / 10 mm reinforced insulation
- **For surface mounting SMT** - for manual soldering
- AC and DC coils
- Compliance with standard PN-EN 60335-1
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	12 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	12 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		25 A $AgSnO_2$
Rated current		12 A
Max. breaking capacity	AC1	3 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	3 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

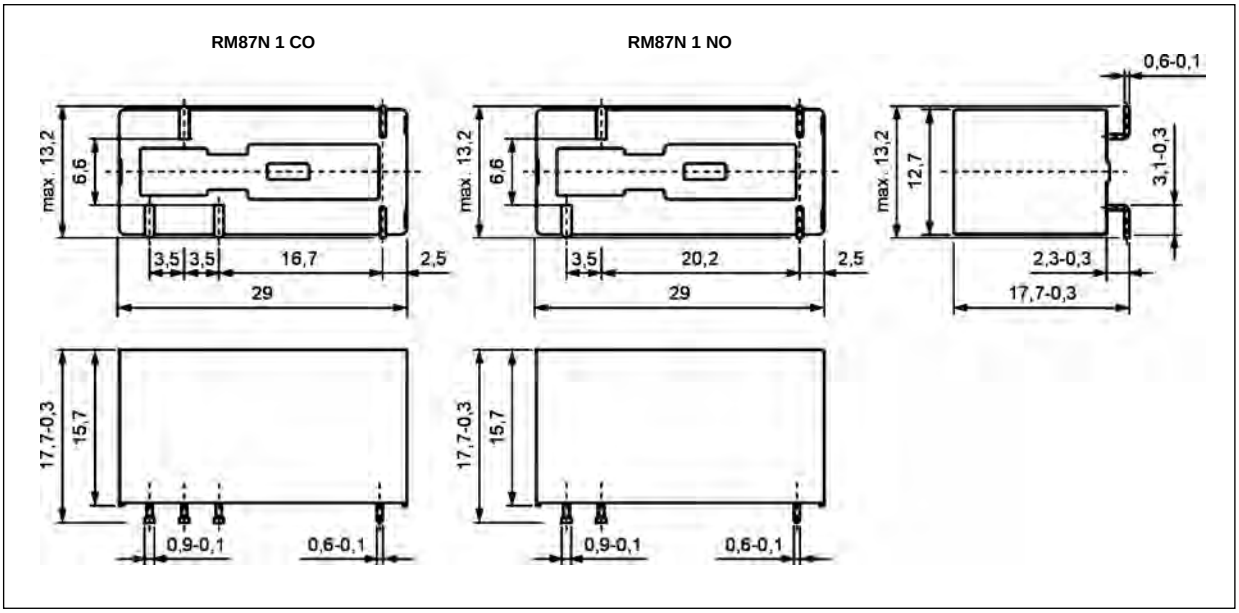
Insulation rated voltage	400 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

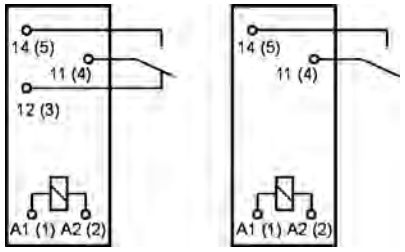
Operating / release time (typical values)		7 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		$> 10^5$ 12 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		$> 10^5$ 0,15 A, 220 V DC
Mechanical life (cycles)		$> 3 \times 10^7$
Dimensions (L x W x H)		29 x 13,2 x 17,7 mm
Weight		14 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz
Soldering temperature		max. 350 °C
Soldering time		max. 3 s

The data in bold type relate to the standard versions of the relays.

Dimensions



Connection diagrams (pin side view)

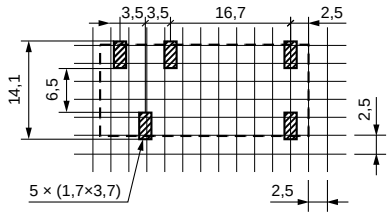


RM87N 1 CO **RM87N 1 NO**

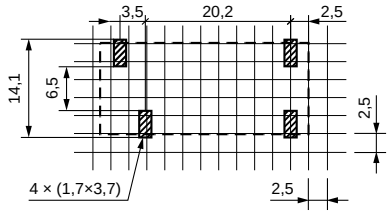
Terminal (pin)	A1(1); A2(2)	12(3); 11(4); 14(5)
[mm]	Ø 0,6	0,5 x 0,9

Soldering areas (solder side view)

RM87N 1 CO



RM87N 1 NO



Mounting

Relays **RM87N SMT** are designed for surface mounting SMT - for manual soldering.

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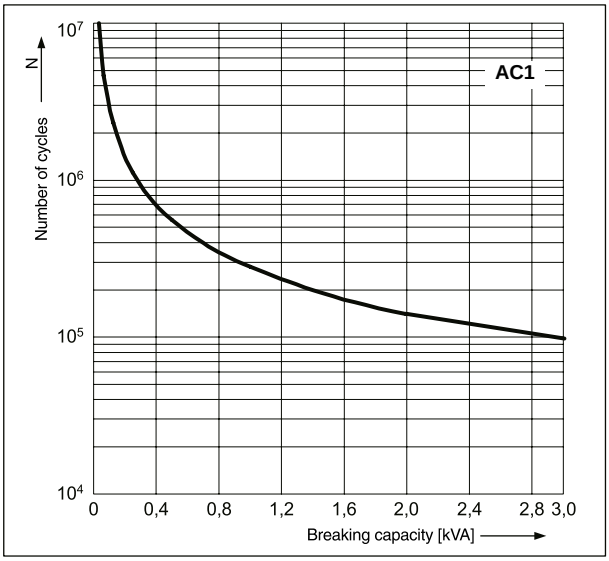
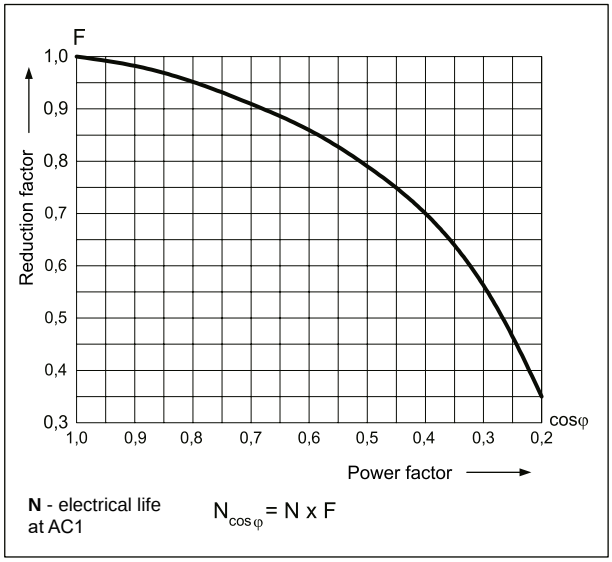
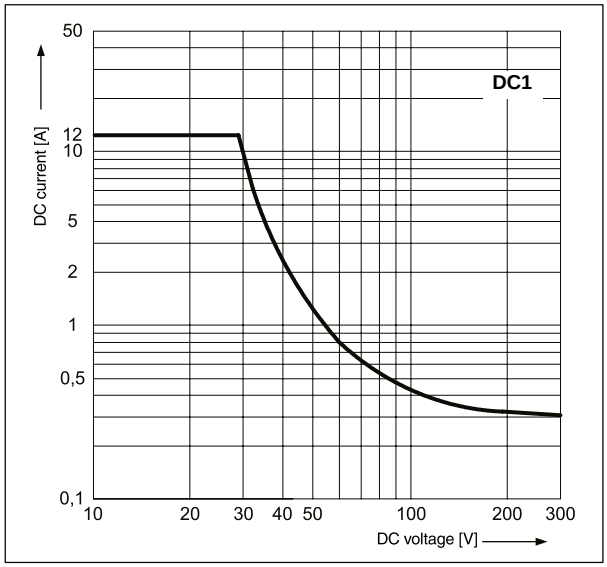
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



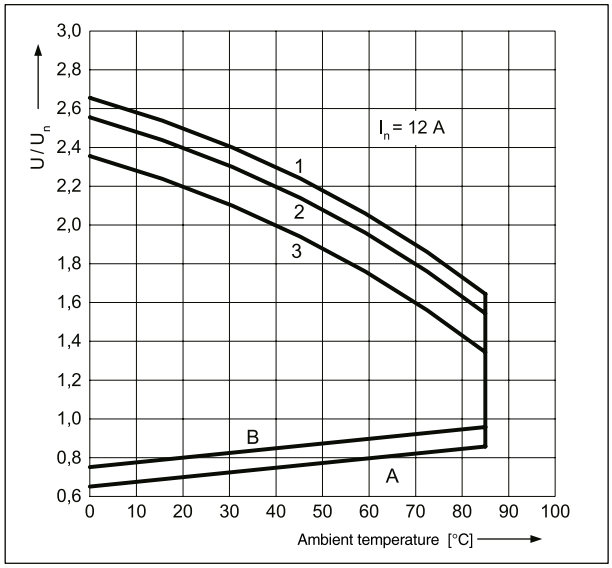
Electrical life reduction factor at AC inductive load Fig. 2



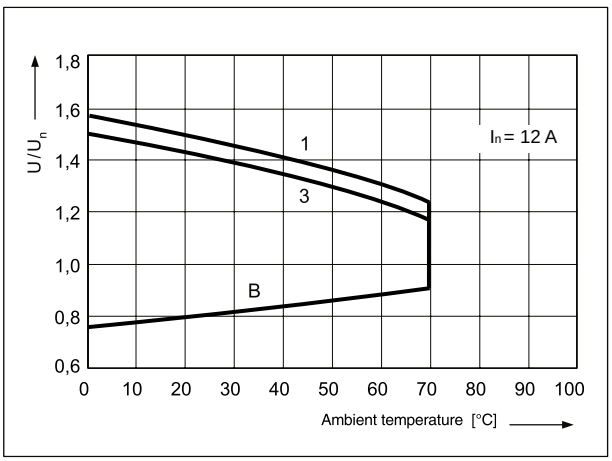
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

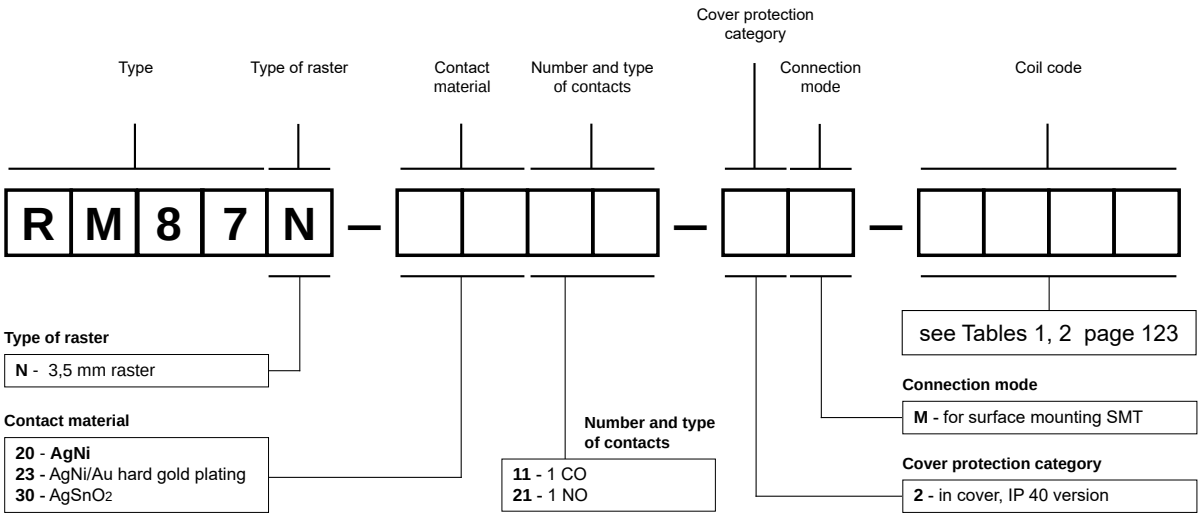
Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1003	3	22	± 10%	2,1	7,6
1005	5	60	± 10%	3,5	12,7
1006	6	90	± 10%	4,2	15,3
1009	9	200	± 10%	6,3	22,9
1012	12	360	± 10%	8,4	30,6
1018	18	710	± 10%	12,6	45,9
1024	24	1 440	± 10%	16,8	61,2
1036	36	3 140	± 10%	25,2	91,8
1048	48	5 700	± 10%	33,6	122,4
1060	60	7 500	± 10%	42,0	153,0
1110	110	25 200	± 10%	77,0	280,0

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
5012	12	100	± 10%	9,6	13,2
5024	24	400	± 10%	19,2	28,8
5048	48	1 550	± 10%	38,4	57,6
5060	60	2 600	± 10%	48,0	72,0
5110	110	8 900	± 10%	88,0	132,0
5115	115	9 600	± 10%	92,0	138,0
5120	120	10 200	± 10%	96,0	144,0
5220	220	35 500	± 10%	176,0	264,0
5230	230	38 500	± 10%	184,0	276,0
5240	240	42 500	± 15%	192,0	288,0

Ordering codes



Examples of ordering code:

RM87N-2011-2M-1024 relay **RM87N SMT**, 3,5 mm raster, for surface mounting SMT, one changeover contact, contact material AgNi, coil voltage 24 V DC, in cover IP 40

RM87N-2321-2M-5012 relay **RM87N SMT**, 3,5 mm raster, for surface mounting SMT, one normally open contact, contact material AgNi/Au hard gold plating, coil voltage 12 V AC 50/60 Hz, in cover IP 40

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RM96 1 CO RM96 1 NO / 1 NC

- Height 16,2 mm • IP 40 and IP 67
- For PCB (1 CO, 1 NO, 1 NC) and plug-in sockets (1 CO)
- Accessories: sockets and modules for 1 CO
- DC coils
- Recyclable packing
- Terminals: 3,2 mm for version 1 CO,
  5,0 mm for version 1 NO and 1 NC
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO, 1 NC
Contact material		**$AgSnO_2$**, $AgSnO_2$/Au hard gold plating, AgCdO ❶
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V $AgSnO_2$, 5 V $AgSnO_2$/Au hard gold plating, 10 V AgCdO
Rated load (capacity)	AC1	8 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor; 0,5 HP / 250 V AC UL 508)
	DC1	8 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		10 mA $AgSnO_2$, 2 mA $AgSnO_2$/Au hard gold plating, 5 mA AgCdO
Max. inrush current		15 A
Rated current		8 A
Max. breaking capacity	AC1	2 000 VA
Min. breaking capacity		1 W $AgSnO_2$, 0,05 W $AgSnO_2$/Au hard gold plating, 0,5 W AgCdO
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	DC	5 ... 48 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1 and Fig. 4
Rated power consumption	DC	0,22...0,3 W

Insulation according to PN-EN 60664-1

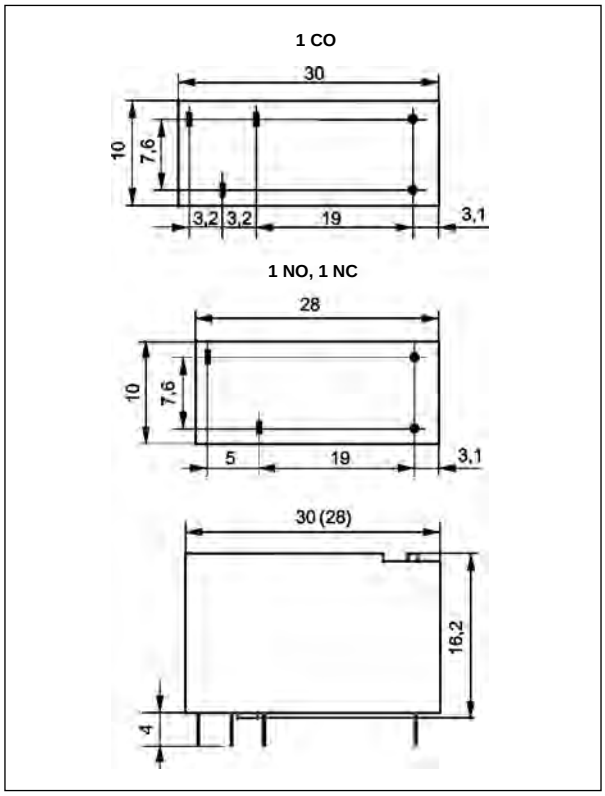
Insulation rated voltage	400 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	4 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 8 mm
• creepage	≥ 8 mm

General data

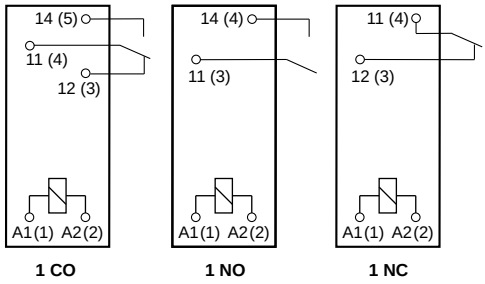
Operating / release time (typical values)		10 ms / 5 ms
Electrical life (number of cycles)		
• resistive AC1		> 10^5 8 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Motor load according to UL 508		0,25 HP 120 V AC, single-phase motor
Dimensions (L x W x H)		1 CO: 30 x 10 x 16,2 mm
		1 NO, 1 NC: 28 x 10 x 16,2 mm
Weight		11 g
Ambient temperature	• storage	-40...+85 °C
	• operating	-40...+80 °C
Cover protection category		IP 40 or **IP 67** PN-EN 60529
Environmental protection		RTII PN-EN 116000-3
Shock resistance		20 g
Vibration resistance		10 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU.

Dimensions

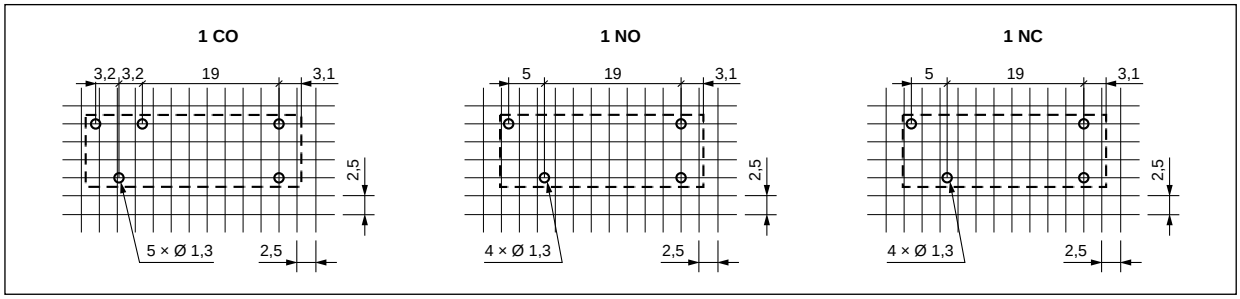


Connection diagrams (pin side view)



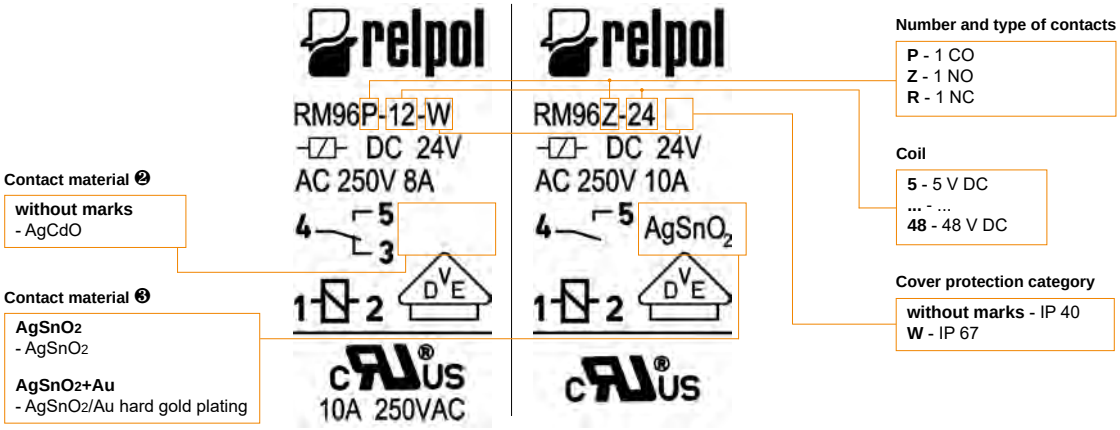
Terminal (pin)	A1(1); A2(2)	12(3); 11(4); 14(5)
[mm]	0,6 x 0,9	0,6 x 0,1
Drilling hole: • for relays	Ø 1,3 + 0,1 mm	

Pinout (solder side view)



Print on relay cover

Type marking on relays cover **RM96** do not match the ordering codes (examples of marking for **RM96-1011-35-1012** ❷ and **RM96-3021-25-1024** ❸).



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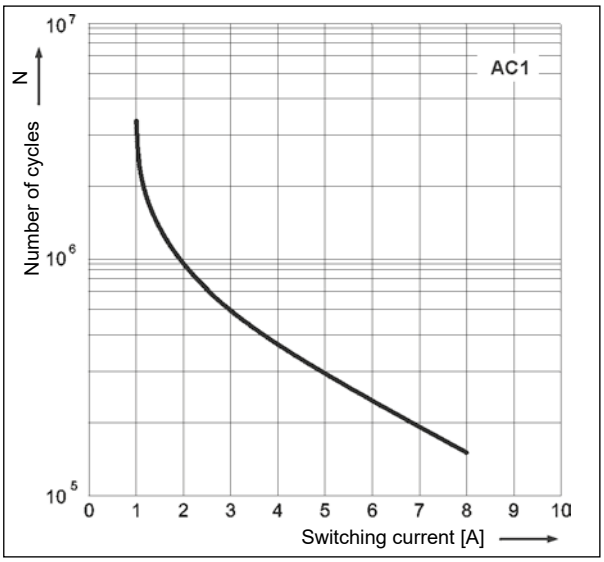
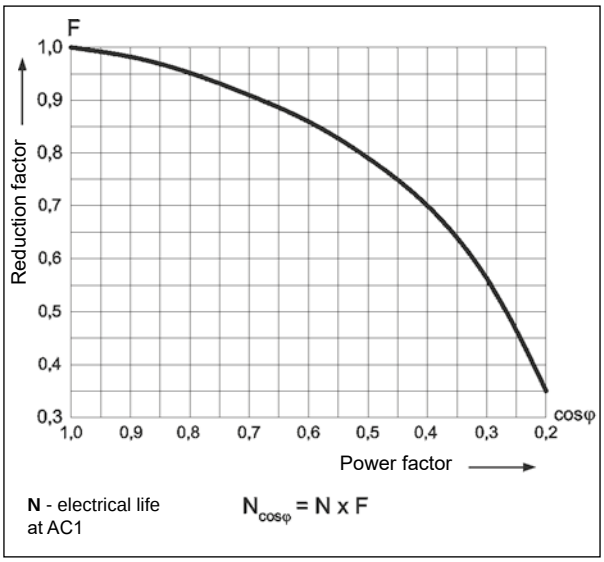
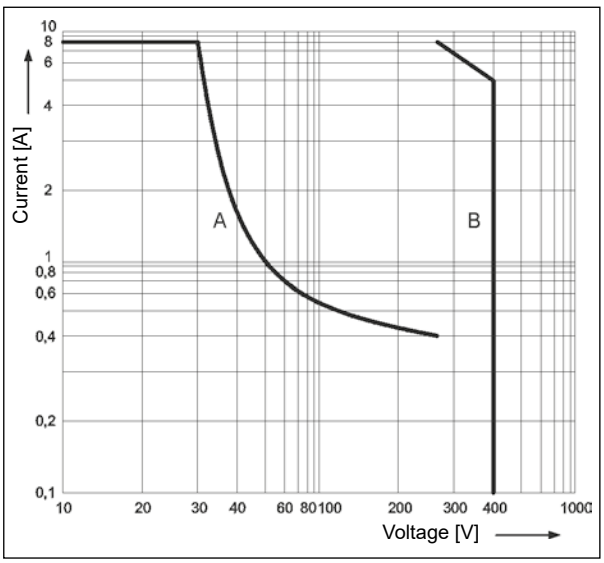
Electrical life at AC resistive current. Fig. 1
U_n = 230 V AC - version 1 NO



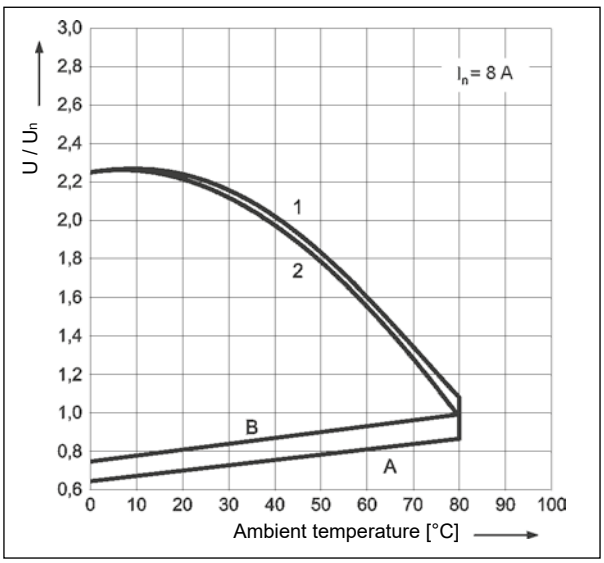
Electrical life reduction factor at AC inductive load Fig. 2



Max. breaking capacity
A - resistive load DC1
B - resistive load AC1 Fig. 3



Coil operating range - DC Fig. 4



Description of Fig. 4

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - rated load

ES 32

Screw terminals plug-in socket for RM96 1 CO
- see page 400

Mounting

Relays **RM96 1 CO** (one changeover contact) are designed for: • direct PCB mounting • screw terminals plug-in sockets **ES 32** ❹ with clip **MS 16** or **GZMB80-0040** or **GZM80-0041**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw. Signalling / protecting modules **type M...** are available with sockets (see page 422).

Relays **RM96 1 NO** (one normally open contact) and **RM96 1 NC** (one normally closed contact) are designed for direct PCB mounting.

❹ Plug-in sockets **ES 32** may be linked with interconnection strip type **ZGGZ80** (see page 418).

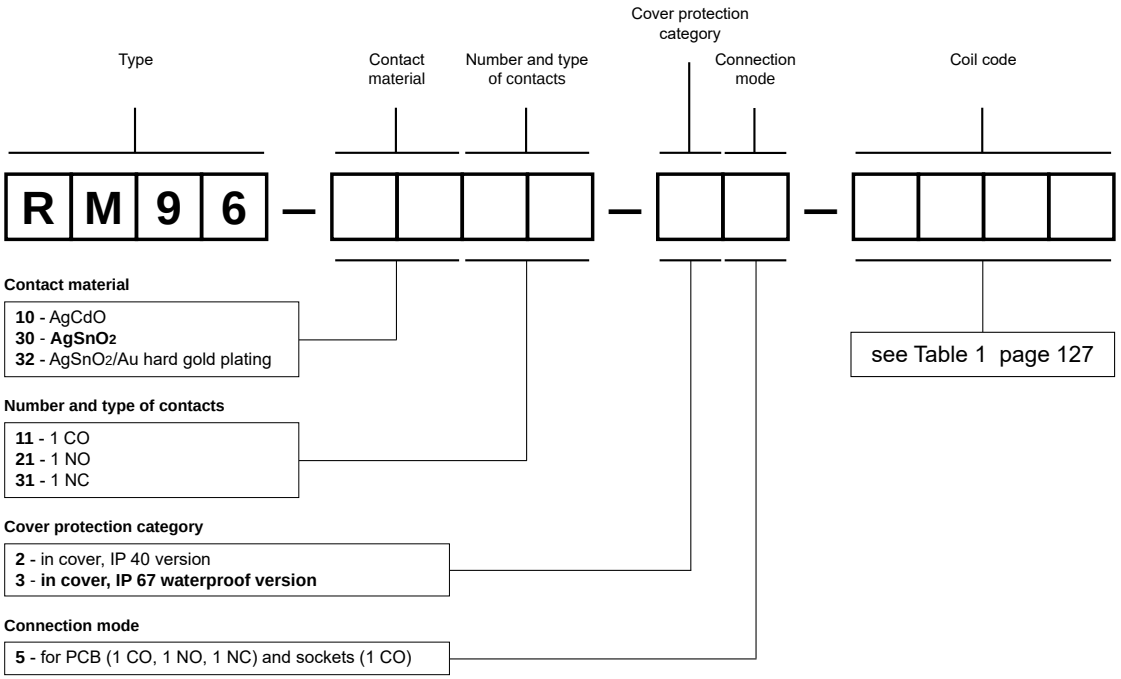
Coil data - DC voltage version

Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	110	± 10%	3,5	12,0
1006	6	160	± 10%	4,2	14,5
1009	9	360	± 10%	6,3	22,0
1012	**12**	**660**	**± 10%**	**8,4**	**29,5**
1018	18	1 500	± 10%	12,6	44,0
1024	**24**	**2 200**	**± 10%**	**16,8**	**54,0**
1048	48	8 000	± 10%	33,6	102,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

RM96-1011-35-1012 relay **RM96**, for PCB and sockets, one changeover contact, contact material AgCdO, coil voltage 12 V DC, in cover IP 67

RM96-3021-25-1024 relay **RM96**, for PCB, one normally open contact, contact material $AgSnO_2$, coil voltage 24 V DC, in cover IP 40

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RM83 RM83-...-01

- Miniature dimensions • General purpose relays
- **Version 1 NO $AgSnO_2$ - for special loads: resistance to inrush current 120 A (20 ms)**
- Protection category IP 40 or IP 67
- For PCB and plug-in sockets
- DC coils - standard and sensitive
- Available special versions: with transparent cover
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO, 1 NC
Contact material		**$AgSnO_2$**, (AgCdO, AgCdO/Au flash gold plating) ❶
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V $AgSnO_2$, 10 V AgCdO, 10 V AgCdO/Au flash gold plating
Rated load (capacity)	AC1	16 A / 250 V AC
	AC15	6 A / 120 V 3 A / 240 V (A300)
	AC3	550 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		10 mA $AgSnO_2$, 5 mA AgCdO, 5 mA AgCdO/Au flash gold plating
Max. inrush current		30 A 1 NO, $AgSnO_2$
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		1 W $AgSnO_2$, 0,5 W AgCdO, 0,5 W AgCdO/Au flash gold plating
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	DC	5 ... 110 V standard version 110 V sensitive version
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Rated power consumption	DC	0,6 W 5 ... 60 V standard version
		0,6 W 110 V sensitive version
		0,9 W 110 V standard version

Insulation according to PN-EN 60664-1

Insulation rated voltage		400 V AC
Dielectric strength		
• between coil and contacts		4 000 V AC type of insulation: reinforced
• contact clearance		1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	• clearance	≥ 8 mm
	• creepage	≥ 8 mm

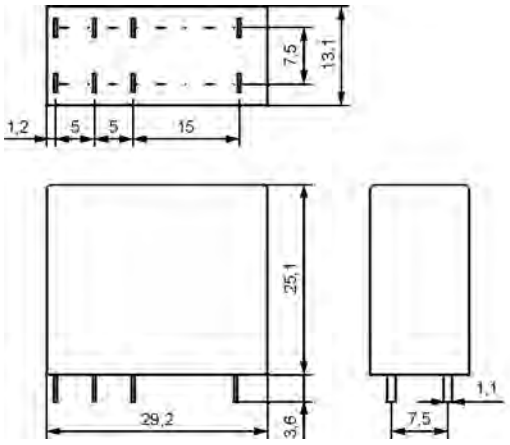
General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life (number of cycles)		
• resistive AC1		$> 10^5$ 16 A, 250 V AC
• at incandescent lamp load		$> 10^5$ 1000 W, 230 V AC, 1 NO, $AgSnO_2$
		$> 3 \times 10^4$ 3000 W, 230 V AC, 1 NO, $AgSnO_2$
• at halogen lamp load		$> 10^4$ 2500 W, 230 V AC, 1 NO, $AgSnO_2$
• cosφ		see Fig. 2
• L/R=40 ms		$> 10^5$ 0,12 A, 220 V DC
Mechanical life (cycles)		$> 3 \times 10^7$
Dimensions (L x W x H)		IP 40: 29,2 x 13,1 x 25,1 mm
		IP 67: 29,2 x 13,1 x 25,6 mm
Weight		18 g
Ambient temperature	• storage	-40...+85 °C
	• operating	-40...+70 °C
Cover protection category		**IP 40** or IP 67 PN-EN 60529
Shock resistance		20 g
Vibration resistance		10 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

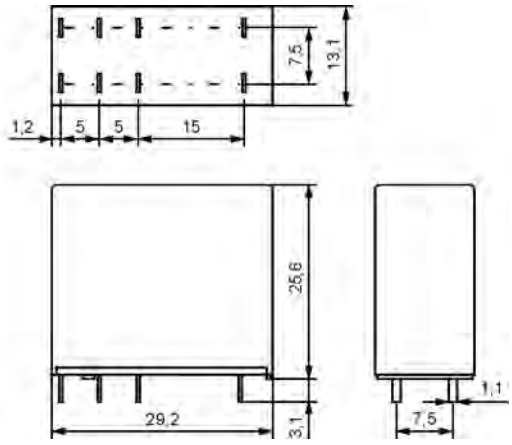
The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU.

Dimensions

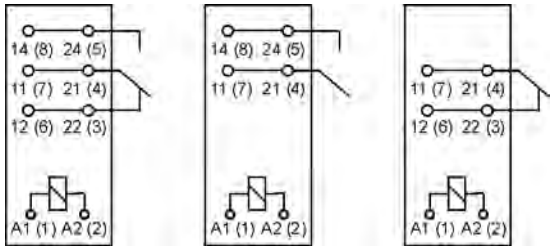
version IP 40



version IP 67



Connection diagrams (pin side view)



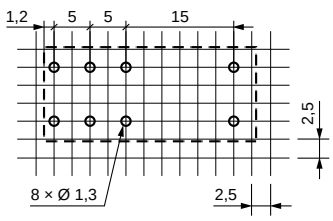
1 CO 1 NO 1 NC

Terminal (pin)	A1(1); A2(2)	21(4); 11(7)	22 (3); 24 (5); 12 (6); 14 (8)
[mm]	0,4 x 1,1	0,2 x 1,1	0,4 x 1,1
Drilling hole: • for relays • for sockets	Ø 1,3 + 0,1 mm Ø 1,5 + 0,1 mm		

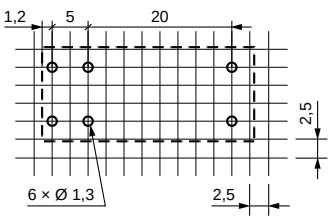
RM83 terminals are doubled for each contact.
Both terminals are to be used while connecting to load.

Pinout (solder side view)

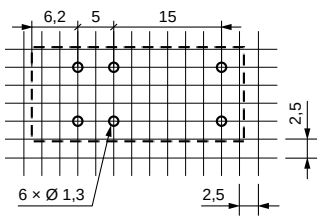
1 CO



1 NO



1 NC



Mounting

Relays **RM83** are designed for: • direct PCB mounting • plug-in sockets for PCB mounting **EC 50** and **GD50** with clip **MP25-2** or **MH25-2**; plug-in sockets **PW80** with clip **MH25-2**.

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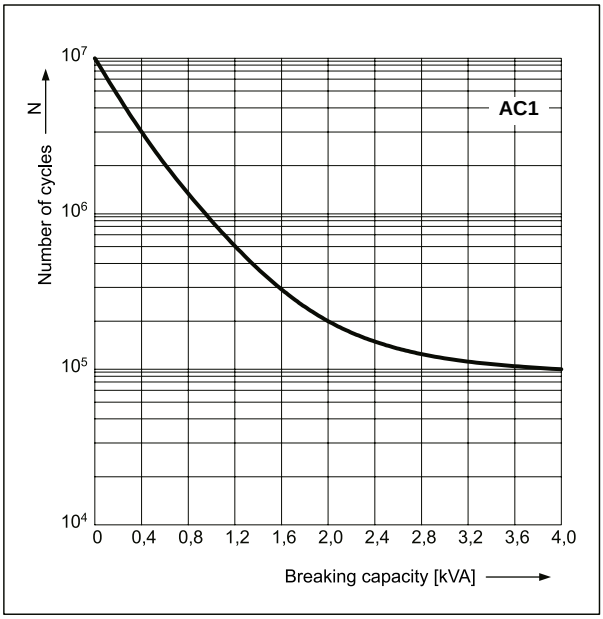
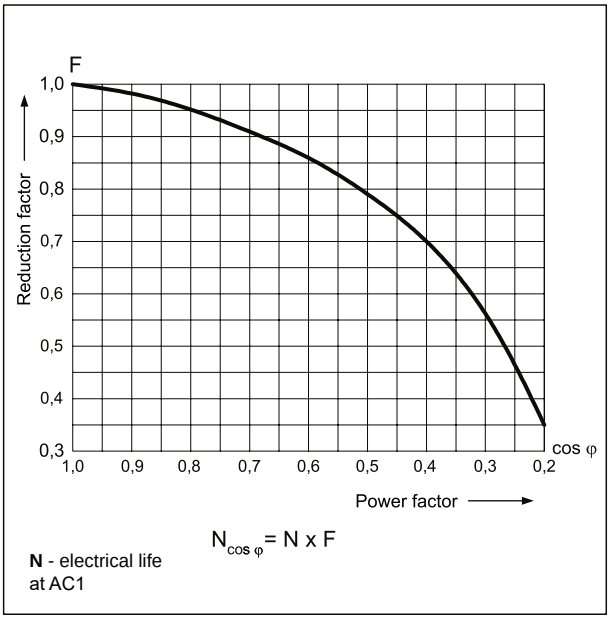
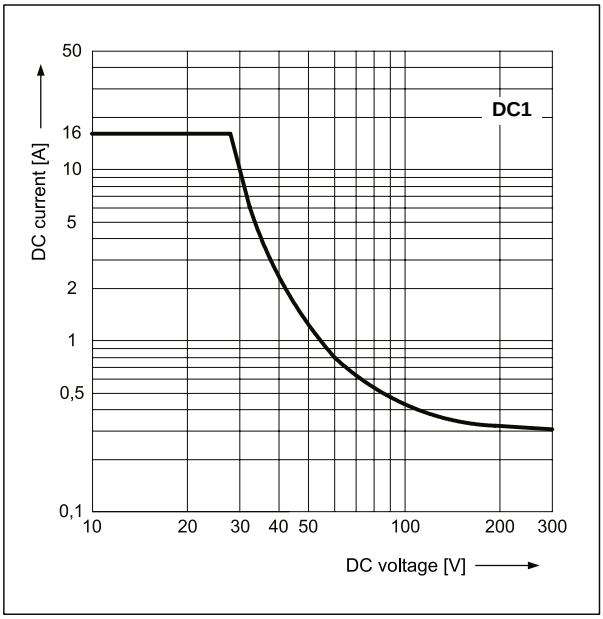
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



Electrical life reduction factor at AC inductive load Fig. 2



Max. DC resistive load breaking capacity Fig. 3



Coil data - DC voltage version, standard — Table 1

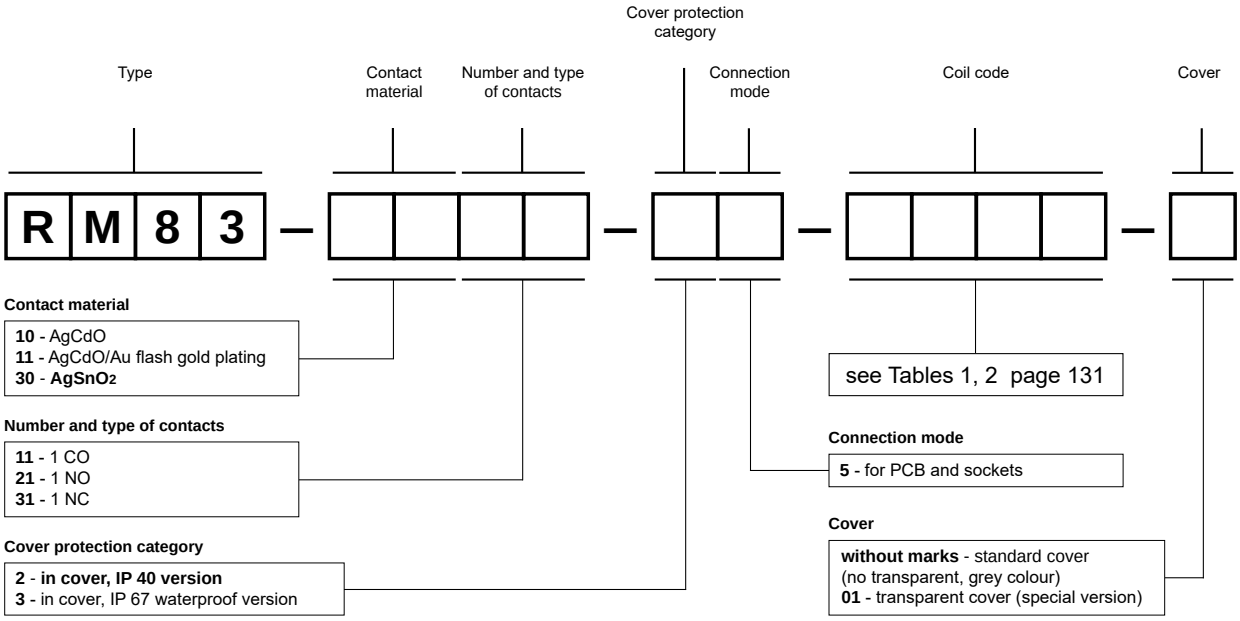
Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	49	± 10%	3,5	8,9
1006	6	68	± 10%	4,2	10,6
1009	9	110	± 10%	6,3	15,9
1012	**12**	**260**	**± 10%**	**8,4**	**21,2**
1018	18	550	± 10%	12,6	31,8
1024	**24**	**1 100**	**± 10%**	**16,8**	**42,5**
1036	36	2 100	± 10%	25,2	63,7
1048	48	4 400	± 10%	33,6	85,0
1060	60	7 000	± 10%	42,0	106,2
1110	110	13 000	± 10%	77,0	140,0

The data in bold type relate to the standard versions of the relays.

Coil data - DC voltage version, sensitive — Table 2

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
S110	110	20 500	± 10%	77,0	188,0

Ordering codes



Examples of ordering code:

RM83-3011-25-1024 relay **RM83**, for PCB and sockets, one changeover contact, contact material $AgSnO_2$, coil voltage 24 V DC, in standard cover (no transparent, grey colour) IP 40

RM83-3011-25-S110 relay **RM83**, for PCB and sockets, one changeover contact, contact material $AgSnO_2$, sensitive coil voltage 110 V DC, in standard cover (no transparent, grey colour) IP 40

RM83-3021-35-1012-01 relay **RM83**, for PCB and sockets, one normally open contact, contact material $AgSnO_2$, coil voltage 12 V DC, with transparent cover (special version) IP 67

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version AC

version DC

NEW

- Cadmium - free contacts • Height 25,5 mm
- 5000 V / 8 mm reinforced insulation
- For plug-in sockets
- Accessories: sockets and modules
- AC and DC coils
- WT (mechanical indicator + lockable front test button) - standard features of relays
- Recognitions, certifications, directives: RoHS, CE

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		12 V 10 mA
Rated load	AC1	8 A / 250 V AC
Min. switching current		10 mA 12 V
Max. inrush current		16 A 20 ms
Rated current		8 A
Max. breaking capacity	AC1	2 000 VA
Min. breaking capacity		0,12 W 10 mA / 12 V
Contact resistance		≤ 100 mΩ 1 A / 6 V DC
Max. operating frequency		
• at rated load	AC1	360 cycles/hour ON for 5 s / OFF for 5 s
• no load		18 000 cycles/hour

Coil data

Rated voltage	50 Hz AC	24 ... 230 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 3, 4
Rated power consumption	AC	0,75 VA ❶
	DC	0,4 ... 0,48 W ❶

Insulation according to PN-EN 60664-1

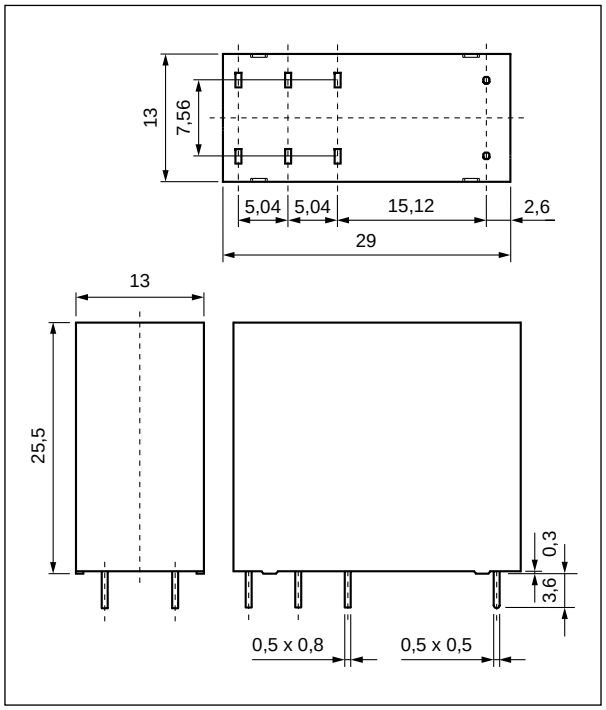
Insulation rated voltage	500 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Insulation resistance	1000 MΩ 500 V DC
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 8 mm
• creepage	≥ 8 mm

General data

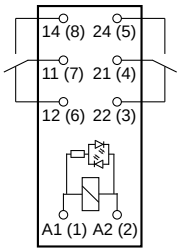
Operating / release time (typical values)		15 ms / 8 ms
Electrical life (number of cycles)		
• resistive AC1		> 3 x 10^4 AC coils, 8 A, 250 V AC
		> 10^4 DC coils, 8 A, 250 V AC
Mechanical life (cycles)		> 5 x 10^6
Dimensions (L x W x H)		29 x 13 x 25,5 mm
Weight		16 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C ❷ ❸ DC: -40...+85 °C ❷ ❸
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTII IEC 61810-7
Relative humidity		5...85%
Shock resistance		10 g
Vibration resistance	(NO/NC)	10 g / 5 g length direction: 10 g / 2 g ❸ 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays. ❶ The data don't include the power of electronic indicating circuit when the relay picks-up. ❷ Operating temperature for relays mounted in sockets on 35 mm rail mount: -40...+55 °C. ❸ The distance between the mounting relays: min. 5 mm for versions AC; min. 1,5 mm for versions DC.

Dimensions



Connection diagram (pin side view)



2 CO

Terminal (pin)	A1(1); A2(2)	22(3); 21(4); 24(5); 12(6); 11(7); 14(8)
[mm]	0,5 x 0,5	0,5 x 0,8
Drilling hole: • for sockets	Ø 1,5 + 0,1 mm	

Test buttons type T

orange
– AC coils

blue
– DC coils

Note: Normally open contacts may be closed with the blocking function of the test button of the T type (it shall be bent by 90° to vertical position). When the button is drawn back, the normally open contacts are opened.

Mounting

Relays **RMP84** ❸ are designed for: • screw terminals plug-in sockets **GZF80** with clip **GZM80-0025**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • spring terminals plug-in sockets **GZMB80** ❹ with clip **GZMB80-0025** or **GZM80-0025**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** ❺ are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 50** and **GD50** with clip **MH25-2**.

❸ The distance between the mounting relays: min. 5 mm for versions AC; min. 1,5 mm for versions DC. ❹ For sockets **GZMB80** - see page 397 (wire connection). ❺ For sockets **GZF80** not applicable modules type **M...**

GZF80, GZMB80, EC 50, GD50

Plug-in sockets
for relays
RMP84, RMP85
- see pages 397-398

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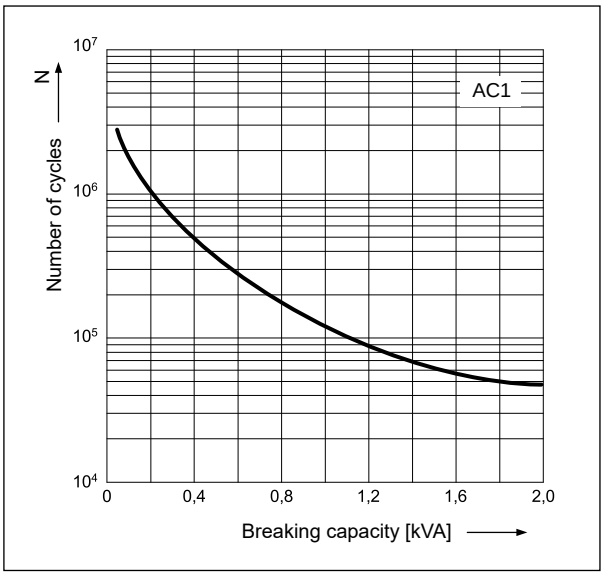
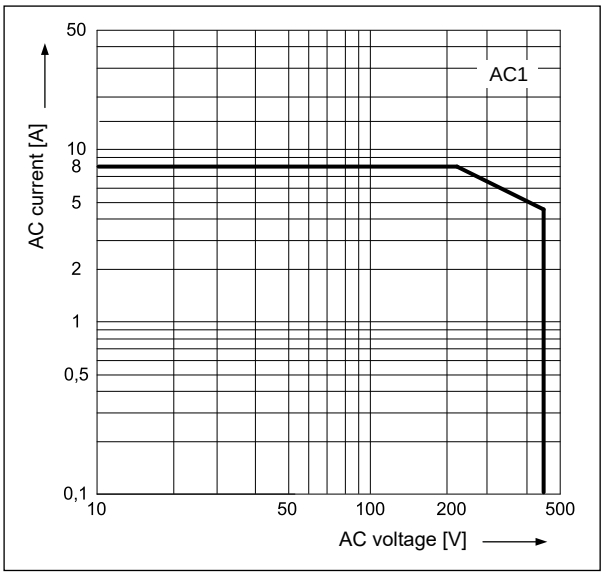
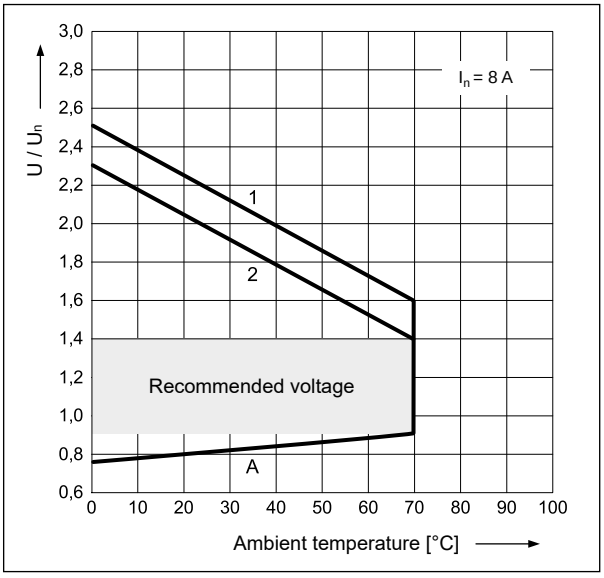
Electrical life at AC resistive load. Switching frequency: 360 cycles/hour Fig. 1



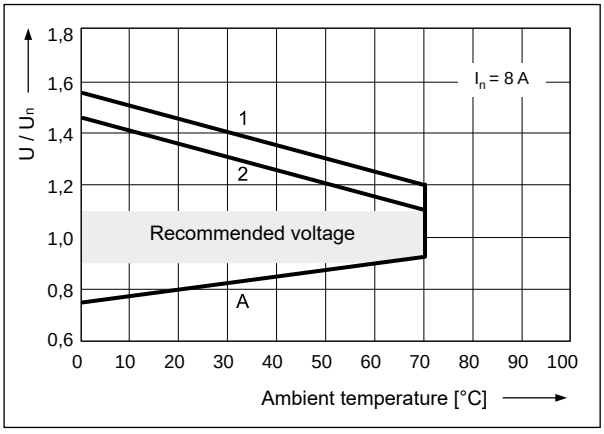
Max. AC 50 Hz resistive load breaking capacity Fig. 2



Coil operating range - DC Fig. 3



Coil operating range - AC 50 Hz Fig. 4



Description of Fig. 3 and 4

A - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).

1, 2 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:

1 - no load

2 - rated load

Note: the use of the relay at energizing voltage other than the rated voltage may lead to reduced electrical life. Energizing voltage exceeding the recommended range may damage the insulation of the relay coil.

Coil data - DC voltage version

Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC ❻	
				min. (at 23 °C)	max. (at 23 °C)
1012	**12**	**360**	**± 10%**	**8,4**	**18,0**
1024	**24**	**1 440**	**± 10%**	**16,8**	**36,0**
1048	48	5 760	± 15%	33,6	72,0
1110	110	25 200	± 15%	77,0	165,0

The data in bold type relate to the standard versions of the relays.
❻ The max. allowable voltage is coil overdrive voltage, it is the instantaneous max. voltage which the relay coil could endure in very short time.

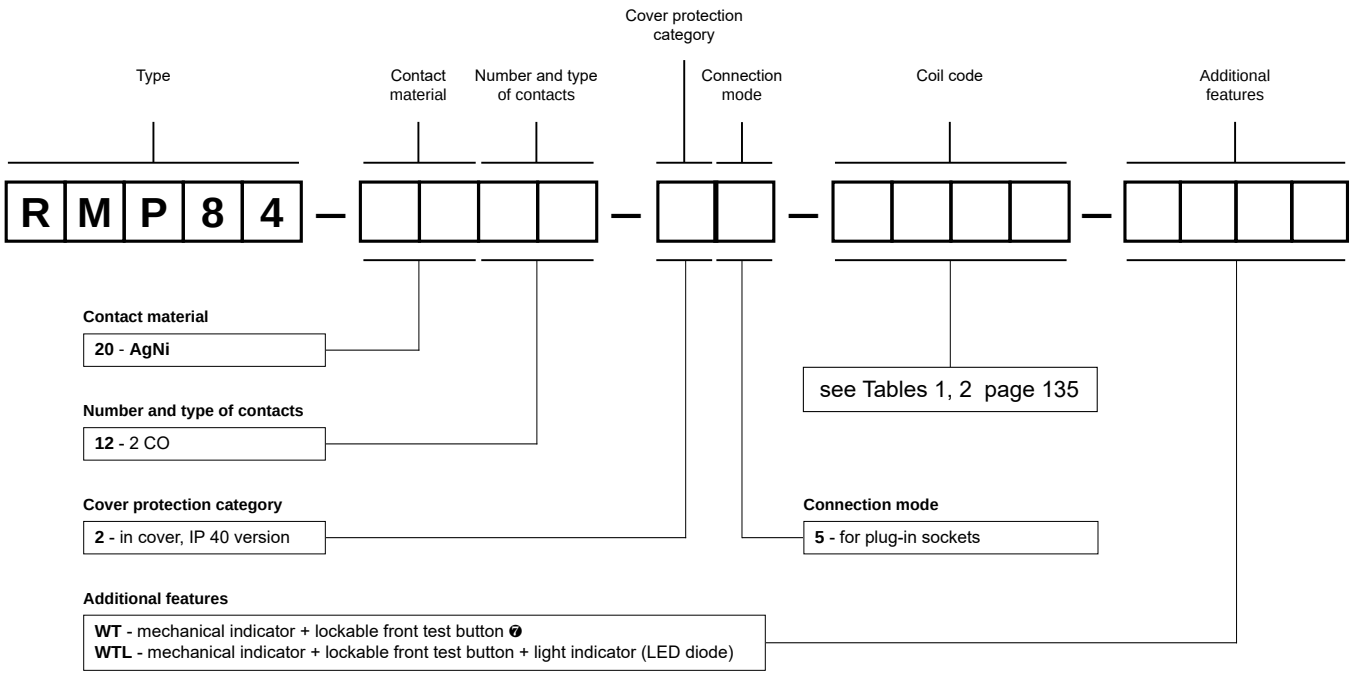
Coil data - AC 50 Hz voltage version

Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 23 °C)	max. (at 23 °C)
5024	**24**	**350**	**± 10%**	**18,0**	**26,4**
5115	115	8 100	± 15%	86,3	126,5
5230	**230**	**32 500**	**± 15%**	**172,5**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



❼ **WT** - standard features of relays. Test buttons type T - see page 133.

Examples of ordering code:

RMP84-2012-25-1024-WT relay **RMP84**, for plug-in sockets, two changeover contacts, contact material AgNi, coil voltage 24 V DC, with mechanical indicator and lockable front test button, in cover IP 40

RMP84-2012-25-5230-WTL relay **RMP84**, for plug-in sockets, two changeover contacts, contact material AgNi, coil voltage 230 V AC 50 Hz, with mechanical indicator and lockable front test button and light indicator (LED diode), in cover IP 40

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version AC

version DC

NEW

- Cadmium - free contacts • Height 25,5 mm
- 5000 V / 8 mm reinforced insulation
- For plug-in sockets
- Accessories: sockets and modules
- AC and DC coils
- WT (mechanical indicator + lockable front test button) - standard features of relays
- Recognitions, certifications, directives: RoHS, CE

Contact data

Number and type of contacts		1 CO
Contact material		**AgNi**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		12 V 10 mA
Rated load	AC1	16 A / 250 V AC
Min. switching current		10 mA 12 V
Max. inrush current		32 A 20 ms
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		0,12 W 10 mA / 12 V
Contact resistance		≤ 100 mΩ 1 A / 6 V DC
Max. operating frequency		
• at rated load	AC1	360 cycles/hour ON for 5 s / OFF for 5 s
• no load		18 000 cycles/hour

Coil data

Rated voltage	50 Hz AC	24 ... 230 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 3, 4
Rated power consumption	AC	0,75 VA ❶
	DC	0,4 ... 0,48 W ❶

Insulation according to PN-EN 60664-1

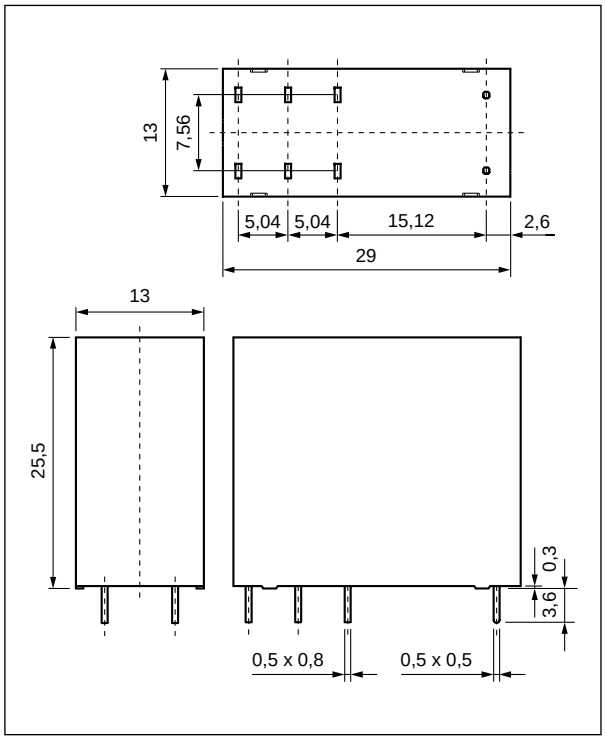
Insulation rated voltage	500 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Insulation resistance	1000 MΩ 500 V DC
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 8 mm
• creepage	≥ 8 mm

General data

Operating / release time (typical values)		15 ms / 8 ms
Electrical life (number of cycles)		
• resistive AC1		> 3 x 10^4 AC coils, 16 A, 250 V AC
		> 10^4 DC coils, 16 A, 250 V AC
Mechanical life (cycles)		> 5 x 10^6
Dimensions (L x W x H)		29 x 13 x 25,5 mm
Weight		16 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C ❷ ❸ DC: -40...+85 °C ❷ ❸
Cover protection category		IP 40 wg PN-EN 60529
Environmental protection		RTII wg IEC 61810-7
Relative humidity		5...85%
Shock resistance		10 g
Vibration resistance	(NO/NC)	10 g / 5 g length direction: 10 g / 2 g ❸ 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays. ❶ The data don't include the power of electronic indicating circuit when the relay picks-up. ❷ Operating temperature for relays mounted in sockets on 35 mm rail mount: -40...+55 °C. ❸ The distance between the mounting relays: min. 5 mm for versions AC; min. 1,5 mm for versions DC.

Dimensions

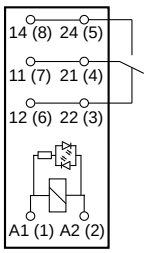


Mounting

Relays **RMP85** ❸ are designed for: • screw terminals plug-in sockets **GZF80** ❹ with clip **GZM80-0025**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • spring terminals plug-in sockets **GZMB80** ❹ ❺ with clip **GZMB80-0025** or **GZM80-0025**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** ❻ are available with sockets (see page 422) • plug-in sockets for PCB mounting **EC 50** and **GD50** with clip **MH25-2**.

❸ The distance between the mounting relays: min. 5 mm for versions AC; min. 1,5 mm for versions DC. ❹ Loads above 10 A (GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24 - see page 137. ❺ For sockets **GZMB80** - see page 397 (wire connection). ❻ For sockets **GZF80** not applicable modules type **M...**

Connection diagram (pin side view)

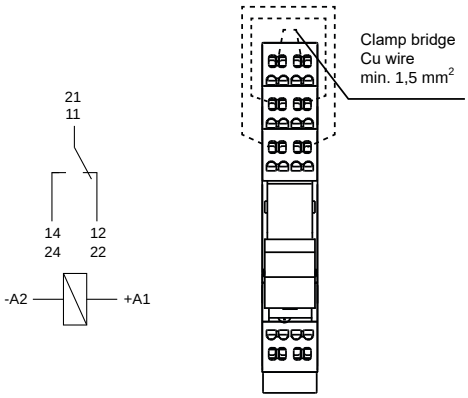


1 CO

Terminal (pin)	A1(1); A2(2)	22(3); 21(4); 24(5); 12(6); 11(7); 14(8)
[mm]	0,5 x 0,5	0,5 x 0,8
Drilling hole: • for sockets	Ø 1,5 + 0,1 mm	

RMP85 terminals are doubled for each contact.
Both terminals are to be used while connecting to load.

Connection of GZ... sockets



Note: Loads above 10 A (GZF80, GZMB80) require bridging pairs of spring terminals: 11 with 21, 12 with 22, 14 with 24. Loads up to 10 A do not require bridging of common terminals (such bridges may be fixed, however).

Test buttons type T

orange
– AC coils

blue
– DC coils

Note: Normally open contacts may be closed with the blocking function of the test button of the T type (it shall be bent by 90° to vertical position). When the button is drawn back, the normally open contacts are opened.

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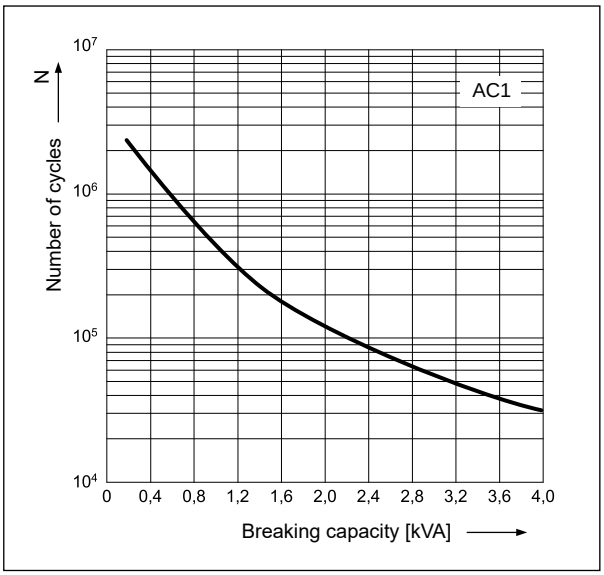
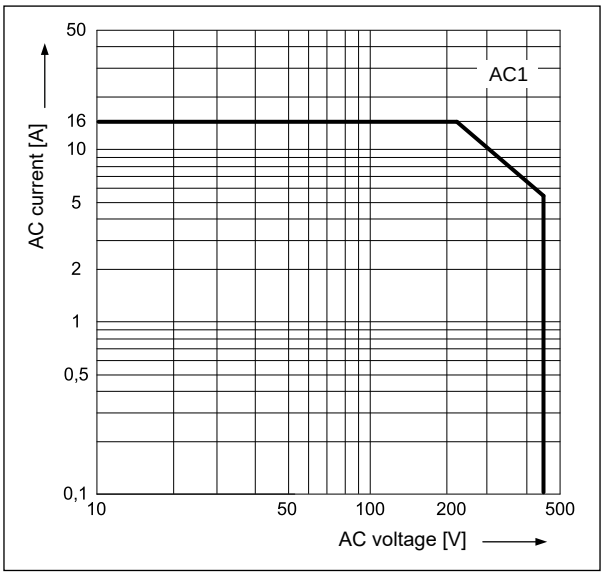
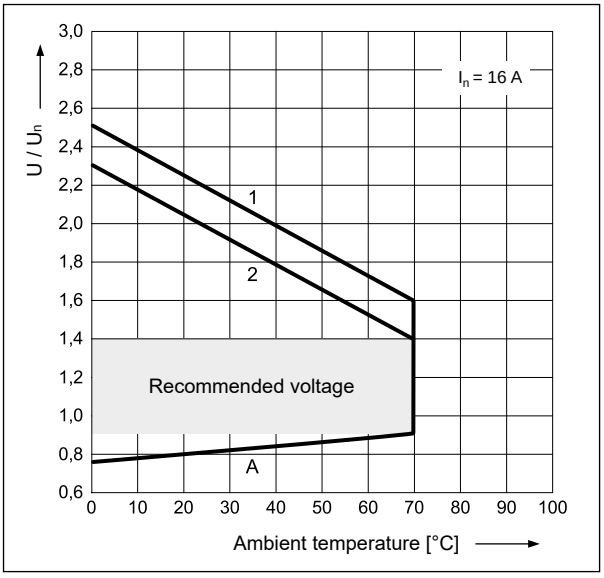
Electrical life at AC resistive load. Switching frequency: 360 cycles/hour Fig. 1



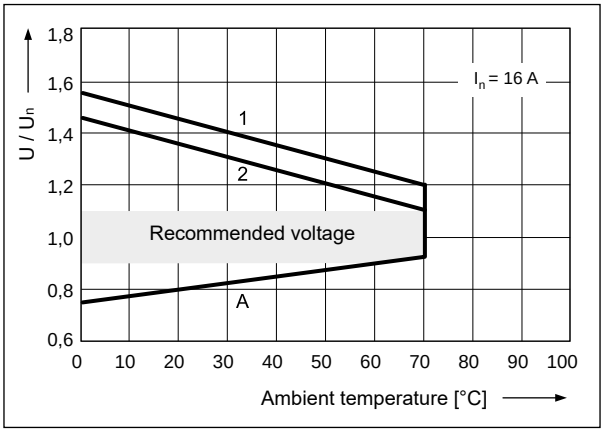
Max. AC 50 Hz resistive load breaking capacity Fig. 2



Coil operating range - DC Fig. 3



Coil operating range - AC 50 Hz Fig. 4



Description of Fig. 3 and 4

A - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).

1, 2 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:

1 - no load

2 - rated load

Note: the use of the relay at energizing voltage other than the rated voltage may lead to reduced electrical life. Energizing voltage exceeding the recommended range may damage the insulation of the relay coil.

Coil data - DC voltage version

Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC ❼	
				min. (at 23 °C)	max. (at 23 °C)
1012	**12**	**360**	**± 10%**	**8,4**	**18,0**
1024	**24**	**1 440**	**± 10%**	**16,8**	**36,0**
1048	48	5 760	± 15%	33,6	72,0
1110	110	25 200	± 15%	77,0	165,0

The data in bold type relate to the standard versions of the relays.
❼ The max. allowable voltage is coil overdrive voltage, it is the instantaneous max. voltage which the relay coil could endure in very short time.

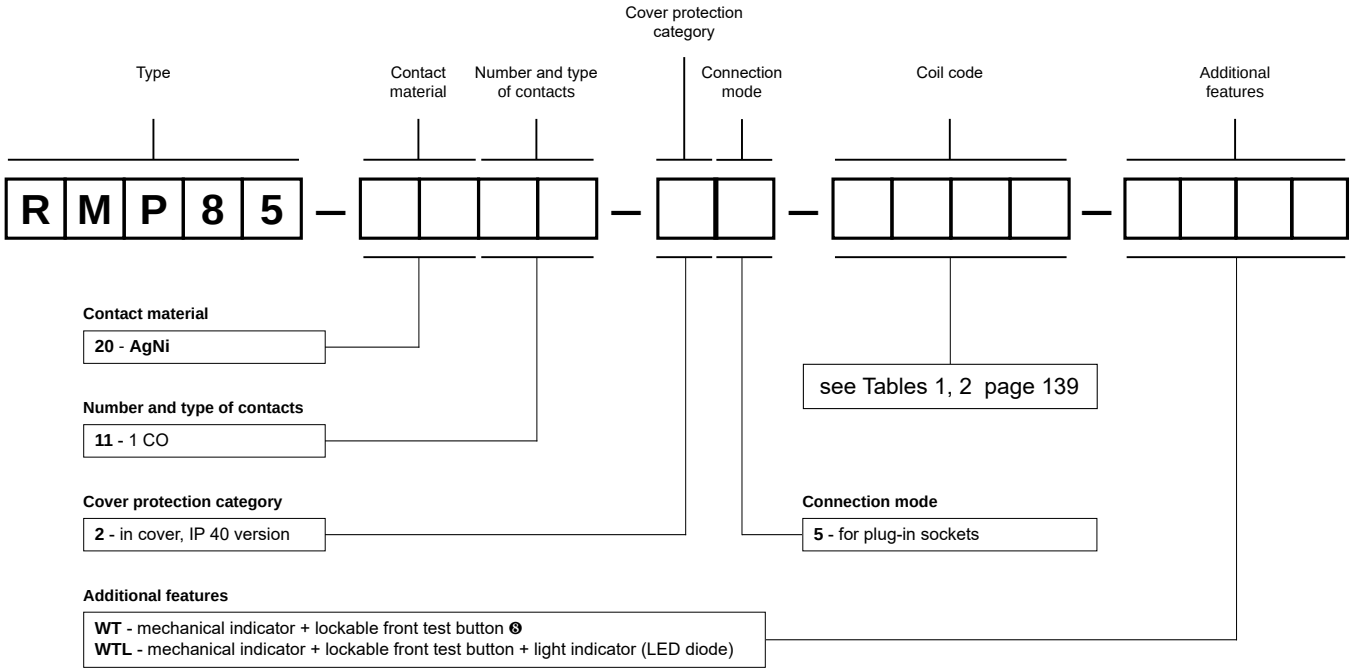
Coil data - AC 50 Hz voltage version

Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 23 °C)	max. (at 23 °C)
5024	**24**	**350**	**± 10%**	**18,0**	**26,4**
5115	115	8 100	± 15%	86,3	126,5
5230	**230**	**32 500**	**± 15%**	**172,5**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



❽ **WT** - standard features of relays. Test buttons type T - see page 137.

Examples of ordering code:

RMP85-2011-25-1024-WT relay **RMP85**, for plug-in sockets, one changeover contact, contact material AgNi, coil voltage 24 V DC, with mechanical indicator and lockable front test button, in cover IP 40

RMP85-2011-25-5230-WTL relay **RMP85**, for plug-in sockets, one changeover contact, contact material AgNi, coil voltage 230 V AC 50 Hz, with mechanical indicator and lockable front test button and light indicator (LED diode), in cover IP 40

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- Cadmium - free contacts • Miniature dimensions
- Automotive applications
- High resistance to inrush current
- For PCB
- Following relays versions are available:
  RA2 - standard design
  RAW2 - narrow pin layout design
- Recognitions, certifications, directives: RoHS

Contact data

Number and type of contacts		1 CO, 1 NO, 2 NO
Contact material		**$AgSnO_2$**
Rated / max. switching voltage	DC	60 V / 60 V
Min. switching voltage		1 V
Min. switching current		10 mA
Max. inrush current		1 CO: 110 A / 50 A (NO/NC) 1 NO: 110 A 2 NO: 2 x 110 A
Rated current		1 CO: 20 A / 12 A (NO/NC) 1 NO: 20 A 2 NO: 2 x 12,5 A
Max. breaking capacity		1 CO: 270 W / 162 W (NO/NC) 1 NO: 270 W 2 NO: 2 x 168 W
Min. breaking capacity		1 W
Contact resistance		≤ 3 mΩ
Max. operating frequency		
• at rated load	AC1	900 cycles/hour 2 s ON / 2 s OFF
• at motor load		450 cycles/hour 2 s ON / 6 s OFF
• at incandescent lamp load		120 cycles/hour 2 s ON / 30 s OFF
• no load		36 000 cycles/hour

Coil data

Rated voltage	DC	5 ... 48 V
Must release voltage		DC: ≥ 0,15 U_n
Operating range of supply voltage		see Table 1
Must operate voltage		≤ 0,6 U_n
Rated power consumption	DC	1,44 W

Insulation

Insulation rated voltage	60 V AC
Dielectric strength	
• between coil and contacts	500 V AC
• contact clearance	500 V AC
Contact - coil distance	
• clearance	≥ 1 mm
• creepage	≥ 1 mm

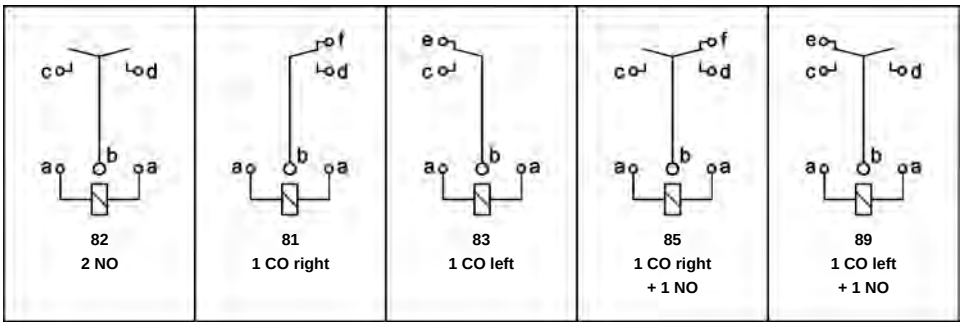
General data

Operating / release time (typical values)		10 ms / 3 ms
Electrical life		
• resistive DC1		1 CO: > 10^5 20 A / 12 A (NO/NC), 13,5 V DC 1 NO: > 10^5 20 A, 13,5 V DC 2 NO: > 10^5 2 x 12,5 A, 13,5 V DC
Mechanical life (cycles)		> 10^7
Dimensions (L x W x H)		IP 00: 18,6 x 13,0 x 18,5 mm IP 40: 20,5 x 15,3 x 19,7 mm
Weight		12 g
Ambient temperature	• storage	-40...+100 °C
	• operating	-40...+85 °C
Cover protection category		IP 40 or **IP 00 (without cover)** PN-EN 60529
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

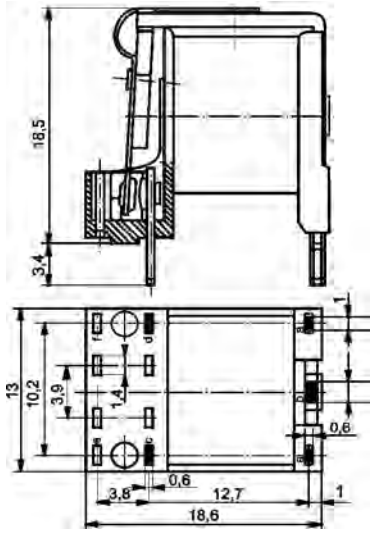
The data in bold type relate to the standard versions of the relays.

Connection diagrams (pin side view)

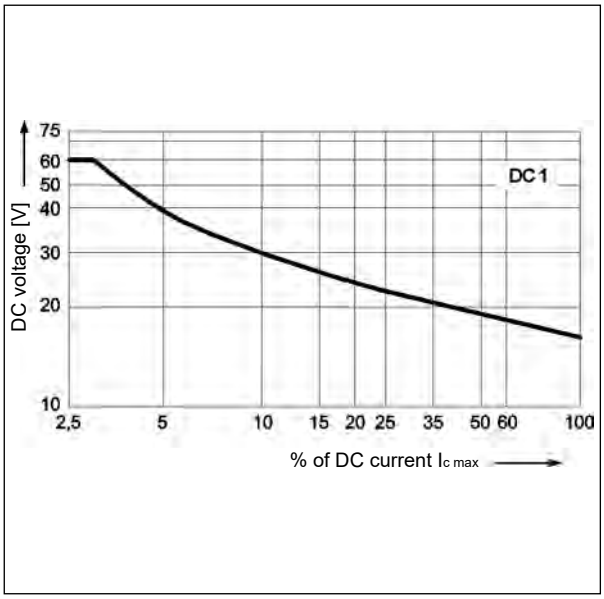
Relay terminals:
c, d, e, f - 0,6 x 1,4 mm **a** - 0,6 x 1,0 mm **b** - 1,0 x 1,5 mm



Dimensions



Max. DC resistive load breaking capacity Fig. 1



Mounting

Relays **RA2** are designed for direct PCB mounting.

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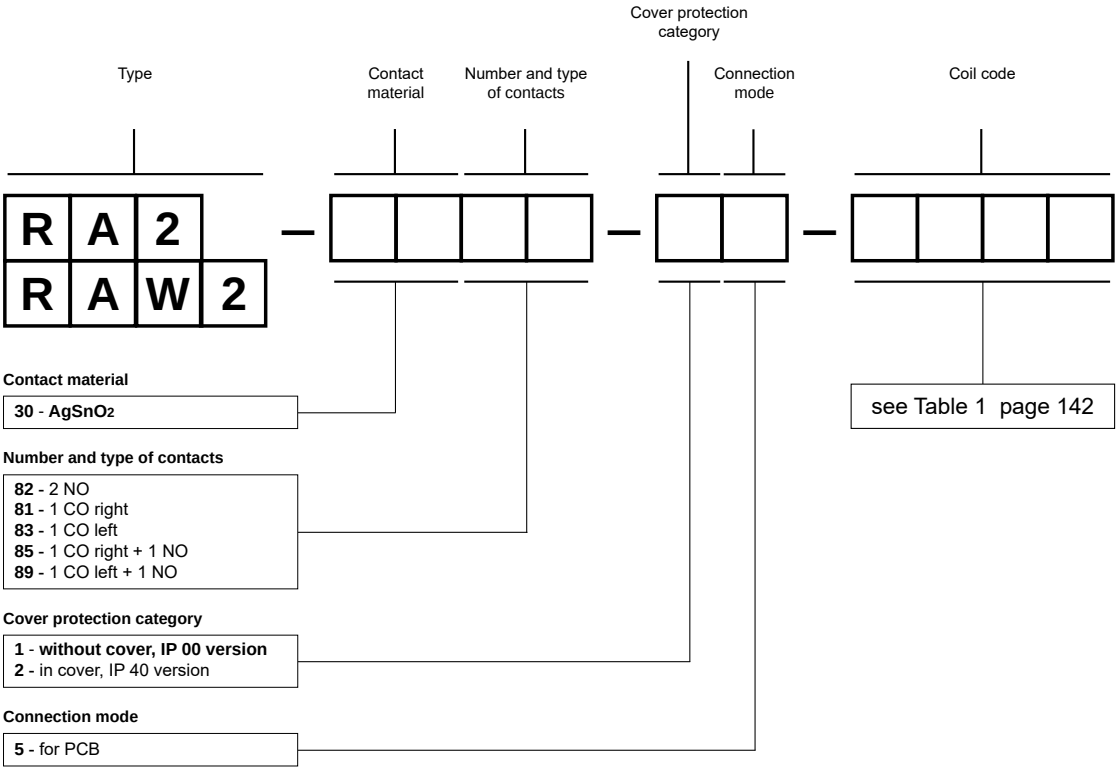
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	5	18	± 10%	4,0	6,6
1006	6	24	± 10%	4,8	8,0
1009	9	55	± 10%	7,2	12,0
1012	**12**	**100**	**± 10%**	**9,6**	**16,0**
1015	15	152	± 10%	12,0	20,0
1018	18	230	± 10%	14,4	23,9
1024	24	390	± 10%	19,2	31,9
1048	48	1 590	± 10%	38,4	63,8

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

RA2-3081-15-1012 relay **RA2**, for PCB, one right changeover contact, contact material $AgSnO_2$, coil voltage 12 V DC, without cover IP 00

RAW2-3082-25-1024 relay **RAW2** with narrow pin layout design, for PCB, two normally open contacts, contact material $AgSnO_2$, coil voltage 24 V DC, in cover IP 40

Relays
industrial

relpol S.A.

Industrial relays are applied mainly in industrial and power automation systems, in signaling and protection systems, in other control and electric drives systems. The main products of Relpol S.A. have been successfully applied in industrial automation for many years. Their reliability and quality have been acknowledged by numerous prizes and awards, and by the Customers' satisfaction.

The basic features of industrial relays are: contact number: from 1 to 4, rated contact switching currents up to 48 A (depending on the relay type), versions with coil overvoltage suppression, versions with flag indicators and manual relay test pushbuttons with the possibility of latching the normally open contacts closed, mounting on PCB, plug-in sockets, 35 mm rails; screw and spring terminals of plug-in sockets, and via flat connecting inserts. R2N, R3N and R4N relays are the basis for the interface relays of PIR2, PIR3 and PIR4 types which are described in the section of "Interface relays".

They meet the requirements of RoHS Directive.
The relays are recognized and certified by:
AUCOTEAM GmbH Berlin,

miniature industrial

R2N 144
R3N 149
R4N 154
RY2 159
R2M 163

industrial of small dimensions

R15 - 2 CO, 3 CO 167
R15 - 4 CO 172
RUC 176
RUC-M 182
RG25 187
R20 190
R30N 193
R40N 196
RS35, RS50 199

12 A / 250 V AC

- Relays of general application • For plug-in sockets: 35 mm rail mount acc. to PN-EN 60715; on panel mounting; PCB mounting
- Miniature dimensions • Cadmium - free contacts • AC and DC coils
- WT (mechanical indicator + lockable front test button) - standard features of relays. Relays may be provided with the test buttons (no latching) and plugs - page 421
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**, AgNi/Au flash gold plating
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V
Rated load (capacity)	AC1	12 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor)
	DC1	12 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA
Max. inrush current		24 A
Rated current		12 A
Max. breaking capacity	AC1	3 000 VA
Min. breaking capacity		0,3 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		12 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	6 ... 240 V
	DC	5 ... 220 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	AC	1,6 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

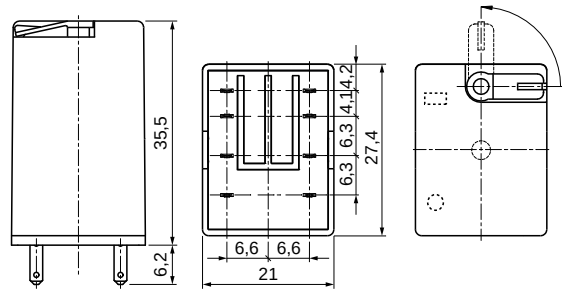
Insulation rated voltage	250 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 2,5 mm
• creepage	≥ 4 mm

General data

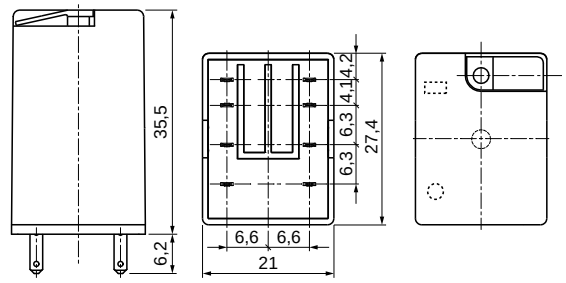
Operating / release time (typical values)		AC: 10 ms / 8 ms DC: 13 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 12 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		27,4 x 21 x 35,5 mm
Weight		35 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

Dimensions - plug-in version (WT), with lockable front test button type T

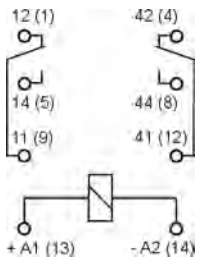


Dimensions - plug-in version, with test button (no latching) or with plug (no manual operation)



Test buttons R4P-0001 and **plugs R4W-0003** need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

Connection diagram (pin side view)

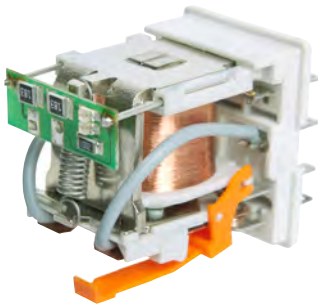


2 CO

Note: the indicated polarity of the supply refers to the relays with extra equipment **D** - surge suppression element (diode) - for DC coils only.

Design

Improvement of the functionality of the mechanical indicator (W): it is mounted on an insulation base of the unit of the movable contacts; the changes provide the appropriate position in the window in the upper side of the housing irrespectively of the number of operations performed by the relay.



Application of electronics made in the SMD technology: additional features L (LED diode) and D (diode) are located on the printed circuit board; the change of the position of the LED diode and optimization of the quality and intensity of its light provide certainty that the relay is in operation status when the LED is on.

Improvement of the efficiency of the electromagnet: an innovational technology of connecting elements has been introduced, which guarantees more reliable operation of the relay.

Strengthening of the insulation in the area of the contact plate: polyamide PA66 has been applied; it has very good mechanical and electrical parameters and best thermal properties.

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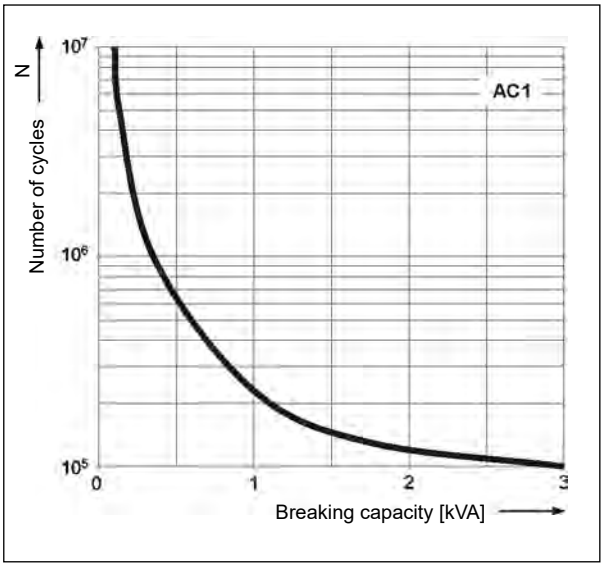
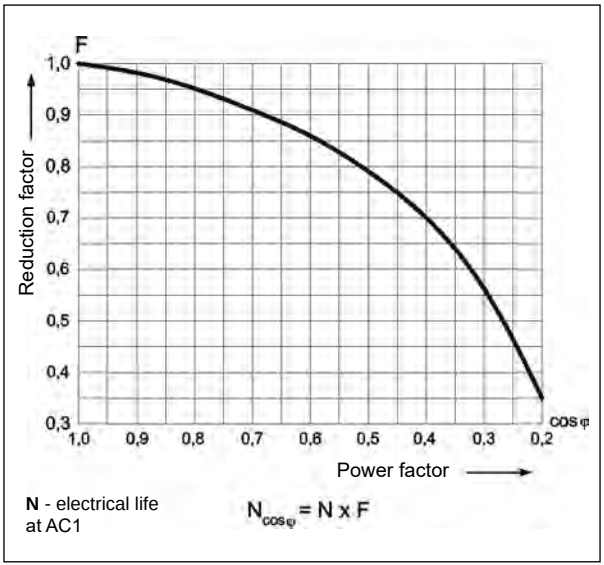
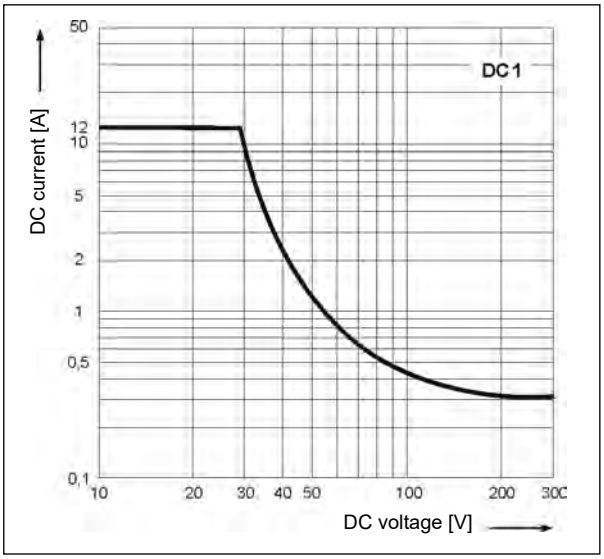
Electrical life at AC resistive load. Switching frequency: 1 200 cycles/hour Fig. 1



Electrical life reduction factor at AC inductive load Fig. 2



Max. DC resistive load breaking capacity Fig. 3



Contact material selection for different load types

- **AgNi** - for resistive or inductive loads,
- **AgNi/Au flash gold plating** - Au protects the contact surface during storage.

Mounting

Relays R2N are offered in versions: • for plug-in sockets. **With WT features as standard** (**W** - mechanical indicator + **T** - lockable front test button). In these relays is **possibility self-exchange of button type T for test button R4P-0001** (no latching) **or on plug R4W-0003** (no manual operation). The buttons **R4P-0001** and the plugs **R4W-0003 need to ordered saparately**.

Relays **R2N** are designed for: • screw terminals plug-in sockets **GZT2** ❶ and **GZM2** ❶ with clip **GZT4-0040** or **G4 1052**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • spring terminals plug-in sockets **GZMB2** ❷ with clip **GZMB4-0040** or **G4 1052**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** are available with sockets (see page 422) • plug-in sockets for PCB mounting **SU4/2D** with clip **G4 1053** • solder terminals sockets **SU4/2L** with clip **G4 1053** and spring clamp **G4 1040** • solder terminals sockets **G4/2** with clip **G4 1053**.

❶ Plug-in sockets **GZT2**, **GZM2** may be linked with interconnection strip type **ZGGZ4** (see page 419).
❷ For sockets **GZMB2** - see page 401 (wire connection).

Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
1005	5	28	± 10%	4,0	5,5
1006	6	40	± 10%	4,8	6,6
1012	12	160	± 10%	9,6	13,2
1024	**24**	**640**	**± 10%**	**19,2**	**26,4**
1048	48	2 600	± 10%	38,4	52,8
1060	60	4 000	± 10%	48,0	66,0
1080	80	7 100	± 10%	64,0	88,0
1110	110	13 600	± 10%	88,0	121,0
1125	125	16 000	± 10%	100,0	137,5
1220	**220**	**54 000**	**± 10%**	**176,0**	**242,0**

The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5006	6	9,8	± 10%	4,8	6,6
5012	12	39,5	± 10%	9,6	13,2
5024	**24**	**158**	**± 10%**	**19,2**	**26,4**
5042	42	470	± 10%	33,6	46,2
5048	48	640	± 10%	38,4	52,8
5060	60	930	± 10%	48,0	66,0
5080	80	1 720	± 10%	64,0	88,0
5110	110	3 450	± 10%	88,0	121,0
5115	115	3 610	± 10%	92,0	127,0
5120	120	3 770	± 10%	96,0	132,0
5127	127	4 000	± 10%	101,6	139,0
5220	220	15 400	± 10%	176,0	242,0
5230	**230**	**16 100**	**± 10%**	**184,0**	**253,0**
5240	240	16 800	± 10%	192,0	264,0

The data in bold type relate to the standard versions of the relays.

NEW TECHNOLOGY

The new R2N, R3N, R4N relays are modernized versions of the R2, R3, R4 relays. The modernization covered the design of the relays and the manufacturing process.

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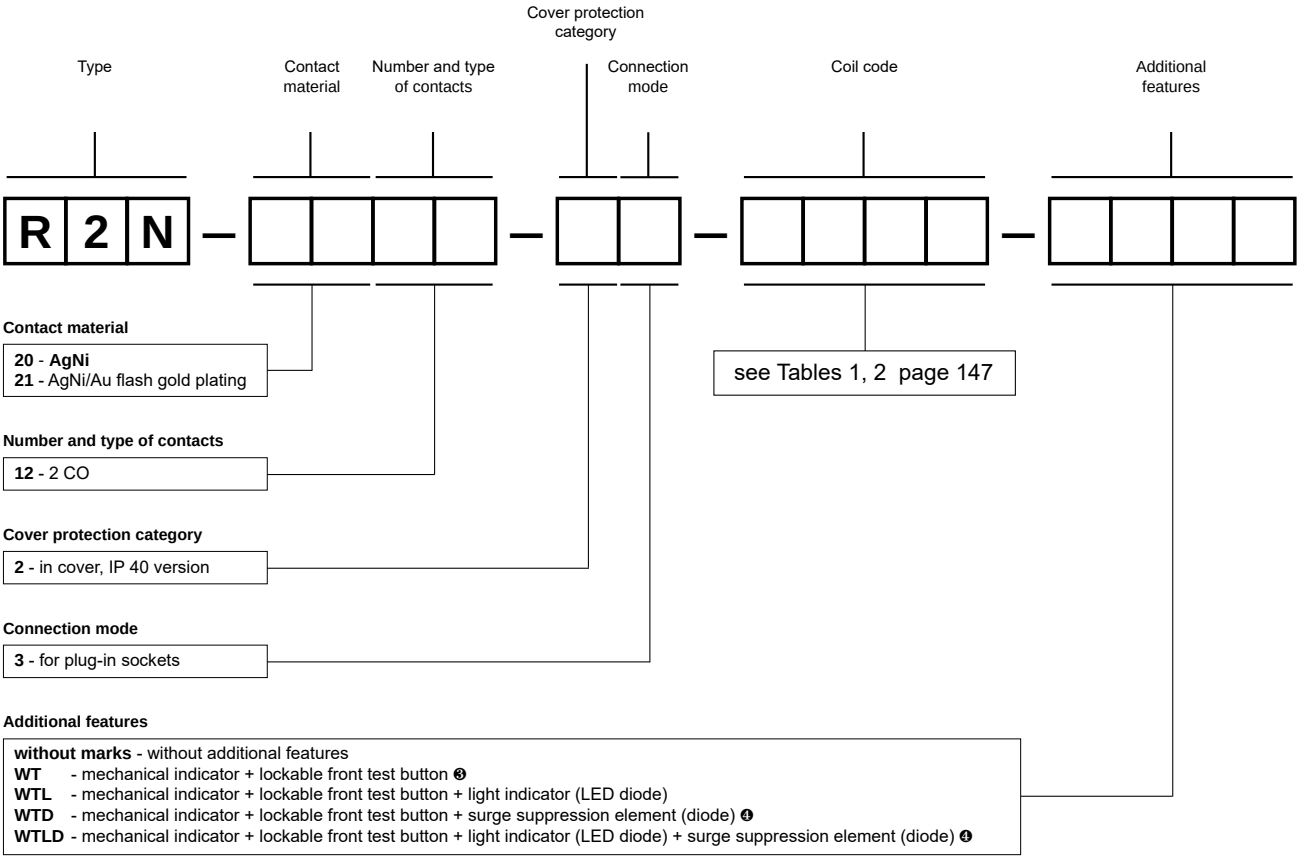
Ordering codes



❸ **WT** - standard features of relays
❹ **WTD, WTLD** - available only in relays with DC coils

Test buttons (no latching) and plugs need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

- Button R4P-0001-A - orange colour (AC coils)
- Button R4P-0001-D - green colour (DC coils)
- Plug R4W-0003-A - orange colour (AC coils)
- Plug R4W-0003-D - green colour (DC coils)

Note:

While the relay operates, the test button of the **T** type becomes heated. In order to push the test button manually, you should first turn the supply voltage off, and wait some time until the button becomes colder (or push the button immediately using a protective glove or an insulated tool). The button shall be pushed smoothly and quickly. The normally open contacts are closed with the button for the time during which the button is pushed. Releasing the button opens the normally open contacts. Normally open contacts may be closed with the blocking function of the button (it shall be turned by 90°). When the button is turned back, the normally open contacts are opened.

For relays with additional features **D** - surge suppression element (diode) (versions WTD and WTLD) - fixed supply polarity compulsory for the DC load of coils: +A1(13) / -A2(14). The polarity is indicated on the relay cover. For other versions of the relays with DC coils any polarity is possible.

Example of ordering codes:

R2N-2012-23-1024-WT relay **R2N**, for plug-in sockets, two changeover contacts, contact material AgNi, coil voltage 24 V DC, with mechanical indicator and lockable front test button, in cover IP 40

10 A / 250 V AC

- Relays of general application • For plug-in sockets: 35 mm rail mount acc. to PN-EN 60715; on panel mounting
- Miniature dimensions • Cadmium - free contacts • AC and DC coils
- WT (mechanical indicator + lockable front test button) - standard features of relays. Relays may be provided with the test buttons (no latching) and plugs - page 421
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		3 CO
Contact material		**AgNi**, AgNi/Au flash gold plating
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V
Rated load (capacity)	AC1	10 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor)
	DC1	10 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA
Max. inrush current		20 A
Rated current		10 A
Max. breaking capacity	AC1	2 500 VA
Min. breaking capacity		0,3 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	6 ... 240 V
	DC	5 ... 220 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	AC	1,6 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	2
Dielectric strength	
• between coil and contacts	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 2,5 mm
• creepage	≥ 4 mm

General data

Operating / release time (typical values)		AC: 10 ms / 8 ms DC: 13 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 10 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		27,4 x 21 x 35,5 mm
Weight		35 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

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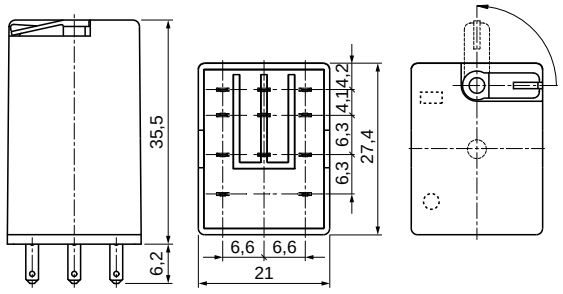
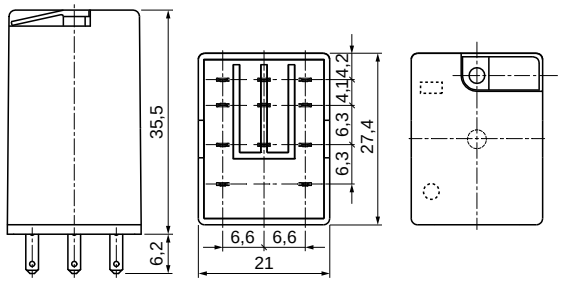
Dimensions - plug-in version (WT), with lockable front test button type T

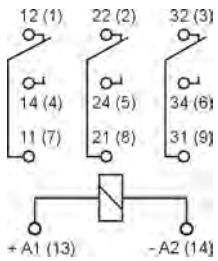


Dimensions - plug-in version, with test button (no latching) or with plug (no manual operation)



Test buttons R4P-0001 and **plugs R4W-0003** need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

Connection diagram (pin side view)

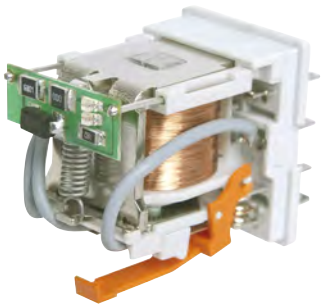


3 CO

Note: the indicated polarity of the supply refers to the relays with extra equipment **D** - surge suppression element (diode) - for DC coils only.

Design

Improvement of the functionality of the mechanical indicator (W): it is mounted on an insulation base of the unit of the movable contacts; the changes provide the appropriate position in the window in the upper side of the housing irrespectively of the number of operations performed by the relay.

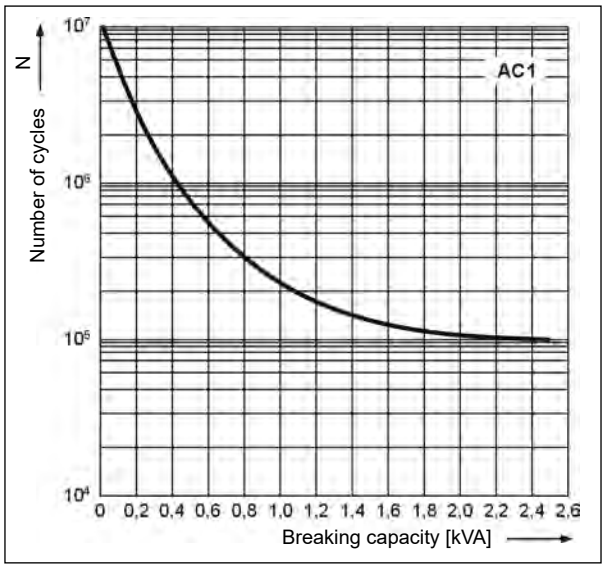


Application of electronics made in the SMD technology: additional features L (LED diode) and D (diode) are located on the printed circuit board; the change of the position of the LED diode and optimization of the quality and intensity of its light provide certainty that the relay is in operation status when the LED is on.

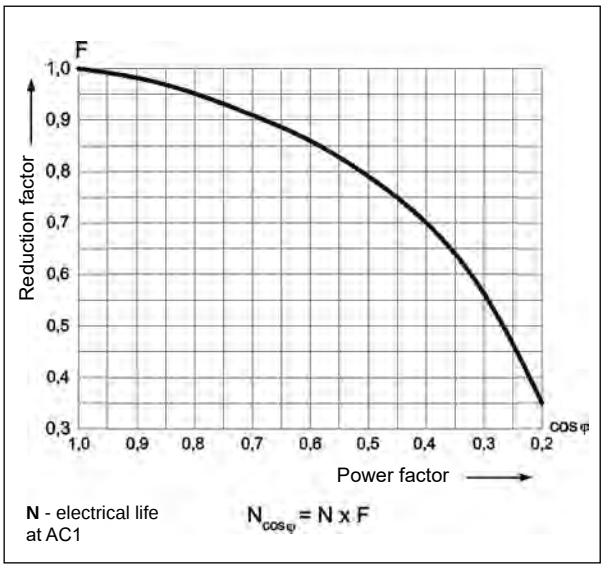
Improvement of the efficiency of the electromagnet: an innovational technology of connecting elements has been introduced, which guarantees more reliable operation of the relay.

Strengthening of the insulation in the area of the contact plate: polyamide PA66 has been applied; it has very good mechanical and electrical parameters and best thermal properties.

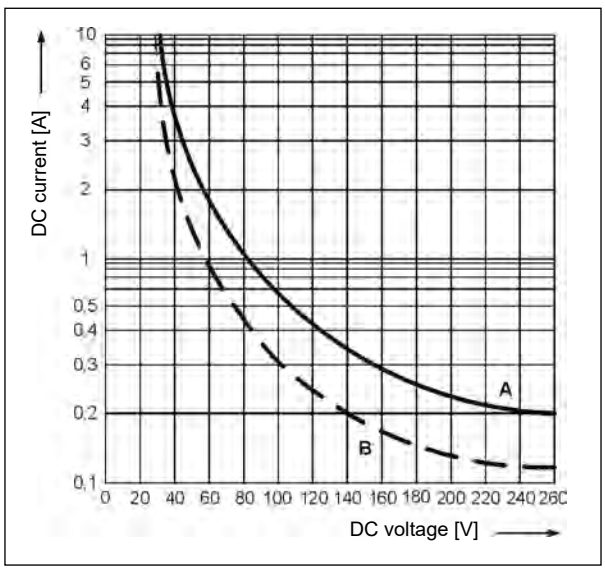
Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour Fig. 1



Electrical life reduction factor at AC inductive load Fig. 2



Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms Fig. 3



Mounting

Relays R3N are offered in versions: • for plug-in sockets. **With WT features as standard** (**W** - mechanical indicator + **T** - lockable front test button). In these relays is **possibility self-exchange of button type T for test button R4P-0001** (no latching) **or on plug R4W-0003** (no manual operation). The buttons **R4P-0001** and the plugs **R4W-0003 need to ordered saparately**.

Relays **R3N** are designed for: • screw terminals plug-in sockets **GZT3** ❶ and **GZM3** ❶ with clip **GZT4-0040** or **G4 1052**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws. Signalling / protecting modules **type M...** are available with sockets (see page 422).

❶ Plug-in sockets **GZT3**, **GZM3** may be linked with interconnection strip type **ZGGZ4** (see page 419).

Contact material selection for different load types

- **AgNi** - for resistive or inductive loads,
- **AgNi/Au flash gold plating** - Au protects the contact surface during storage.

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Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
1005	5	28	± 10%	4,0	5,5
1006	6	40	± 10%	4,8	6,6
1012	12	160	± 10%	9,6	13,2
1024	**24**	**640**	**± 10%**	**19,2**	**26,4**
1048	48	2 600	± 10%	38,4	52,8
1060	60	4 000	± 10%	48,0	66,0
1080	80	7 100	± 10%	64,0	88,0
1110	110	13 600	± 10%	88,0	121,0
1125	125	16 000	± 10%	100,0	137,5
1220	**220**	**54 000**	**± 10%**	**176,0**	**242,0**

The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version Table 2

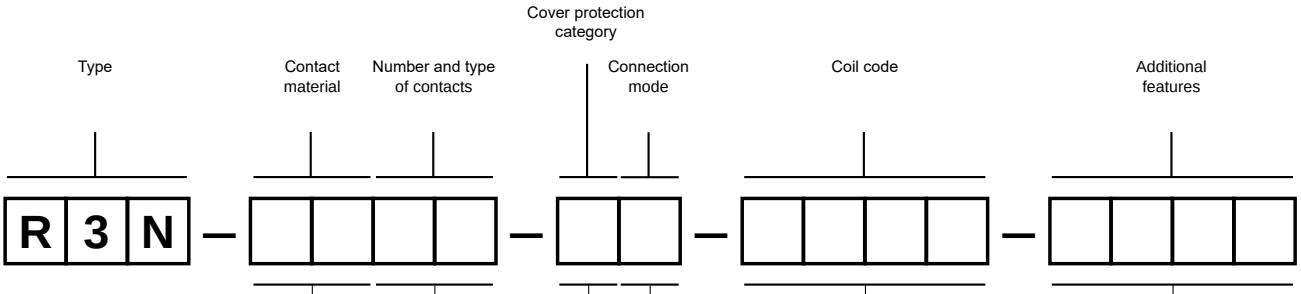
Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5006	6	9,8	± 10%	4,8	6,6
5012	12	39,5	± 10%	9,6	13,2
5024	**24**	**158**	**± 10%**	**19,2**	**26,4**
5042	42	470	± 10%	33,6	46,2
5048	48	640	± 10%	38,4	52,8
5060	60	930	± 10%	48,0	66,0
5080	80	1 720	± 10%	64,0	88,0
5110	110	3 450	± 10%	88,0	121,0
5115	115	3 610	± 10%	92,0	127,0
5120	120	3 770	± 10%	96,0	132,0
5127	127	4 000	± 10%	101,6	139,0
5220	220	15 400	± 10%	176,0	242,0
5230	**230**	**16 100**	**± 10%**	**184,0**	**253,0**
5240	240	16 800	± 10%	192,0	264,0

The data in bold type relate to the standard versions of the relays.

NEW TECHNOLOGY

The new R2N, R3N, R4N relays are modernized versions of the R2, R3, R4 relays. The modernization covered the design of the relays and the manufacturing process.

Ordering codes



Contact material

20 - **AgNi**
21 - AgNi/Au flash gold plating

see Tables 1, 2 page 152

Number and type of contacts

13 - 3 CO

Cover protection category

2 - in cover, IP 40 version

Connection mode

3 - for plug-in sockets

Additional features

without marks - without additional features
WT - mechanical indicator + lockable front test button ❷
WTL - mechanical indicator + lockable front test button + light indicator (LED diode)
WTD - mechanical indicator + lockable front test button + surge suppression element (diode) ❸
WTLD - mechanical indicator + lockable front test button + light indicator (LED diode) + surge suppression element (diode) ❸

❷ **WT** - standard features of relays
❸ **WTD, WTLD** - available only in relays with DC coils

Test buttons (no latching) and plugs need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

- Button R4P-0001-A - orange colour (AC coils)
- Button R4P-0001-D - green colour (DC coils)
- Plug R4W-0003-A - orange colour (AC coils)
- Plug R4W-0003-D - green colour (DC coils)

Note:

While the relay operates, the test button of the **T** type becomes heated. In order to push the test button manually, you should first turn the supply voltage off, and wait some time until the button becomes colder (or push the button immediately using a protective glove or an insulated tool). The button shall be pushed smoothly and quickly. The normally open contacts are closed with the button for the time during which the button is pushed. Releasing the button opens the normally open contacts. Normally open contacts may be closed with the blocking function of the button (it shall be turned by 90°). When the button is turned back, the normally open contacts are opened.

For relays with additional features **D** - surge suppression element (diode) (versions WTD and WTLD) - fixed supply polarity compulsory for the DC load of coils: +A1(13) / -A2(14). The polarity is indicated on the relay cover. For other versions of the relays with DC coils any polarity is possible.

Example of ordering code:

R3N-2013-23-1024-WT relay **R3N**, for plug-in sockets, three changeover contacts, contact material AgNi, coil voltage 24 V DC, with mechanical indicator and lockable front test button, in cover IP 40

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7 A / 230 V AC

- Relays of general application • For plug-in sockets: 35 mm rail mount acc. to PN-EN 60715; on panel mounting; PCB mounting • For PCB and soldering connections - option • Miniature dimensions • Cadmium - free contacts
- AC and DC coils • WT (mechanical indicator + lockable front test button) - standard features of relays. Relays may be provided with the test buttons (no latching) and plugs - page 421
- **Have obtained LR Type Approval Certificate (Lloyd's Register)**
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		4 CO
Contact material		**AgNi**, AgNi/Au flash gold plating, AgNi/Au hard gold plating
Rated / max. switching voltage	AC	250 V / 250 V
Min. switching voltage		10 V AgNi, 10 V AgNi/Au flash gold plating 5 V AgNi/Au hard gold plating
Rated load (capacity)	AC1	7 A / 230 V AC (VDE) 6 A / 250 V AC
	AC15	1,5 A / 120 V 0,75 A / 240 V (C300)
	AC3	125 W (single-phase motor)
	DC1	6 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA
Max. inrush current		12 A
Rated current		7 A
Max. breaking capacity	AC1	1 500 VA
Min. breaking capacity		0,3 W AgNi, 0,3 W AgNi/Au flash gold plating 0,1 W AgNi/Au hard gold plating
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	6 ... 240 V
	DC	5 ... 220 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	AC	1,6 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

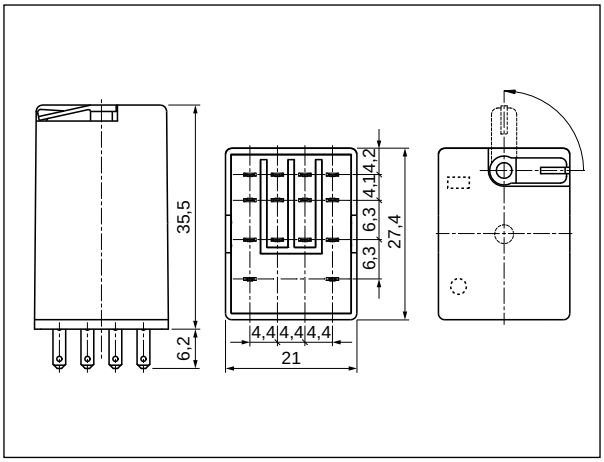
Insulation rated voltage	250 V AC
Rated surge voltage	2 500 V 1,2 / 50 µs
Overvoltage category	II
Insulation pollution degree	2
Dielectric strength	
• between coil and contacts	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 000 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 1,6 mm
• creepage	≥ 3,2 mm

General data

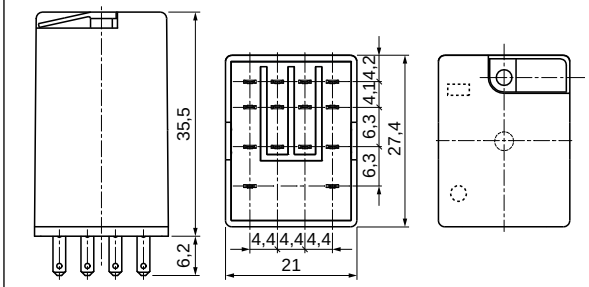
Operating / release time (typical values)		AC: 10 ms / 8 ms DC: 13 ms / 3 ms
Electrical life		
• resistive AC1		> 5 x 10^4 7 A, 230 V AC (VDE) > 10^5 6 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		27,4 x 21 x 35,5 mm
Weight		35 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

Dimensions - plug-in version (WT),
with lockable front test button type T

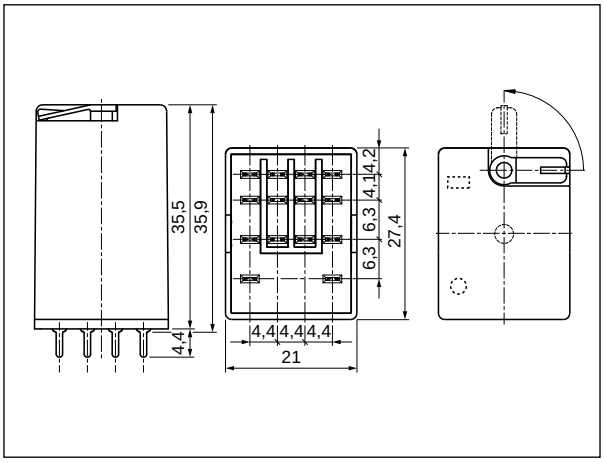


Dimensions - plug-in version, with test button
(no latching) or with plug (no manual operation)



Test buttons R4P-0001 and **plugs R4W-0003** need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

Dimensions - PCB version (WT),
with lockable front test button type T



Design

Improvement of the functionality of the mechanical indicator (W): it is mounted on an insulation base of the unit of the movable contacts; the changes provide the appropriate position in the window in the upper side of the housing irrespectively of the number of operations performed by the relay.

Application of electronics made in the SMD technology: additional features L (LED diode) and D (diode) are located on the printed circuit board; the change of the position of the LED diode and optimization of the quality and intensity of its light provide certainty that the relay is in operation status when the LED is on.

Improvement of the efficiency of the electromagnet: an innovational technology of connecting elements has been introduced, which guarantees more reliable operation of the relay.

Strengthening of the insulation in the area of the contact plate: polyamide PA66 has been applied; it has very good mechanical and electrical parameters and best thermal properties.

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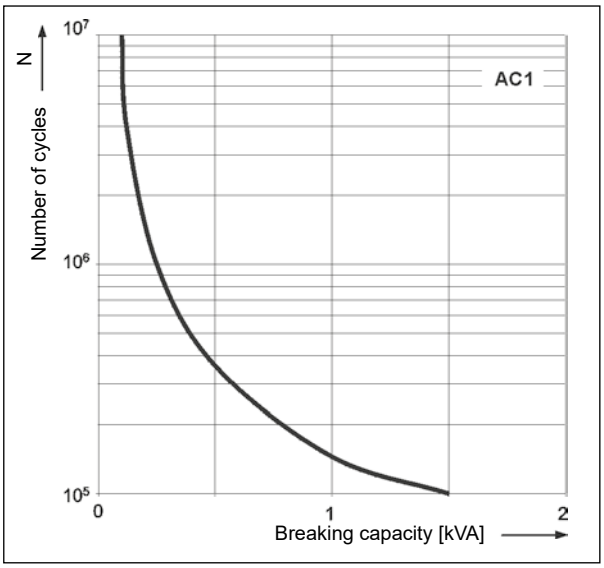
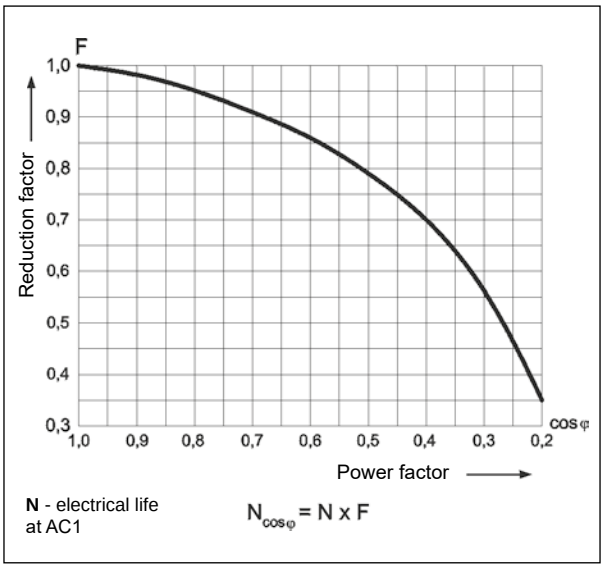
Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour Fig. 1



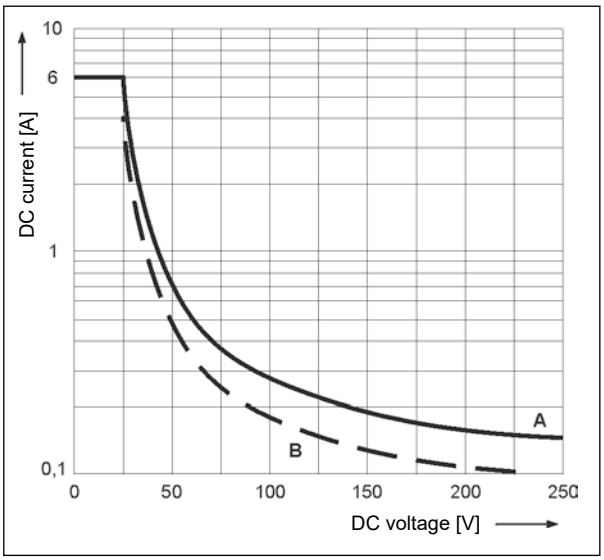
Electrical life reduction factor at AC inductive load Fig. 2



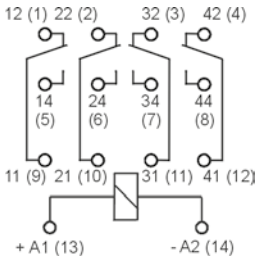
N - electrical life at AC1

$N_{cos\varphi} = N \times F$

Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms Fig. 3



Connection diagram (pin side view)



4 CO

Note: the indicated polarity of the supply refers to the relays with extra equipment **D** - surge suppression element (diode) - for DC coils only.

Contact material selection for different load types

- **AgNi** - for resistive or inductive loads,
- **AgNi/Au flash gold plating** - Au protects the contact surface during storage,
- **AgNi/Au hard gold plating** - for small resistive loads in control circuits.

NEW TECHNOLOGY

The new R2N, R3N, R4N relays are modernized versions of the R2, R3, R4 relays. The modernization covered the design of the relays and the manufacturing process.

Mounting

Relays R4N are offered in versions: • for plug-in sockets • for PCB. **With WT features as standard** (**W** - mechanical indicator + **T** - lockable front test button). In these relays is **possibility self-exchange of button type T for test button R4P-0001** (no latching) **or on plug R4W-0003** (no manual operation). The buttons **R4P-0001** and the plugs **R4W-0003 need to ordered saparately**.

Relays **R4N** are designed for: • screw terminals plug-in sockets **GZT4** ❶ and **GZM4** ❶ with clip **GZT4-0040** or **G4 1052**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • spring terminals plug-in sockets **GZMB4** ❷ with clip **GZMB4-0040** or **G4 1052**, 35 mm rail mount acc. to PN-EN 60715. Signalling / protecting modules **type M...** are available with sockets (see page 422) • screw terminals plug-in sockets **GZ4** with clip **G4 1052** or plug-in sockets **GS4** with clip **GS4-0036**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • plug-in sockets for PCB mounting **SU4D** with clip **G4 1053** • solder terminals sockets **SU4L** with clip **G4 1053** and spring clamp **G4 1040** • solder terminals sockets **G4** with clip **G4 1053** • direct PCB mounting.

❶ Plug-in sockets **GZT4**, **GZM4** may be linked with interconnection strip type **ZGGZ4** (see page 419). ❷ For sockets **GZMB4** - see page 403 (wire connection).

Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
1005	5	28	± 10%	4,0	5,5
1006	6	40	± 10%	4,8	6,6
1012	**12**	**160**	**± 10%**	**9,6**	**13,2**
1024	**24**	**640**	**± 10%**	**19,2**	**26,4**
1048	48	2 600	± 10%	38,4	52,8
1060	60	4 000	± 10%	48,0	66,0
1080	80	7 100	± 10%	64,0	88,0
1110	110	13 600	± 10%	88,0	121,0
1125	125	16 000	± 10%	100,0	137,5
1220	**220**	**54 000**	**± 10%**	**176,0**	**242,0**

The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5006	6	9,8	± 10%	4,8	6,6
5012	12	39,5	± 10%	9,6	13,2
5024	**24**	**158**	**± 10%**	**19,2**	**26,4**
5042	42	470	± 10%	33,6	46,2
5048	48	640	± 10%	38,4	52,8
5060	60	930	± 10%	48,0	66,0
5080	80	1 720	± 10%	64,0	88,0
5110	110	3 450	± 10%	88,0	121,0
5115	115	3 610	± 10%	92,0	127,0
5120	120	3 770	± 10%	96,0	132,0
5127	127	4 000	± 10%	101,6	139,0
5220	220	15 400	± 10%	176,0	242,0
5230	**230**	**16 100**	**± 10%**	**184,0**	**253,0**
5240	240	16 800	± 10%	192,0	264,0

The data in bold type relate to the standard versions of the relays.

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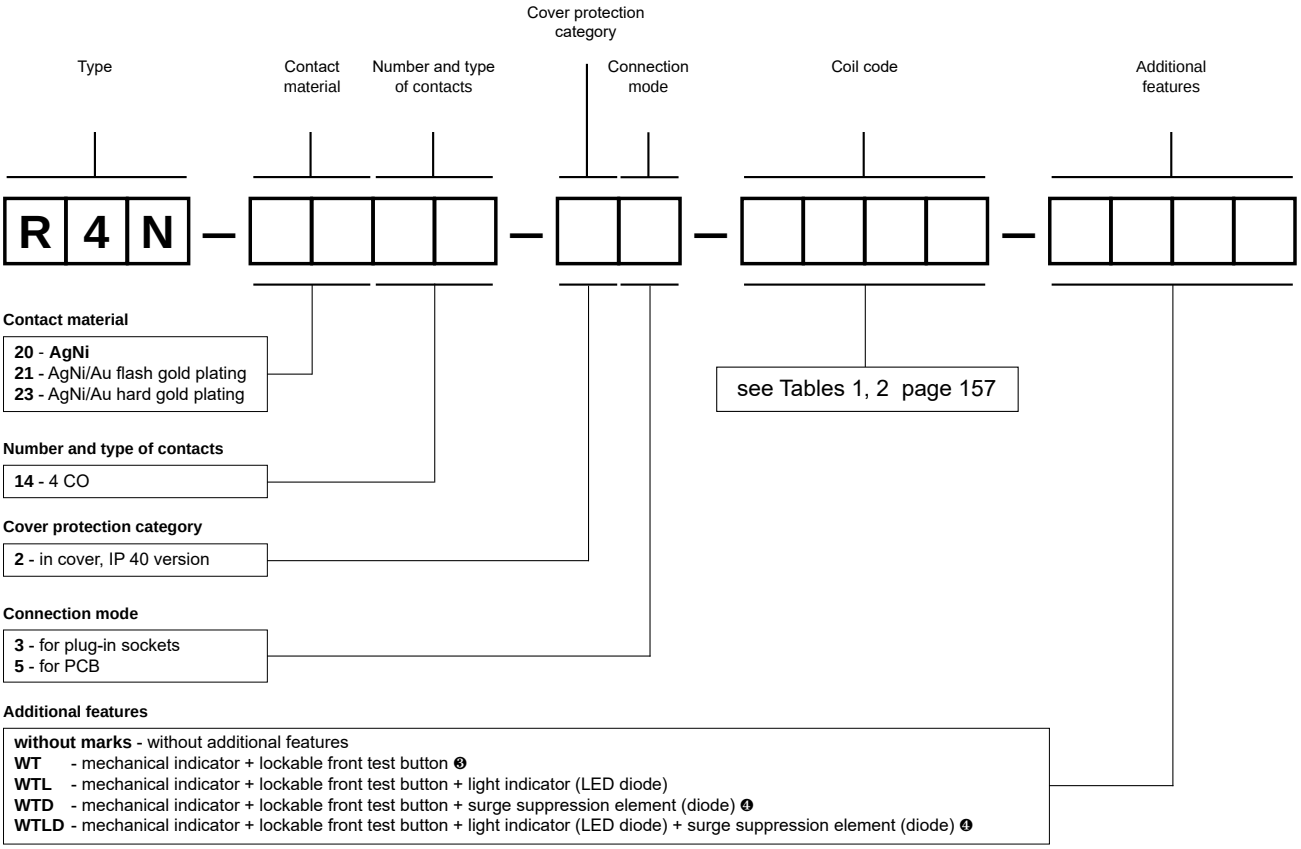
Ordering codes



❸ **WT** - standard features of relays
❹ **WTD, WTLD** - available only in relays with DC coils

Test buttons (no latching) and plugs need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

- Button R4P-0001-A - orange colour (AC coils)
- Button R4P-0001-D - green colour (DC coils)
- Plug R4W-0003-A - orange colour (AC coils)
- Plug R4W-0003-D - green colour (DC coils)

Note:

While the relay operates, the test button of the **T** type becomes heated. In order to push the test button manually, you should first turn the supply voltage off, and wait some time until the button becomes colder (or push the button immediately using a protective glove or an insulated tool). The button shall be pushed smoothly and quickly. The normally open contacts are closed with the button for the time during which the button is pushed. Releasing the button opens the normally open contacts. Normally open contacts may be closed with the blocking function of the button (it shall be turned by 90°). When the button is turned back, the normally open contacts are opened.

For relays with additional features **D** - surge suppression element (diode) (versions WTD and WTLD) - fixed supply polarity compulsory for the DC load of coils: +A1(13) / -A2(14). The polarity is indicated on the relay cover. For other versions of the relays with DC coils any polarity is possible.

Examples of ordering codes:

R4N-2014-23-5230-WTL	relay **R4N**, for plug-in sockets, four changeover contacts, contact material AgNi, coil voltage 230 V AC 50/60 Hz, with mechanical indicator and lockable front test button and light indicator (LED diode), in cover IP 40
R4N-2014-25-1024-WT	relay **R4N**, for PCB, four changeover contacts, contact material AgNi, coil voltage 24 V DC, with mechanical indicator and lockable front test button, in cover IP 40

- Relays of general application
- For plug-in sockets: 35 mm rail mount acc. to PN-EN 60715; on panel mounting
- For direct mounting on panel - cover with mounting flange
- Flat insert connectors - faston 187 (4,8 x 0,5 mm)
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**, AgCdO ❶
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 10 V AgCdO
Rated load	AC1	12 A / 250 V AC
	DC1	12 A / 30 V DC
Min. switching current		5 mA AgNi, 10 mA AgCdO
Max. inrush current		20 A
Rated current		12 A
Max. breaking capacity	AC1	3 000 VA
Min. breaking capacity		0,3 W AgNi, 1 W AgCdO
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	6 ... 240 V
	DC	5 ... 220 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	AC	1,6 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength		
• between coil and contacts		2 500 V AC type of insulation: basic
• contact clearance		1 000 V AC type of clearance: micro-disconnection
• pole - pole		2 500 V AC type of insulation: basic
Contact - coil distance		
• clearance		≥ 2,6 mm
• creepage		≥ 4 mm

General data

Operating / release time (typical values)		15 ms / 10 ms
Electrical life		
• resistive AC1		> 10^5 12 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 10^7
Dimensions (L x W x H)		27,5 x 21,1 x 34,5 mm ❷
Weight		35 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-40...+55 °C
Cover protection category		IP 40 PN-EN 60529
Shock resistance		10 g
Vibration resistance		5 g 15...150 Hz

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU. ❷ For plug-in sockets version: standard

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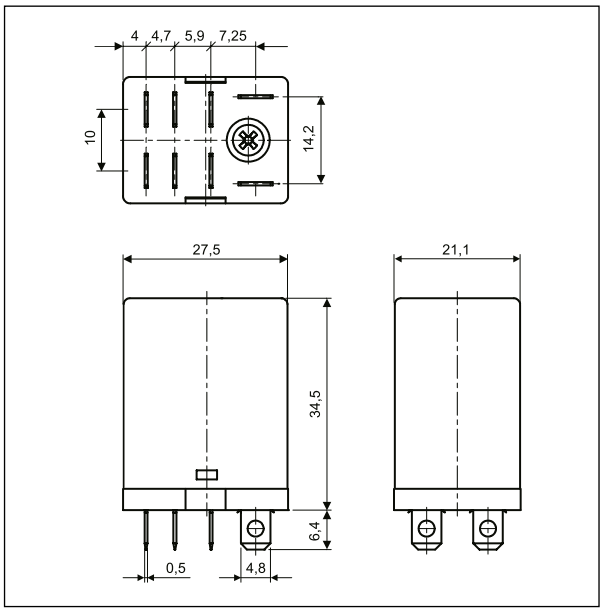
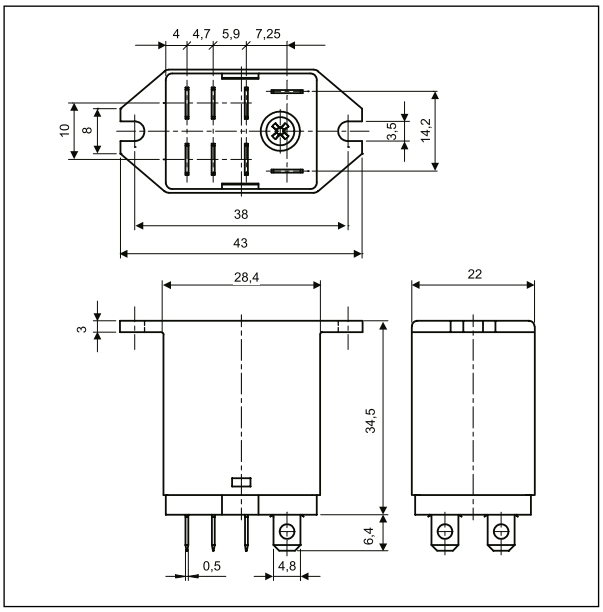
Dimensions - plug-in version (standard)

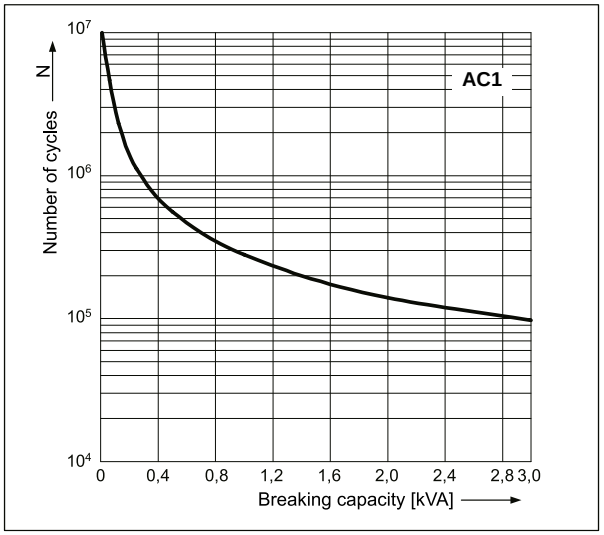


Dimensions - version with mounting flange in the upper wall of the cover



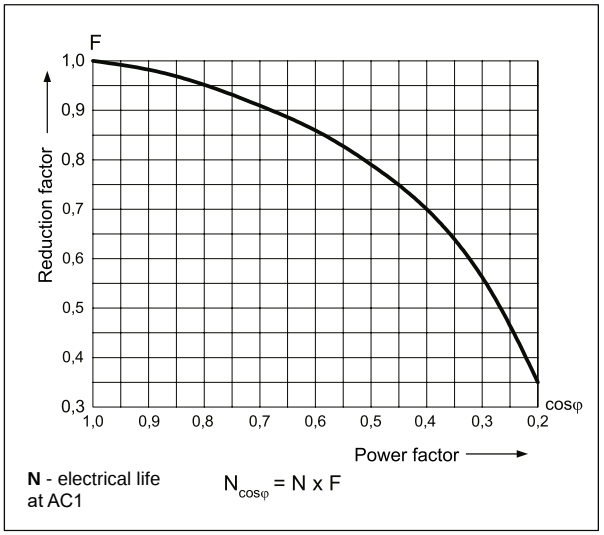
Electrical life at AC resistive load. Switching frequency: 1 200 cycles/hour

Fig. 1

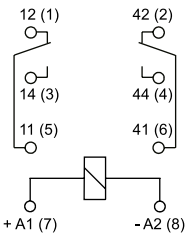


Electrical life reduction factor at AC inductive load

Fig. 2



Connection diagram (pin side view)



2 CO

Note: the indicated polarity of the supply refers to the relays with extra equipment **D** - surge suppression element (diode) - for DC coils only.

Mounting

Relays RY2 are offered in versions: • standard, for plug-in sockets • with mounting flange in the upper wall of the cover.

Relays **RY2** are designed for: • screw terminals plug-in sockets **GZY2G** with clips GZY2G-0041 ❸, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • flat insert connectors - faston 187 (4,8 x 0,5 mm), relays are direct on panel mounting with two M3 screws - cover with mounting flange.

❸ For each GZY2G socket a set of two GZY2G-0041 clips shall be ordered.

Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 55 °C)
1005	5	28	± 10%	4,0	5,5
1006	6	40	± 10%	4,8	6,6
1012	12	160	± 10%	9,6	13,2
1024	24	640	± 10%	19,2	26,4
1048	48	2 600	± 10%	38,4	52,8
1060	60	4 000	± 10%	48,0	66,0
1080	80	7 100	± 10%	64,0	88,0
1110	110	13 600	± 10%	88,0	121,0
1125	125	16 000	± 10%	100,0	137,5
1220	220	54 000	± 10%	176,0	242,0

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5006	6	9,8	± 10%	4,8	6,6
5012	12	39,5	± 10%	9,6	13,2
5024	24	158	± 10%	19,2	26,4
5042	42	470	± 10%	33,6	46,2
5048	48	640	± 10%	38,4	52,8
5060	60	930	± 10%	48,0	66,0
5080	80	1 720	± 10%	64,0	88,0
5110	110	3 450	± 10%	88,0	121,0
5120	120	3 770	± 10%	96,0	132,0
5127	127	4 000	± 10%	101,6	139,7
5220	220	15 400	± 10%	176,0	242,0
5230	230	16 100	± 10%	184,0	253,0
5240	240	16 800	± 10%	192,0	264,0

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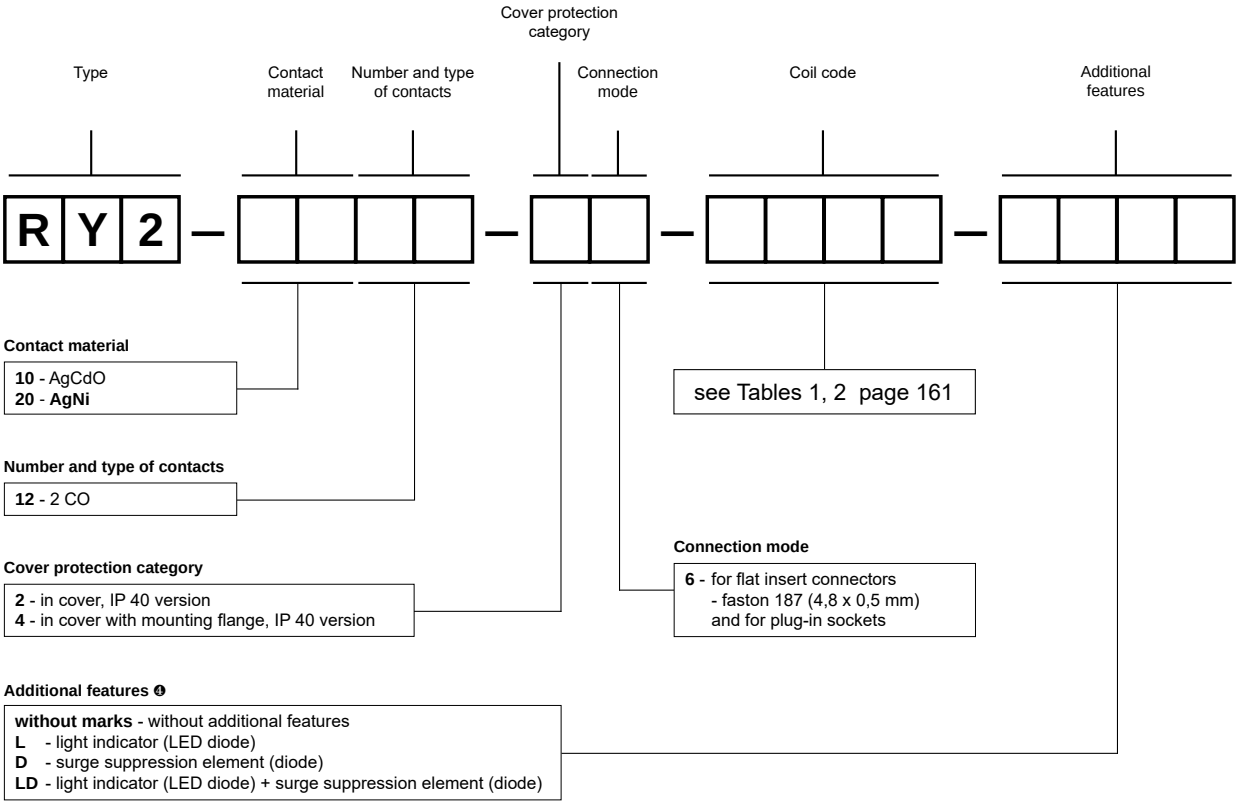
Ordering codes



❹ **D, LD** - only for DC coils

Note:
For relays with additional features **D** - surge suppression element (diode) (versions D and LD) - fixed supply polarity compulsory for the DC load of coils: +A1(7) / -A2(8). The polarity is indicated on the relay cover. For other versions of the relays with DC coils any polarity is possible.

Examples of ordering codes:

RY2-2012-26-1024	relay **RY2**, for plug-in sockets, two changeover contacts, contact material AgNi, coil voltage 24 V DC, in cover IP 40
RY2-2012-26-5230-L	relay **RY2**, for plug-in sockets, two changeover contacts, contact material AgNi, coil voltage 230 V AC 50/60 Hz, with light indicator (LED diode), in cover IP 40

GZY2G

Screw terminals
plug-in sockets
for RY2
- see page 405

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- Relays of general application
- For plug-in sockets: 35 mm rail mount acc. to PN-EN 60715; on panel mounting
- For PCB and for soldering connections
- AC and DC coils
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**, AgNi/Au flash gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 250 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au flash gold plating, 10 V $AgSnO_2$
Rated load	AC1	5 A / 250 V AC
	DC1	5 A / 24 V DC
Min. switching current		5 mA AgNi, 5 mA AgNi/Au flash gold plating, 10 mA $AgSnO_2$
Rated current		5 A
Max. breaking capacity	AC1	1 250 VA
Min. breaking capacity		0,3 W AgNi, 0,3 W AgNi/Au flash gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		36 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	6 ... 240 V
	DC	6 ... 110 V
Must release voltage		≥ 0,05 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	AC	1,2 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	2 500 V 1,2 / 50 µs
Overvoltage category	II
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	2 000 V AC type of insulation: basic
• contact clearance	1 000 V AC type of clearance: micro-disconnection
• pole - pole	2 000 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 3 mm
• creepage	≥ 4 mm

General data

Operating / release time (typical values)		AC: 8 ms / 7 ms DC: 10 ms / 3 ms
Electrical life		
• resistive AC1		> 2×10^5 5 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 10^7
Dimensions (L x W x H)		27,5 x 14 x 32,9 mm
Weight		22 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-40...+55 °C
Cover protection category		IP 40 PN-EN 60529
Shock resistance		10 g
Vibration resistance		5 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays.
Note: relays with AgNi contacts can be used up to 5 A at resistive and inductive load.

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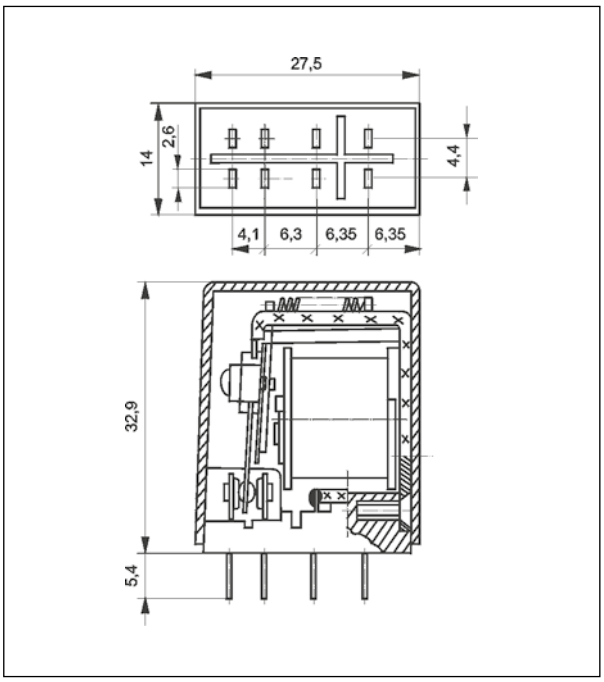
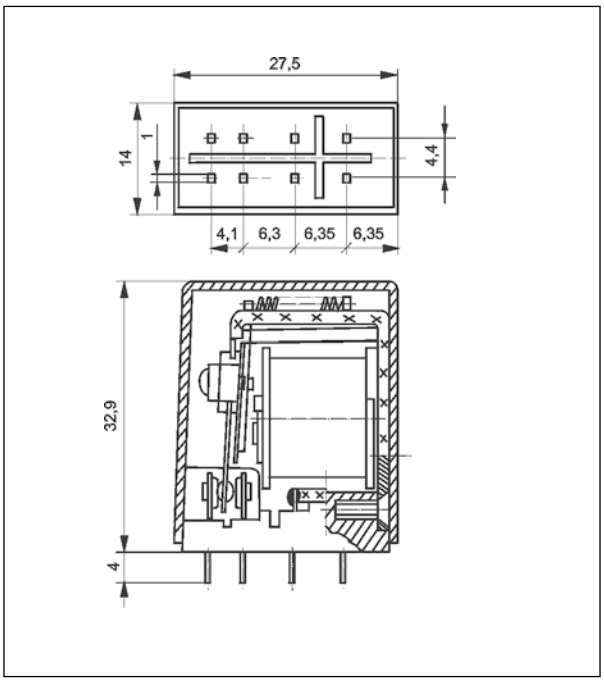
Dimensions - plug-in version



Dimensions - PCB version



Mounting

Relays **R2M** are designed for: • screw terminals plug-in sockets **GZ2** with clip **GZ2 1060** and spring clamp **GZ2 1111**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • plug-in sockets for PCB mounting **S2M** with clip **G4 1050** • solder terminals sockets **G2M** with clip **G4 1050** and spring clamp **G2M 1020** • direct PCB mounting.

Contact material selection for different load types

- **AgNi** - for resistive or inductive loads,
- **AgNi/Au flash gold plating** - Au protects the contact surface during storage,
- **AgSnO$_2$** - for capacitive loads or incandescent lamp loads.

GZ2

Screw terminals
plug-in sockets
for R2M
- see page 405

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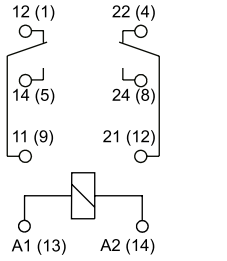
Connection diagram (pin side view)

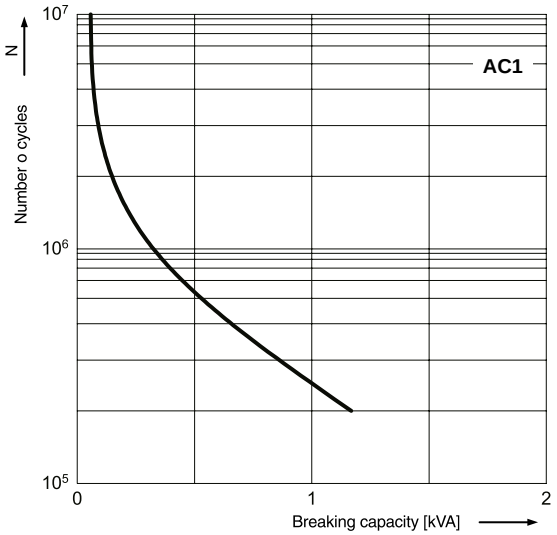


2 CO

Relay terminals for PCB 0,5 x 1 mm
Drilling hole: • for relays Ø 1,3 + 0,1 mm • for sockets Ø 1,5 + 0,1 mm

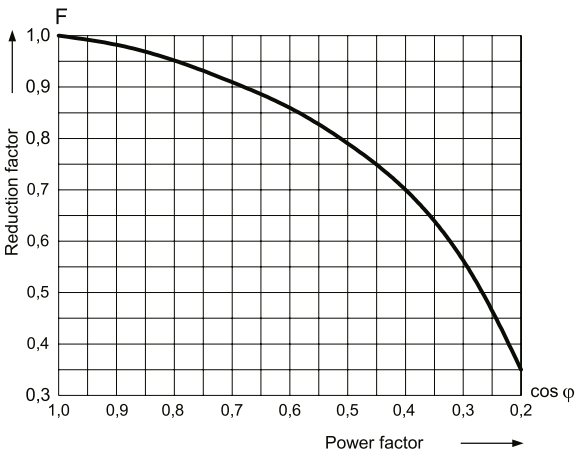
Electrical life at AC resistive load. Switching frequency: 1 200 cycles/hour

Fig. 1



Electrical life reduction factor at AC inductive load

Fig. 2

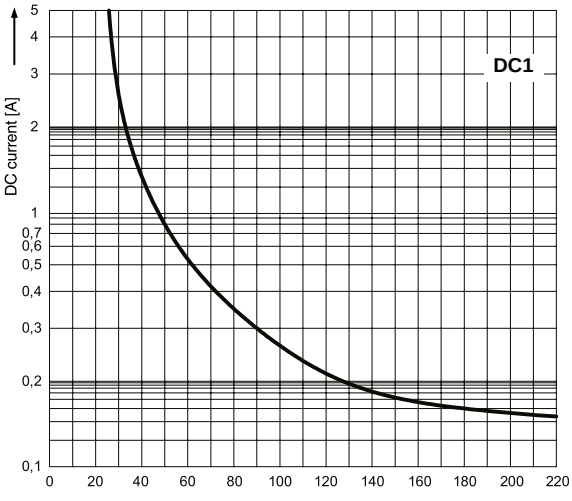


N - electrical life at AC1

$N_{cosj} = N \times F$

Max. DC resistive load breaking capacity

Fig. 3



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Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 55 °C)
1006	6	47	± 10%	4,8	6,6
1012	**12**	**188**	**± 10%**	**9,6**	**13,2**
1024	**24**	**750**	**± 10%**	**19,2**	**26,4**
1048	48	2 660	± 10%	38,4	52,8
1060	60	4 000	± 10%	48,0	66,0
1080	80	7 100	± 10%	64,0	88,0
1110	110	13 480	± 10%	88,0	121,0

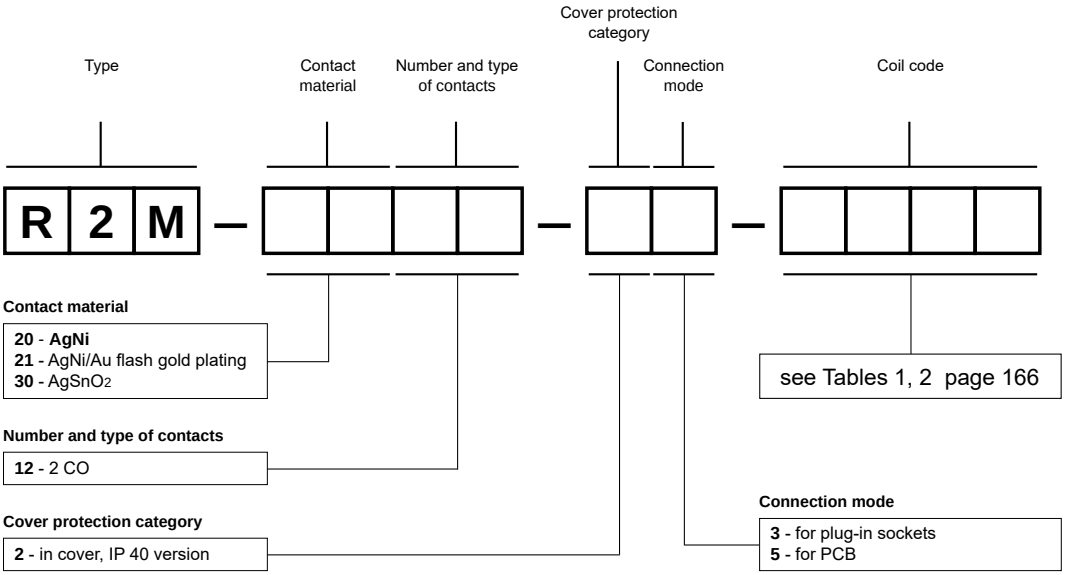
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5006	6	16	± 10%	4,8	6,6
5012	12	68	± 10%	9,6	13,2
5024	**24**	**270**	**± 10%**	**19,2**	**26,4**
5050	50	1 150	± 10%	40,0	55,0
5100	100	5 590	± 10%	80,0	110,0
5110	110	5 670	± 10%	88,0	121,0
5115	115	5 990	± 10%	92,0	126,0
5120	120	6 390	± 10%	96,0	132,0
5220	220	21 470	± 10%	176,0	242,0
5230	**230**	**21 470**	**± 10%**	**184,0**	**253,0**
5240	240	25 390	± 10%	192,0	264,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

R2M-2012-23-5230 relay **R2M**, for plug-in sockets, two changeover contacts, contact material AgNi, coil voltage 230 V AC 50/60 Hz, in cover IP 40

R2M-2012-25-1024 relay **R2M**, for PCB, two changeover contacts, contact material AgNi, coil voltage 24 V DC, in cover IP 40

R15 - 2 CO

R15 - 3 CO

• Relays of general application • For plug-in sockets: 35 mm rail mount acc. to PN-EN 60715; on panel mounting; solder terminals • Contacts AgNi • Coils AC and DC • WT (mechanical indicator + lockable front test button) - standard features of relays in cover, for plug-in sockets. Relays may be provided with the test buttons (no latching) and plugs - page 421 • **Have obtained LR Type Approval Certificate (Lloyd's Register)** • Recognitions, certifications, directives: RoHS, AUCOTEAM GmbH Berlin - railroad standard,

Contact data

Number and type of contacts		2 CO, 3 CO
Contact material		**AgNi**, AgNi/Au flash gold plating, AgNi/Au hard gold plating
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V AgNi, 10 V AgNi/Au flash gold plating 5 V AgNi/Au hard gold plating
Rated load (capacity)	AC1	10 A / 250 V AC 10 A / 277 V AC UL 508
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor; 0,5 HP / 240 V AC UL 508)
	DC1	10 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA
Max. inrush current		20 A
Rated current		10 A
Max. breaking capacity	AC1	2 500 VA
Min. breaking capacity		0,3 W AgNi, 0,3 W AgNi/Au flash gold plating 0,05 W AgNi/Au hard gold plating
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		12 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	6 ... 240 V
	DC	6 ... 220 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	AC	2,8 VA 50 Hz 2,5 VA 60 Hz
	DC	1,5 W

Insulation according to PN-EN 60664-1

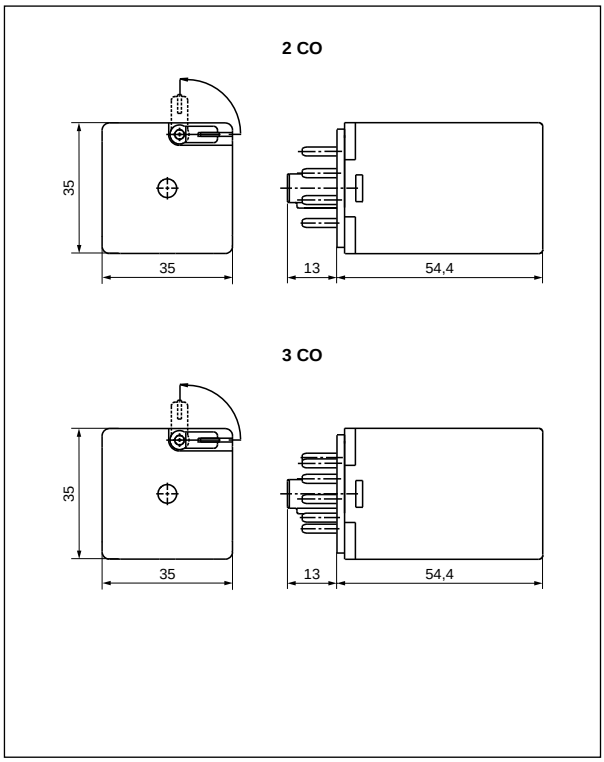
Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength		
• between coil and contacts		2 500 V AC type of insulation: basic
• contact clearance		1 500 V AC type of clearance: micro-disconnection
• pole - pole		2 000 V AC type of insulation: basic
Contact - coil distance	• clearance	≥ 3 mm
	• creepage	≥ 4,2 mm

General data

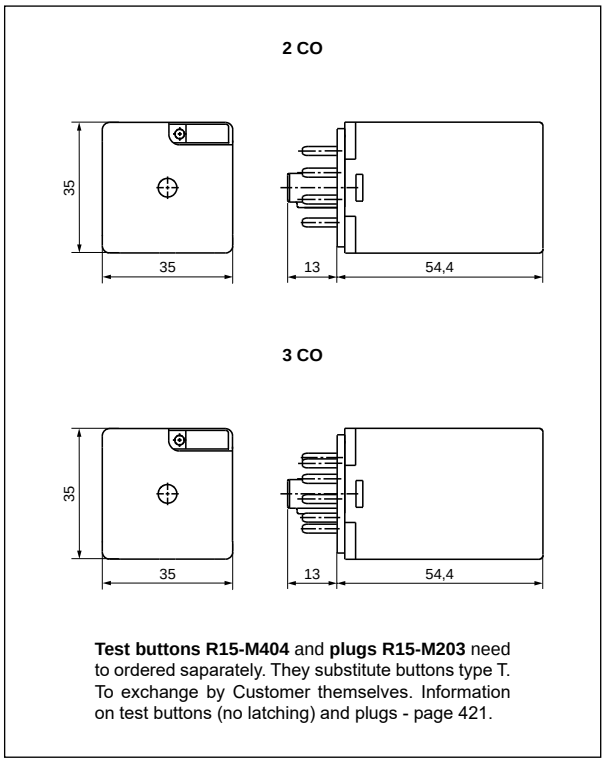
Operating / release time (typical values)		AC: 12 ms / 10 ms DC: 18 ms / 7 ms
Electrical life		
• resistive AC1		> 2 x 10^5 10 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		35 x 35 x 54,4 mm
Weight		83 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance		10 g
Vibration resistance		5 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays.

Dimensions - plug-in version (WT), with lockable front test button type T



Dimensions - plug-in version, with test button (no latching) or with plug (no manual operation)



Test buttons R15-M404 and **plugs R15-M203** need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

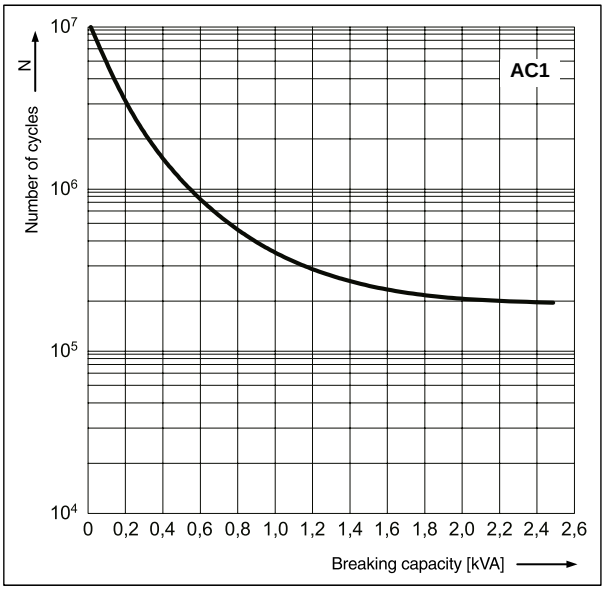
Mounting

Relays R15 - 2 CO, 3 CO are offered in versions: • for plug-in sockets. **With WT features as standard** (**W** - mechanical indicator + **T** - lockable front test button). In these relays is **possibility self-exchange of button type T for test button R15-M404** (no latching) **or on plug R15-M203** (no manual operation). The buttons **R15-M404** and the plugs **R15-M203 need to ordered saparately**.

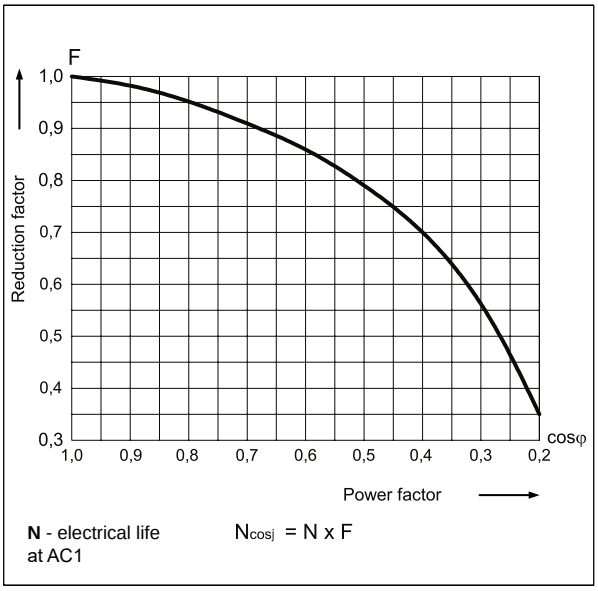
Relays **R15 - 2 CO** are designed for: • screw terminals plug-in sockets **PZ8** with clip **PZ11 0031**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • screw terminals plug-in sockets **GZU8** with clip **GZU 1052**, 35 mm rail mount acc. to PN-EN 60715 • screw terminals plug-in sockets **GZ8** with clip **GZ 1050**, on panel mounting with two M3 screws • screw terminals plug-in sockets **GZP8** with clip **GZP-0054**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • solder terminals sockets **GOP8** with clip **R159 1051** and spring clamp **R15 5922**.

Relays **R15 - 3 CO** are designed for: • screw terminals plug-in sockets **PS11** and **PZ11** with clip **PZ11 0031**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • screw terminals plug-in sockets **GZU11** with clip **GZU 1052**, 35 mm rail mount acc. to PN-EN 60715 • screw terminals plug-in sockets **GZ11** with clip **GZ 1050**, on panel mounting with two M3 screws • screw terminals plug-in sockets **GZP11** with clip **GZP-0054**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • solder terminals sockets **GOP11** with clip **R159 1051** and spring clamp **R15 5922**.

Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour Fig. 1



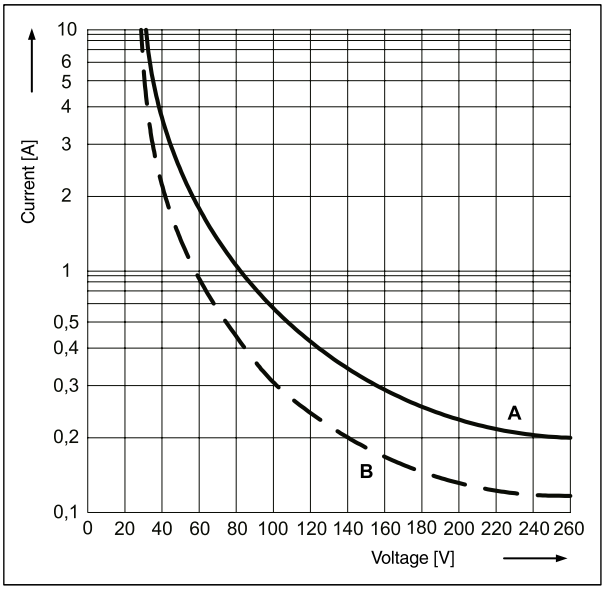
Electrical life reduction factor at AC inductive load Fig. 2



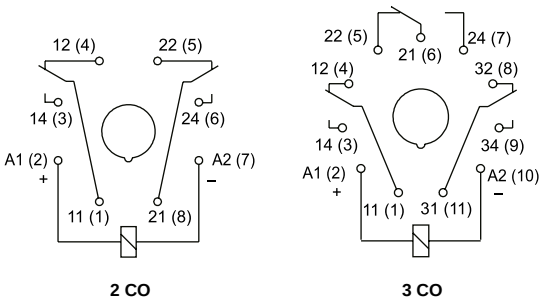
N - electrical life at AC1

$N_{cosj} = N \times F$

Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms Fig. 3



Connection diagrams (pin side view)



2 CO **3 CO**

Note: the indicated polarity of the supply refers to the relays with extra equipment **D** - surge suppression element (diode) - for DC coils only.

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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
1006	6	28	± 10%	4,8	6,6
1012	**12**	**110**	**± 10%**	**9,6**	**13,2**
1024	**24**	**430**	**± 10%**	**19,2**	**26,4**
1048	48	1 750	± 10%	38,4	52,8
1060	60	2 700	± 10%	48,0	66,0
1110	110	9 200	± 10%	88,0	121,0
1120	120	11 000	± 10%	96,0	132,0
1220	**220**	**37 000**	**± 10%**	**176,0**	**242,0**

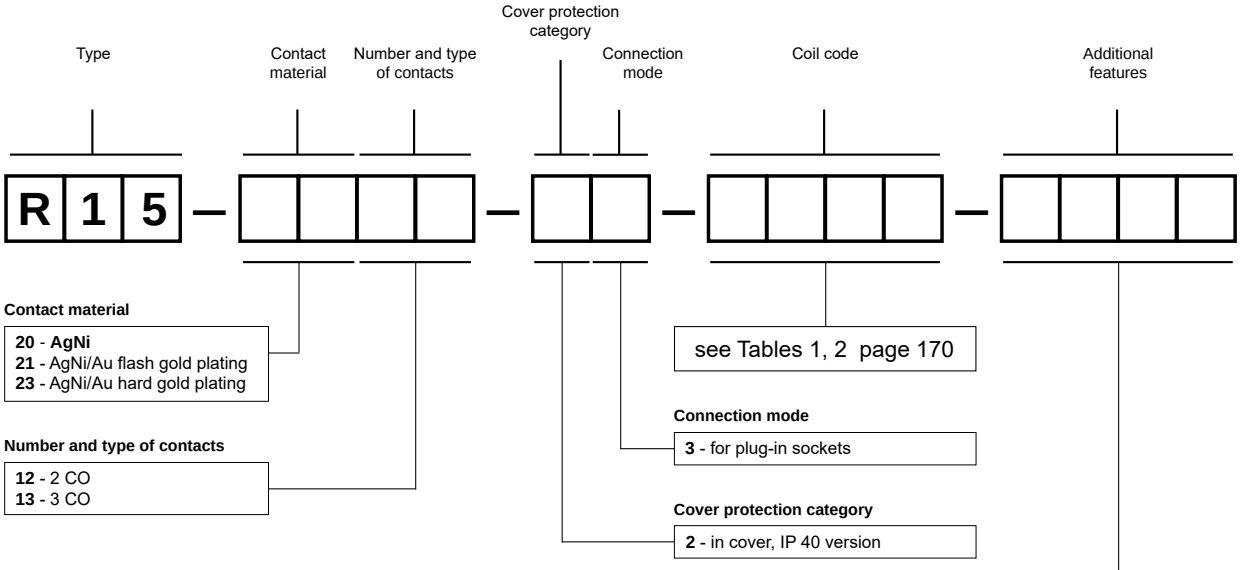
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5006	6	4,3	± 15%	4,8	6,6
5012	12	18,5	± 15%	9,6	13,2
5024	**24**	**75**	**± 15%**	**19,2**	**26,4**
5048	48	305	± 15%	38,4	52,8
5060	60	475	± 15%	48,0	66,0
5115	115	1 840	± 15%	92,0	126,5
5120	120	1 910	± 15%	96,0	132,0
5220	220	6 980	± 15%	176,0	242,0
5230	**230**	**7 080**	**± 15%**	**184,0**	**253,0**
5240	240	7 760	± 15%	192,0	264,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Contact material

20 - **AgNi**
21 - AgNi/Au flash gold plating
23 - AgNi/Au hard gold plating

Number and type of contacts

12 - 2 CO
13 - 3 CO

see Tables 1, 2 page 170

Connection mode

3 - for plug-in sockets

Cover protection category

2 - in cover, IP 40 version

Additional features ❶

WT	- mechanical indicator + lockable front test button
WTL	- mechanical indicator + lockable front test button + light indicator (LED diode)
WTD	- mechanical indicator + lockable front test button + surge suppression element (diode)
WTLD	- mechanical indicator + lockable front test button + light indicator (LED diode) + surge suppression element (diode)
WTV	- mechanical indicator + lockable front test button + surge suppression element (varistor)
WTLV	- mechanical indicator + lockable front test button + light indicator (LED diode) + surge suppression element (varistor)

❶ **WT** - standard features of relays for plug-in sockets. **WTD, WTLD** - only for DC coils, **WTV, WTLV** - only for AC coils

Test buttons (no latching) and plugs need to ordered saparately. They substitute buttons type T. To exchange by Customer themselves. Information on test buttons (no latching) and plugs - page 421.

- Button R15-M404-A - orange colour (AC coils)
- Button R15-M404-D - green colour (DC coils)
- Plug R15-M203-A - orange colour (AC coils)
- Plug R15-M203-D - green colour (DC coils)

Note:

While the relay operates, the test button of the **T** type becomes heated. In order to push the test button manually, you should first turn the supply voltage off, and wait some time until the button becomes colder (or push the button immediately using a protective glove or an insulated tool). The button shall be pushed smoothly and quickly. The normally open contacts are closed with the button for the time during which the button is pushed. Releasing the button opens the normally open contacts. Normally open contacts may be closed with the blocking function of the button (it shall be turned by 90°). When the button is turned back, the normally open contacts are opened.

For relays with additional features **D** - surge suppression element (diode) (versions WTD and WTLD) - fixed supply polarity compulsory for the DC load of coils: +A1(2) / -A2(7) for R15 - 2 CO and +A1(2) / -A2(10) for R15 - 3 CO. The polarity is indicated on the relay cover. For other versions of the relays with DC coils any polarity is possible.

Examples of ordering codes:

R15-2012-23-1024-WT relay **R15**, for plug-in sockets, two changeover contacts, contact material AgNi, coil voltage 24 V DC, with mechanical indicator and lockable front test button, in cover IP 40

R15-2013-23-5230-WTL relay **R15**, for plug-in sockets, three changeover contacts, contact material AgNi, coil voltage 230 V AC 50/60 Hz, with mechanical indicator and lockable front test button and light indicator (LED diode), in cover IP 40

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- Relays of general application
- For plug-in sockets: 35 mm rail mount acc. to PN-EN 60715; on panel mounting; solder terminals
- Coils AC and DC
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		4 CO
Contact material		(**AgCdO**, AgCdO/Au flash gold plating, AgCdO/Au hard gold plating) ❶
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V AgCdO, 10 V AgCdO/Au flash gold plating 5 V AgCdO/Au hard gold plating
Rated load (capacity)	AC1	10 A / 250 V AC 10 A / 277 V AC UL 508
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor; 0,5 HP / 240 V AC UL 508)
	DC1	10 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		10 mA AgCdO, 10 mA AgCdO/Au flash gold plating 5 mA AgCdO/Au hard gold plating
Max. inrush current		20 A
Rated current		10 A
Max. breaking capacity	AC1	2 500 VA
Min. breaking capacity		0,5 W AgCdO, 0,5 W AgCdO/Au flash gold plating 0,05 W AgCdO/Au hard gold plating
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		12 000 cycles/hour

Coil data

Rated voltage	50 Hz, 60 Hz AC	6 ... 240 V
	DC	6 ... 220 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2, 3
Rated power consumption	AC	2,8 VA 50 Hz 2,5 VA 60 Hz
	DC	1,5 W

Insulation according to PN-EN 60664-1

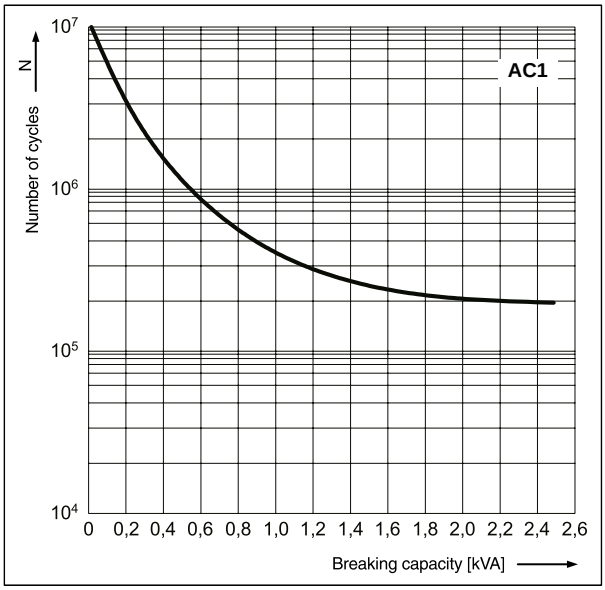
Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength	• between coil and contacts	2 500 V AC type of insulation: basic
	• contact clearance	1 500 V AC type of clearance: micro-disconnection
	• pole - pole	2 000 V AC type of insulation: basic
Contact - coil distance	• clearance	≥ 3 mm
	• creepage	≥ 3,2 mm

General data

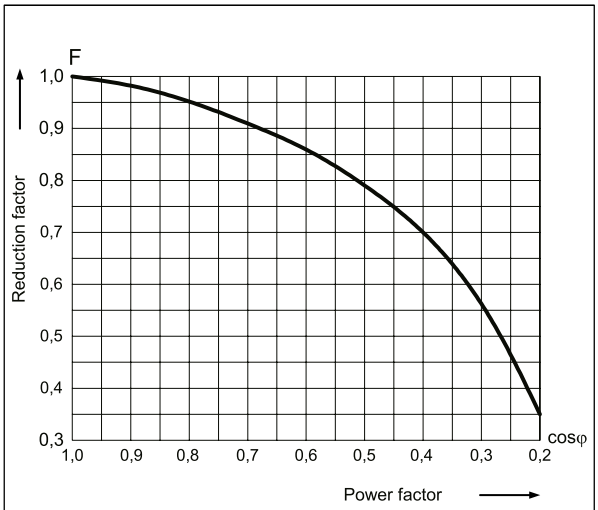
Operating / release time (typical values)		AC: 12 ms / 10 ms DC: 18 ms / 7 ms
Electrical life	• resistive AC1	> 2 x 10^5 10 A, 250 V AC
	• cosφ	see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H) / Weight		35 x 42,5 x 54,5 mm / 95 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 40 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance		10 g
Vibration resistance		5 g 10...150 Hz
Solder bath temperature		max. 270 °C
Soldering time		max. 5 s

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU.

Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour Fig. 1



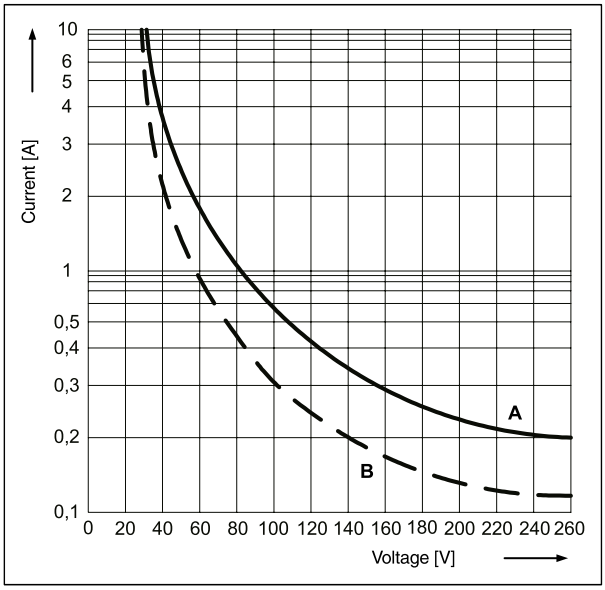
Electrical life reduction factor at AC inductive load Fig. 2



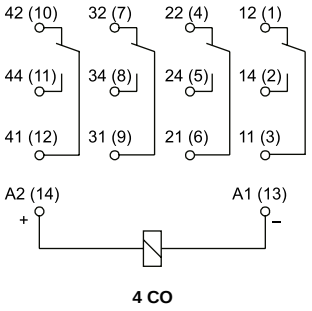
N - electrical life at AC1

$N_{cos\varphi} = N \times F$

Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms Fig. 3



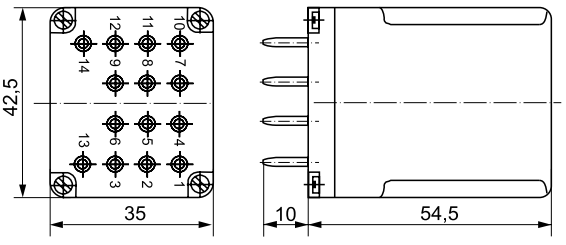
Connection diagram (pin side view)



4 CO

Note: the indicated polarity of the supply refers to the relays with extra equipment **D** - surge suppression element (diode) - for DC coils only.

Dimensions



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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
1006	6	28	± 10%	4,8	6,6
1012	**12**	**110**	**± 10%**	**9,6**	**13,2**
1024	**24**	**430**	**± 10%**	**19,2**	**26,4**
1048	48	1 750	± 10%	38,4	52,8
1060	60	2 700	± 10%	48,0	66,0
1110	110	9 200	± 10%	88,0	121,0
1120	120	11 000	± 10%	96,0	132,0
1220	**220**	**37 000**	**± 10%**	**176,0**	**242,0**

The data in bold type relate to the standard versions of the relays.

Coil data - AC 50 Hz voltage version, basic — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
3006	6	4,8	± 15%	4,8	6,6
3012	12	20	± 15%	9,6	13,2
3024	24	72	± 15%	19,2	26,4
3048	48	360	± 15%	38,4	52,8
3060	60	520	± 15%	48,0	66,0
3115	115	2 100	± 15%	92,0	126,5
3120	120	2 300	± 15%	96,0	132,0
3220	220	7 000	± 15%	176,0	242,0
3230	230	7 900	± 15%	184,0	253,0
3240	240	8 300	± 15%	192,0	264,0

Coil data - AC 60 Hz voltage version, special — Table 3

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
6006	6	4,8	± 15%	4,8	6,6
6012	12	17	± 15%	9,6	13,2
6024	24	65	± 15%	19,2	26,4
6048	48	310	± 15%	38,4	52,8
6060	60	490	± 15%	48,0	66,0
6110	110	1 760	± 15%	88,0	121,0
6120	120	2 000	± 15%	96,0	132,0
6220	220	6 900	± 15%	176,0	242,0
6230	230	7 000	± 15%	184,0	253,0
6240	240	7 100	± 15%	192,0	264,0

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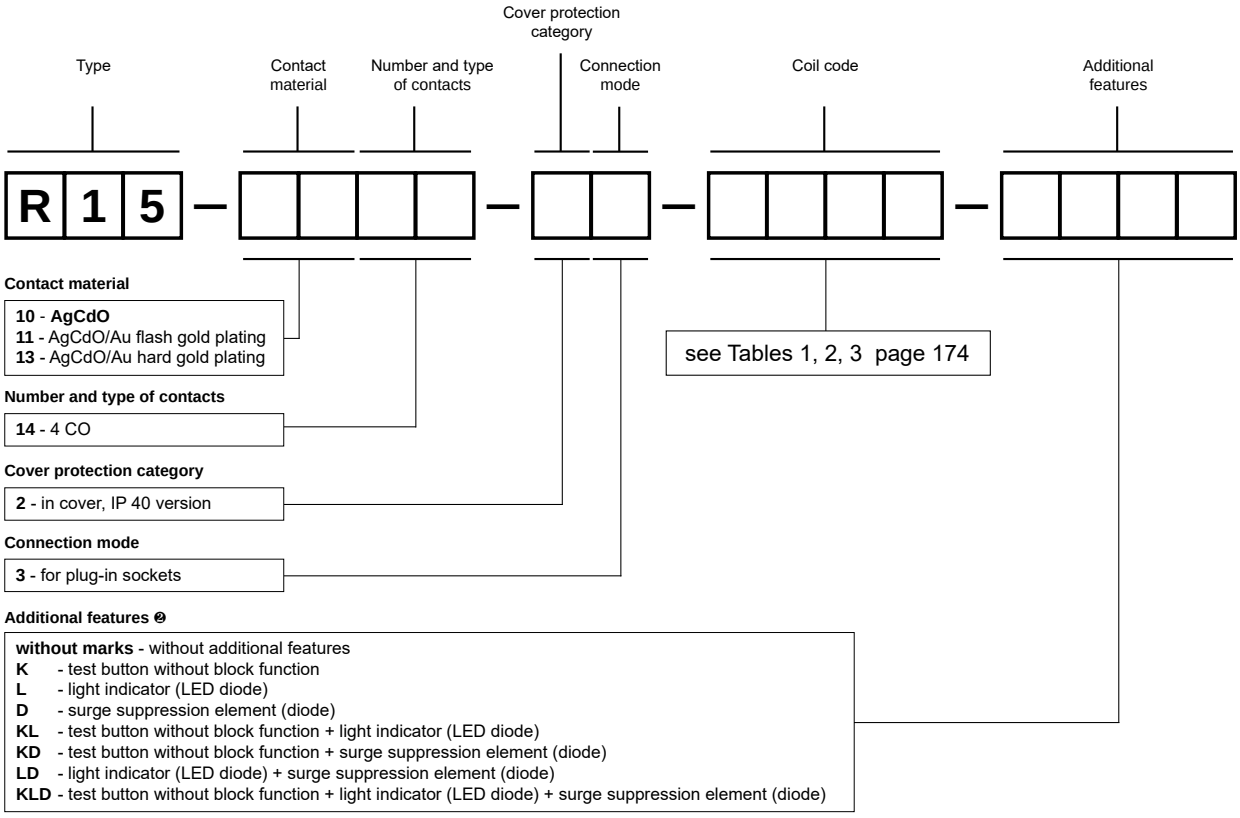
Mounting

Relays **R15 4 - CO** are designed for: • screw terminals plug-in sockets **GZ14U** with clip **GZ14 0737**, 35 mm rail mount acc. to PN-EN 60715 • screw terminals plug-in sockets **GZ14** with clip **GZ14 0737**, on panel mounting with two M3 screws • screw terminals plug-in sockets **GZ14Z** with clip **GZ14 0737**, on panel mounting with two M3 screws • solder terminals sockets **GOP14** with clip **R15 0736** and spring clamp **R15 5922**.

GZ14Z

Screw terminals
plug-in sockets
for R15 - 4 CO
to be mounted behind the assembly panel
- see page 409

Ordering codes



❷ **D, KD, LD, KLD** - only for DC coils

Note:
For relays with additional features **D** - surge suppression element (diode) (versions D, KD, LD, KLD) - fixed supply polarity compulsory for the DC load of coils: -A1(13) / +A2(14). The polarity is indicated on the relay cover. For other versions of the relays with DC coils any polarity is possible.

Examples of ordering codes:

R15-1014-23-1024-KD relay **R15**, for plug-in sockets, four changeover contacts, contact material AgCdO, coil voltage 24 V DC, with test button without block function and surge suppression element (diode), in cover IP 40

R15-1114-23-3230-KL relay **R15**, for plug-in sockets, four changeover contacts, contact material AgCdO/Au flash gold plating, coil voltage 230 V AC 50 Hz, with test button without block function and light indicator (LED diode), in cover IP 40

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with adaptor (V) with adaptor (H)

- Power relays of general application • AC and DC coils • Mounting: in sockets; 35 mm rail mount acc. to PN-EN 60715; on panel; PCB
- Versions: faston 187 (4,8 x 0,5 mm); faston 250 (6,3 x 0,8 mm)
- Contact gap: 3 mm (option - only in versions with normally open contacts) • Additional features: K - test button; L - light indicator (LED)
- Applications: control of electromagnets; systems of heating, cooling, ventillation, air conditioning; control with single-phase and three-phase motors; catering industry machines and equipment; automation systems; photoelectric systems; etc.
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 CO, 3 CO, 2 NO, 3 NO 2 NO, 3 NO with contact gap ≥ 3 mm	
Contact material		**AgCdO** ❶, AgNi	
Rated / max. switching voltage	AC	400 V / 440 V	230 V / 250 V ❷
Min. switching voltage		10 V AgCdO, 5 V AgNi	
Rated load	AC1 DC1	16 A / 250 V AC or 10 A / 400 V AC 16 A / 24 V DC (see Fig. 3)	16 A / 250 V AC ❷
Min. switching current		10 mA AgCdO, 5 mA AgNi	
Max. inrush current		40 A	
Rated current		16 A	
Max. breaking capacity	AC1	4 000 VA	
Min. breaking capacity		1 W AgCdO, 0,3 W AgNi	
Contact resistance		≤ 100 mΩ	
Max. operating frequency • at rated load • no load	 AC1	 1 200 cycles/hour 12 000 cycles/hour	

Coil data

Rated voltage	AC DC	6 ... 240 V 50/60 Hz 6 ... 220 V	400 V 50 Hz ❷
Must release voltage		AC: ≥ 0,15 U_n	DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2, 3, 4	
Rated power consumption	AC DC	2,8 VA 50 Hz 1,5 W	2,5 VA 60 Hz 1,7 W with contact gap ≥ 3 mm

Insulation according to PN-EN 60664-1

Insulation rated voltage	400 V AC	
Rated surge voltage	4 000 V 1,2 / 50 µs	
Overvoltage category	III	
Insulation pollution degree	2	
Dielectric strength		
• between coil and contacts	2 500 V AC	type of insulation: basic
• contact clearance	1 500 V AC	type of clearance: micro-disconnection
	2 500 V AC	type of clearance: full-disconnection, with contact gap ≥ 3 mm
• pole - pole	2 500 V AC	type of insulation: basic
Contact - coil distance		
• clearance	≥ 5 mm 2 CO, 2 NO	≥ 4 mm 3 CO, 3 NO
• creepage	≥ 8 mm 2 CO, 2 NO	≥ 5 mm 3 CO, 3 NO

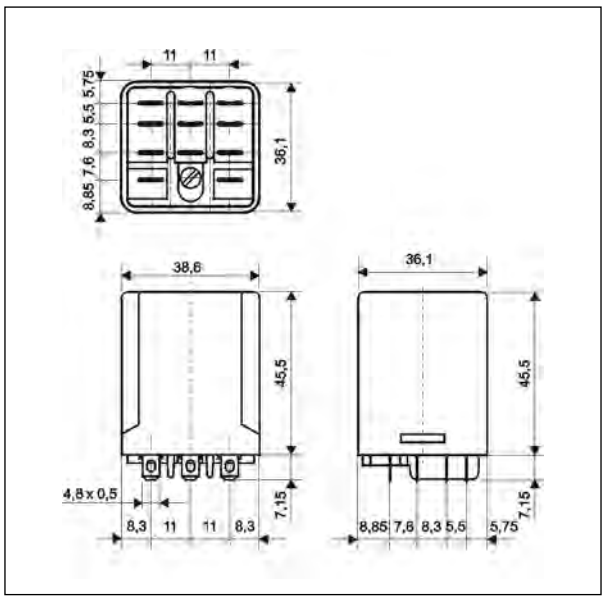
The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU. ❷ For RUC faston 4,8 x 0,5 with GUC11 or GUC11S socket, max. switching voltages and coil voltages of relays are limited to 250 V AC / DC.

General data

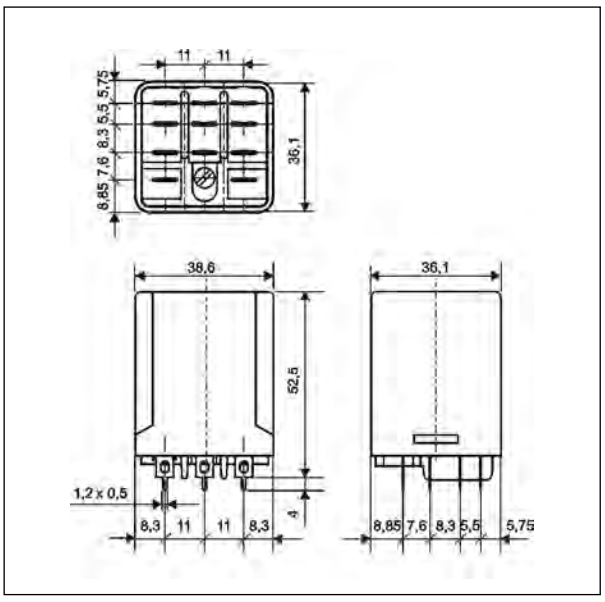
Operating / release time (typical values)	20 ms / 15 ms
Electrical life	
• resistive AC1	> 10^5 16 A, 250 V AC > 10^5 10 A, 400 V AC
• cosφ	see Fig. 2
Mechanical life (cycles)	> 10^7
Motor load according to UL 508	0,33 HP 2 CO, 3 CO / 120 V AC, single-phase motor 0,5 HP 2 CO, 3 CO / 240 V AC, single-phase motor 0,5 HP 3 CO / 240 V AC, three-phase motor
Dimensions (L x W x H)	RUC faston 4,8 x 0,5 ❸ RUC faston 6,3 x 0,8 ❹
Weight	80 g ❺ 85 g ❻
Ambient temperature	
• storage	-40...+85 °C
• operating	AC: -40...+55 °C 3 CO, 3 NO / 16 A AC: -40...+70 °C 2 CO, 2 NO / 16 A DC: -40...+55 °C 3 CO, 3 NO / 16 A DC: -40...+70 °C 3 CO, 3 NO / 10 A; 2 CO, 2 NO / 16 A
Cover protection category	IP 00 PN-EN 60529
Shock resistance	10 g
Vibration resistance	5 g 10...150 Hz
Solder bath temperature	max. 270 °C
Soldering time	max. 5 s

❸ For plug-in sockets version: 36,1 x 38,6 x 45,5 mm. For version: with (V) adaptor: 58,75 x 38,6 x 45,9 mm; with (H) adaptor: 46,8 x 38,6 x 62,45 mm. For version with mounting flange: 66,3 x 38,6 x 36,1 mm. For PCB version: 36,1 x 38,6 x 52,5 mm. ❹ For version: with (V) adaptor: 62,4 x 38,6 x 45,9 mm; with (H) adaptor: 46,8 x 38,6 x 66,1 mm. For version with mounting flange: 66,3 x 38,6 x 36,1 mm. ❺ Weight of plug-in sockets version and PCB version (RUC faston 4,8 x 0,5). ❻ Weight of version with (V) or (H) adaptor, and version with mounting flange.

Dimensions - RUC faston 4,8 x 0,5
- plug-in version (standard)



Dimensions - RUC faston 4,8 x 0,5
- PCB version



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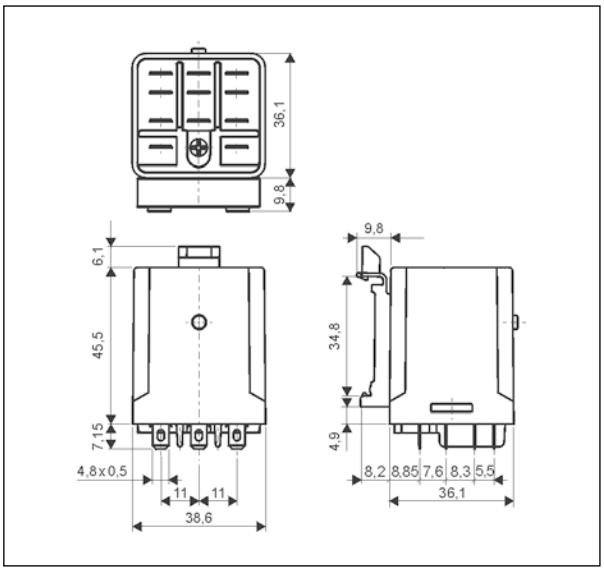
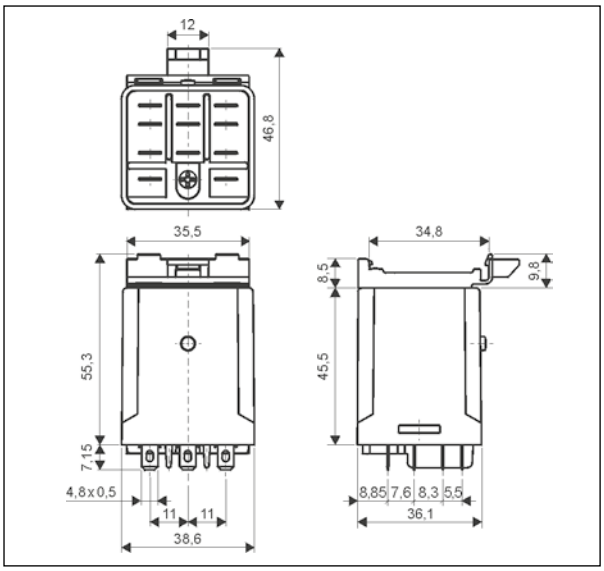
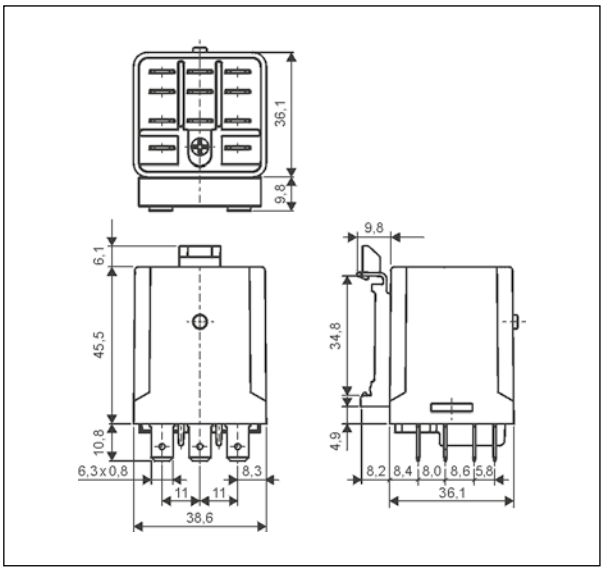
Dimensions - RUC faston 4,8 x 0,5
- version with vertical adaptor (V)



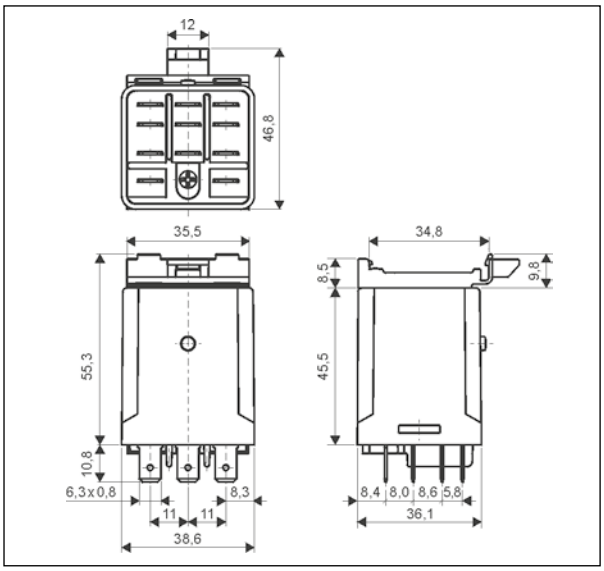
Dimensions - RUC faston 4,8 x 0,5
- version with horizontal adaptor (H)



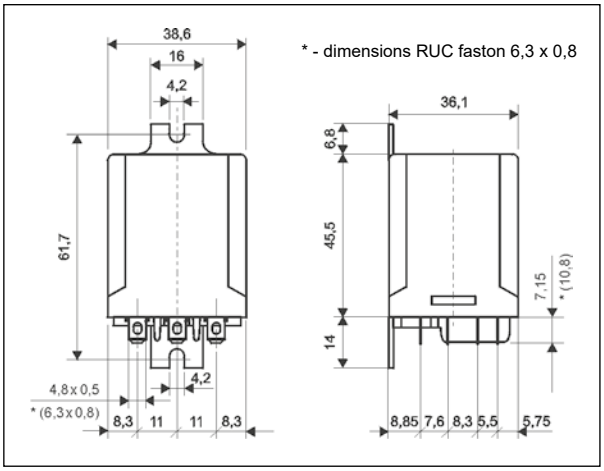
Dimensions - RUC faston 6,3 x 0,8
- version with vertical adaptor (V)



Dimensions - RUC faston 6,3 x 0,8
- version with horizontal adaptor (H)



Dimensions - RUC faston 4,8 x 0,5 (faston 6,3 x 0,8)
- version with mounting flange in the wall of the cover

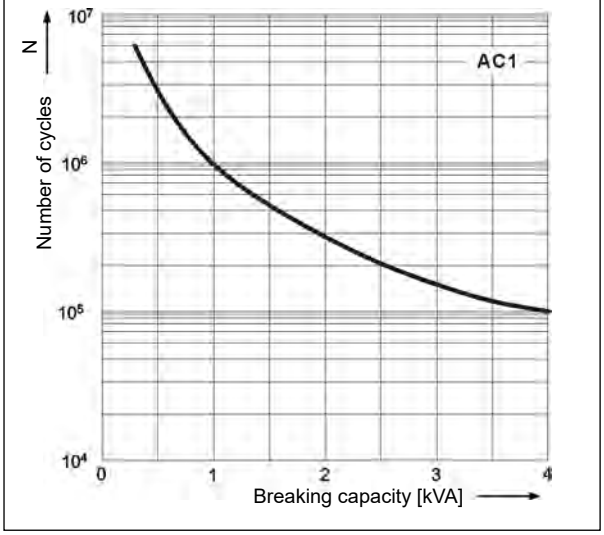


GUC11S

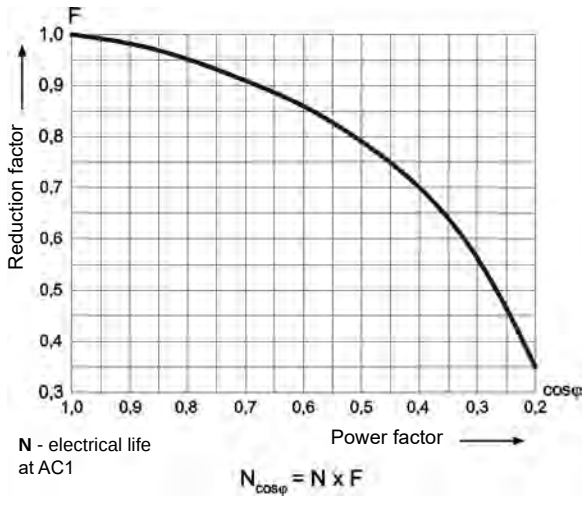
Screw terminals
plug-in sockets for
RUC faston 4,8x0,5,
RUC-M
- see page 410

NEW

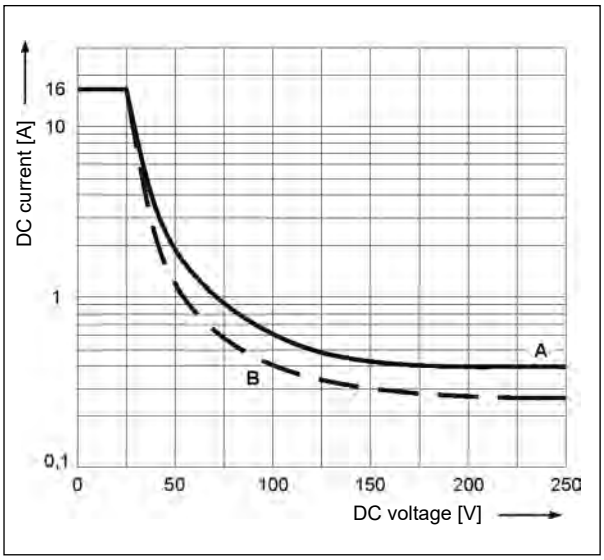
Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour Fig. 1



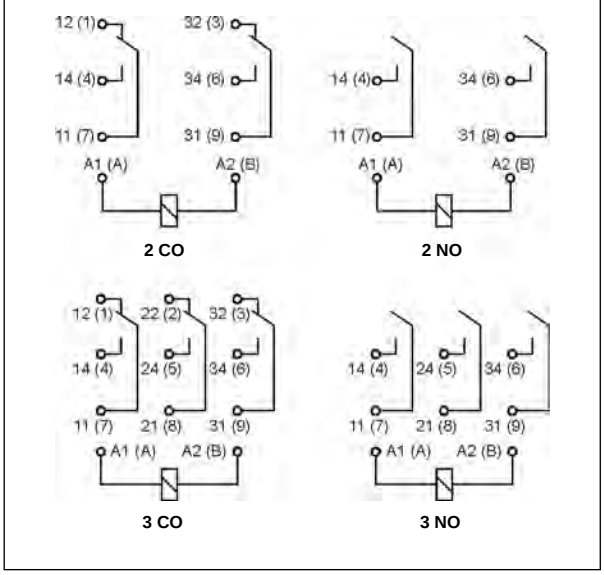
Electrical life reduction factor at AC inductive load Fig. 2



Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms Fig. 3



Connection diagrams (pin side view)



Mounting

Relays RUC are offered in versions: • standard for: screw terminals plug-in sockets **GUC11** ❷ with clip **MBA**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws; screw terminals plug-in sockets **GUC11S** ❷ with clip **MBA**, 35 mm rail mount acc. to PN-EN 60715 • with mounting flange in the wall of the cover, on panel mounting with two M4 screws, flat insert connectors - faston 187 (4,8 x 0,5 mm) or faston 250 (6,3 x 0,8 mm) • with vertical (V) or horizontal (H) adaptors for direct mounting on 35 mm rail mount acc. to PN-EN 60715, flat insert connectors - faston 187 (4,8 x 0,5 mm) or faston 250 (6,3 x 0,8 mm) • for direct PCB mounting ❼.

❼ Relays unavailable with (V) or (H) adaptor, and cover with mounting flange. ❷ For RUC faston 4,8 x 0,5 with GUC11 or GUC11S socket, max. switching voltages and coil voltages of relays are limited to 250 V AC / DC.

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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 55 °C) ❽
1006	6	28	± 10%	4,8	6,6
1012	**12**	**110**	**± 10%**	**9,6**	**13,2**
1024	24	430	± 10%	19,2	26,4
1042	42	1 340	± 10%	33,6	46,2
1048	48	1 750	± 10%	38,4	52,8
1060	60	2 700	± 10%	48,0	66,0
1110	110	9 200	± 10%	88,0	121,0
1120	120	11 000	± 10%	96,0	132,0
1220	220	37 000	± 10%	176,0	242,0

The data in bold type relate to the standard versions of the relays.

Coil data - DC voltage version, reinforced — Table 2

Coil code ❾	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 55 °C) ❽
W012	12	85	± 10%	9,6	13,2
W024	24	345	± 10%	19,2	26,4
W048	48	1 370	± 10%	38,4	52,8
W110	110	7 300	± 10%	88,0	121,0
W220	220	30 000	± 10%	176,0	242,0

❽ Max. (at 70 °C) for versions: 3 CO, 3 NO / 10 A; 2 CO, 2 NO / 16 A
❾ For version with contact gap ≥ 3 mm.

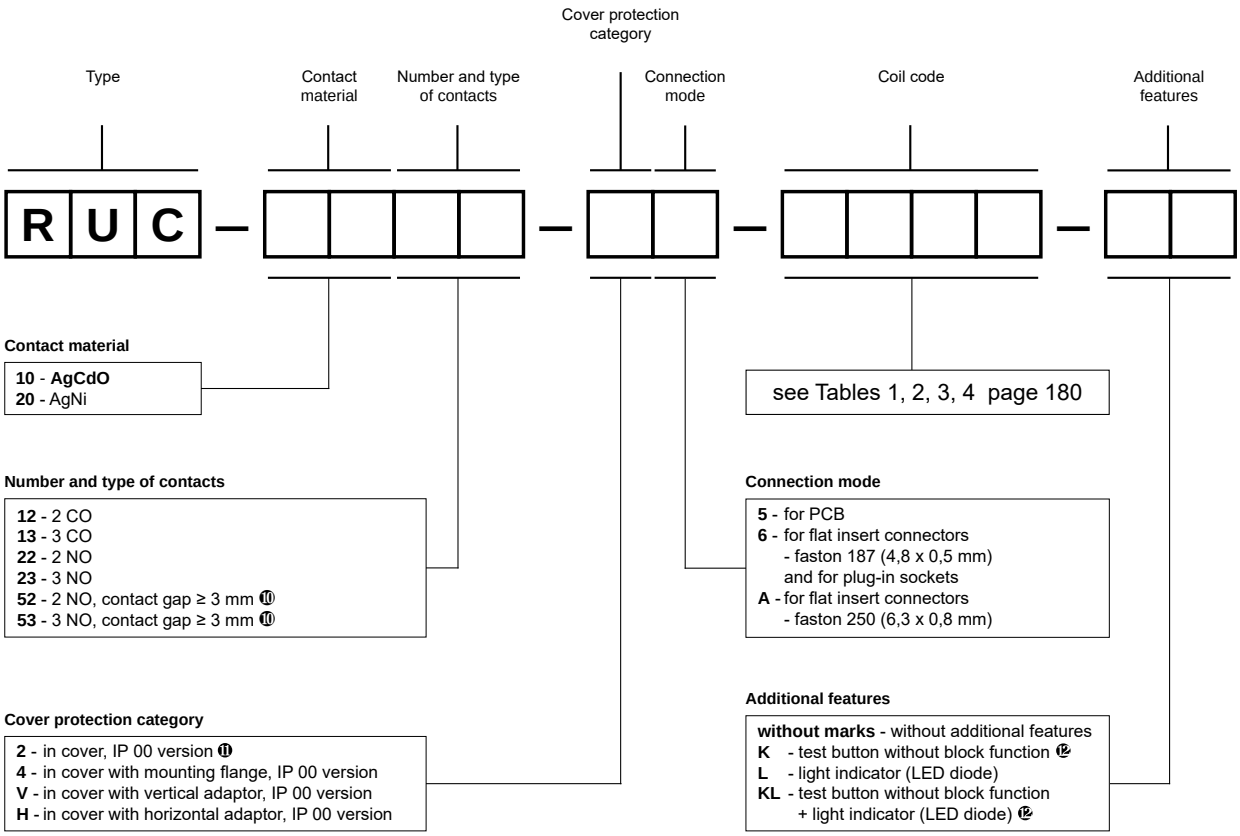
Coil data - AC 50/60 Hz voltage version — Table 3

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5006	6	4,3	± 10%	4,8	6,6
5012	12	18,5	± 10%	9,6	13,2
5024	24	75	± 10%	19,2	26,4
5115	115	1 840	± 10%	92,0	126,5
5120	120	1 910	± 10%	96,0	132,0
5220	220	6 980	± 10%	176,0	242,0
5230	230	7 080	± 10%	184,0	253,0
5240	240	7 760	± 10%	192,0	264,0

Coil data - AC 50 Hz voltage version — Table 4

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
3400	400	21 500	± 10%	320,0	440,0

Ordering codes



⑩ For versions with reinforced DC coils: W012, W024, W048, W110, W220 and with AC coils.
⑪ For relays RUC: for plug-in sockets; for PCB.
⑫ Additional features is not available in versions of relays with contact gap ≥ 3 mm.

Examples of ordering codes:

RUC-2053-26-W024 relay **RUC**, faston 187 (4,8 x 0,5 mm), with contact gap ≥ 3 mm, for plug-in sockets, three normally open contacts, contact material AgNi, reinforced coil voltage 24 V DC, in cover IP 00

RUC-2013-V6-3400-KL relay **RUC**, faston 187 (4,8 x 0,5 mm), for flat insert connectors, with vertical adaptor (V), three changeover contacts, contact material AgNi, coil voltage 400 V AC 50 Hz, with test button without block function and light indicator (LED diode), in cover IP 00

RUC-2052-HA-W220-L relay **RUC**, faston 250 (6,3 x 0,8 mm), for flat insert connectors, with contact gap ≥ 3 mm, with horizontal adaptor (H), two normally open contacts, contact material AgNi, reinforced coil voltage 220 V DC, with light indicator (LED diode), in cover IP 00

RUC-1022-25-5024 relay **RUC**, for PCB, two normally open contacts, contact material AgCdO, coil voltage 24 V AC 50/60 Hz, in cover IP 00

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with adaptor (V) with adaptor (H)

• Relays with permanent magnet whose magnetic field blows the electric arc between the contacts; for high DC loads • AC and DC coils • Mounting: in sockets; 35 mm rail mount acc. to PN-EN 60715; on panel; PCB • Version: faston 187 (4,8 x 0,5 mm) • Contact gap: 3 mm (version 2 NO); 6 mm (version 1 NO) • Additional features: L - light indicator (LED) • Applications: control of electromagnets; systems of heating, cooling, ventillation, air conditioning; control with single-phase motors; catering industry machines and equipment; automation systems; photoelectric systems; etc.
• Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 NO (double-break)	2 NO
Contact material		**AgCdO ❶**, AgNi	
Rated / max. switching voltage		250 V DC; 250 V AC / 350 V DC; 440 V AC ❷	
Min. switching voltage		10 V AgCdO, 5 V AgNi	
Rated load	DC1	16 A / 24 V DC; 14 A / 110 V DC 12 A / 220 V DC	16 A / 24 V DC; 10,5 A / 110 V DC 4,5 A / 220 V DC
	DC L/R=40 ms	16 A / 24 V DC; 5,4 A / 110 V DC 3 A / 220 V DC	16 A / 24 V DC; 1,35 A / 110 V DC 0,45 A / 220 V DC
	AC1	16 A / 250 V AC	16 A / 250 V AC
Min. switching current		10 mA AgCdO, 5 mA AgNi	
Max. inrush current		40 A 20 ms	
Rated current		16 A	
Min. breaking capacity		1 W AgCdO, 0,3 W AgNi	
Contact resistance		≤ 100 mΩ	
Max. operating frequency • at rated load • no load	AC1	 1 200 cycles/hour 12 000 cycles/hour	

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V	
	DC	12 ... 220 V	
Must release voltage		AC: ≥ 0,15 U_n	DC: ≥ 0,1 U_n
Operating range of supply voltage		AC: 0,85...1,1 U_n	DC: 0,8...1,1 U_n see Tables 1, 2
Rated power consumption	AC	2,8 VA	
	DC	1,7 W	

Insulation according to PN-EN 60664-1

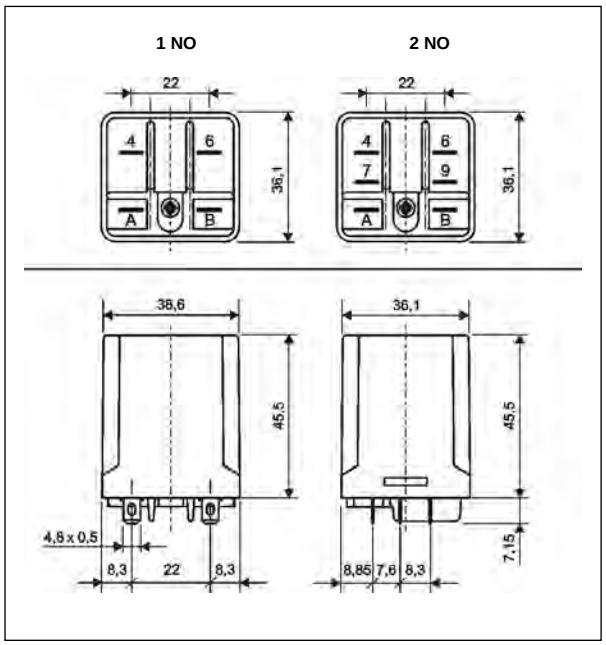
Insulation rated voltage		400 V AC	
Rated surge voltage		4 000 V 1,2 / 50 µs	
Overvoltage category		III	
Insulation pollution degree		3	
Dielectric strength	• between coil and contacts	2 500 V AC	type of insulation: basic
	• contact clearance	4 000 V AC	type of clearance: full-disconnection
	• pole - pole	2 500 V AC	contacts 2 NO, type of insulation: basic
Contact - coil distance	• clearance	≥ 6,3 mm	
	• creepage	≥ 8 mm	

General data

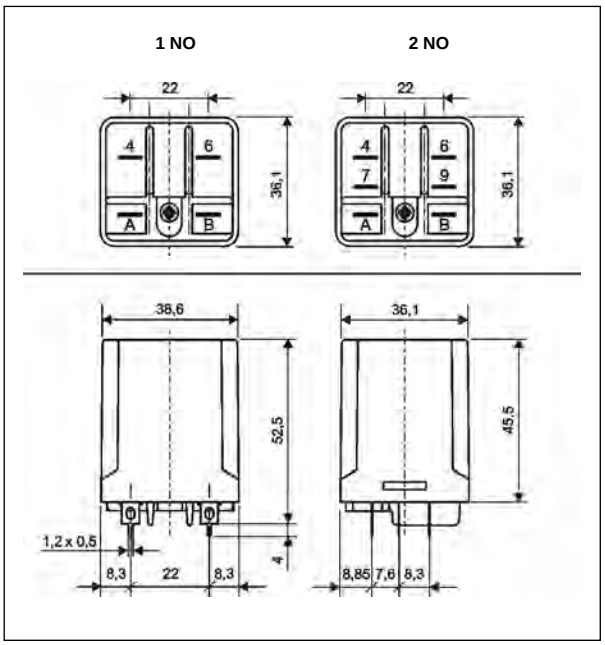
Operating / release time (typical values)		20 ms / 15 ms	
Electrical life • resistive DC1 • DC L/R=40 ms		 > 2 x 10^5 12 A, 220 V DC > 2 x 10^5 3 A, 220 V DC	 > 2 x 10^5 4,5 A, 220 V DC > 2 x 10^5 0,45 A, 220 V DC
Mechanical life (cycles)		> 2 x 10^7	
Dimensions (L x W x H)		36,1 x 38,6 x 45,5 mm ❸	
Weight		80 g ❹	85 g ❺
Ambient temperature	• storage	-40...+85 °C	
	• operating	-40...+70 °C	
Cover protection category		IP 00	PN-EN 60529
Shock resistance / Vibration resistance		10 g / 5 g 10...150 Hz	
Solder bath temperature		max. 270 °C	
Soldering time		max. 5 s	

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU. ❷ For RUC-M with GUC11 or GUC11S socket, max. switching voltages and coil voltages of relays are limited to 250 V AC / DC. ❸ For plug-in sockets version. For version: with (V) adaptor: 58,75 x 38,6 x 45,9 mm; with (H) adaptor: 46,8 x 38,6 x 62,45 mm. For version with mounting flaange: 66,3 x 38,6 x 36,1 mm. For PCB version: 36,1 x 38,6 x 52,5 mm. ❹ Weight of plug-in sockets version and PCB version. ❺ Weight of version with (V) or (H) adaptor, and version with mounting flange.

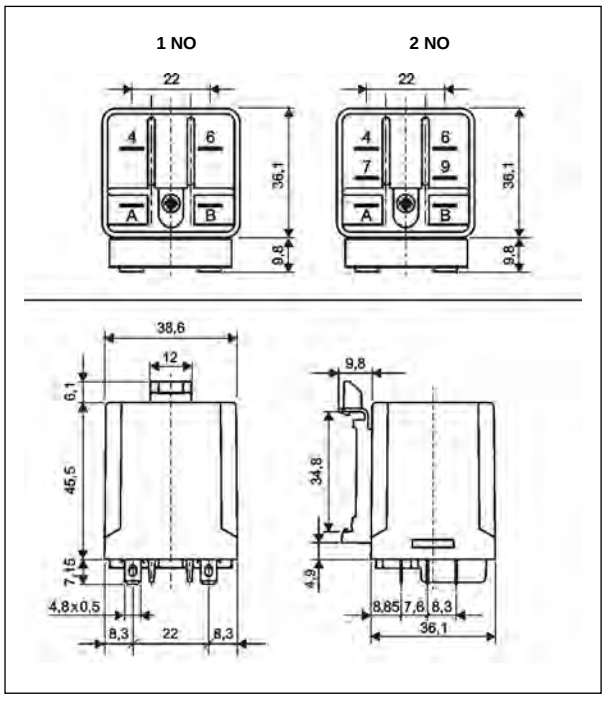
Dimensions - plug-in version (standard)



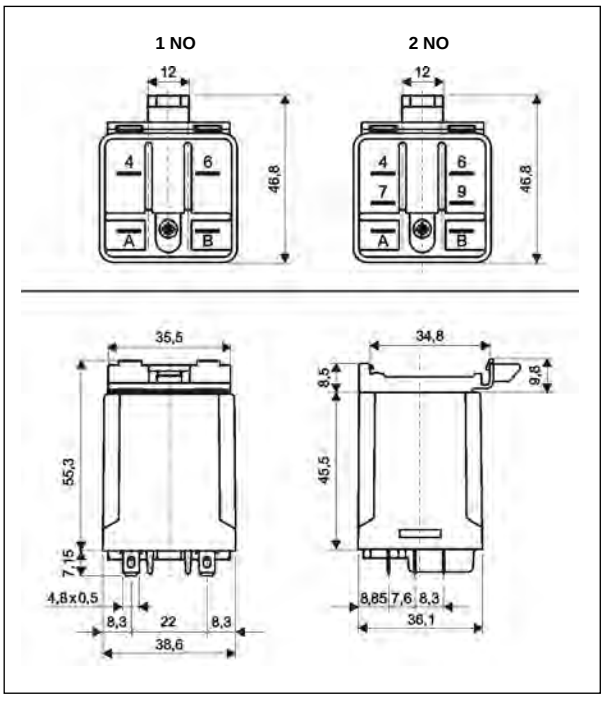
Dimensions - PCB version



Dimensions - version with vertical adaptor (V)



Dimensions - version with horizontal adaptor (H)



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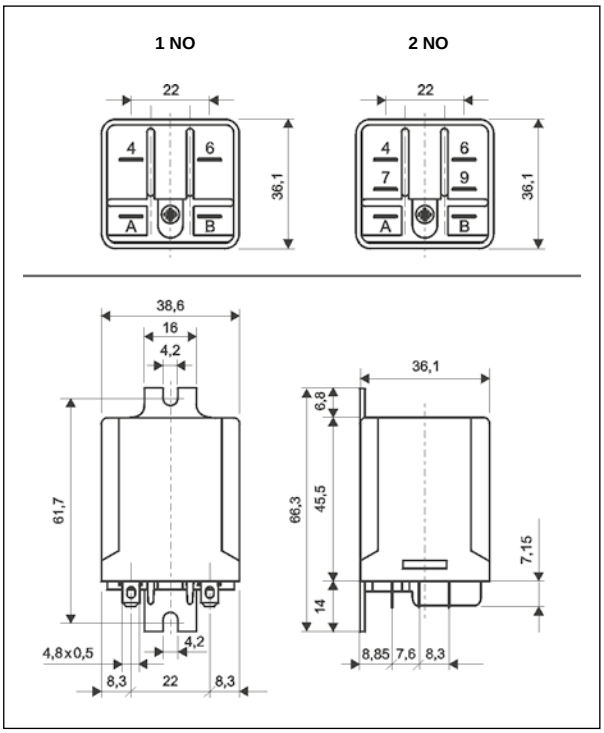
Dimensions - version with mounting flange in the wall of the cover

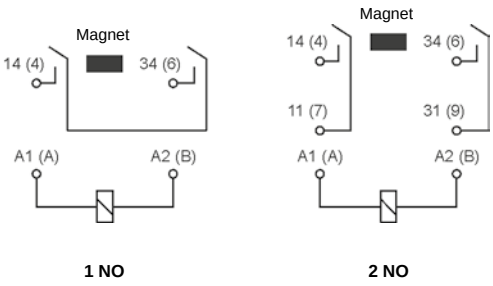


Mounting

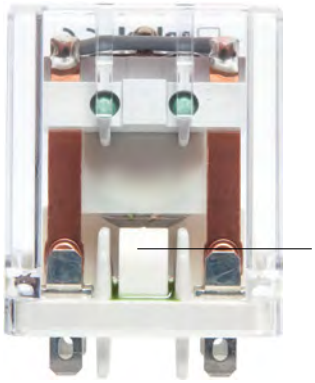
Relays RUC-M are offered in versions: • standard for: screw terminals plug-in sockets **GUC11** ❶ with clip **MBA**, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws; screw terminals plug-in sockets **GUC11S** ❷ with clip **MBA**, 35 mm rail mount acc. to PN-EN 60715 • with mounting flange in the wall of the cover, on panel mounting with two M4 screws, flat insert connectors - faston 187 (4,8 x 0,5 mm) • with vertical (V) or horizontal (H) adaptors for direct mounting on 35 mm rail mount acc. to PN-EN 60715, flat insert connectors - faston 187 (4,8 x 0,5 mm) • for direct PCB mounting ❻.

❻ Relays unavailable with (V) or (H) adaptor, and cover with mounting flange. ❷ For RUC-M with GUC11 or GUC11S socket, max. switching voltages and coil voltages of relays are limited to 250 V AC/DC.

Connection diagrams (pin side view)



Design



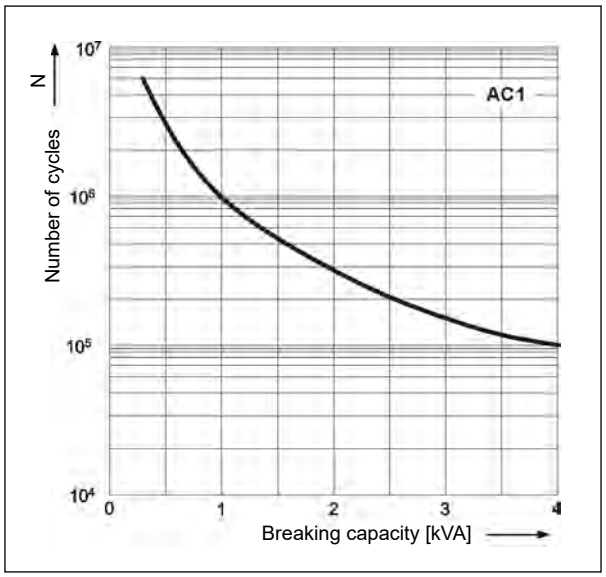
The permanent magnet is fixed on the contact plate. Its magnetic field is directed to the contacts and it blows the electric arc which occurs when the DC load is switched off.

GUC11S

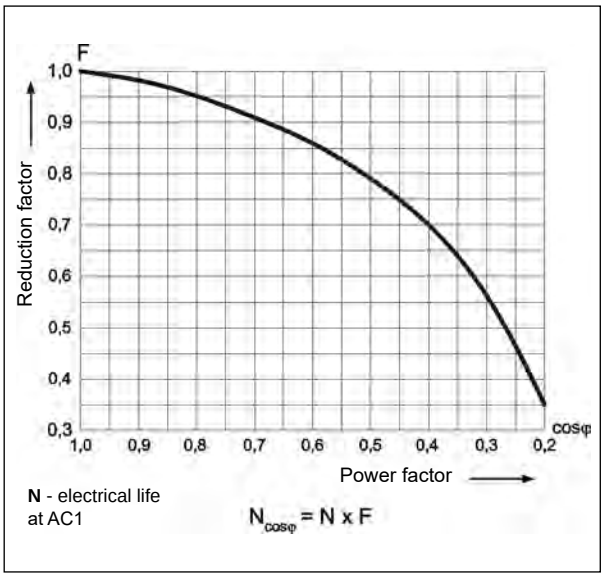
Screw terminals plug-in sockets for RUC faston 4,8x0,5, RUC-M
- see page 410

NEW

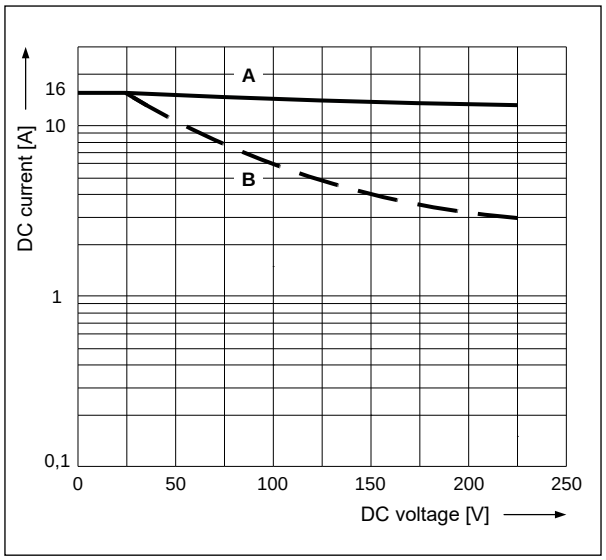
Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour Fig. 1



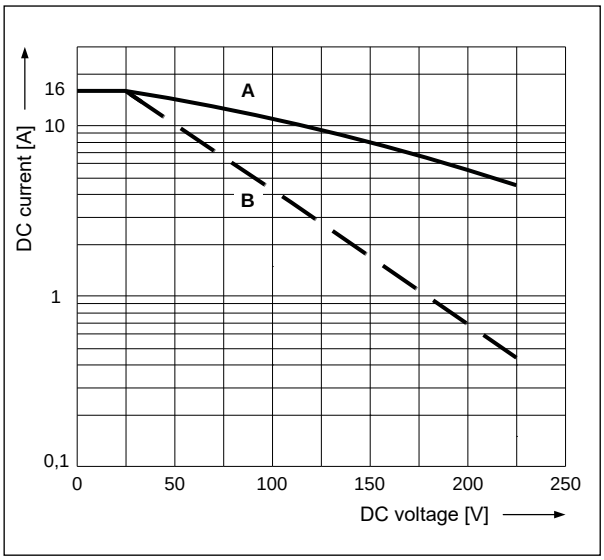
Electrical life reduction factor at AC inductive load Fig. 2



Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms
U_n = 24 V DC - version 1 NO (6 mm) Fig. 3



Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms
U_n = 24 V DC - version 2 NO (3 mm) Fig. 4



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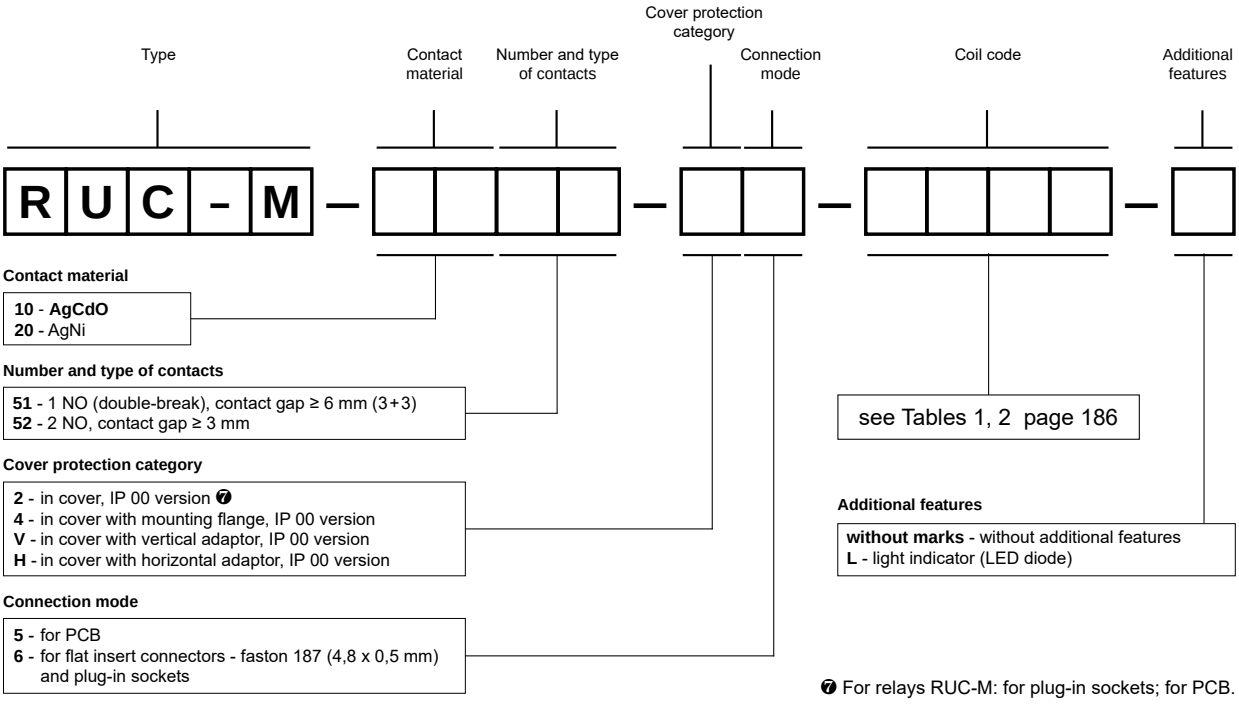
Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
W012	12	85	± 10%	9,6	13,2
W024	24	345	± 10%	19,2	26,4
W048	48	1 370	± 10%	38,4	52,8
W110	110	7 300	± 10%	88,0	121,0
W220	220	30 000	± 10%	176,0	242,0

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5012	12	18,5	± 10%	9,6	13,2
5024	24	75	± 10%	19,2	26,4
5115	115	1 840	± 10%	92,0	126,5
5120	120	1 910	± 10%	96,0	132,0
5230	230	7 080	± 10%	184,0	253,0
5240	240	7 760	± 10%	192,0	264,0

Ordering codes



❼ For relays RUC-M: for plug-in sockets; for PCB.

Examples of ordering codes:

RUC-M-1051-26-W024 relay **RUC-M**, faston 187 (4,8 x 0,5 mm), with contact gap ≥ 6 mm (3+3), for plug-in sockets, one normally open contact (double-break), contact material AgCdO, reinforced coil voltage 24 V DC, in cover IP 00

RUC-M-1052-V6-5230-L relay **RUC-M**, faston 187 (4,8 x 0,5 mm), for flat insert connectors, with contact gap ≥ 3 mm, with vertical adaptor (V), two normally open contacts, contact material AgCdO, coil voltage 230 V AC 50/60 Hz, with light indicator (LED diode), in cover IP 00

RUC-M-2051-25-3024 relay **RUC-M**, with contact gap ≥ 6 mm (3+3), for PCB, one normally open contact (double-break), contact material AgNi, coil voltage 24 V AC 50 Hz, in cover IP 00

- Power relays of general application • AC and DC coils
- High breaking capacity: AC1 - 10 kVA; AC3 - 6 kVA
- 35 mm rail mount acc. to PN-EN 60715 • High insulation dielectric strength
- Applications: control of electromagnets; systems of heating, cooling, ventillation, air conditioning; control with single-phase motors; catering industry machines and equipment; automation systems; photoelectric systems; etc.
- Recognitions, certifications, directives: RoHS, CE EAC

Contact data

Number and type of contacts		2 NO
Contact material		**AgCdO** ❶
Rated / max. switching voltage	AC	400 V / 440 V
Min. switching voltage		10 V
Rated load (capacity)	AC1	25 A / 400 V AC
	AC3	5 A / 400 V AC
	DC1	25 A / 24 V DC (see Fig. 3)
	DC13	0,30 A / 120 V 0,15 A / 250 V (R300)
Min. switching current		10 mA
Max. inrush current		40 A
Rated current		25 A
Max. breaking capacity	AC1	10 000 VA
	AC3	6 000 VA
Min. breaking capacity		1 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
	AC3	600 cycles/hour
• no load		3 600 cycles/hour

Coil data

Rated voltage	50 Hz AC	12 ... 400 V
	DC	12 ... 220 V
Must release voltage		≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2
Rated power consumption	AC	3,0 VA
	DC	1,7 W

Insulation according to PN-EN 60664-1

Insulation rated voltage		400 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength		
• between coil and contacts		5 000 V AC type of insulation: reinforced
• contact clearance		1 500 V AC type of clearance: micro-disconnection
• pole - pole		5 000 V AC type of insulation: reinforced
Contact - coil distance		
• clearance		≥ 6 mm
• creepage		≥ 8 mm

General data

Operating / release time (typical values)		20 ms / 20 ms
Electrical life		
• resistive AC1		> 10^5 25 A, 400 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 10^6
Dimensions (L x W x H)		26 x 49 x 72 mm
Weight		130 g
Ambient temperature	• storage	-25...+85 °C
	• operating	-25...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance		10 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU.

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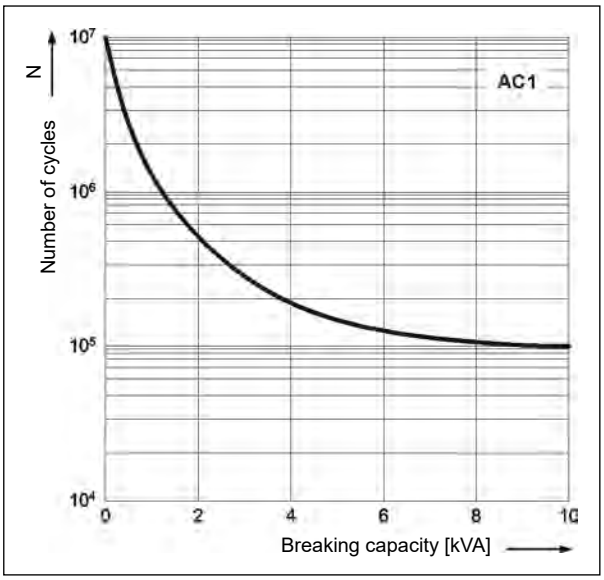
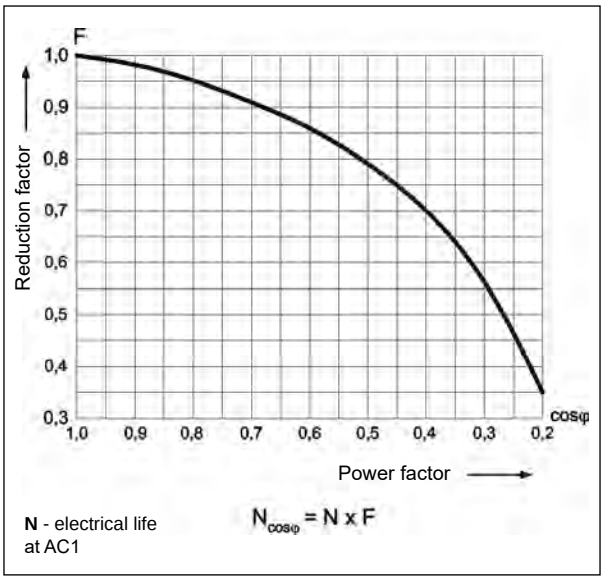
Electrical life at AC resistive load.
Switching frequency: 600 cycles/hour Fig. 1

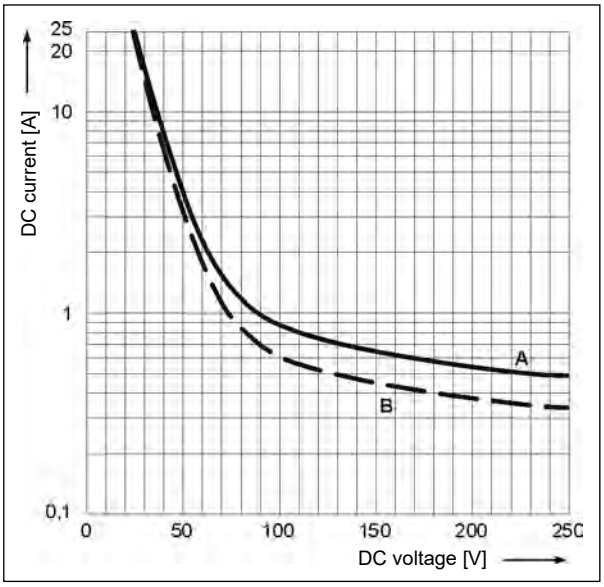


Electrical life reduction factor at AC inductive load Fig. 2

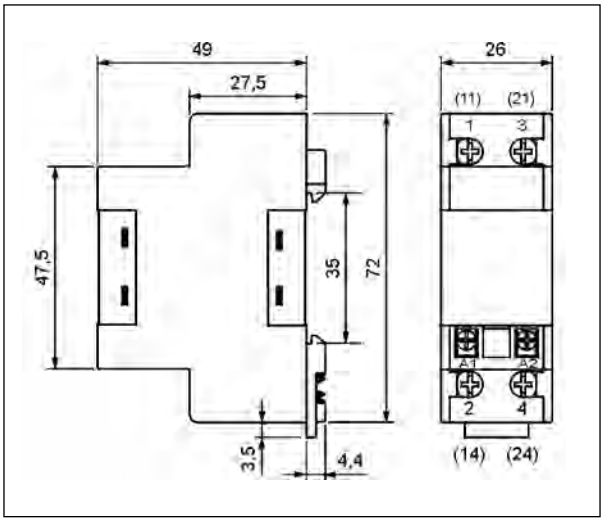


N - electrical life at AC1

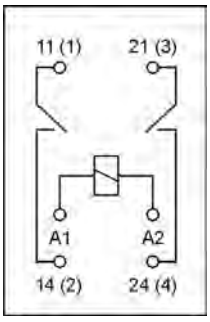
Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms Fig. 3



Dimensions



Connection diagrams
(screw terminals side view)



2 NO

Mounting

Relays **RG25** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - screw terminals of coil downwards. **Connections:** max. cross section of the cables: 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 9 mm, max. tightening moment for the terminal: 0,7 Nm.

Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 55 °C)
1012	12	85	± 10%	9,6	13,2
1024	**24**	**340**	**± 10%**	**19,2**	**26,4**
1048	48	1 350	± 10%	38,4	52,8
1110	110	7 600	± 10%	88,0	121,0
1220	220	30 000	± 10%	176,0	242,0

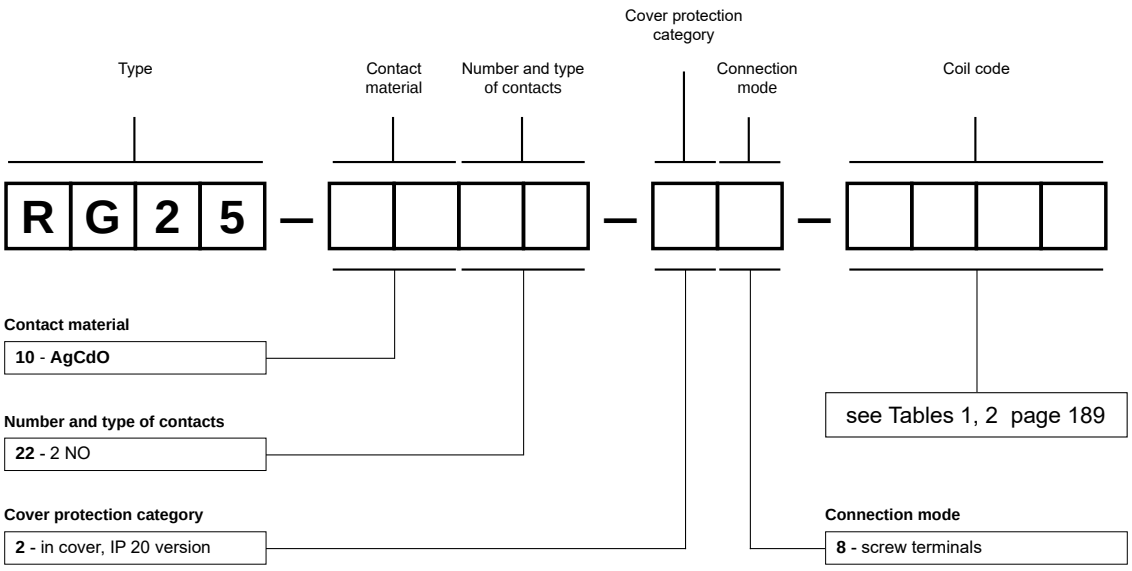
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
3012	12	17	± 10%	8,4	13,2
3024	**24**	**76**	**± 10%**	**16,8**	**26,4**
3110	110	1 600	± 10%	77,0	121,0
3230	**230**	**6 800**	**± 10%**	**161,0**	**253,0**
3400	400	18 600	± 10%	280,0	440,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Example of ordering code:

RG25-1022-28-3230 relay **RG25**, screw terminals, two normally open contacts, contact material AgCdO, coil voltage 230 V AC 50 Hz, in cover IP 20

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- High switching capacity up to 30 A
- „Bridge" type contacts which open the circuit with double break
- Flat insert connectors - faston faston 250 (6,3 x 0,8 mm)
- High resistance to interference • High strength of insulation
- Applications: household equipment; air-conditioning and ventilation systems; audio equipment; control devices; automation systems; photoelectric systems; etc.
- Recognitions, certifications, directives: RoHS, CE

Contact data

Number and type of contacts		1 NO, 2 NO	
Contact material		**$AgSnO_2$**	
Rated / max. switching voltage	AC	250 V / 440 V	
Min. switching voltage		10 V	
Rated load	AC1	1 NO: 30 A / 250 V AC	2 NO: 25 A / 250 V AC
Min. switching current		10 mA	10 mA
Rated current		1 NO: 30 A	2 NO: 25 A
Max. breaking capacity	AC1	1 NO: 7 000 VA	2 NO: 6 250 VA
Min. breaking capacity		0,1 W	
Contact resistance		≤ 100 mΩ	

Coil data

Rated voltage	50/60 Hz AC	24 ... 230 V	
	DC	12 ... 110 V	
Must release voltage		DC: ≥ 0,1 U_n	
Operating range of supply voltage		see Tables 1, 2	
Rated power consumption	AC	1,7 VA 24, 48 V	2,5 VA 115, 230 V
	DC	1,9 W	

Insulation according to PN-EN 60664-1

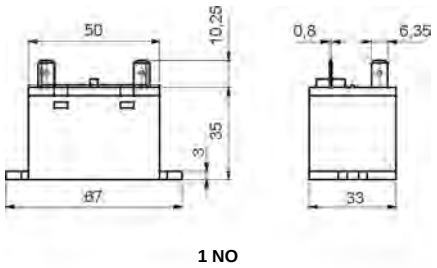
Insulation rated voltage		250 V AC	
Dielectric strength			
• between coil and contacts		4 000 V AC	type of insulation: reinforced
• contact clearance		2 000 V AC	type of clearance: full-disconnection
Contact - coil distance			
• clearance		≥ 9 mm	
• creepage		≥ 11 mm	

General data

Operating / release time (typical values)		30 ms / 30 ms	
Electrical life			
• resistive AC1	1 200 cycles/hour	10^5 1Z: 30 A, 250 V AC	2Z: 25 A, 250 V AC
Mechanical life (cycles)		> 10^7	
Dimensions (L x W x H)		67 x 33 x 35 mm	
Weight		90 g	
Ambient temperature	• operating	-25...+75 °C	
Cover protection category		IP 50 PN-EN 60529	
Shock resistance		10 g	
Vibration resistance		1,5 mm DA (constant amplitude) 10...55 Hz	

The data in bold type relate to the standard versions of the relays.

Dimensions



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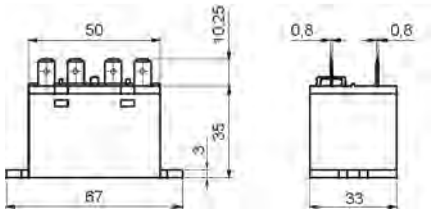
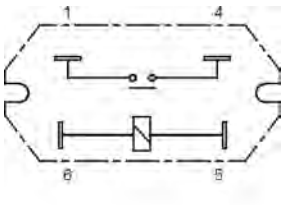


2 NO

Connection diagrams (pin side view)



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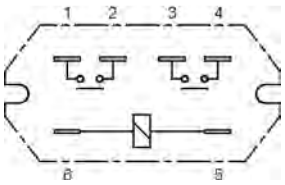
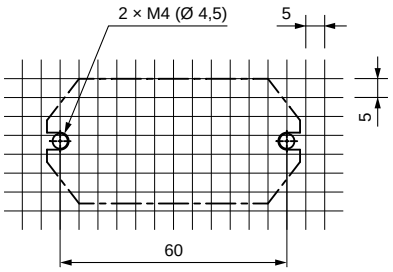


2 NO

Pinout



Mounting

Relays **R20** are designed for flat insert connectors - faston 250 (6,3 x 0,8 mm), relays are direct on panel mounting with two M4 screws.

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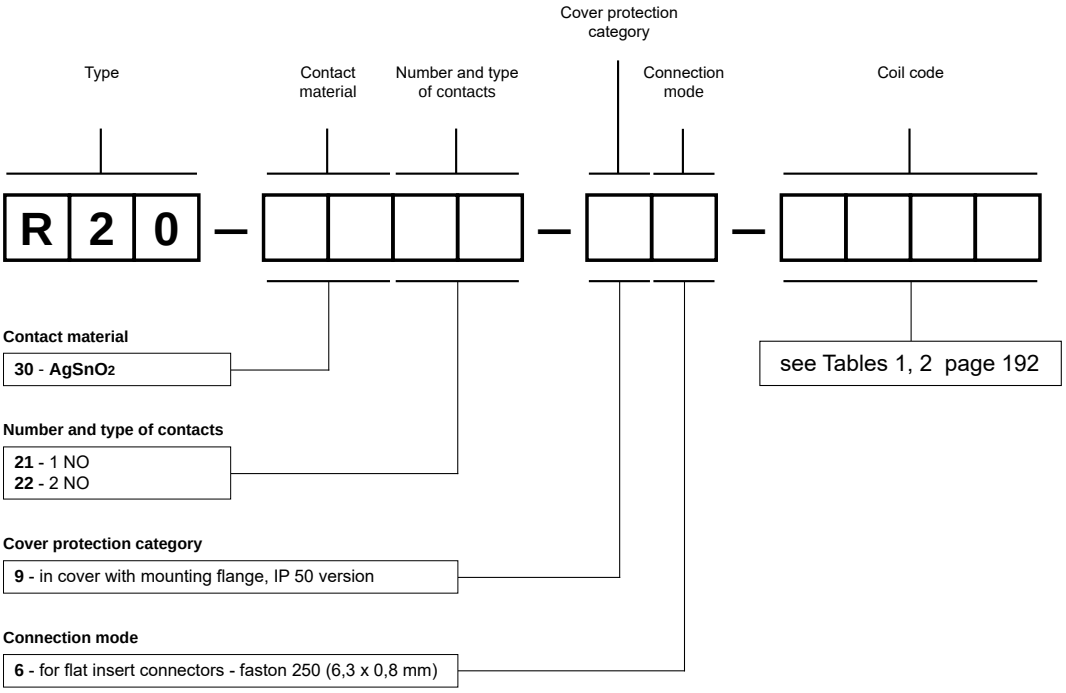
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1012	12	75,8	± 10%	9,0	13,2
1024	24	303	± 10%	18,0	26,4
1110	110	6 400	± 10%	82,5	121,0

Coil data - AC 50/60 Hz voltage version Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 20 °C)
5024	24	338	± 10%	18,0	26,4
5048	48		± 10%	36,0	52,8
5115	115	5 260	± 10%	86,3	126,5
5230	230	21 000	± 10%	172,5	253,0

Ordering codes



Example of ordering code:

R20-3021-96-1012 relay **R20**, for flat insert connectors - faston 250 (6,3 x 0,8 mm), one normally open contact, contact material $AgSnO_2$, coil voltage 12 V DC, in cover with mounting flange IP 50

- High load 30 A • DC coils - of up to 110 V DC, low coil power 0,9 W, insulation class F: 155 °C
- For PCB • Small dimensions, light weight
- High shock and vibration resistance
- High quality, long life
- Applications: for automobile, machine, electronic equipment, air conditioner, household appliance
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO	
Contact material		**$AgSnO_2$**, AgCdO ❶	
Rated / max. switching voltage	AC	240 V / 300 V	
	DC	110 V / 110 V	
Min. switching voltage		10 V	
Rated load	AC1	1 CO: 30 A / 20 A (NO/NC) / 240 V AC	1 NO: 30 A / 240 V AC
	DC1	1 CO: 30 A / 20 A (NO/NC) / 14 V DC	1 NO: 30 A / 14 V DC
Rated current		30 A	
Max. breaking capacity	AC1	1 CO: 7 200 VA / 4 800 VA (NO/NC)	1 NO: 7 200 VA
Contact resistance		≤ 30 mΩ	

Coil data

Rated voltage	DC	5 ... 110 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1
Must operate voltage		≤ 0,75 U_n
Rated power consumption	DC	0,9 W

Insulation according to PN-EN 60664-1

Insulation rated voltage		500 V AC
Overvoltage category		II
Flammability class		V-0 UL94
Insulation resistance		> 1 000 MΩ 500 V DC, 60 s
Dielectric strength		
• between coil and contacts		2 500 V AC type of insulation: basic
• contact clearance		1 500 V AC type of clearance: micro-disconnection

General data

Operating / release time (typical values)		15 ms / 10 ms	
Electrical life			
• resistive AC1	1 200 cycles/hour	10^5 1 CO: 30 A / 20 A (NO/NC), 240 V AC	1 NO: 30 A, 240 V AC
• resistive DC1	1 200 cycles/hour	10^5 1 CO: 30 A / 20 A (NO/NC), 14 V DC	1 NO: 30 A, 14 V DC
Mechanical life (cykle)		10^7	
Dimensions (L x W x H)		32,5 x 27,6 x 20,5 mm	
Weight		30 g	
Ambient temperature	• operating	-55...+100 °C	
Cover protection category		IP 40 or **IP 64** PN-EN 60529	
Shock resistance		20 g	
Vibration resistance		1,5 mm DA (constant amplitude) 10...55 Hz	
Solder bath temperature		max. 235 °C	
Soldering time		max. 3,5 s	

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU.

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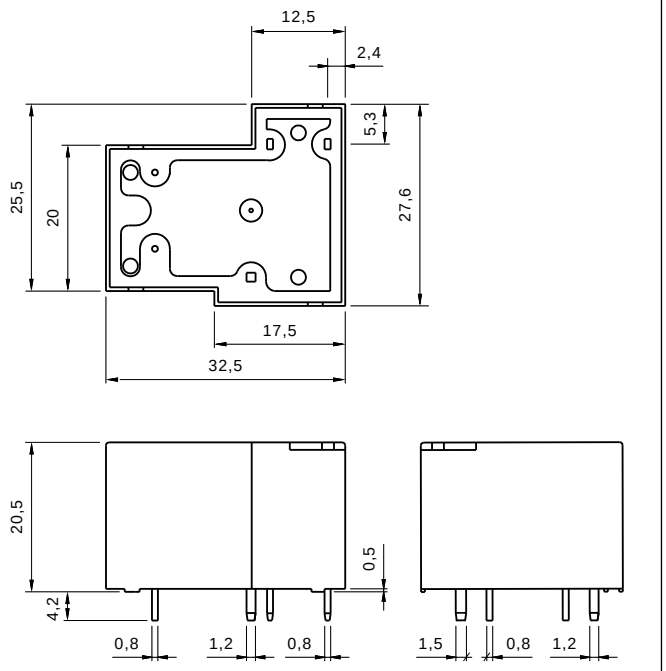
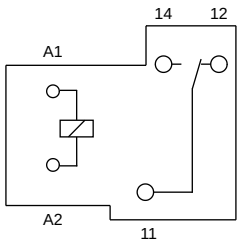
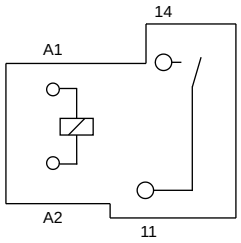
Dimensions



Connection diagrams (pin side view)



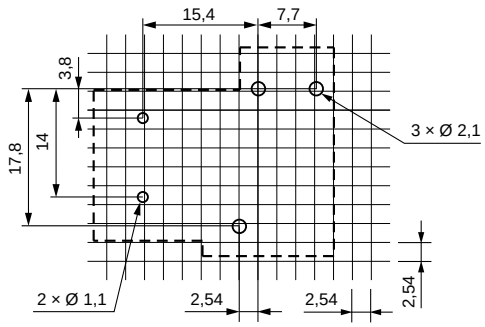
1 CO



1 NO

Pinout (solder side view)

1 CO



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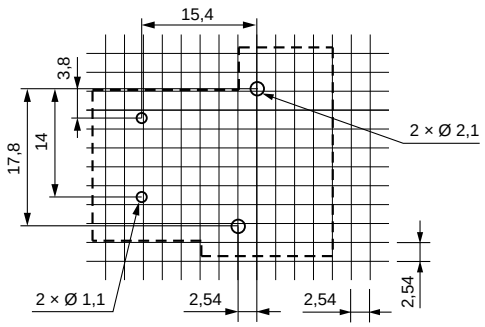


Mounting

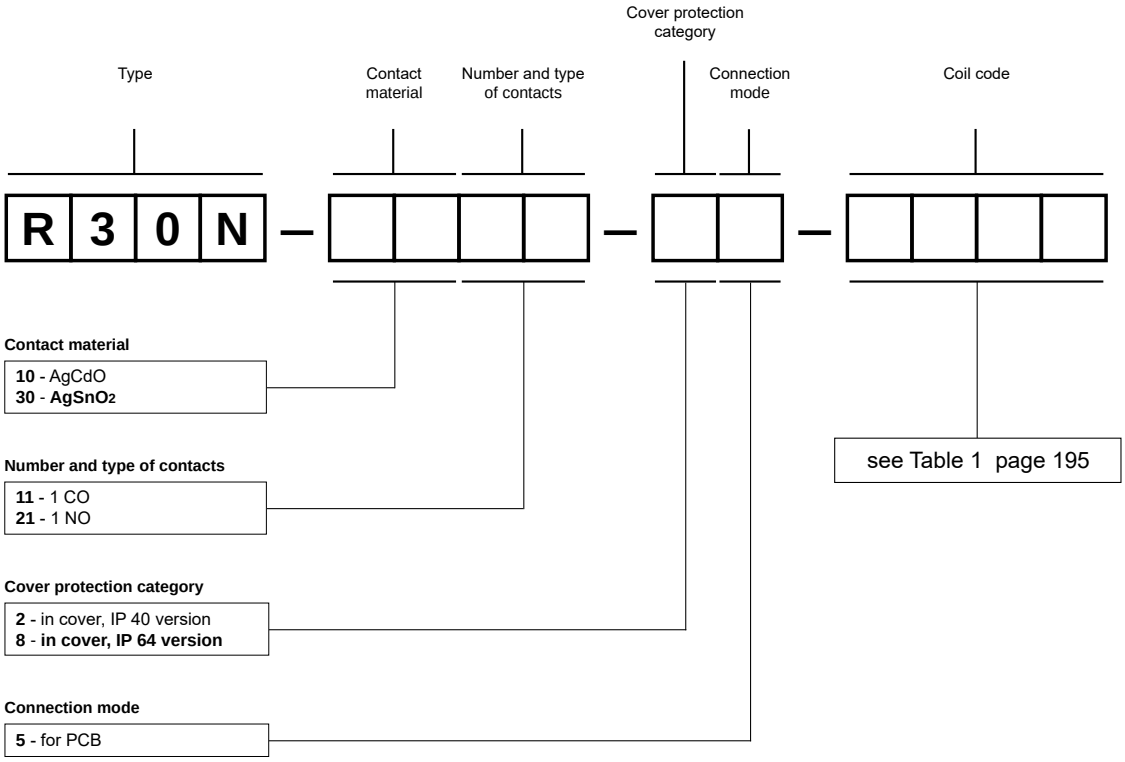
Relays **R30N** are designed for direct PCB mounting.

Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	**5**	**28**	**± 10%**	**3,8**	**6,5**
1012	**12**	**160**	**± 10%**	**9,0**	**15,6**
1024	**24**	**640**	**± 10%**	**18,0**	**31,2**
1048	48	2 560	± 10%	36,0	62,4
1110	110	13 445	± 10%	82,5	143,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

R30N-3011-85-1012 relay **R30N**, for PCB, one changeover contact, contact material $AgSnO_2$, coil voltage 12 V DC, in cover IP 64

R30N-1021-25-1024 relay **R30N**, for PCB, one normally open contact, contact material AgCdO, coil voltage 24 V DC, in cover IP 40

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- High load 40 A • AC coils - of up to 220 V AC, DC coils - of up to 110 V DC, insulation class F: 155 °C
- For PCB • Small dimensions, light weight
- High shock and vibration resistance
- High quality, long life
- Applications: for automobile, machine, electronic equipment, air conditioner, household appliance
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		1 CO, 1 NO	
Contact material		**$AgSnO_2$**, AgCdO ❶	
Rated / max. switching voltage	AC	240 V / 300 V	
	DC	110 V / 110 V	
Min. switching voltage		10 V	
Rated load	AC1	1 CO: 40 A / 30 A (NO/NC) / 240 V AC	1 NO: 40 A / 240 V AC
	DC1	1 CO: 40 A / 30 A (NO/NC) / 30 V DC	1 NO: 40 A / 30 V DC
Rated current		40 A	
Max. breaking capacity	AC1	1 CO: 9 600 VA / 7 200 VA (NO/NC)	1 NO: 9 600 VA
	AC3	1 CO: 2,0 HP / 1,5 HP (NO/NC) UL 508 (single-phase motor)	1 NO: 2,0 HP UL 508 (single-phase motor)
	DC1	1 CO: 1 200 W / 900 W (NO/NC)	1 NO: 1 200 W
Contact resistance		≤ 30 mΩ	

Coil data

Rated voltage	50/60 Hz AC	12 ... 220 V	
	DC	5 ... 110 V	
Must release voltage		DC: ≥ 0,1 U_n	
Operating range of supply voltage		see Tables 1, 2	
Must operate voltage		≤ 0,75 U_n	
Rated power consumption	AC	2,0 VA	
	DC	0,9 W	

Insulation according to PN-EN 60664-1

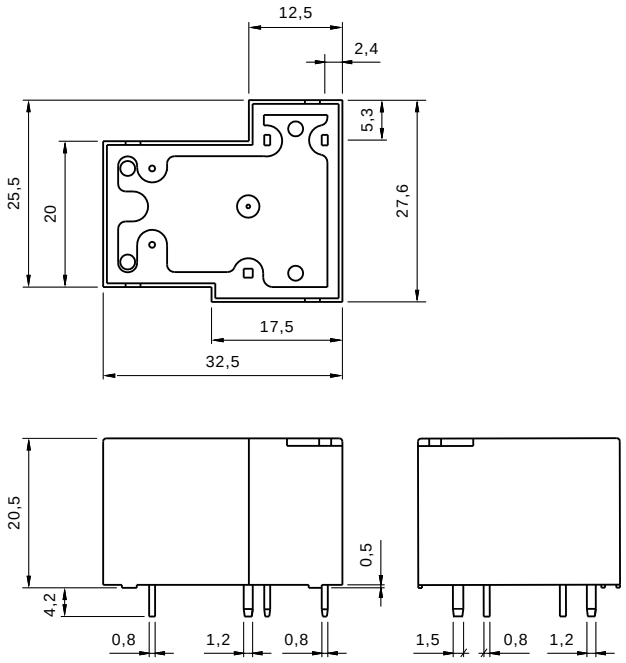
Insulation rated voltage	500 V AC	
Overvoltage category	II	
Flammability class	V-0 UL94	
Insulation resistance	> 1 000 MΩ	500 V DC, 60 s
Dielectric strength		
• between coil and contacts	4 000 V AC	type of insulation: reinforced
• contact clearance	1 500 V AC	type of clearance: micro-disconnection

General data

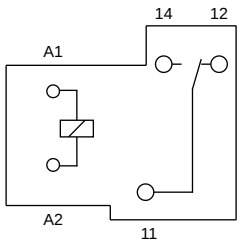
Operating / release time (typical values)		15 ms / 10 ms	
Electrical life			
• resistive AC1	1 200 cycles/hour	10^5 1 CO: 40 A / 30 A (NO/NC), 240 V AC	1 NO: 40 A, 240 V AC
• resistive DC1	1 200 cycles/hour	10^5 1 CO: 40 A / 30 A (NO/NC), 30 V DC	1 NO: 40 A, 30 V DC
Mechanical life (cykle)		10^7	
Dimensions (L x W x H)		32,5 x 27,6 x 20,5 mm	
Weight		30 g	
Ambient temperature	• operating	-55...+100 °C	
Cover protection category		IP 40 or **IP 64** PN-EN 60529	
Shock resistance		20 g	
Vibration resistance		1,5 mm DA (constant amplitude) 10...55 Hz	
Solder bath temperature		max. 235 °C	
Soldering time		max. 3,5 s	

The data in bold type relate to the standard versions of the relays. ❶ AgCdO contact material in electrical contacts is only for use in electrical and electronic equipment (EEE) in compliance with directive RoHS2 2011/65/EU in restricted categories of EEE covered by this directive. Relpol S.A. is not responsible for usage relays with AgCdO contact material in categories of EEE where it is prohibited by the directive RoHS2 2011/65/EU.

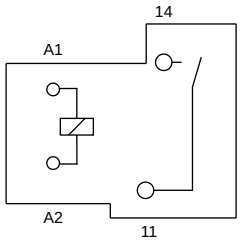
Dimensions



Connection diagrams (pin side view)



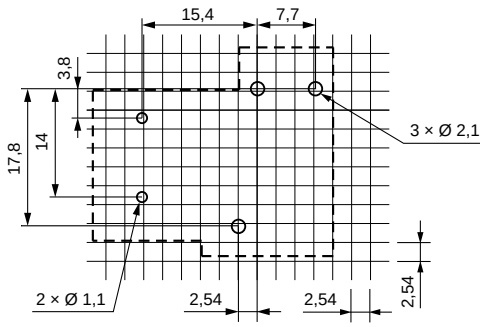
1 CO



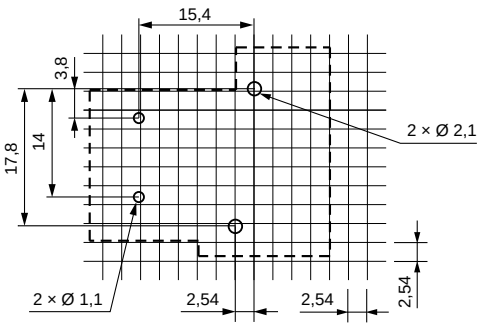
1 NO

Pinout (solder side view)

1 CO



1 NO



Mounting

Relays **R40N** are designed for direct PCB mounting.

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Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
1005	**5**	**28**	**± 10%**	**3,8**	**6,5**
1012	**12**	**160**	**± 10%**	**9,0**	**15,6**
1024	**24**	**640**	**± 10%**	**18,0**	**31,2**
1048	48	2 560	± 10%	36,0	62,4
1110	110	13 445	± 10%	82,5	143,0

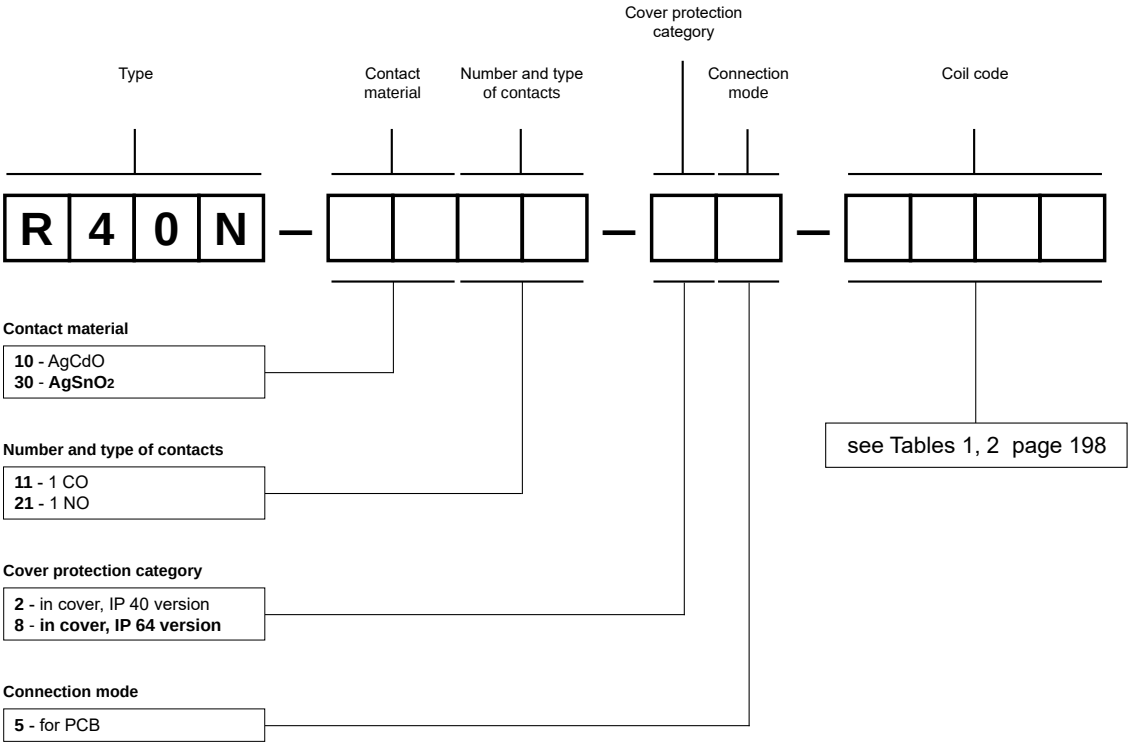
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
5012	12	27	± 10%	9,0	15,6
5024	**24**	**120**	**± 10%**	**18,0**	**31,2**
5110	110	2 360	± 10%	82,5	143,0
5120	120	3 040	± 10%	90,0	156,0
5220	**220**	**13 490**	**± 10%**	**165,0**	**286,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

R40N-3011-85-1012 relay **R40N**, for PCB, one changeover contact, contact material $AgSnO_2$, coil voltage 12 V DC, in cover IP 64

R40N-1021-25-5024 relay **R40N**, for PCB, one normally open contact, contact material AgCdO, coil voltage 24 V AC 50/60 Hz, in cover IP 40

RS35

RS50

- **Relays to control power in photovoltaic systems which generate electric energy**
- Max. switching current: 35 A (version RS35); 50 A (version RS50)
- 5000 V / 10 mm reinforced insulation • Contact gap: RS35 ≥ 2,2 mm; RS50 ≥ 1,85 mm • Holding power 0,1 W
- For PCB • DC coils • Reinforced insulation, acc. PN-EN 60730-1 (VDE 0631, part 1); PN-EN 60335-1 (VDE 0700, part 1)
- Recognitions, certifications, directives: RoHS,

Contact data

Number and type of contacts		2 NO	
Contact material		**$AgSnO_2$**	
Rated / max. switching voltage	AC	250 V / 440 V	
Min. switching voltage		10 V	
Rated load	AC1	RS35: 35 A / 250 V AC	RS50: 48 A / 250 V AC
	DC1	RS35: 35 A / 24 V DC	RS50: 48 A / 24 V DC
Min. switching current		10 mA	10 mA
Rated current		RS35: 35 A	RS50: 50 A
Max. breaking capacity	AC1	RS35: 8 750 VA	RS50: 12 500 VA
	DC1	RS35: 90 W 0,3 A / 300 V	RS50: 90 W 0,3 A / 300 V
Min. breaking capacity		1 W	
Contact resistance		≤ 50 mΩ	
Max. operating frequency			
• at rated load	AC1	360 cycles/hour	
• no load		3 600 cycles/hour	

Coil data

Rated voltage	DC	5 ... 110 V
Must release voltage		DC: ≥ 0,05 U_n
Operating range of supply voltage		0,75...2,0 U_n see Table 1
Rated power consumption	DC	0,48 W
Power consumption at pickup voltage		0,3 W
Max. continuous dissipation		1,9 W 20 °C

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	6 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Insulation resistance	1000 MΩ
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	2 500 V AC type of clearance: full-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		40 ms / 5 ms	
Electrical life			
• resistive AC1		3×10^4 35 A, 250 V AC, 20 °C	10^4 50 A, 250 V AC, 20 °C
• AC7a		3×10^4 35 A, 250 V AC, 20 °C	3×10^4 50 A, 250 V AC, 20 °C
Mechanical life (cycles)		10^6	
Dimensions (L x W x H)		40 x 25 x 49,2 mm	
Weight		105 g	
Ambient temperature	• storage	-40...+105 °C	
	• operating	-40...+85 °C	
Cover protection category		IP 40 PN-EN 60529	
Environmental protection		RTI PN-EN 116000-3	
Shock resistance		10 g	
Vibration resistance		1,5 mm DA (constant amplitude) 10...55 Hz	
Solder bath temperature		max. 270 °C	
Soldering time		max. 5 s	

The data in bold type relate to the standard versions of the relays.

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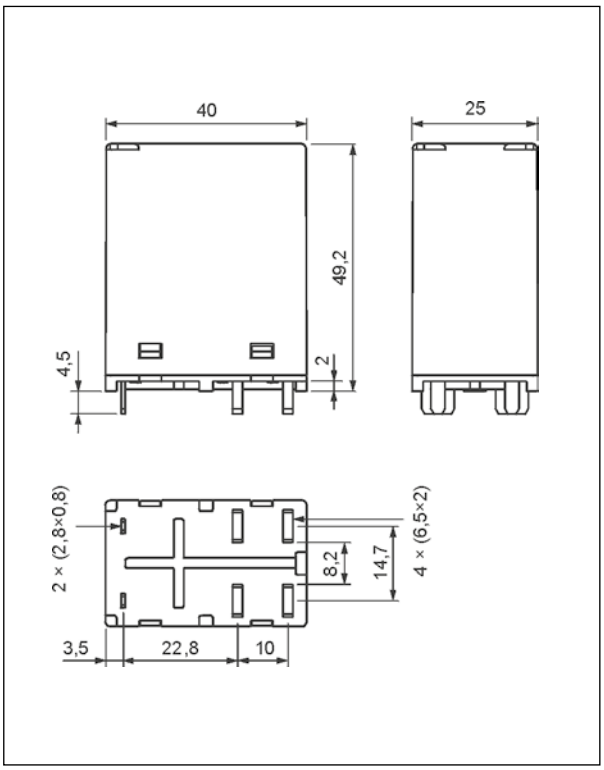
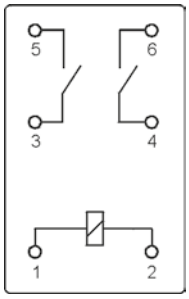
Dimensions



Mounting

Relays **RS35**, **RS50** are designed for direct PCB mounting.

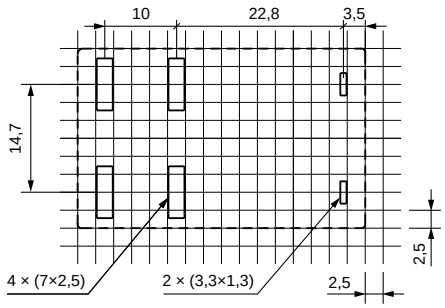
Connection diagrams (pin side view)



2 NO

Pinout (solder side view)

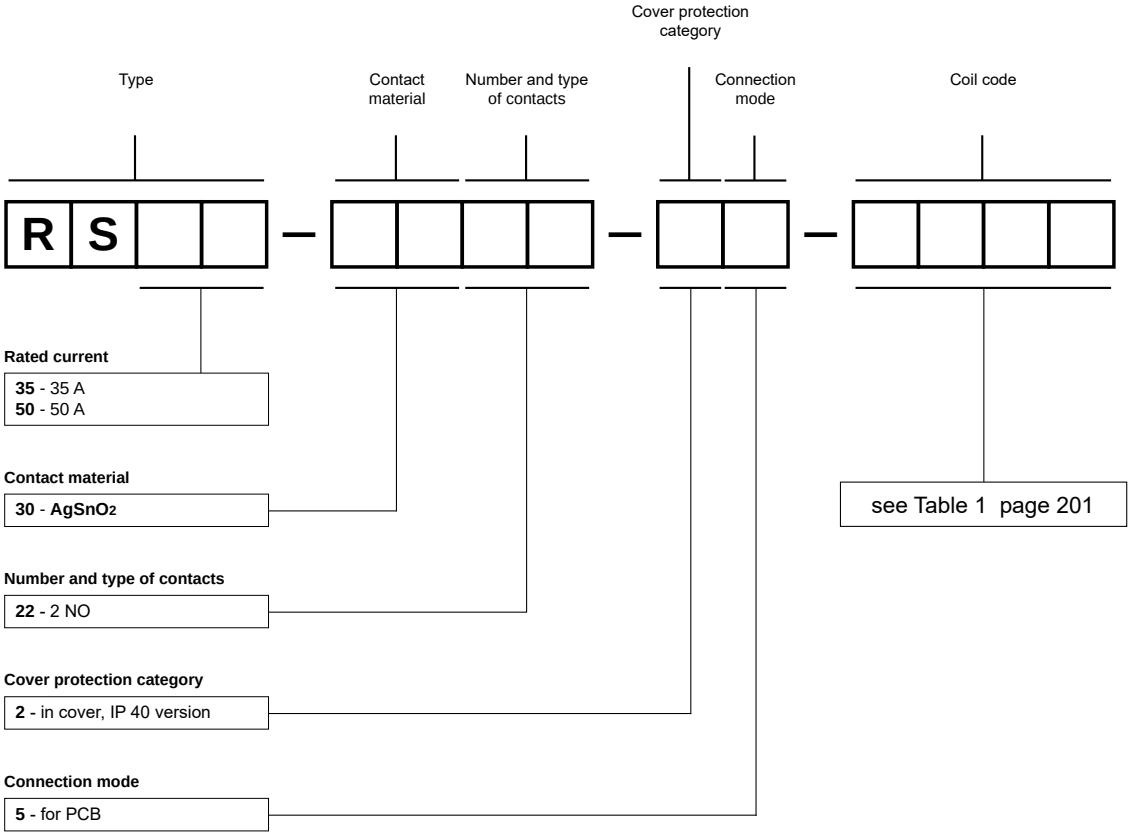
2 NO



Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 55 °C)
1005	5	50	± 10%	3,75	10
1009	9	170	± 10%	6,75	18
1012	12	300	± 10%	9,00	24
1018	18	675	± 10%	13,50	36
1024	24	1 200	± 10%	18,00	48
1110	110	25 000	± 10%	82,50	220

Ordering codes



Examples of ordering code:

RS35-3022-25-1005 relay **RS35**, rated current 35 A, for PCB, two normally open contacts, contact material $AgSnO_2$, coil voltage 5 V DC, in cover IP 40

RS50-3022-25-1110 relay **RS50**, rated current 50 A, for PCB, two normally open contacts, contact material $AgSnO_2$, coil voltage 110 V DC, in cover IP 40

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Relays
interface

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The interface relays perform the function of input/output separation in the applications with PLC controllers, and they are applied in numerous other electric devices as interface and output elements.

The basic features of the relays are: quick mounting, separation of control circuits from output circuits, coil overvoltage suppression devices, light indicators of operation, number of contacts: from 1 to 4.

The high quality and reliability of the interface relays have been proved by their numerous successful applications. Miniature and industrial relays of the types: RM699BV, RM84, RM85, R2N, R3N, R4N are the basis for these relays.

They meet the requirements of RoHS Directive.
The relays are recognized and certified by:

with plug-in sockets

PI84 with socket GZT80 203
PI84 with socket GZM80 207
PI84 with socket GZMB80 211
PI85 with socket GZT80 215
PI85 with socket GZM80 219
PI85 with socket GZMB80 223
PI85 inrush with socket GZT80 227
PIR2 with socket GZM2 231
PIR3 with socket GZM3 235
PIR4 with socket GZM4 239

in narrow-profile covers

PI6-1P 243
PI6-1T 246
PIR6W-1P-... 248
PIR6W-1PS-... 252
PIR6WB-1PS-... 256

RM84 + GZT80

- Interface relay **PI84 with socket GZT80** consists of: electromagnetic relay **RM84**, grey plug-in socket **GZT80**, signalling / protecting module **type M...**, retainer / retractor clip **GZT80-0040** (plastic), white description plate **GZT80-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • May be linked with interconnection strip type **ZGGZ80**
- Recognitions, certifications, directives: recognitions RM84, RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	8 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	550 W (single-phase motor)
	DC1	8 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		15 A
Rated current		8 A
Max. breaking capacity	AC1	2 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 8 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,12 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		80 x 15,6 x 67 mm
Weight		61 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RM84: RTII GZT80: RT0 PN-EN 116000-3
Shock resistance		20 g
Vibration resistance	(NO/NC)	10 g / 5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

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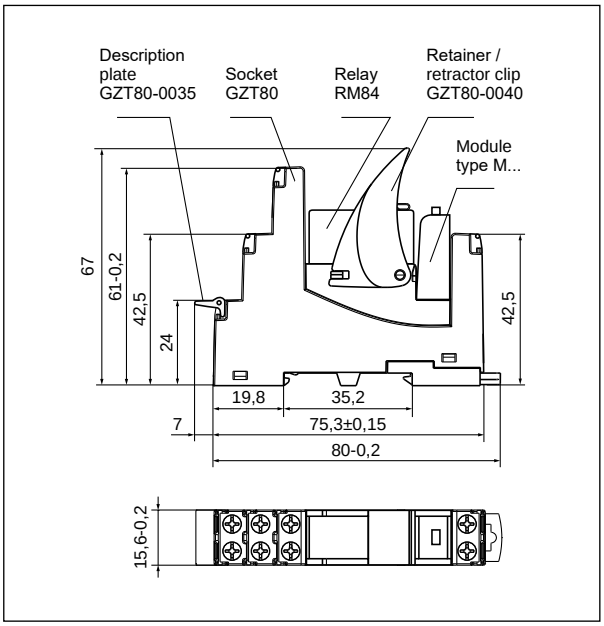
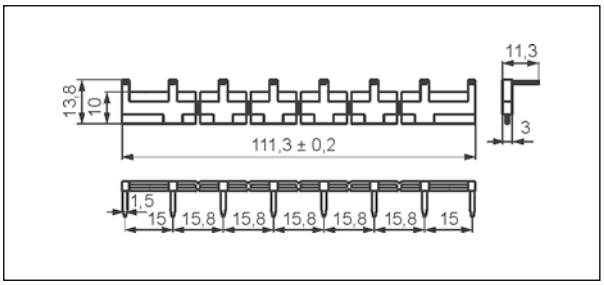
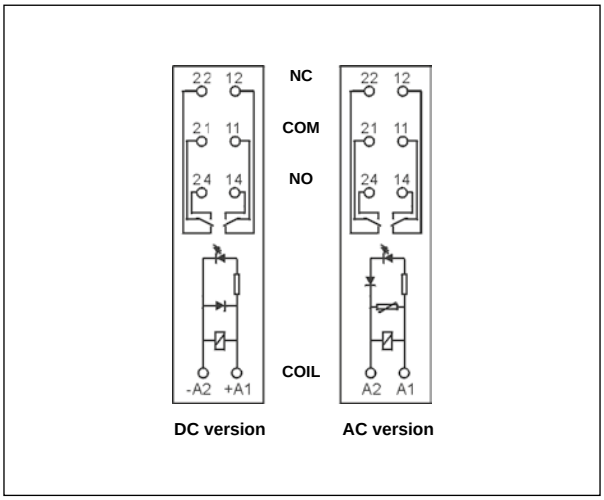
Dimensions



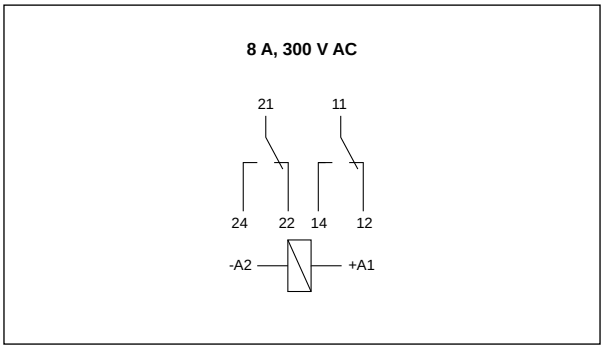


Interconnection strip type **ZGGZ80**

Connection diagrams
(screw terminals side view)



Connection of GZT80 socket



Mounting

Relays **PI84 with socket GZT80** ❶ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

❶ Plug-in sockets **GZT80** may be linked with interconnection strip type **ZGGZ80**. Strip **ZGGZ80** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 8 sockets. Colours of strips: **ZGGZ80-1** grey, **ZGGZ80-2** black (see page 418).

ZGGZ80

Interconnection strip ZGGZ80:
bridging of common input signals.

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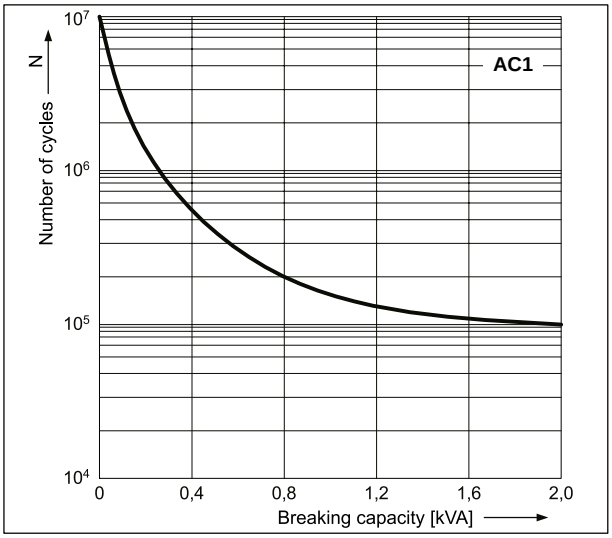
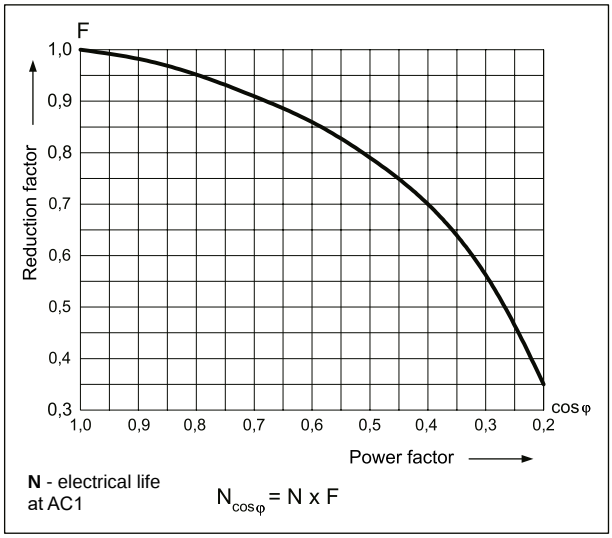
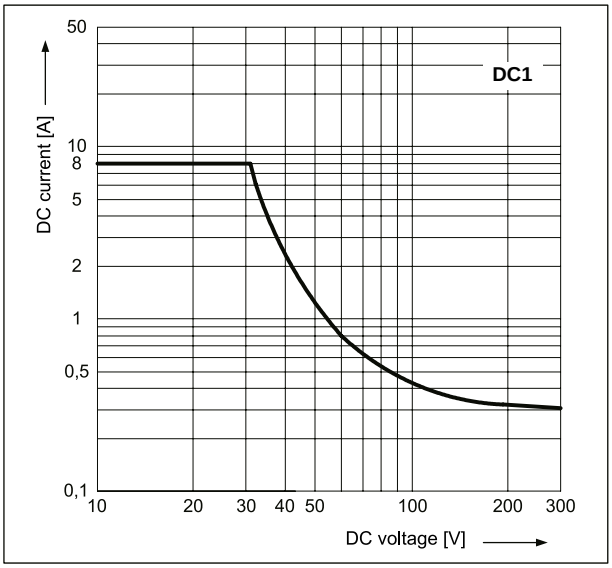
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



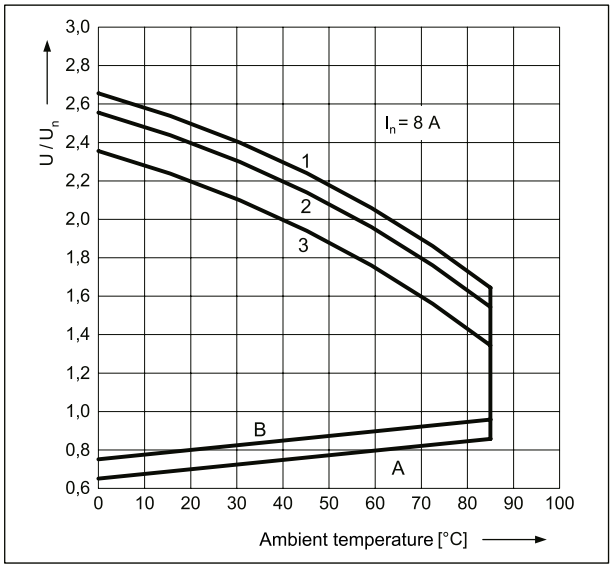
Electrical life reduction factor at AC inductive load Fig. 2



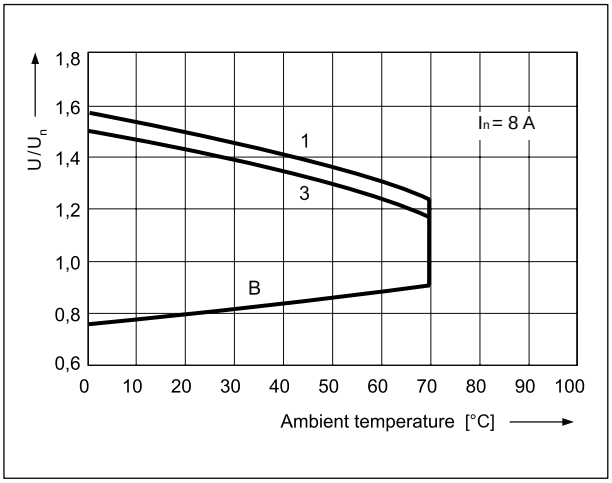
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
012DC	12	360	± 10%	8,4	30,6
024DC	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
048DC	48	5 700	± 10%	33,6	122,4
110DC	110	25 200	± 10%	77,0	280,0

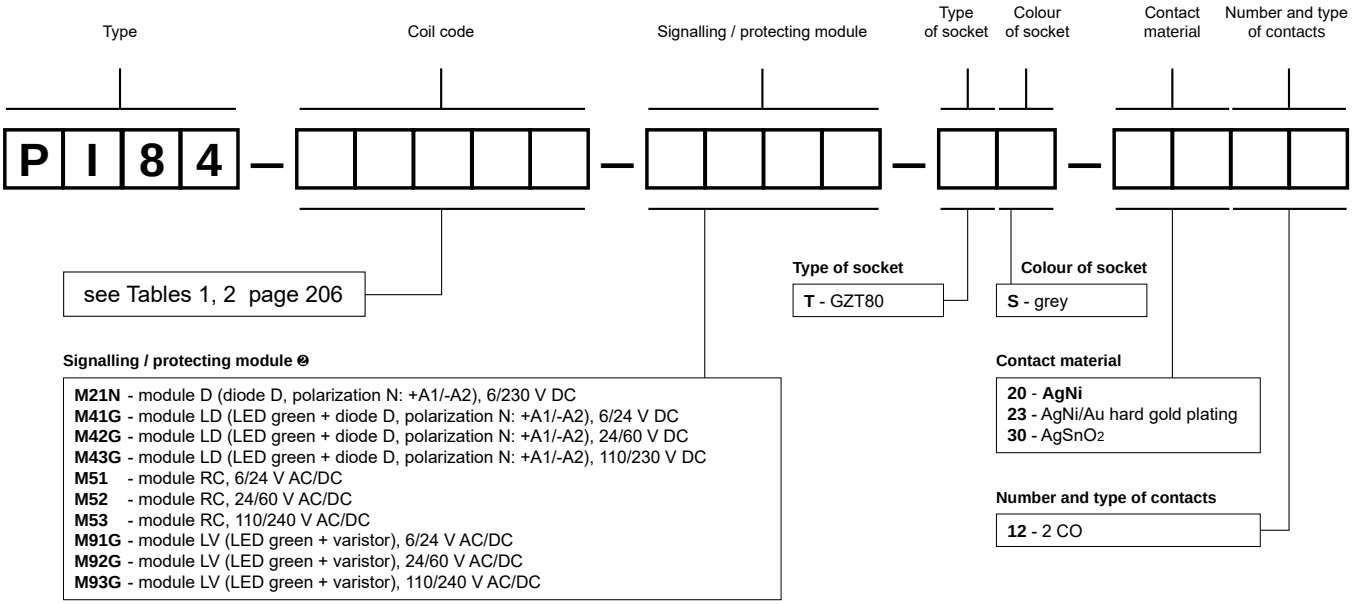
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
012AC	12	100	± 10%	9,6	13,2
024AC	**24**	**400**	**± 10%**	**19,2**	**26,4**
048AC	48	1 550	± 10%	38,4	57,6
120AC	120	10 200	± 10%	96,0	144,0
230AC	**230**	**38 500**	**± 10%**	**184,0**	**253,0**
240AC	240	42 500	± 15%	192,0	288,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



❷ Modules D, RC - only for versions with contacts AgNi

Examples of ordering codes:

PI84-012DC-M41G-TS-2012 — interface relay **PI84** consists of: relay **RM84** (two changeover contacts, contact material AgNi, coil voltage 12 V DC), socket **GZT80** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

PI84-230AC-M93G-TS-3012 — interface relay **PI84** consists of: relay **RM84** (two changeover contacts, contact material $AgSnO_2$, coil voltage 230 V AC 50/60 Hz), socket **GZT80** (grey, screw terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

RM84 + GZM80

- Interface relay **PI84 with socket GZM80** consists of: electromagnetic relay **RM84**, grey plug-in socket **GZM80**, signalling / protecting module **type M...**, retainer / retractor clip **GZT80-0040** (plastic), white description plate **GZT80-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw •May be linked with interconnection strip type **ZGGZ80**
- Recognitions, certifications, directives: recognitions RM84, RoHS,

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	8 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	550 W (single-phase motor)
	DC1	8 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		15 A
Rated current		8 A
Max. breaking capacity	AC1	2 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 8 A, 250 V AC
• cosφ		see Fig. 2
• cosφ = 0,4		> 10^5 3 A, 250 V AC
• DC L/R=40 ms		> 10^5 0,12 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		81,6 x 15,9 x 67 mm
Weight		60 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RM84: RTII GZM80: RT0 PN-EN 116000-3
Shock resistance		20 g
Vibration resistance	(NO/NC)	10 g / 5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

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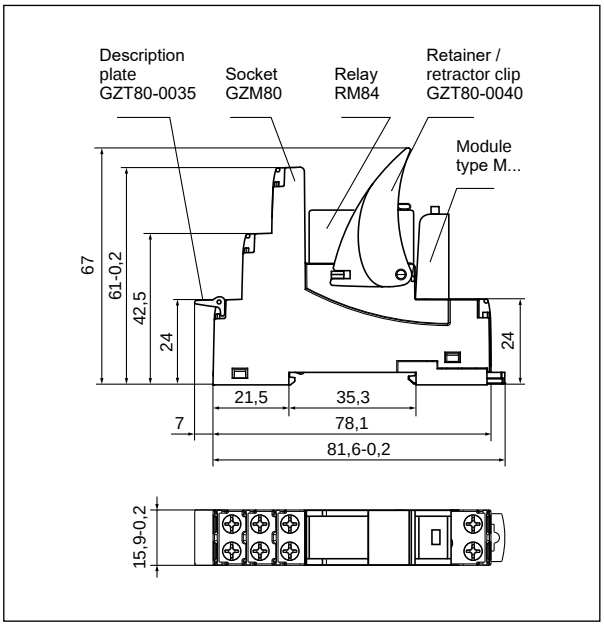
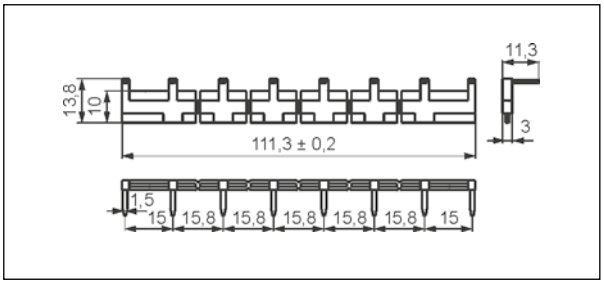
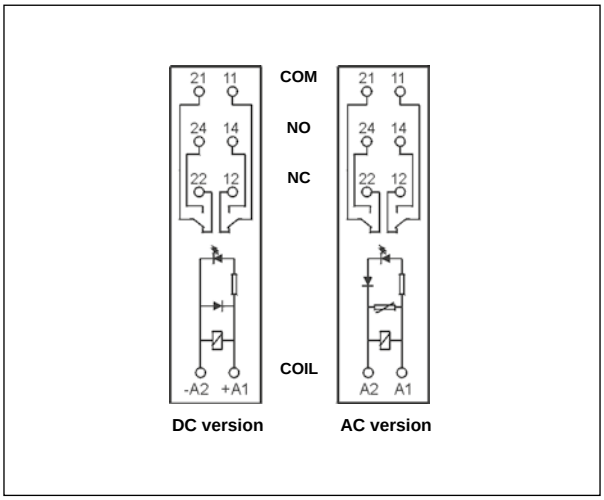
Dimensions



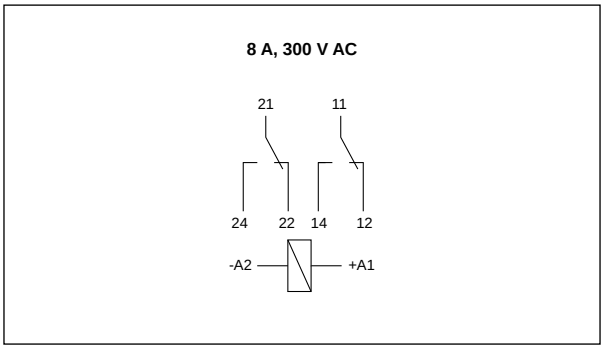


Interconnection strip type **ZGGZ80**

Connection diagrams
(screw terminals side view)



Connection of GZM80 socket



Mounting

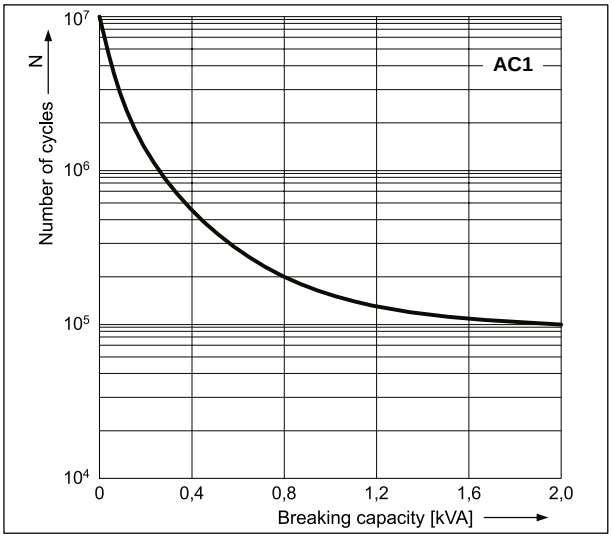
Relays **PI84 with socket GZM80** ❶ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

❶ Plug-in sockets **GZM80** may be linked with interconnection strip type **ZGGZ80**. Strip **ZGGZ80** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 8 sockets. Colours of strips: **ZGGZ80-1** grey, **ZGGZ80-2** black (see page 418).

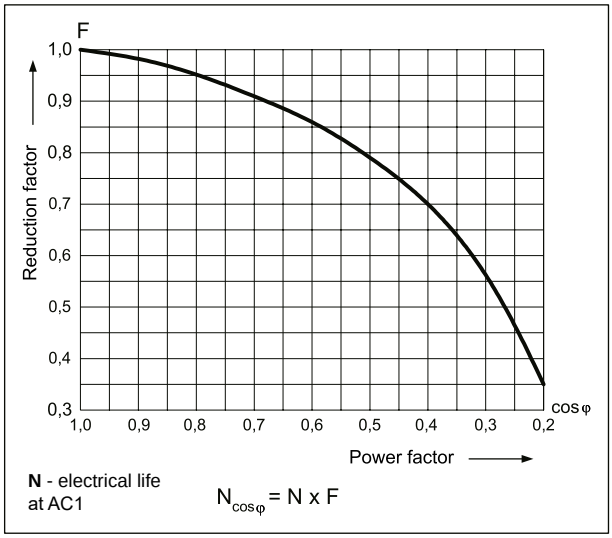
ZGGZ80

Interconnection strip ZGGZ80:
bridging of common input signals.

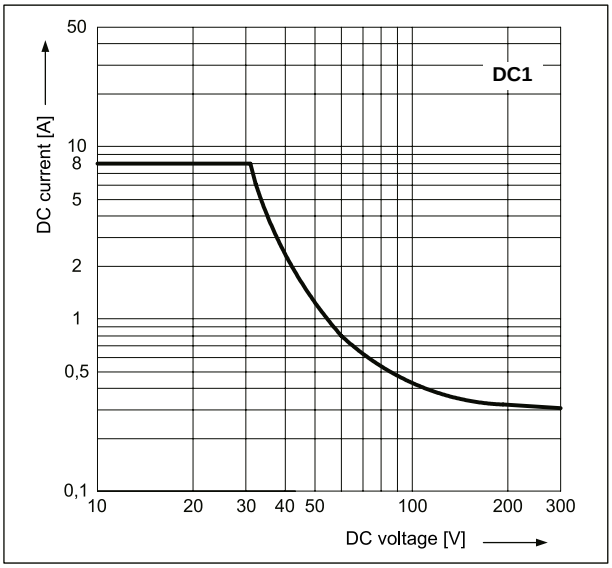
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



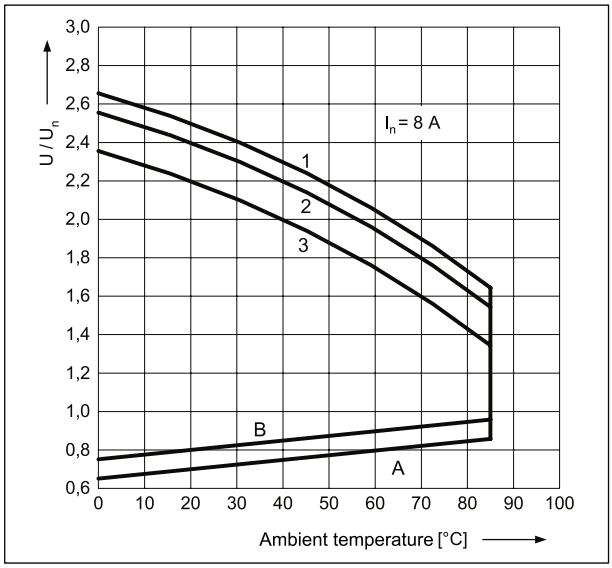
Electrical life reduction factor at AC inductive load Fig. 2



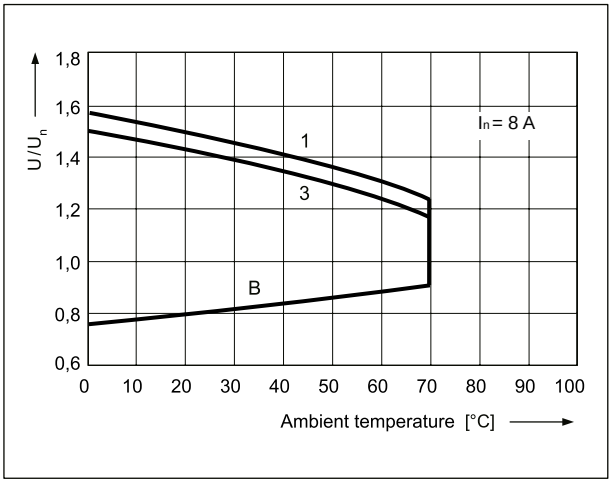
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
012DC	12	360	± 10%	8,4	30,6
024DC	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
048DC	48	5 700	± 10%	33,6	122,4
060DC	60	7 500	± 10%	42,0	153,0
110DC	110	25 200	± 10%	77,0	280,0

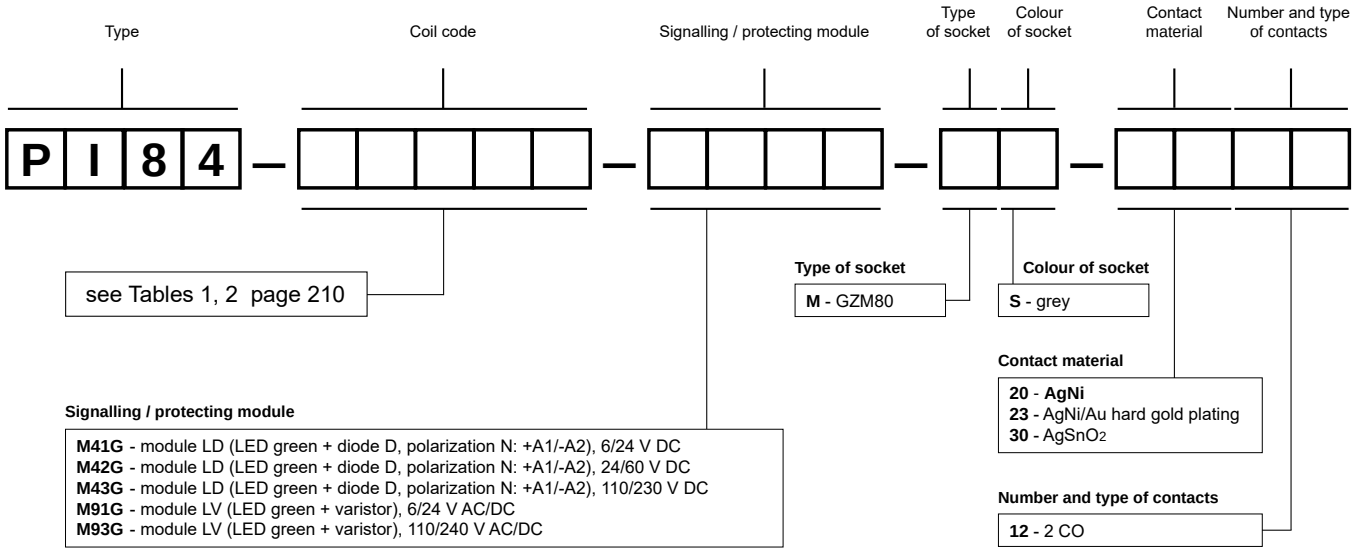
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
012AC	12	100	± 10%	9,6	13,2
024AC	**24**	**400**	**± 10%**	**19,2**	**26,4**
120AC	120	10 200	± 10%	96,0	144,0
230AC	**230**	**38 500**	**± 10%**	**184,0**	**253,0**
240AC	240	42 500	± 15%	192,0	288,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

PI84-012DC-M41G-MS-2012 interface relay **PI84** consists of: relay **RM84** (two changeover contacts, contact material AgNi, coil voltage 12 V DC), socket **GZM80** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

PI84-230AC-M93G-MS-3012 interface relay **PI84** consists of: relay **RM84** (two changeover contacts, contact material $AgSnO_2$, coil voltage 230 V AC 50/60 Hz), socket **GZM80** (grey, screw terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

RM84 + GZMB80

- Interface relay **PI84 with socket GZMB80** consists of: electromagnetic relay **RM84**, black plug-in socket **GZMB80**, signalling / protecting module **type M...**, retainer / retractor clip **GZMB80-0040** (plastic), white description plate **TR**
- 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: recognitions RM84, RoHS,

CE EAC CIK

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	8 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	550 W (single-phase motor)
	DC1	8 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		15 A $AgSnO_2$
Rated current		8 A
Max. breaking capacity	AC1	2 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 230 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	2 500 V AC
• contact clearance	1 000 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 8 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,12 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		97 x 16 x 69 mm
Weight		60 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RM84: RTII GZMB80: RT0 PN-EN 116000-3
Shock resistance		20 g
Vibration resistance	(NO/NC)	10 g / 5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

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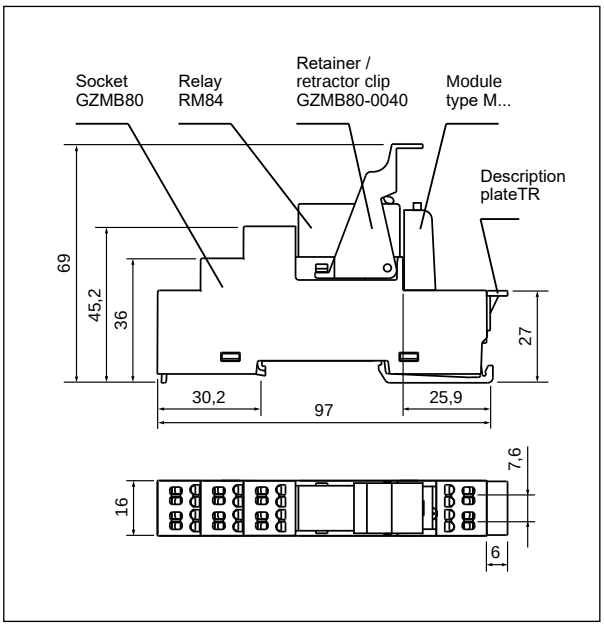
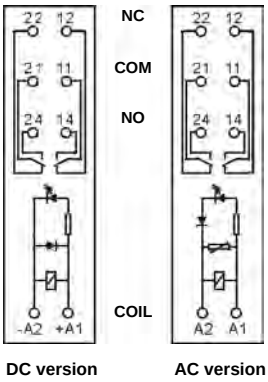
Dimensions



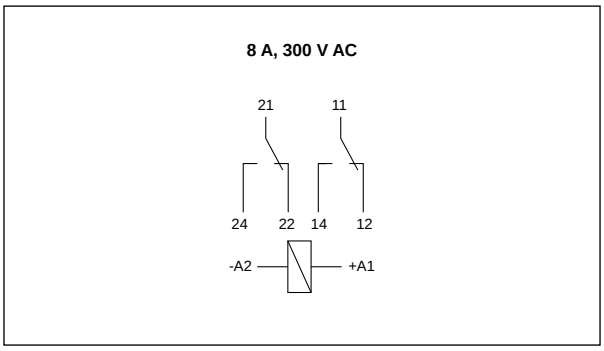
Connection diagrams
(spring terminals side view)



Mounting

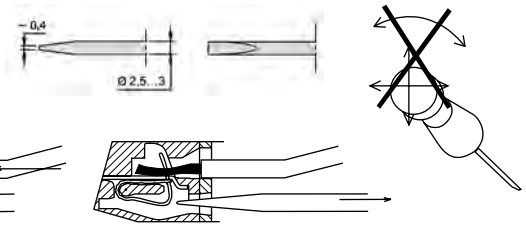
Relays **PI84 with socket GZMB80** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 0,2...1,5 mm^2 (1 x 24...16 AWG), length of the cable deinsulation: 9...11 mm.

Connection of GZMB80 socket

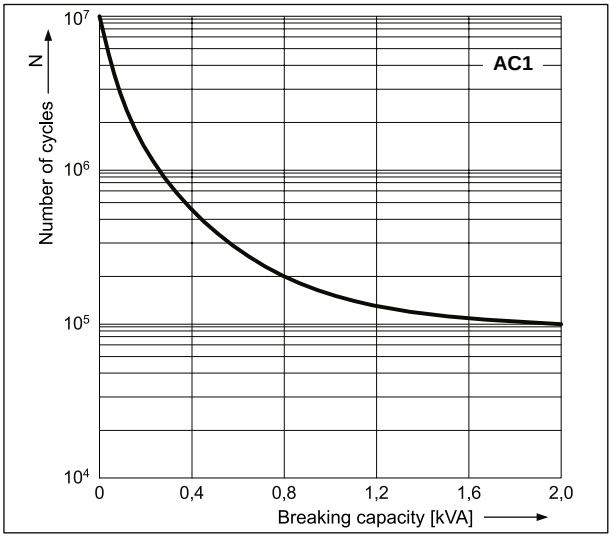


Wire connection

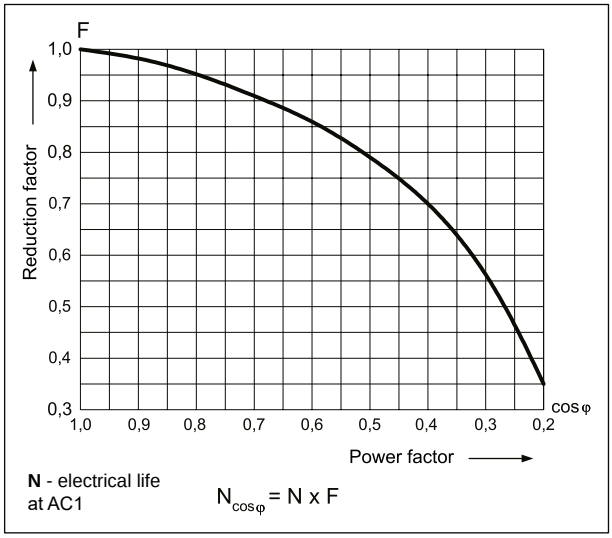
The drawings present the sequence of operations in course of inserting wires to the spring terminal, and the recommended screwdriver to be used for opening of case springs, comply with the DIN 5264 FORM „A".



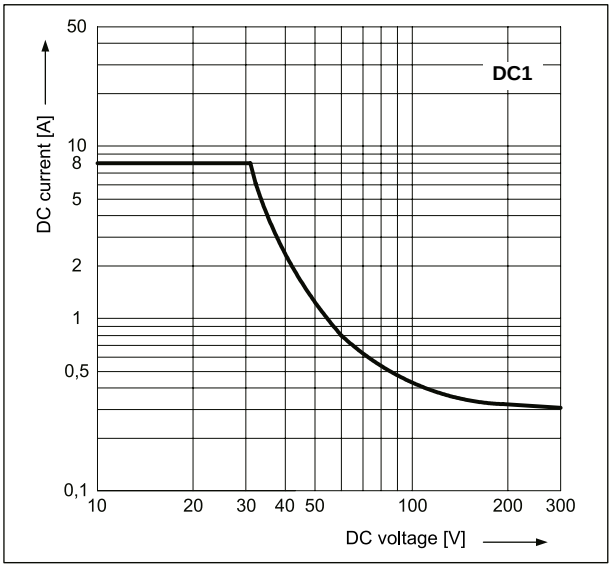
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



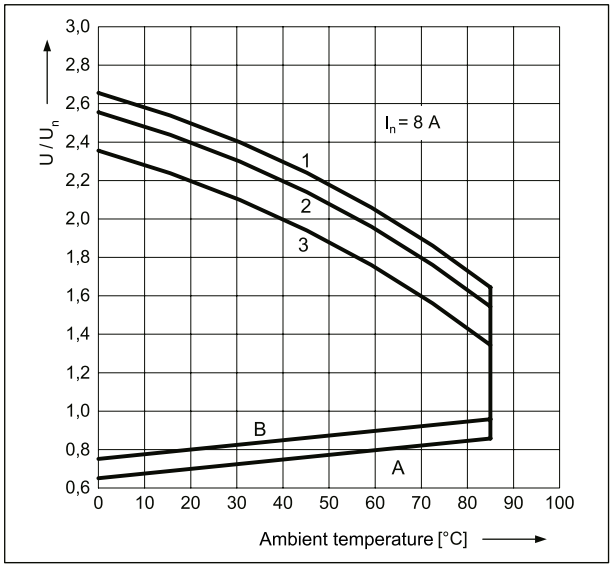
Electrical life reduction factor at AC inductive load Fig. 2



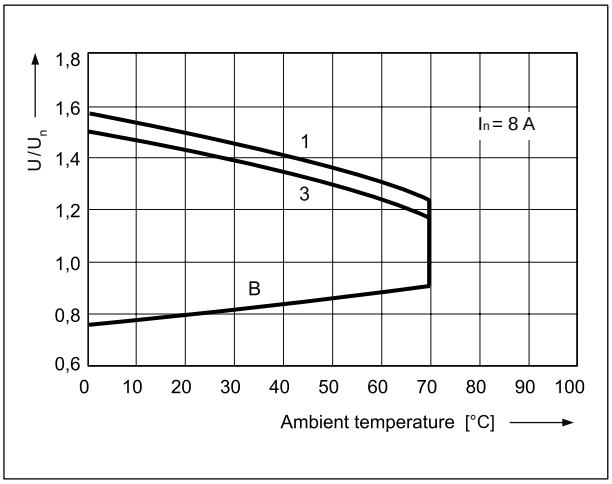
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
012DC	**12**	**360**	**± 10%**	**8,4**	**30,6**
024DC	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
110DC	110	25 200	± 10%	77,0	280,0

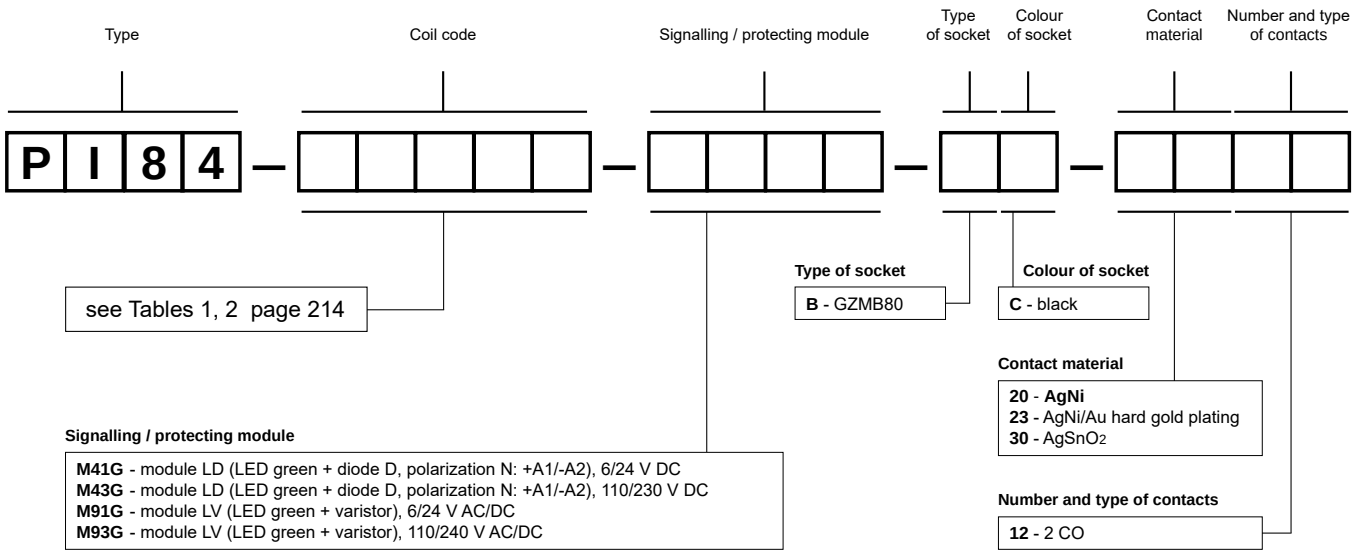
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
012AC	12	100	± 10%	9,6	13,2
024AC	**24**	**400**	**± 10%**	**19,2**	**26,4**
110AC	110	8 900	± 10%	88,0	132,0
120AC	120	10 200	± 10%	96,0	144,0
230AC	**230**	**38 500**	**± 10%**	**184,0**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

PI84-012DC-M41G-BC-2012 interface relay **PI84** consists of: relay **RM84** (two changeover contacts, contact material AgNi, coil voltage 12 V DC), socket **GZMB80** (black, spring terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZMB80-0040** (plastic), description plate **TR** (white)

PI84-230AC-M93G-BC-3012 interface relay **PI84** consists of: relay **RM84** (two changeover contacts, contact material $AgSnO_2$, coil voltage 230 V AC 50/60 Hz), socket **GZMB80** (black, spring terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZMB80-0040** (plastic), description plate **TR** (white)

RM85 + GZT80

- Interface relay **PI85 with socket GZT80** consists of: electromagnetic relay **RM85**, grey plug-in socket **GZT80**, signalling / protecting module **type M...**, retainer / retractor clip **GZT80-0040** (plastic), white description plate **GZT80-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • May be linked with interconnection strip type **ZGGZ80**
- Recognitions, certifications, directives: recognitions RM85, RoHS,

CE EAC

Contact data

Number and type of contacts		1 CO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	16 A / 250 V AC ❶
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		30 A
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life		
• resistive AC1		> 0,7 x 10^5 16 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,12 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		80 x 15,6 x 67 mm
Weight		61 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RM85: RTII GZT80: RT0 PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.
❶ Loads above 12 A require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24 - see page 216.

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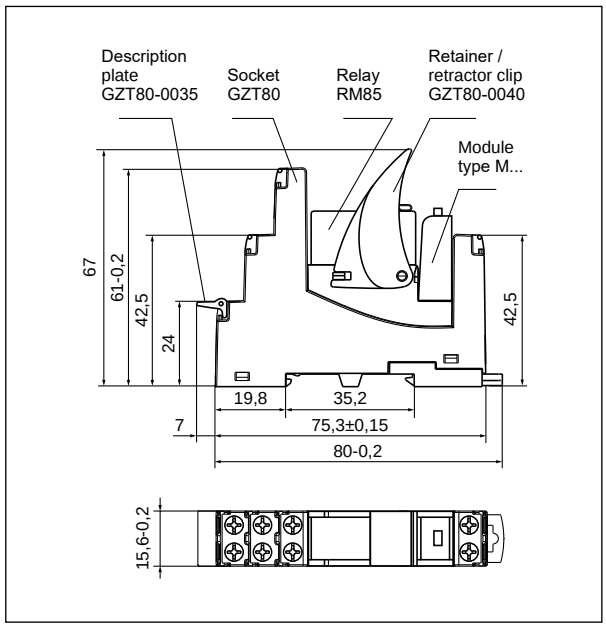
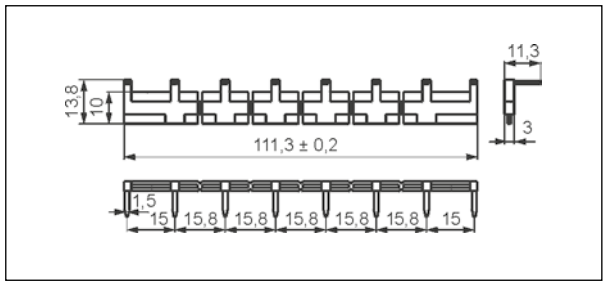
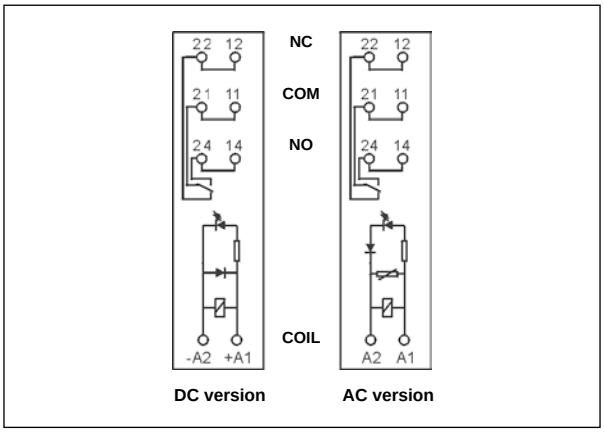
Dimensions



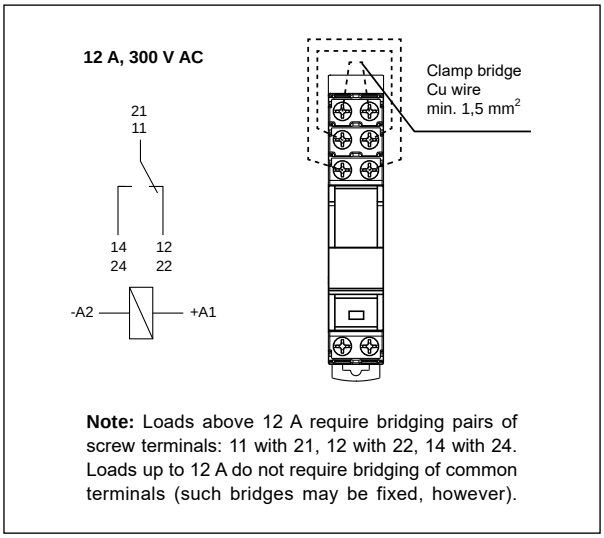


Interconnection strip type **ZGGZ80**

Connection diagrams
(screw terminals side view)



Connection of GZT80 socket



Note: Loads above 12 A require bridging pairs of screw terminals: 11 with 21, 12 with 22, 14 with 24. Loads up to 12 A do not require bridging of common terminals (such bridges may be fixed, however).

Mounting

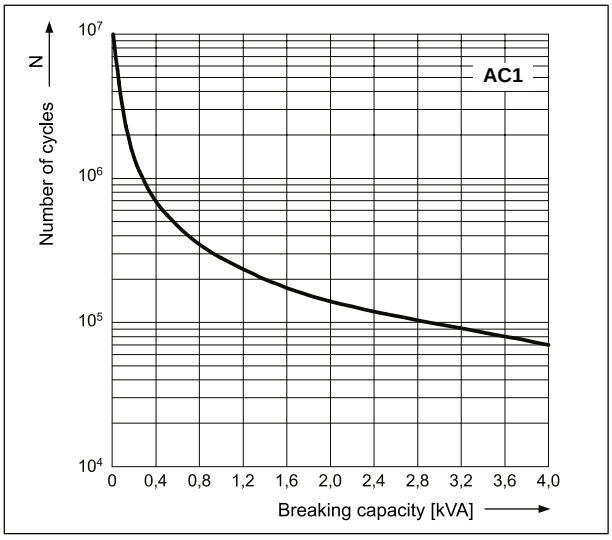
Relays **PI85 with socket GZT80** ❷ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm² (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

❷ Plug-in sockets **GZT80** may be linked with interconnection strip type **ZGGZ80**. Strip **ZGGZ80** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 8 sockets. Colours of strips: **ZGGZ80-1** grey, **ZGGZ80-2** black (see page 418).

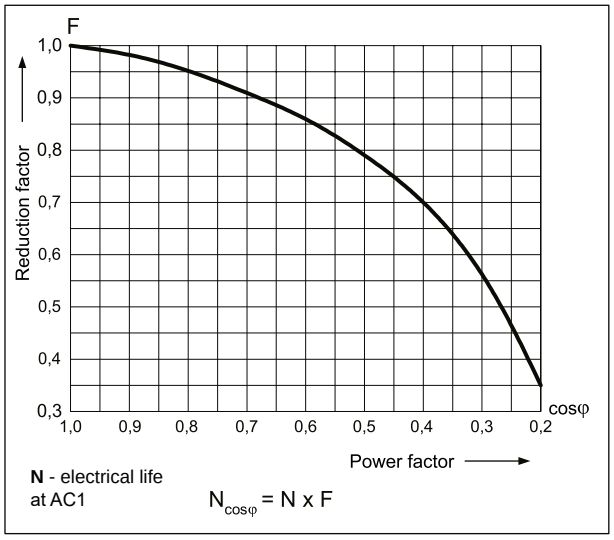
ZGGZ80

Interconnection strip ZGGZ80:
bridging of common input signals.

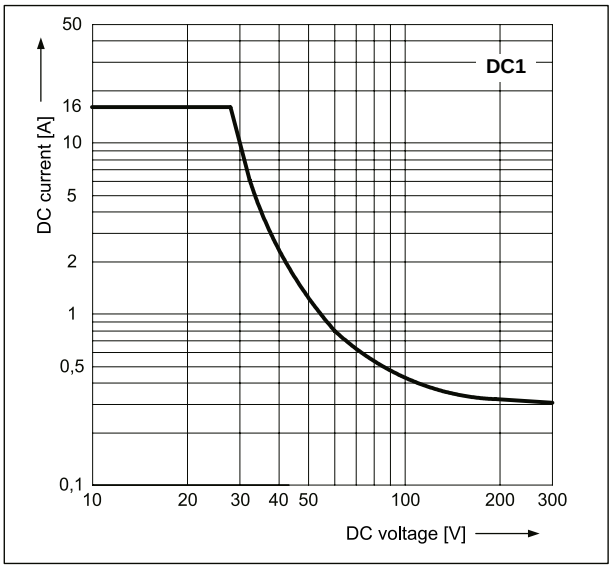
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



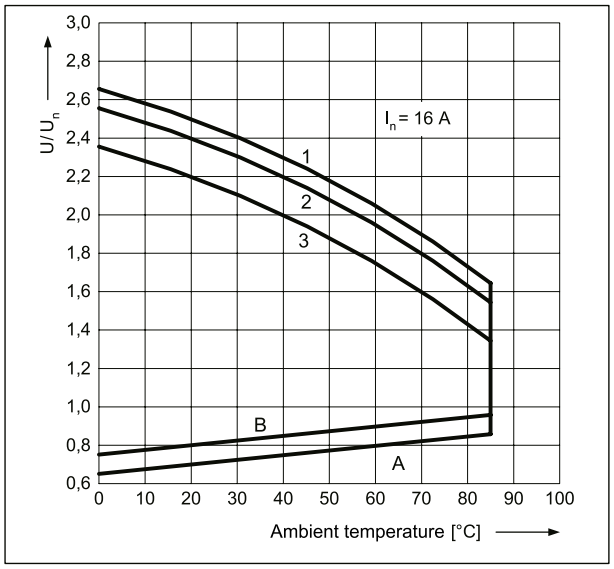
Electrical life reduction factor at AC inductive load Fig. 2



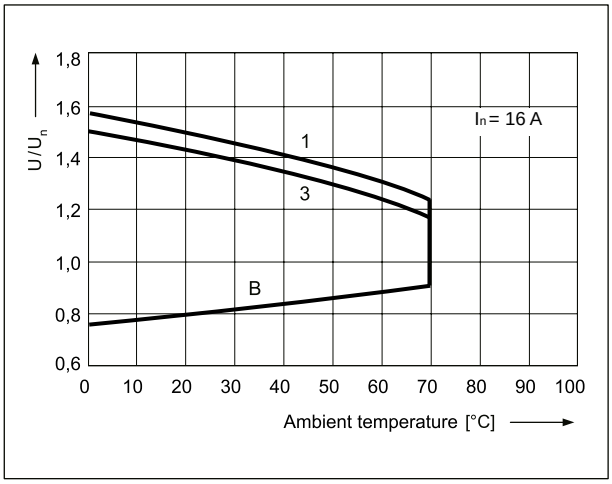
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
012DC	12	360	± 10%	8,4	30,6
024DC	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
048DC	48	5 700	± 10%	33,6	122,4
110DC	110	25 200	± 10%	77,0	280,0

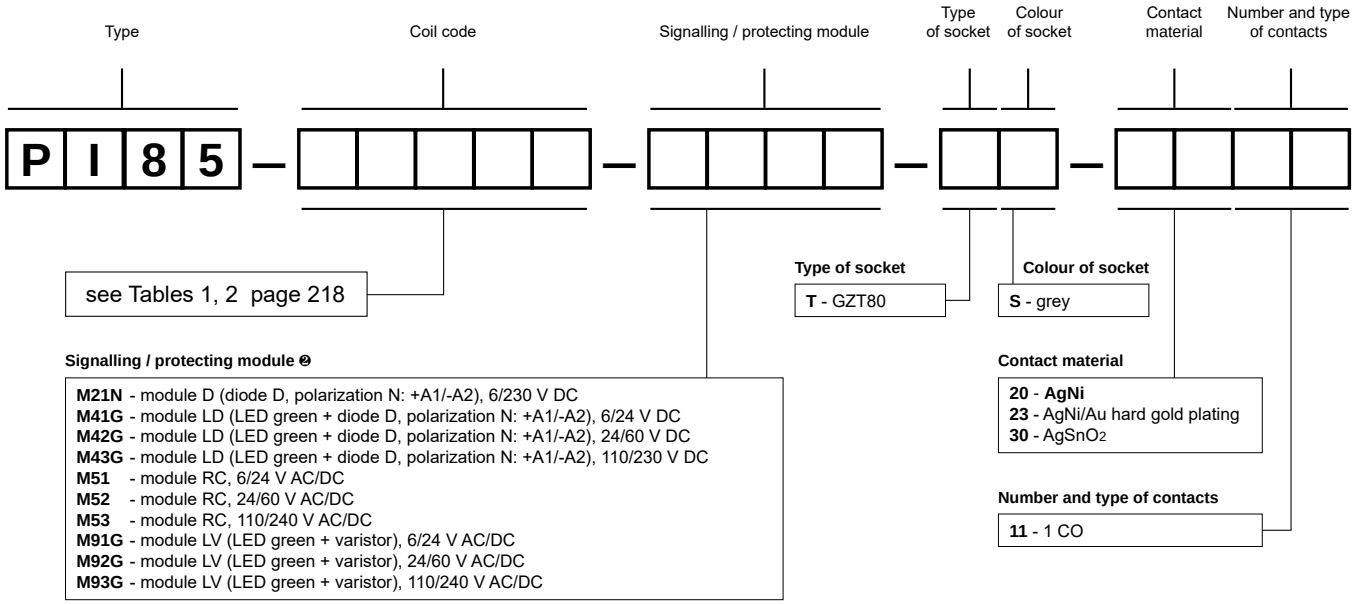
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
012AC	12	100	± 10%	9,6	13,2
024AC	**24**	**400**	**± 10%**	**19,2**	**26,4**
048AC	48	1 550	± 10%	38,4	57,6
120AC	120	10 200	± 10%	96,0	144,0
230AC	**230**	**38 500**	**± 10%**	**184,0**	**253,0**
240AC	240	42 500	± 15%	192,0	288,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



❷ Modules D, RC - only for versions with contacts AgNi

Examples of ordering codes:

PI85-012DC-M41G-TS-2011 — interface relay **PI85** consists of: relay **RM85** (one changeover contact, contact material AgNi, coil voltage 12 V DC), socket **GZT80** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

PI85-230AC-M93G-TS-3011 — interface relay **PI85** consists of: relay **RM85** (one changeover contact, contact material $AgSnO_2$, coil voltage 230 V AC 50/60 Hz), socket **GZT80** (grey, screw terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

RM85 + GZM80

- Interface relay **PI85 with socket GZM80** consists of: electromagnetic relay **RM85**, grey plug-in socket **GZM80**, signalling / protecting module **type M...**, retainer / retractor clip **GZT80-0040** (plastic), white description plate **GZT80-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • May be linked with interconnection strip type **ZGGZ80**
- Recognitions, certifications, directives: recognitions RM85, RoHS,

Contact data

Number and type of contacts		1 CO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	16 A / 250 V AC ❶
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		30 A
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 240 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life		
• resistive AC1		> 0,7 x 10^5 16 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,12 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		81,6 x 15,9 x 67 mm
Weight		60 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RM85: RTII GZM80: RT0 PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.
❶ Loads above 12 A require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24 - see page 220.

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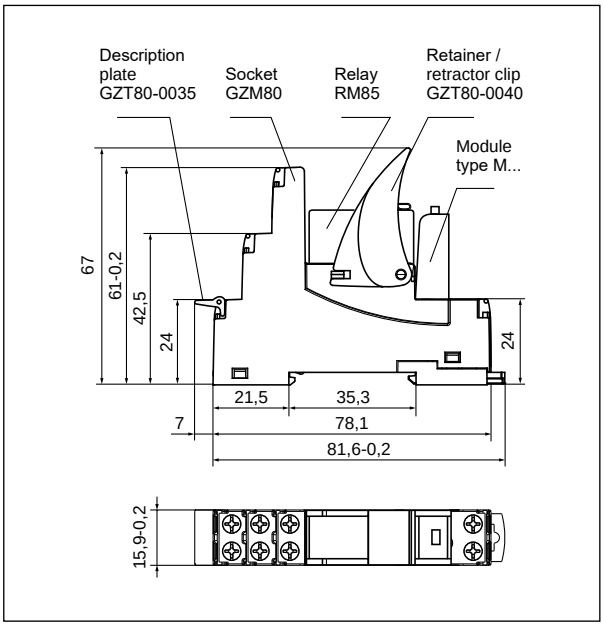
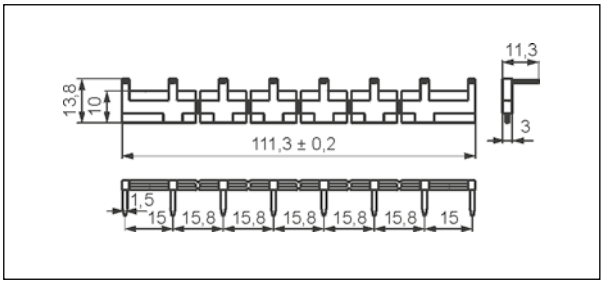
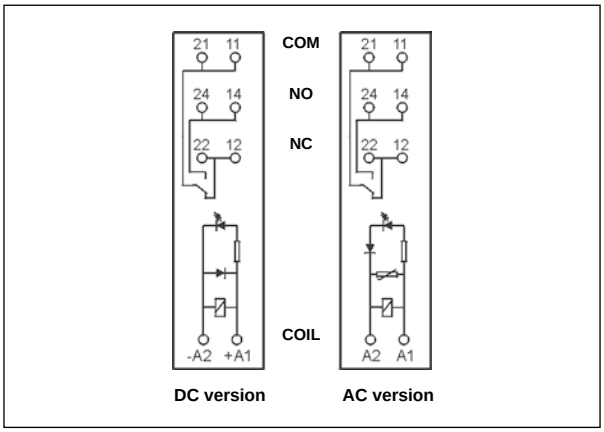
Dimensions



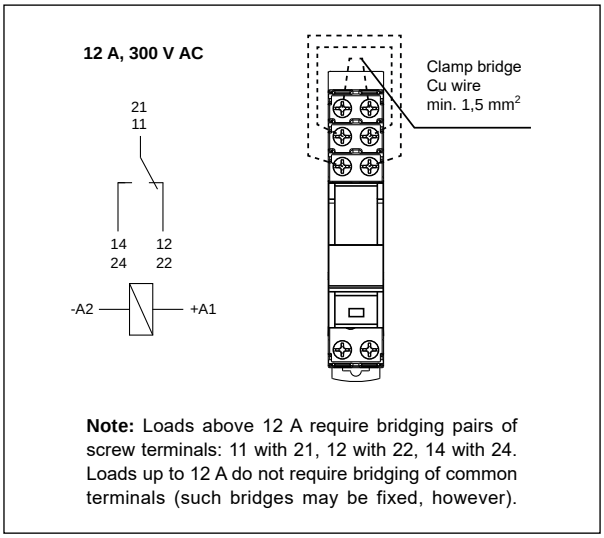


Interconnection strip type **ZGGZ80**

Connection diagrams
(screw terminals side view)



Connection of GZM80 socket



Note: Loads above 12 A require bridging pairs of screw terminals: 11 with 21, 12 with 22, 14 with 24. Loads up to 12 A do not require bridging of common terminals (such bridges may be fixed, however).

Mounting

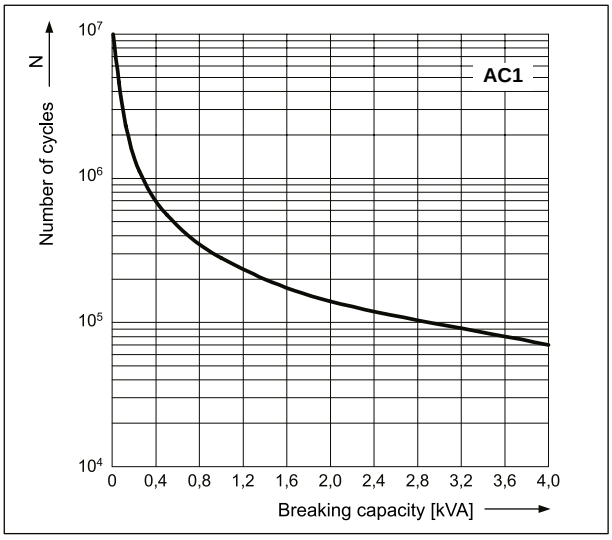
Relays **PI85 with socket GZM80** ❷ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm² (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

❷ Plug-in sockets **GZM80** may be linked with interconnection strip type **ZGGZ80**. Strip **ZGGZ80** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 8 sockets. Colours of strips: **ZGGZ80-1** grey, **ZGGZ80-2** black (see page 418).

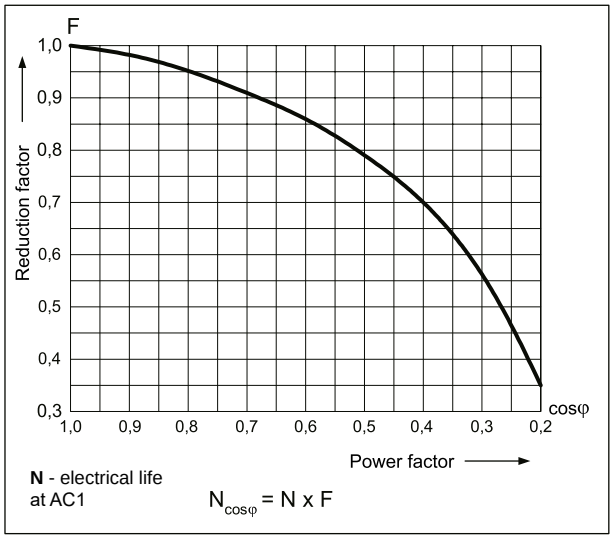
ZGGZ80

Interconnection strip ZGGZ80:
bridging of common input signals.

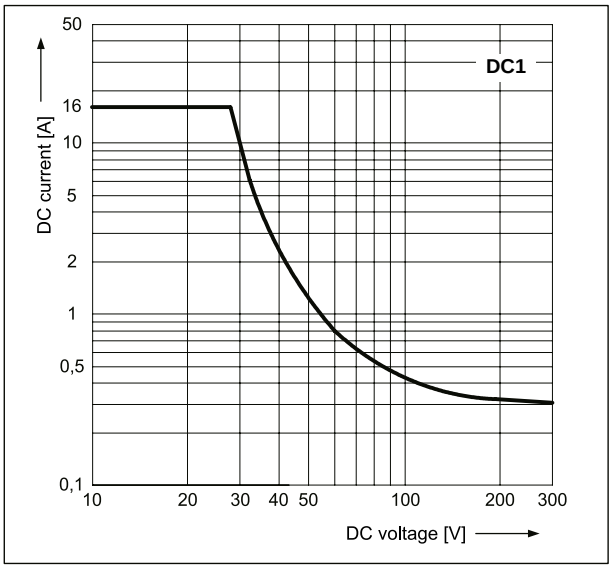
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



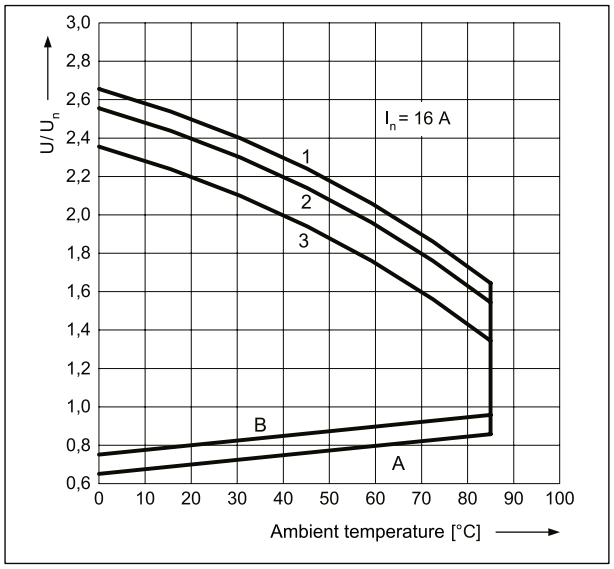
Electrical life reduction factor at AC inductive load Fig. 2



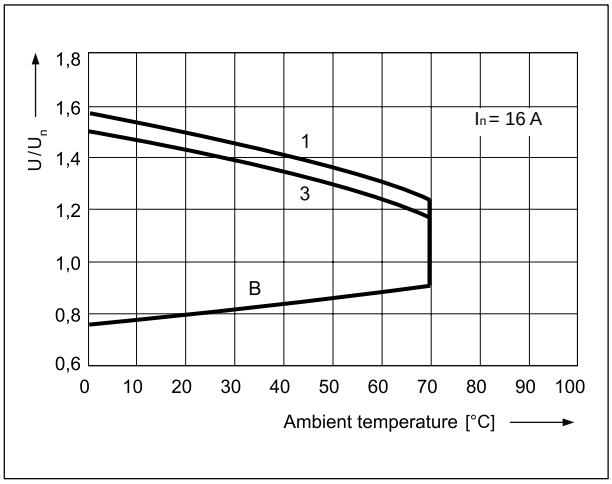
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
012DC	12	360	± 10%	8,4	30,6
024DC	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
048DC	48	5 700	± 10%	33,6	122,4
060DC	60	7 500	± 10%	42,0	153,0
110DC	110	25 200	± 10%	77,0	280,0

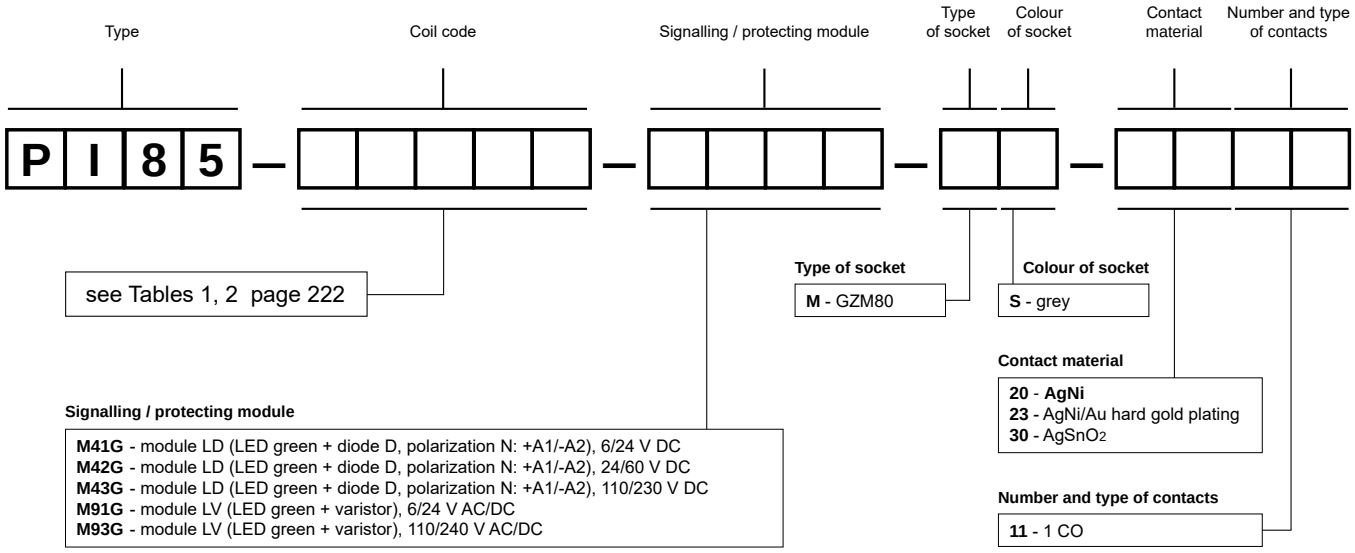
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
012AC	12	100	± 10%	9,6	13,2
024AC	**24**	**400**	**± 10%**	**19,2**	**26,4**
120AC	120	10 200	± 10%	96,0	144,0
230AC	**230**	**38 500**	**± 10%**	**184,0**	**253,0**
240AC	240	42 500	± 15%	192,0	288,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

PI85-012DC-M41G-MS-2011 — interface relay **PI85** consists of: relay **RM85** (one changeover contact, contact material AgNi, coil voltage 12 V DC), socket **GZM80** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

PI85-230AC-M93G-MS-3011 — interface relay **PI85** consists of: relay **RM85** (one changeover contact, contact material $AgSnO_2$, coil voltage 230 V AC 50/60 Hz), socket **GZM80** (grey, screw terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

RM85 + GZMB80

- Interface relay **PI85 with socket GZMB80** consists of: electromagnetic relay **RM85**, black plug-in socket **GZMB80**, signalling / protecting module **type M...**, retainer / retractor clip **GZMB80-0040** (plastic), white description plate **TR**
- 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: recognitions RM85, RoHS,

Contact data

Number and type of contacts		1 CO
Contact material		**AgNi**, AgNi/Au hard gold plating, $AgSnO_2$
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V AgNi, 5 V AgNi/Au hard gold plating, 10 V $AgSnO_2$
Rated load (capacity)	AC1	10 A / 250 V AC; 16 A / 250 V AC ❶
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA AgNi, 2 mA AgNi/Au hard gold plating, 10 mA $AgSnO_2$
Max. inrush current		30 A $AgSnO_2$
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		0,3 W AgNi, 0,05 W AgNi/Au hard gold plating, 1 W $AgSnO_2$
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 230 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,15 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1, 2 and Fig. 4, 5
Rated power consumption	AC	0,75 VA
	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	2 500 V AC
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		7 ms / 3 ms
Electrical life		
• resistive AC1		> 0,7 x 10^5 16 A, 250 V AC
• cosφ		see Fig. 2
• DC L/R=40 ms		> 10^5 0,12 A, 220 V DC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		97 x 16 x 69 mm
Weight		60 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+70 °C DC: -40...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RM85: RTII GZMB80: RT0 PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.
❶ Loads above 10 A require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24 - see page 224.

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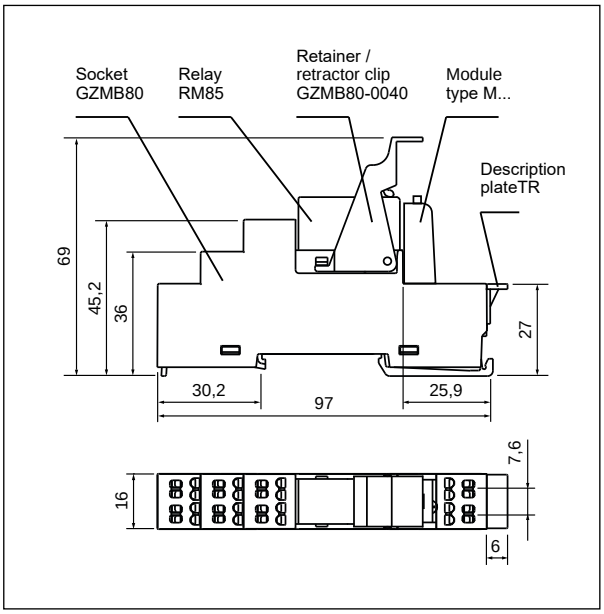
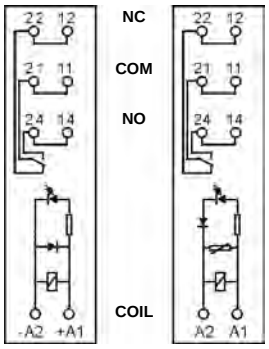
Dimensions



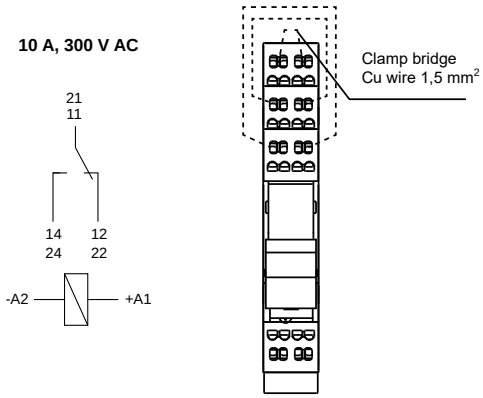
Mounting

Relays **PI85 with socket GZMB80** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 0,2...1,5 mm² (1 x 24...16 AWG), length of the cable deinsulation: 9...11 mm.

Connection diagrams
(spring terminals side view)



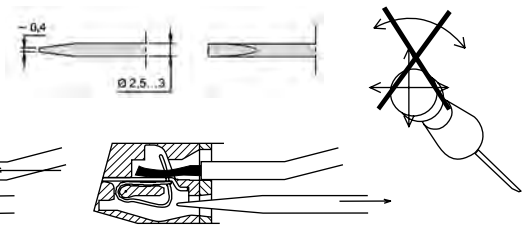
Connection of GZMB80 socket



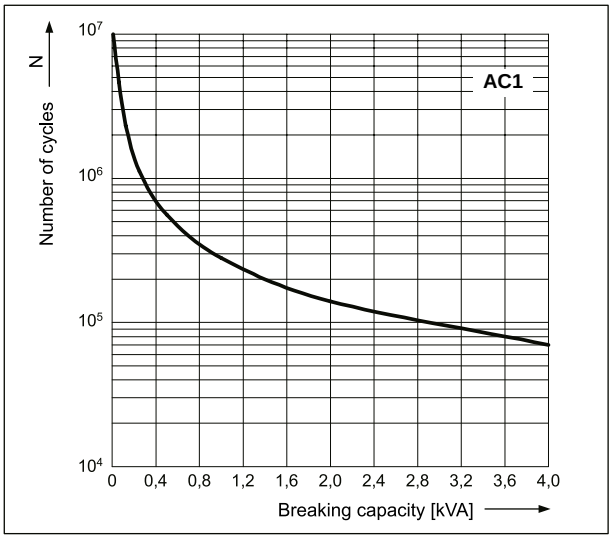
Note: Loads above 10 A require bridging pairs of spring terminals: 11 with 21, 12 with 22, 14 with 24. Loads up to 10 A do not require bridging of common terminals (such bridges may be fixed, however).

Wire connection

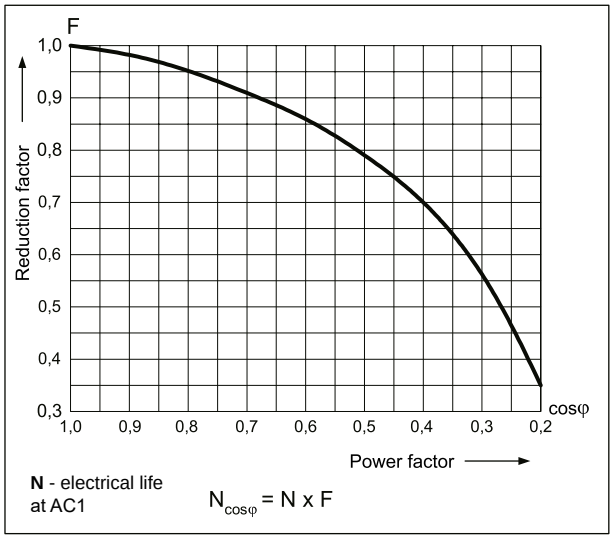
The drawings present the sequence of operations in course of inserting wires to the spring terminal, and the recommended screwdriver to be used for opening of case springs, comply with the DIN 5264 FORM „A".



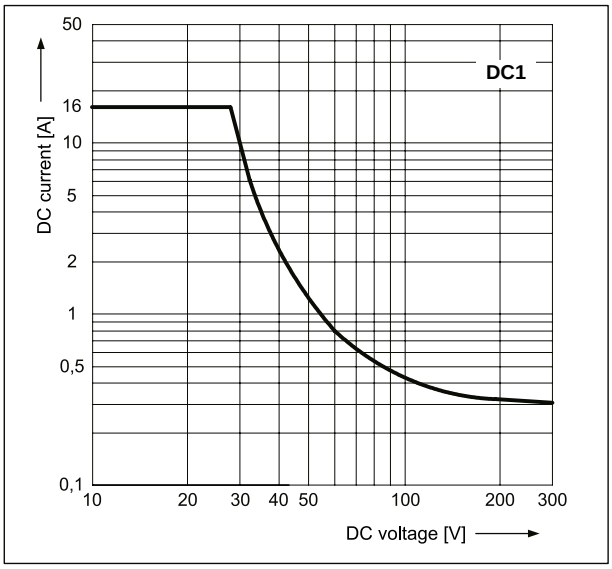
Electrical life at AC resistive load. Switching frequency: 600 cycles/hour Fig. 1



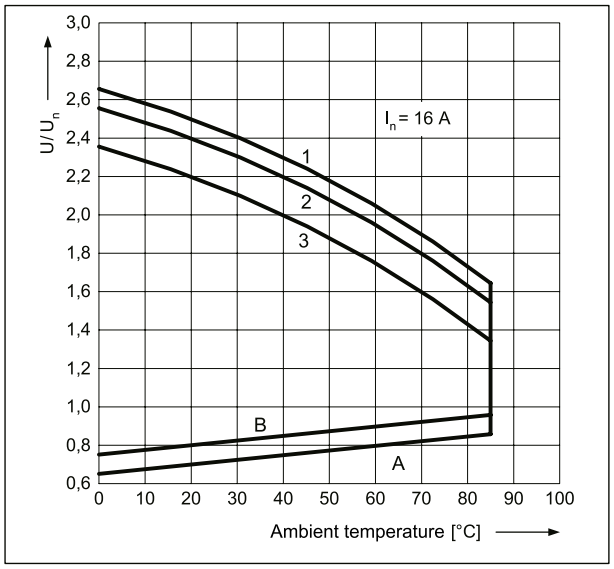
Electrical life reduction factor at AC inductive load Fig. 2



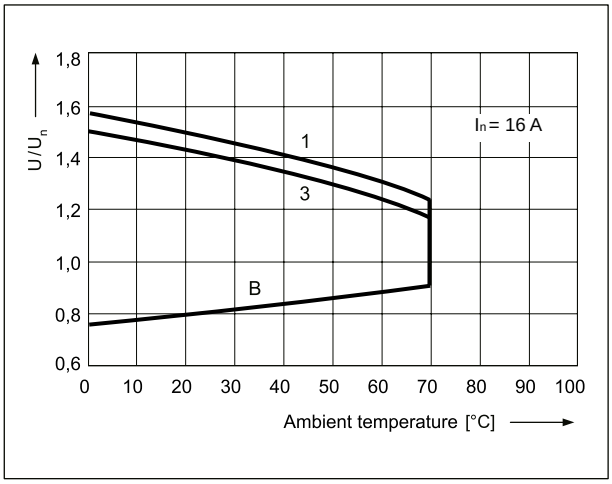
Max. DC resistive load breaking capacity Fig. 3



Coil operating range - DC Fig. 4



Coil operating range - AC 50 Hz Fig. 5



Description of Fig. 4 and 5

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
012DC	**12**	**360**	**± 10%**	**8,4**	**30,6**
024DC	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
110DC	110	25 200	± 10%	77,0	280,0

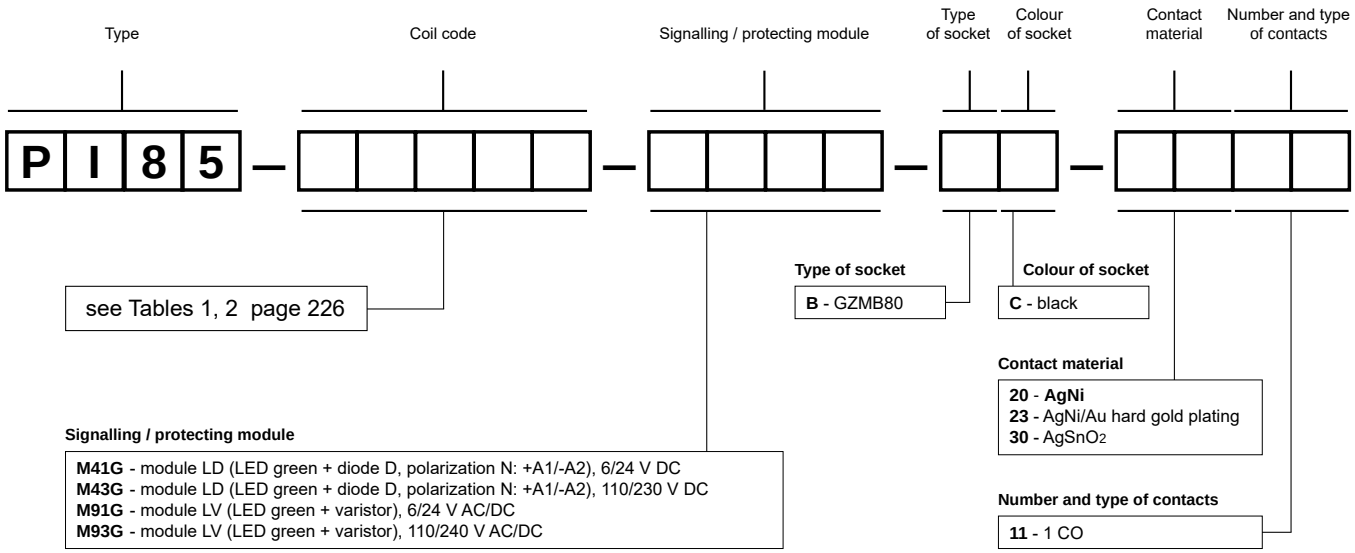
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC 50 Hz	
				min. (at 20 °C)	max. (at 20 °C)
012AC	12	100	± 10%	9,6	13,2
024AC	**24**	**400**	**± 10%**	**19,2**	**26,4**
110AC	110	8 900	± 10%	88,0	132,0
120AC	120	10 200	± 10%	96,0	144,0
230AC	**230**	**38 500**	**± 10%**	**184,0**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

PI85-012DC-M41G-BC-2011 — interface relay **PI85** consists of: relay **RM85** (one changeover contact, contact material AgNi, coil voltage 12 V DC), socket **GZMB80** (black, spring terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZMB80-0040** (plastic), description plate **TR** (white)

PI85-230AC-M93G-BC-3011 — interface relay **PI85** consists of: relay **RM85** (one changeover contact, contact material $AgSnO_2$, coil voltage 230 V AC 50/60 Hz), socket **GZMB80** (black, spring terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZMB80-0040** (plastic), description plate **TR** (white)

RM85 inrush + GZT80

NEW

- Interface relay **PI85 inrush with socket GZT80** consists of: electromagnetic relay **RM85 inrush**, grey plug-in socket **GZT80**, signalling / protecting module **type M...**, retainer / retractor clip **GZT80-0040** (plastic), white description plate **GZT80-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw • May be linked with interconnection strip type **ZGGZ80**
- **Resistance to inrush current 80 A (20 ms)** • Recognitions, certifications, directives: recognitions RM85 inrush, RoHS, CE EAC

Contact data

Number and type of contacts		1 NO
Contact material		**$AgSnO_2$**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		10 V
Rated load (capacity)	AC1	16 A / 250 V AC ❶
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	750 W (single-phase motor)
	DC1	16 A / 24 V DC (see Fig. 2)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		10 mA
Max. inrush current		80 A 20 ms
Rated current		16 A
Max. breaking capacity	AC1	4 000 VA
Min. breaking capacity		1 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Coil data

Rated voltage	DC	12 ... 110 V
Must release voltage		DC: ≥ 0,1 U_n
Operating range of supply voltage		see Table 1 and Fig. 3
Rated power consumption	DC	0,4 ... 0,48 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	5 000 V AC type of insulation: reinforced
• contact clearance	1 000 V AC type of clearance: micro-disconnection
Contact - coil distance	
• clearance	≥ 10 mm
• creepage	≥ 10 mm

General data

Operating / release time (typical values)		8 ms / 3 ms
Electrical life		
• resistive AC1	600 cycles/hour	> 10^5 16 A, 250 V AC
• cosφ		see Fig. 1
• resistive DC1	600 cycles/hour	> 10^5 16 A, 24 V DC
• inductive AC3, I = 3,5 A		> 2,5 x 10^5
• at incandescent lamp load, 1000 W		> 0,9 x 10^5
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		80 x 15,6 x 67 mm
Weight		61 g
Ambient temperature	• storage	-40...+85 °C
	• operating	-40...+85 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RM85 inrush: RTII GZT80: RT0 PN-EN 116000-3
Shock resistance		30 g
Vibration resistance		10 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.
❶ Loads above 12 A require bridging pairs of terminals: 11 with 21, 14 with 24 - see page 228.

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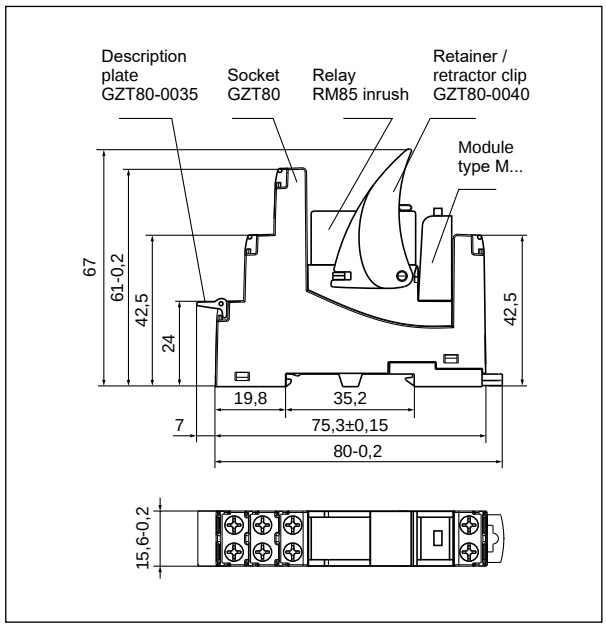
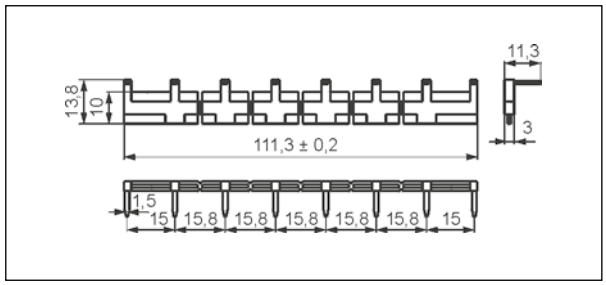
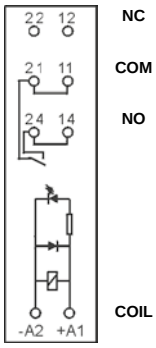
Dimensions





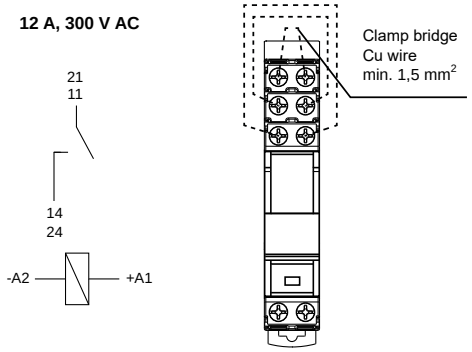
Interconnection strip type **ZGGZ80**

Connection diagrams
(screw terminals side view)



DC version

Connection of GZT80 socket



Note: Loads above 12 A require bridging pairs of screw terminals: 11 with 21, 14 with 24. Loads up to 12 A do not require bridging of common terminals (such bridges may be fixed, however).

Mounting

Relays **PI85 inrush with socket GZT80** ❷ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with one M3 screw. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm² (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

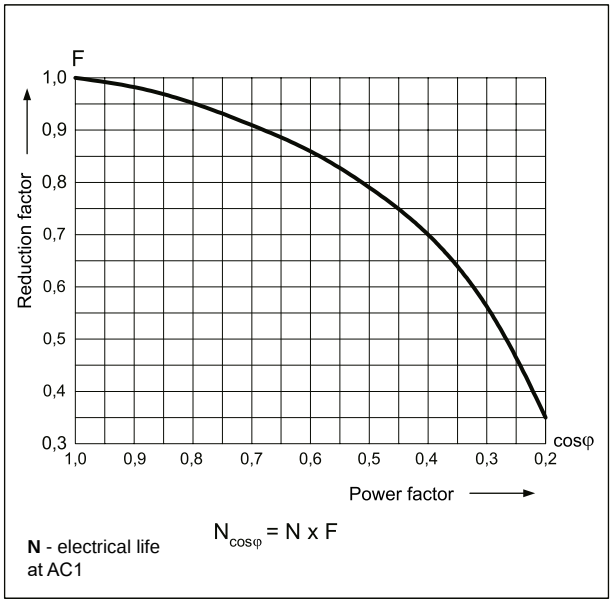
❷ Plug-in sockets **GZT80** may be linked with interconnection strip type **ZGGZ80**. Strip **ZGGZ80** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 8 sockets. Colours of strips: **ZGGZ80-1** grey, **ZGGZ80-2** black (see page 418).

ZGGZ80

Interconnection strip ZGGZ80:
bridging of common input signals.

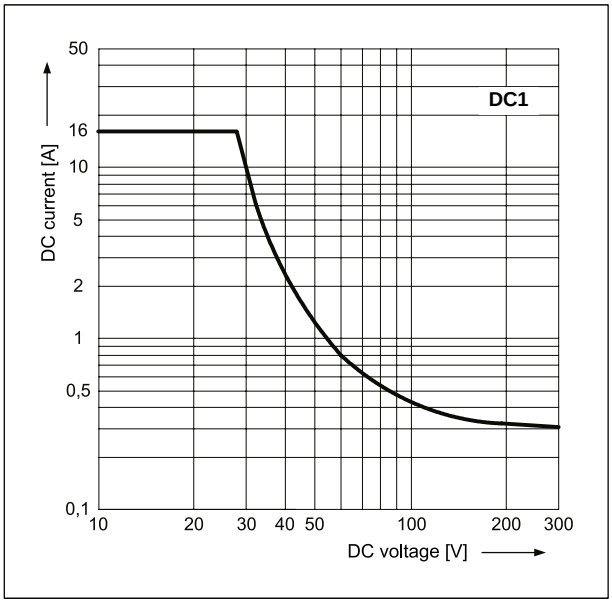
Electrical life reduction factor at AC inductive load

Fig. 1



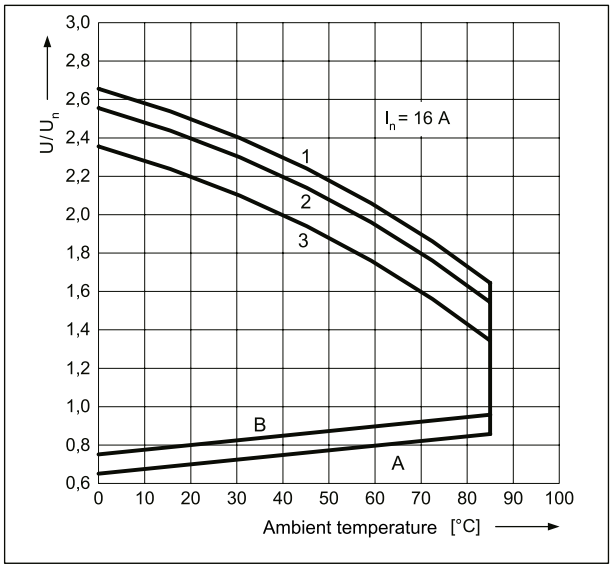
Max. DC resistive load breaking capacity

Fig. 2



Coil operating range - DC

Fig. 3



Description of Fig. 3

A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load
2 - 50% of rated load
3 - rated load

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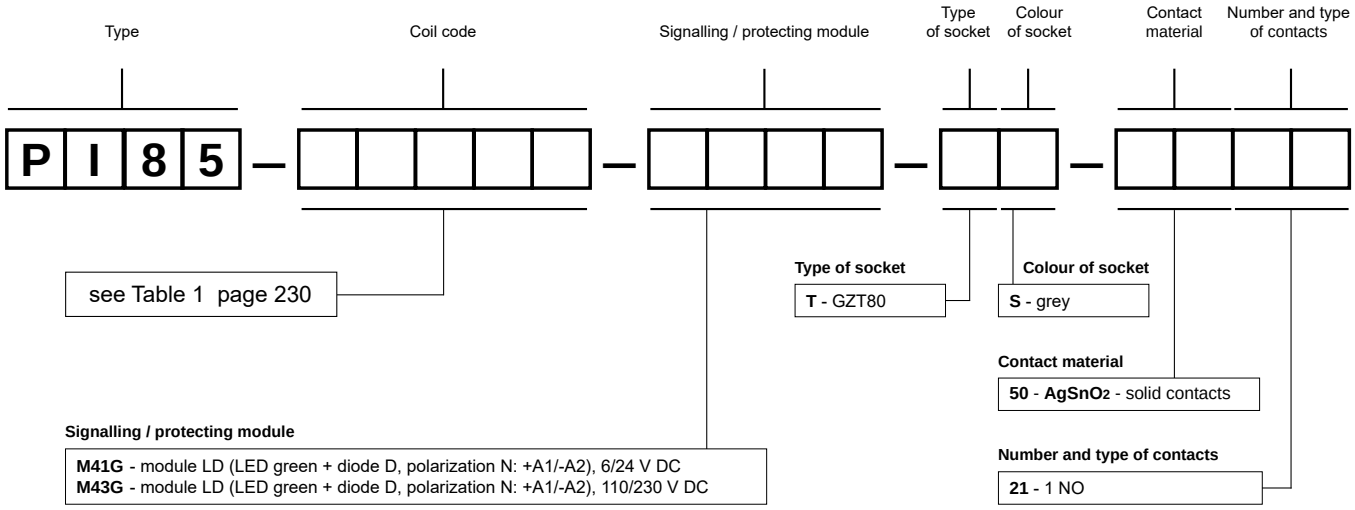
Coil data - DC voltage version Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 20 °C)
012DC	12	360	± 10%	8,4	30,6
024DC	**24**	**1 440**	**± 10%**	**16,8**	**61,2**
110DC	110	25 200	± 10%	77,0	280,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Example of ordering code:

PI85-012DC-M41G-TS-5021

interface relay **PI85 inrush** consists of: relay **RM85 inrush** (one normally open contact, contact material $AgSnO_2$ - solid contacts, coil voltage 12 V DC), socket **GZT80** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT80-0040** (plastic), description plate **GZT80-0035** (white)

R2N + GZM2

- Interface relay **PIR2 with socket GZM2** consists of: electromagnetic relay **R2N**, grey plug-in socket **GZM2**, signalling / protecting module **type M...**, retainer / retractor clip **GZT4-0040** (plastic), white description plate **GZT4-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • May be linked with interconnection strip type **ZGGZ4**
- Recognitions, certifications, directives: recognitions R2N, RoHS,

CE EAC

Contact data

Number and type of contacts		2 CO
Contact material		**AgNi**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V
Rated load (capacity)	AC1	12 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor)
	DC1	12 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA
Max. inrush current		24 A
Rated current		12 A
Max. breaking capacity	AC1	3 000 VA
Min. breaking capacity		0,3 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 230 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1,2
Rated power consumption	AC	50 Hz: 1,6 VA 60 Hz: 1,3 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3
Dielectric strength	
• between coil and contacts	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 2,5 mm
• creepage	≥ 4 mm

General data

Operating / release time (typical values)		AC: 10 ms / 8 ms DC: 13 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 12 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		75 x 27 x 82 mm
Weight		97 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		R2: RTI GZM2: RT0 PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

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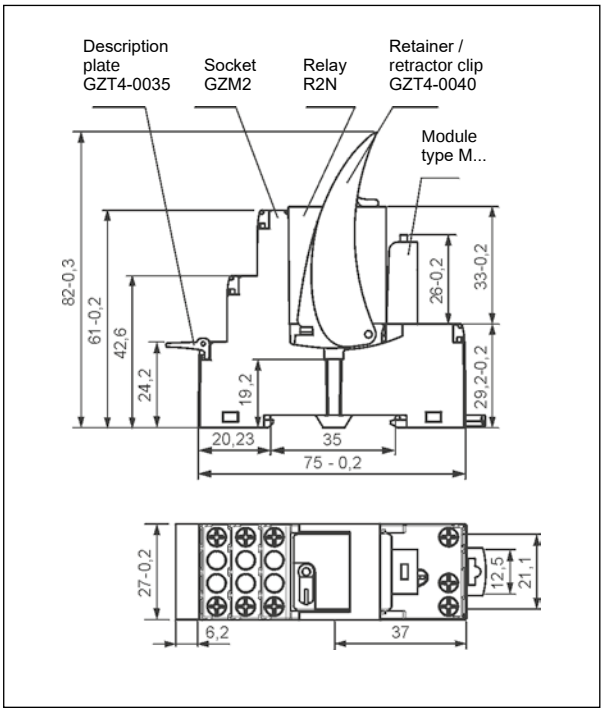
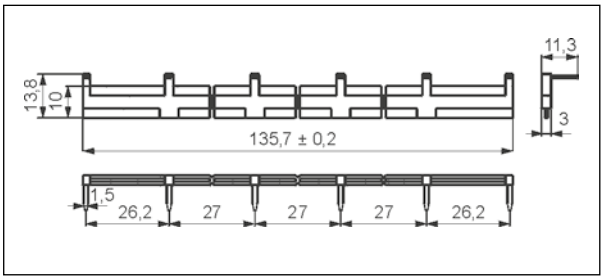
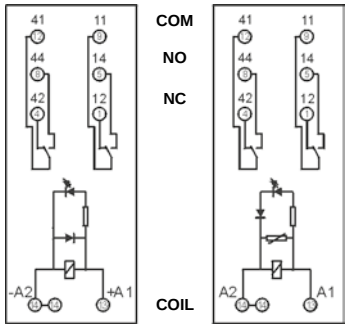
Dimensions





Interconnection strip type **ZGGZ4**

Connection diagrams
(screw terminals side view)



Mounting

Relays **PIR2 with socket GZM2** ❶ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

❶ Plug-in sockets **GZM2** may be linked with interconnection strip type **ZGGZ4**. Strip **ZGGZ4** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 6 sockets. Colours of strips: **ZGGZ4-1** grey, **ZGGZ4-2** black (see page 419).

ZGGZ4

Interconnection strip ZGGZ4:
bridging of common input signals.

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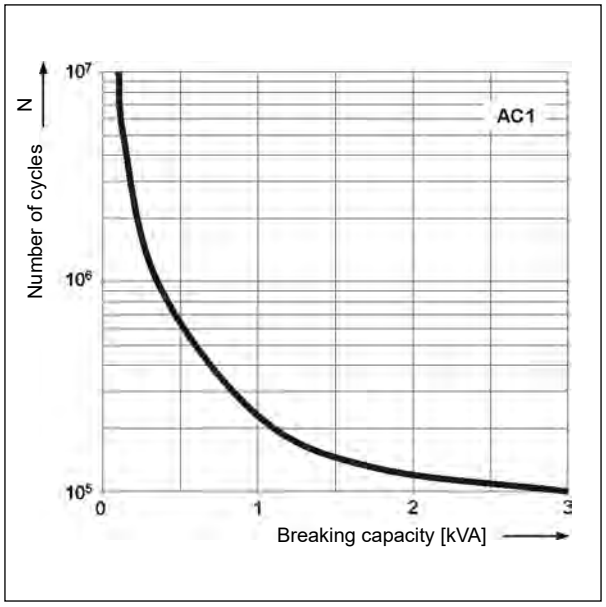
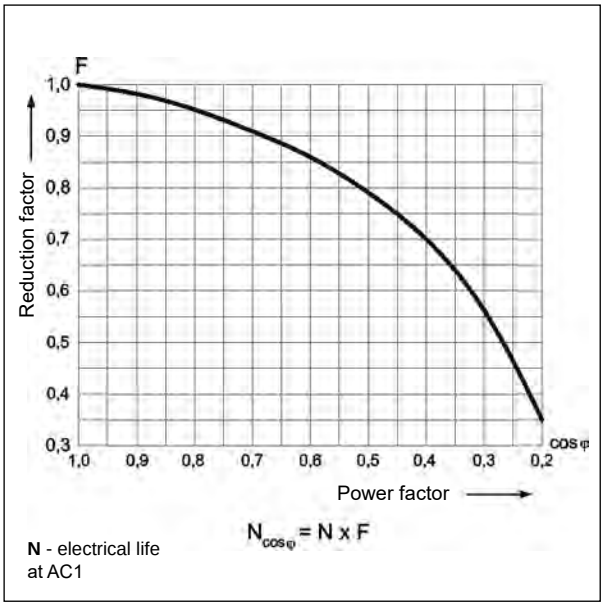
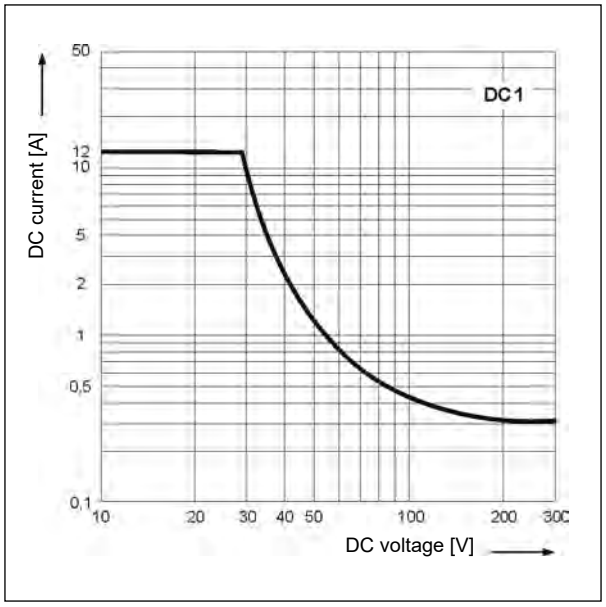
Electrical life at AC resistive load. Switching frequency: 1 200 cycles/hour Fig. 1



Electrical life reduction factor at AC inductive load Fig. 2



Max. DC resistive load breaking capacity Fig. 3



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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
012DC	12	160	± 10%	9,6	13,2
024DC	**24**	**640**	**± 10%**	**19,2**	**26,4**
048DC	48	2 600	± 10%	38,4	52,8
110DC	110	13 600	± 10%	88,0	121,0

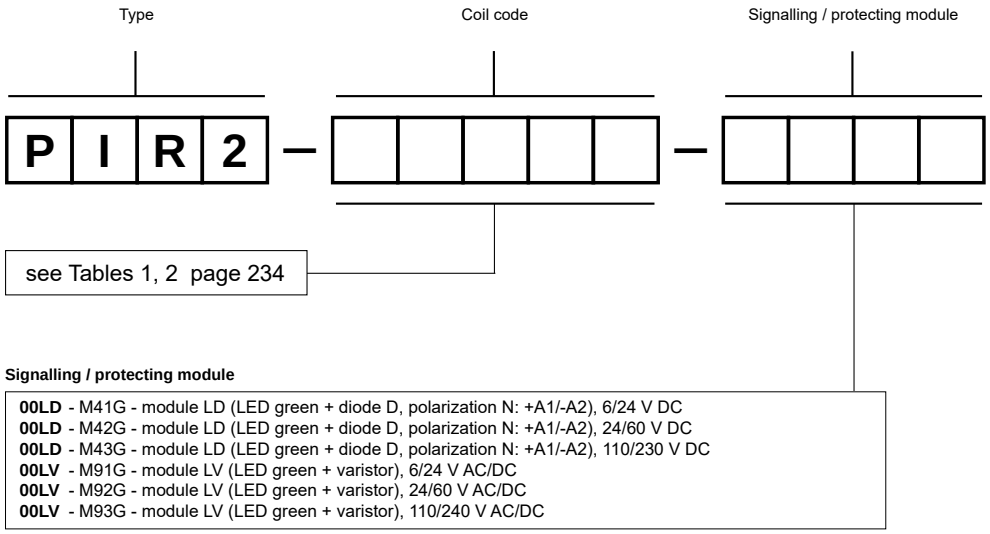
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
012AC	12	39,5	± 10%	9,6	13,2
024AC	**24**	**158**	**± 10%**	**19,2**	**26,4**
048AC	48	640	± 10%	38,4	52,8
120AC	120	3 770	± 10%	96,0	132,0
230AC	**230**	**16 100**	**± 10%**	**184,0**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

PIR2-012DC-00LD — interface relay **PIR2** consists of: relay **R2N** (two changeover contacts, contact material AgNi, coil voltage 12 V DC), socket **GZM2** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT4-0040** (plastic), description plate **GZT4-0035** (white)

PIR2-230AC-00LV — interface relay **PIR2** consists of: relay **R2N** (two changeover contacts, contact material AgNi, coil voltage 230 V AC 50/60 Hz), socket **GZM2** (grey, screw terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZT4-0040** (plastic), description plate **GZT4-0035** (white)

R3N + GZM3

- Interface relay **PIR3 with socket GZM3** consists of: electromagnetic relay **R3N**, grey plug-in socket **GZM3**, signalling / protecting module **type M...**, retainer / retractor clip **GZT4-0040** (plastic), white description plate **GZT4-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • May be linked with interconnection strip type **ZGGZ4**
- Recognitions, certifications, directives: recognitions R3N, RoHS,

CE EAC

Contact data

Number and type of contacts		3 CO
Contact material		**AgNi**
Rated / max. switching voltage	AC	250 V / 440 V
Min. switching voltage		5 V
Rated load (capacity)	AC1	10 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor)
	DC1	10 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA
Max. inrush current		20 A
Rated current		10 A
Max. breaking capacity	AC1	2 500 VA
Min. breaking capacity		0,3 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 230 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1,2
Rated power consumption	AC	50 Hz: 1,6 VA 60 Hz: 1,3 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	2
Dielectric strength	
• between coil and contacts	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 500 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 2,5 mm
• creepage	≥ 4 mm

General data

Operating / release time (typical values)		AC: 10 ms / 8 ms DC: 13 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 10 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		75 x 27 x 82 mm
Weight		107 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		R3: RTI GZM3: RT0 PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

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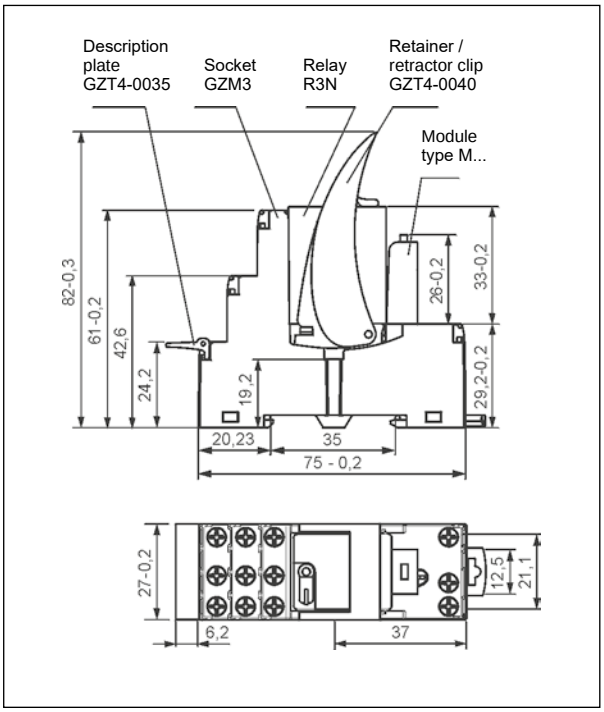
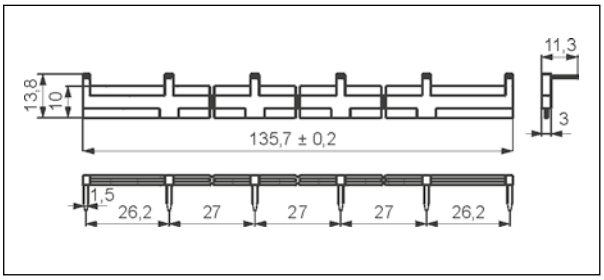
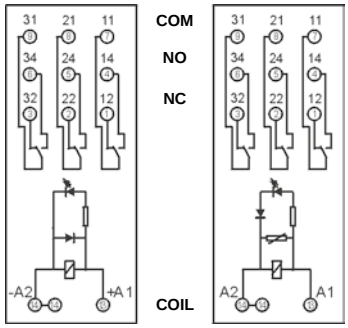
Dimensions





Interconnection strip type **ZGGZ4**

Connection diagrams
(screw terminals side view)



Mounting

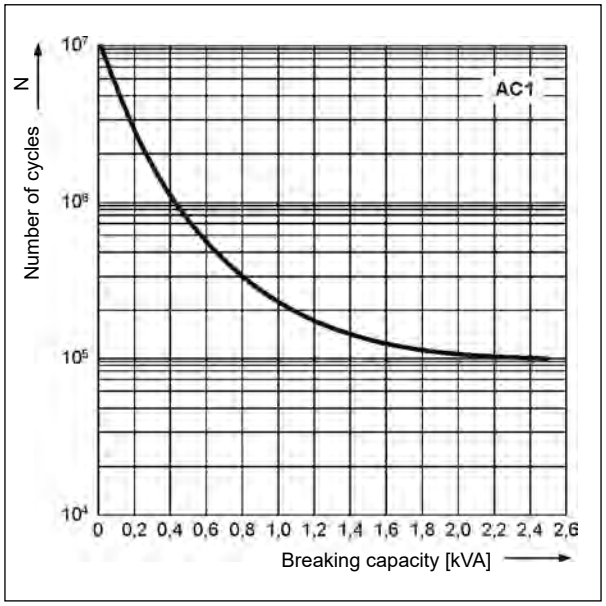
Relays **PIR3 with socket GZM3** ❶ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

❶ Plug-in sockets **GZM3** may be linked with interconnection strip type **ZGGZ4**. Strip **ZGGZ4** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 6 sockets. Colours of strips: **ZGGZ4-1** grey, **ZGGZ4-2** black (see page 419).

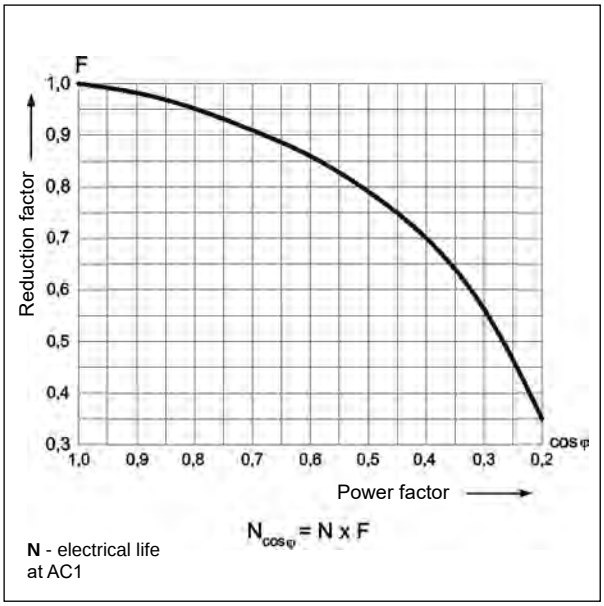
ZGGZ4

Interconnection strip ZGGZ4:
bridging of common input signals.

Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour Fig. 1

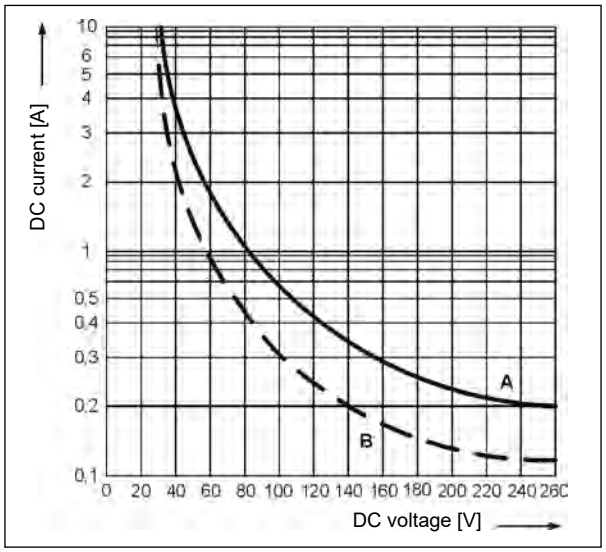


Electrical life reduction factor at AC inductive load Fig. 2



N - electrical life at AC1

Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms Fig. 3



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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
012DC	12	160	± 10%	9,6	13,2
024DC	**24**	**640**	**± 10%**	**19,2**	**26,4**
048DC	48	2 600	± 10%	38,4	52,8
110DC	110	13 600	± 10%	88,0	121,0

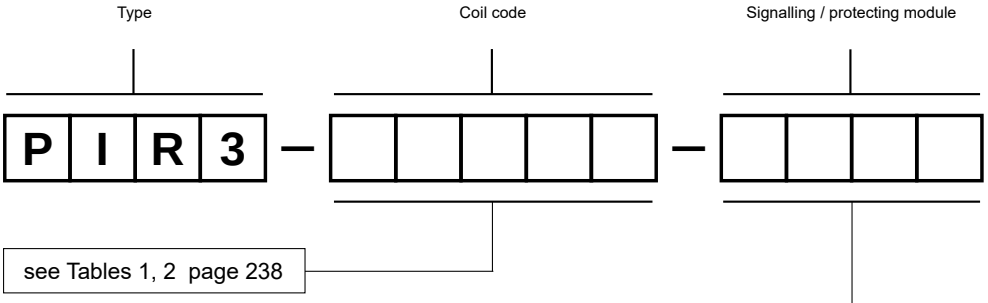
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
012AC	12	39,5	± 10%	9,6	13,2
024AC	**24**	**158**	**± 10%**	**19,2**	**26,4**
048AC	48	640	± 10%	38,4	52,8
120AC	120	3 770	± 10%	96,0	132,0
230AC	**230**	**16 100**	**± 10%**	**184,0**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



Signalling / protecting module

00LD - M41G - module LD (LED green + diode D, polarization N: +A1/-A2), 6/24 V DC
00LD - M42G - module LD (LED green + diode D, polarization N: +A1/-A2), 24/60 V DC
00LD - M43G - module LD (LED green + diode D, polarization N: +A1/-A2), 110/230 V DC
00LV - M91G - module LV (LED green + varistor), 6/24 V AC/DC
00LV - M92G - module LV (LED green + varistor), 24/60 V AC/DC
00LV - M93G - module LV (LED green + varistor), 110/240 V AC/DC

Examples of ordering codes:

PIR3-012DC-00LD — interface relay **PIR3** consists of: relay **R3N** (three changeover contacts, contact material AgNi, coil voltage 12 V DC), socket **GZM3** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT4-0040** (plastic), description plate **GZT4-0035** (white)

PIR3-230AC-00LV — interface relay **PIR3** consists of: relay **R3N** (three changeover contacts, contact material AgNi, coil voltage 230 V AC 50/60 Hz), socket **GZM3** (grey, screw terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZT4-0040** (plastic), description plate **GZT4-0035** (white)

R4N + GZM4

- Interface relay **PIR4 with socket GZM4** consists of: electromagnetic relay **R4N**, grey plug-in socket **GZM4**, signalling / protecting module **type M...**, retainer / retractor clip **GZT4-0040** (plastic), white description plate **GZT4-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • May be linked with interconnection strip type **ZGGZ4**
- Recognitions, certifications, directives: recognitions R4N, RoHS,

CE EAC

Contact data

Number and type of contacts		4 CO
Contact material		**AgNi**
Rated / max. switching voltage	AC	250 V / 250 V
Min. switching voltage		5 V
Rated load (capacity)	AC1	6 A / 250 V AC
	AC15	1,5 A / 120 V 0,75 A / 240 V (C300)
	AC3	125 W (single-phase motor)
	DC1	6 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Min. switching current		5 mA
Max. inrush current		12 A
Rated current		6 A
Max. breaking capacity	AC1	1 500 VA
Min. breaking capacity		0,3 W
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Coil data

Rated voltage	50/60 Hz AC	12 ... 230 V
	DC	12 ... 110 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		see Tables 1,2
Rated power consumption	AC	50 Hz: 1,6 VA 60 Hz: 1,3 VA
	DC	0,9 W

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	2 500 V 1,2 / 50 µs
Overvoltage category	II
Insulation pollution degree	2
Dielectric strength	
• between coil and contacts	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 000 V AC type of insulation: basic
Contact - coil distance	
• clearance	≥ 1,6 mm
• creepage	≥ 3,2 mm

General data

Operating / release time (typical values)		AC: 10 ms / 8 ms DC: 13 ms / 3 ms
Electrical life		
• resistive AC1		> 10^5 6 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		75 x 27 x 82 mm
Weight		108 g
Ambient temperature	• storage	-40...+85 °C
	• operating	AC: -40...+55 °C DC: -40...+70 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		R4: RTI GZM4: RT0 PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.

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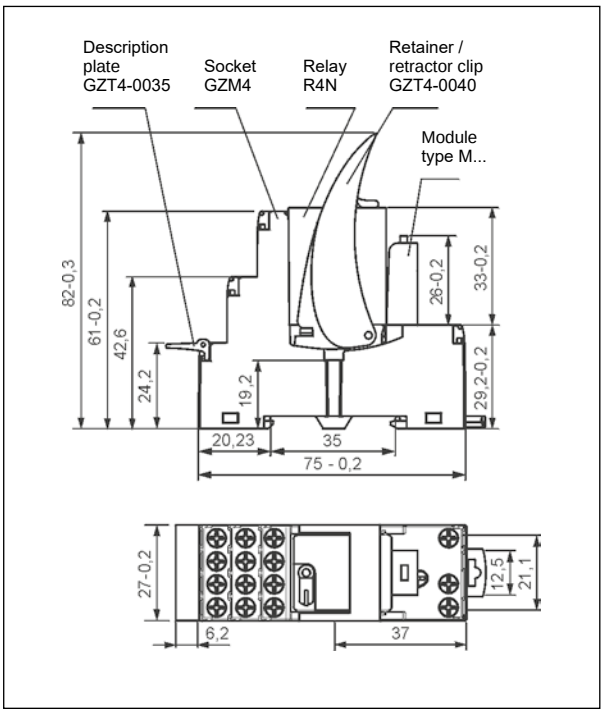
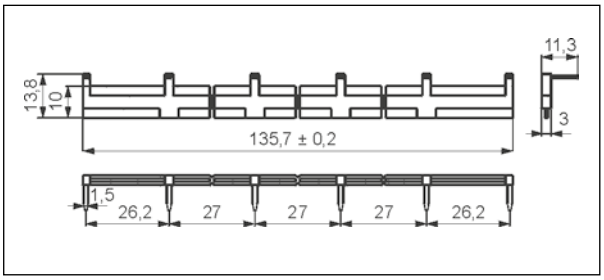
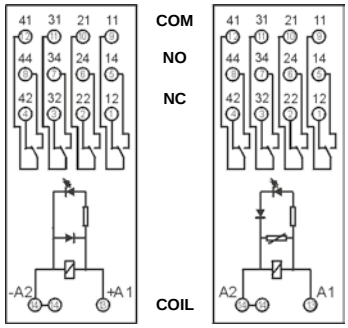
Dimensions





Interconnection strip type **ZGGZ4**

Connection diagrams
(screw terminals side view)



Mounting

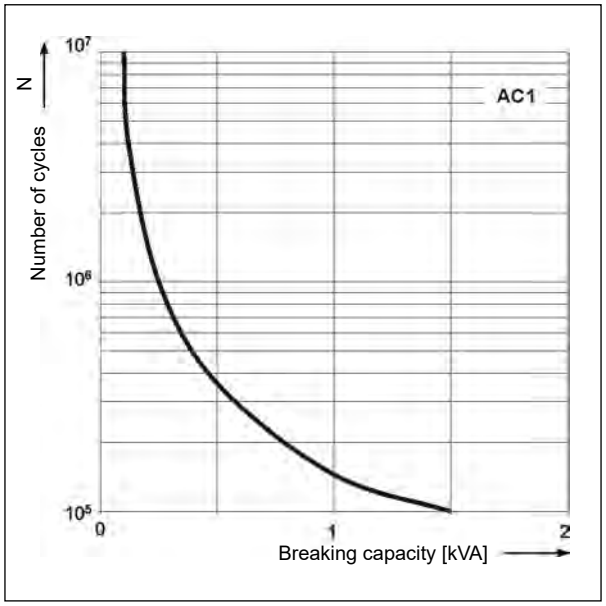
Relays **PIR4 with socket GZM4** ❶ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm.

❶ Plug-in sockets **GZM4** may be linked with interconnection strip type **ZGGZ4**. Strip **ZGGZ4** bridges common input signals, maximum permissible current is 10 A / 250 V AC. Possibility of connection of 6 sockets. Colours of strips: **ZGGZ4-1** grey, **ZGGZ4-2** black (see page 419).

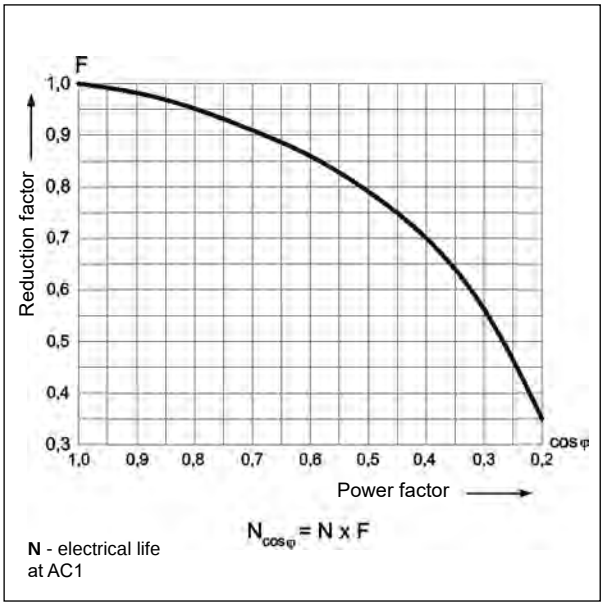
ZGGZ4

Interconnection strip ZGGZ4:
bridging of common input signals.

Electrical life at AC resistive load.
Switching frequency: 1 200 cycles/hour
Fig. 1

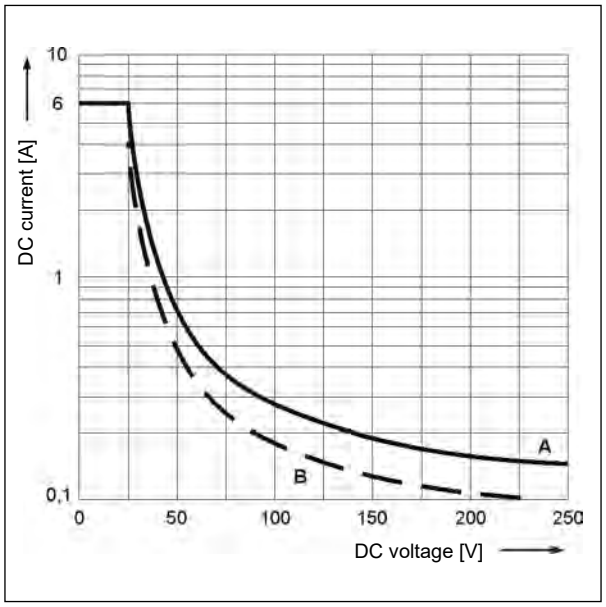


Electrical life reduction factor at AC inductive load
Fig. 2



N - electrical life at AC1

Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms
Fig. 3



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Coil data - DC voltage version — Table 1

Coil code	Rated voltage V DC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V DC	
				min. (at 20 °C)	max. (at 70 °C)
012DC	12	160	± 10%	9,6	13,2
024DC	**24**	**640**	**± 10%**	**19,2**	**26,4**
048DC	48	2 600	± 10%	38,4	52,8
110DC	110	13 600	± 10%	88,0	121,0

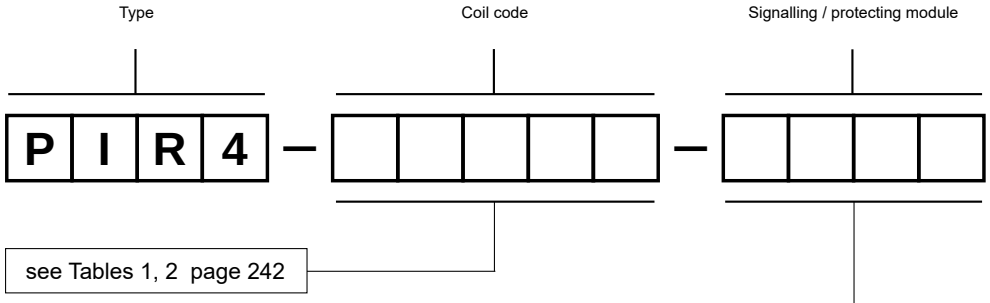
The data in bold type relate to the standard versions of the relays.

Coil data - AC 50/60 Hz voltage version — Table 2

Coil code	Rated voltage V AC	Coil resistance at 20 °C Ω	Acceptable resistance	Coil operating range V AC	
				min. (at 20 °C)	max. (at 55 °C)
012AC	12	39,5	± 10%	9,6	13,2
024AC	**24**	**158**	**± 10%**	**19,2**	**26,4**
048AC	48	640	± 10%	38,4	52,8
120AC	120	3 770	± 10%	96,0	132,0
230AC	**230**	**16 100**	**± 10%**	**184,0**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



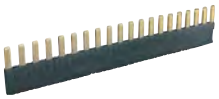
Signalling / protecting module

00LD - M41G - module LD (LED green + diode D, polarization N: +A1/-A2), 6/24 V DC
00LD - M42G - module LD (LED green + diode D, polarization N: +A1/-A2), 24/60 V DC
00LD - M43G - module LD (LED green + diode D, polarization N: +A1/-A2), 110/230 V DC
00LV - M91G - module LV (LED green + varistor), 6/24 V AC/DC
00LV - M92G - module LV (LED green + varistor), 24/60 V AC/DC
00LV - M93G - module LV (LED green + varistor), 110/240 V AC/DC

Examples of ordering codes:

PIR4-012DC-00LD — interface relay **PIR4** consists of: relay **R4N** (four changeover contacts, contact material AgNi, coil voltage 12 V DC), socket **GZM4** (grey, screw terminals), signalling / protecting module **M41G** (version LD), retainer / retractor clip **GZT4-0040** (plastic), description plate **GZT4-0035** (white)

PIR4-230AC-00LV — interface relay **PIR4** consists of: relay **R4N** (four changeover contacts, contact material AgNi, coil voltage 230 V AC 50/60 Hz), socket **GZM4** (grey, screw terminals), signalling / protecting module **M93G** (version LV), retainer / retractor clip **GZT4-0040** (plastic), description plate **GZT4-0035** (white)



- Width 6,2 mm
- Interface relay **PI6-1P** - with 1 CO contact output
- 35 mm rail mount acc. to PN-EN 60715
- May be linked with interconnection strip type **ZG20**
- Equipped in LED green
- Version for long control lines, with anti-interference filter (**PI6-1P-230VAC/DC-10** ❷)
- Recognitions, certifications, directives: : RoHS,

Output circuit - contact data

Number and type of contacts		1 CO	
Contact material		**$AgSnO_2$**	$AgSnO_2/Au$ hard gold plating ❶
Max. switching voltage		400 V AC / 250 V DC	30 V AC / 36 V DC ❶
Min. switching voltage	AC / DC	10 V	5 V
Rated load	AC1	6 A / 250 V AC	0,05 A / 30 V AC ❶
	DC1	6 A / 30 V DC; 0,15 A / 250 V DC	0,05 A / 36 V DC ❶
Min. switching current		100 mA	10 mA
Max. inrush current		10 A 20 ms	0,1 A 20 ms ❶
Rated current		6 A	0,05 A ❶
Max. breaking capacity	AC1	1 500 VA	1,2 VA ❶
Min. breaking capacity		1 W	0,05 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V	≤ 30 mΩ 10 mA, 5 V
Max. operating frequency			
• at rated load	AC1	360 cycles/hour	
• no load		72 000 cycles/hour	

Input circuit

Rated voltage	DC	12 ... 36 V	
	AC: 50/60 Hz AC/DC	24 ... 230 V	
Must release voltage		AC: ≥ 0,2 U_n	AC: ≥ 0,35 U_n ❷
		DC: ≥ 0,1 U_n	
Operating range of supply voltage		see Table 1	
Must operate voltage		AC: ≤ 0,8 U_n	AC: 0,6...0,85 U_n ❷
		DC: ≤ 0,8 U_n	
Input polarization current		AC: 8 mA < I_p < 10 mA 230 V AC ❷	
Rated power consumption	DC	0,3 ... 0,7 W	
	AC/DC	0,3 ... 1,6 VA / 0,3 ... 1,6 W	
Max. length of control line		≤ 300 m	AC control voltage ❷

Insulation according to PN-EN 60664-1

Insulation rated voltage	400 V AC	
Rated surge voltage	4 000 V	1,2 / 50 µs
Overvoltage category	III	
Insulation pollution degree	3	
Dielectric strength		
• input - output	4 000 V AC	50/60 Hz, 1 min., type of insulation: reinforced
• input - output	6 000 V	1,2 / 50 µs
• mass - input, output	2 500 V AC	50/60 Hz, 1 min.
• contact clearance	1 000 V AC	50/60 Hz, 1 min., type of clearance: micro-disconnection
Input - output distance		
• clearance	≥ 6 mm	
• creepage	≥ 8 mm	

The data in bold type relate to the standard versions of the relays. ❶ For gold-plated contacts - when the maximum values given have been exceeded, the gold layer is destroyed. Then, the advantages of gold-plating disappear and the values are as for $AgSnO_2$ contacts (see beside), and electrical life of these contacts may be shorter than of normal contacts. ❷ Refers version for long control lines (max. 300 m) **PI6-1P-230VAC/DC-10** - relay with integrated anti-interference filter (desigend on the basis of appropriately selected elements R and C, and Zener diode), resistant to occurrence of induced voltages in long distances of control wires.

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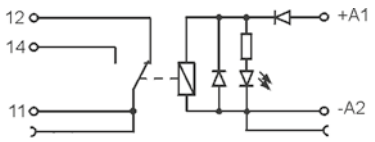
General data

Operating time (typical value)	AC: 7 ms	DC: 6 ms	
Release time (typical value)	AC: 15 ms	DC: 10 ms	
Electrical life			
• resistive AC1	> 0,6 x 10^5	6 A, 250 V AC	
• cos φ = 0,4	> 2 x 10^5	2 A, 250 V AC	
• resistive DC1	10^5	6 A, 30 V DC	
Mechanical life (cycles)	> 2 x 10^7		
Dimensions (L x W x H)	93,8 x 6,2 x 80 mm		
Weight	40 g		
Ambient temperature			
• storage	-40...+70 °C		
• operating	-40...+55 °C		-40...+60 °C 12, 24 V DC
	-40...+40 °C 230 V AC ❷		-40...+50 °C 230 V DC ❷
Cover protection category	IP 20	PN-EN 60529	
Environmental protection	RTI	PN-EN 116000-3	
Shock resistance	10 g		
Vibration resistance	5 g 10...500 Hz		

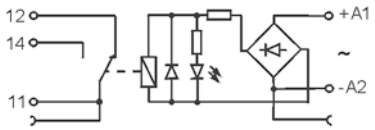
❷ Refers version for long control lines (max. 300 m) **PI6-1P-230VAC/DC-10** - relay with integrated anti-interference filter (desigend on the basis of appropriately selected elements R and C, and Zener diode), resistant to occurrence of induced voltages in long distances of control wires.

Connection diagrams

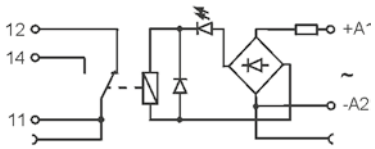
PI6-1P-12VDC, PI6-1P-12VDC-01
PI6-1P-24VDC, PI6-1P-24VDC-01
PI6-1P-36VDC, PI6-1P-36VDC-01



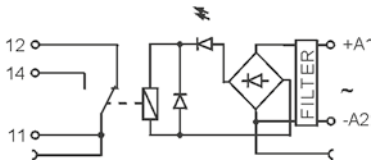
PI6-1P-24VAC/DC, PI6-1P-24VAC/DC-01
PI6-1P-42VAC/DC



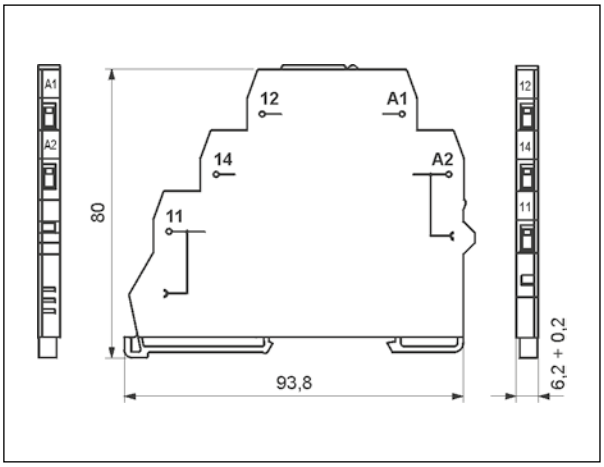
PI6-1P-115VAC/DC
PI6-1P-230VAC/DC, PI6-1P-230VAC/DC-01

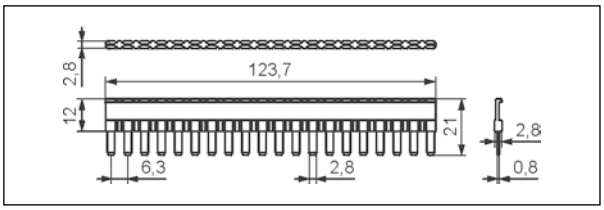


PI6-1P-230VAC/DC-10



Dimensions





Interconnection strip type **ZG20**

Mounting

Relays **PI6-1P** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 8 mm, max. tightening moment for the terminal: 0,3 Nm.
PI6-1P may be linked with interconnection strip type **ZG20**. Strip **ZG20** bridges common input or output signals, maximum permissible current is 36 A / 250 V AC. Colours of strips: **ZG20-1** red, **ZG20-2** black, **ZG20-3** blue.

Interconnection strip ZG20:
bridging of common
input or output signals.

ZG20

Input data

Table 1

Interface relay code	Rated input voltage U_n	Power of input circuit	Input - voltage range V	
			min. (at 20 °C)	max. (at 55 °C)
PI6-1P-12VDC	12 V DC	0,3 W	9,6	14,4
PI6-1P-24VDC	**24 V DC**	**0,4 W**	**19,2**	**28,0**
PI6-1P-36VDC	36 V DC	0,7 W	28,8	40,0
PI6-1P-24VAC/DC	24 V AC/DC	0,5 VA / 0,5 W	19,2	26,4
PI6-1P-42VAC/DC	42 V AC/DC	0,3 VA / 0,3 W	33,6	50,0
PI6-1P-115VAC/DC	115 V AC/DC	0,8 VA / 0,8 W	92,0	130,0
PI6-1P-230VAC/DC	**230 V AC/DC**	**0,8 VA / 0,8 W**	**184,0**	**253,0**
PI6-1P-230VAC/DC-10 ❷	230 V AC/DC	1,6 VA / 1,6 W	196,0	253,0
PI6-1P-12VDC-01 ❶	12 V DC	0,3 W	9,6	14,4
PI6-1P-24VDC-01 ❶	24 V DC	0,4 W	19,2	28,0
PI6-1P-36VDC-01 ❶	36 V DC	0,7 W	28,8	40,0
PI6-1P-24VAC/DC-01 ❶	24 V AC/DC	0,5 VA / 0,5 W	19,2	26,4
PI6-1P-230VAC/DC-01 ❶	230 V AC/DC	0,8 VA / 0,8 W	184,0	253,0

The data in bold type relate to the standard versions of the relays.
❶ Version with gold-plated contacts. ❷ Version for long control lines (max. 300 m), with anti-interference filter.

Ordering codes

Ordering codes **PI6-1P** are specified in Table 1, ”Interface relay code” column.

Interface relay PI6-1P

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- Width 6,2 mm
- Interface relay **PI6-1T** - with triac output
- 35 mm rail mount acc. to PN-EN 60715
- May be linked with interconnection strip type **ZG20**
- Equipped in LED green
- Recognitions, certifications, directives: RoHS, CE EAC

Output circuit - Triac

Number and type of outputs		1 NO	
Rated / max. switching voltage	AC	400 V / 440 V	
Min. switching voltage	AC	20 V	
Rated load	AC1	1,2 A / 400 V AC	
Min. switching current		10 mA	
Max. non-repeat surge current		30 A	t=20 ms
Rated current		1,2 A	
I^2t for fusing		5,1 A^2s	t=1-10 ms
dI/dt		50 A/µs	
dV/dt		40 V/µs	

Input circuit

Rated voltage	DC	5...32 V	
	AC: 50/60 Hz AC/DC	24 ... 230 V	
Turn-off voltage		AC: ≥ 0,2 U_n	DC: ≥ 0,1 U_n
Rated power consumption	DC	0,3 W	5...32 V DC at 24 V
	AC/DC	0,3 VA / 0,3 W	24 V AC/DC
	AC/DC	1,6 VA / 1,6 W	230 V AC/DC

Insulation according to PN-EN 60664-1

Insulation rated voltage		600 V AC	
Insulation pollution degree		2	
Dielectric strength	• input - output	4 000 V AC	50/60 Hz, 1 min., type of insulation: reinforced

General data

Operating time		10 ms	max. (zero turn-on)
Release time		10 ms	max.
Dimensions (L x W x H)		93,8 x 6,2 x 80 mm	
Weight		40 g	
Ambient temperature	• storage	-40...+70 °C	
	• operating	-40...+55 °C	
Cover protection category		IP 20	PN-EN 60529
Environmental protection		RTI	PN-EN 116000-3
Shock resistance		10 g	
Vibration resistance		5 g	10...500 Hz

EUROPRODUCT 2003
for interfece relays **PI6**

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AUTOMATICON 2004
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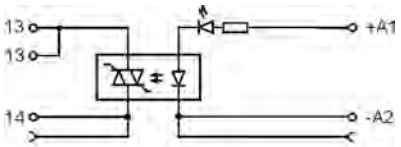
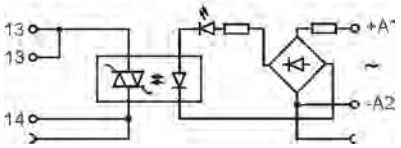
Connection diagrams

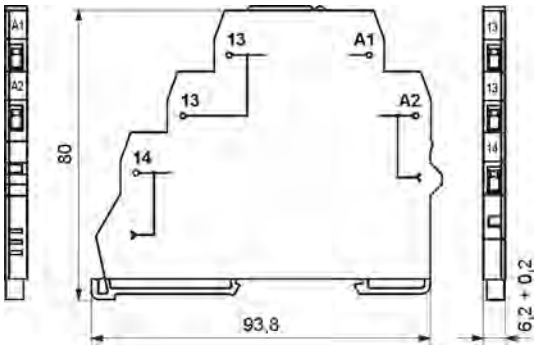
PI6-1T-5...32VDC

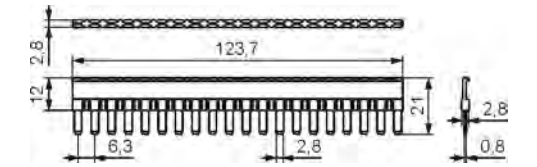


PI6-1T-24VAC/DC
PI6-1T-230VAC/DC



Dimensions





Interconnection strip type **ZG20**

Mounting

Relays **PI6-1T** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 2,5 mm² / 2 x 1,5 mm² (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 8 mm, max. tightening moment for the terminal: 0,3 Nm.
PI6-1T may be linked with interconnection strip type **ZG20**. Strip **ZG20** bridges common input or output signals, maximum permissible current is 36 A / 250 V AC. Colours of strips: **ZG20-1** red, **ZG20-2** black, **ZG20-3** blue.

ZG20

Interconnection strip ZG20: bridging of common input or output signals.

Input data

Table 1

Interface relay code	Rated input voltage U_n	Power of input circuit
PI6-1T-5...32VDC	5...32 V DC	0,3 W at 24 V
PI6-1T-24VAC/DC	24 V AC/DC	0,3 VA / 0,3 W
PI6-1T-230VAC/DC	230 V AC/DC	1,6 VA / 1,6 W

Ordering codes

Ordering codes **PI6-1T** are specified in Table 1, ”Interface relay code” column.

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RM699BV + PI6W-1P-...

- Width 6,2 mm • Interface relay **PIR6W-1P-...** consists of: screw terminals socket, with electronic **PI6W-1P-...**, miniature operational relay - electromagnetic **RM699BV** ❶
- 35 mm rail mount acc. to PN-EN 60715 • May be linked with interconnection strip type **ZG20** • Equipped in LED green • Version for long control lines, with anti-interference filter (**PIR6W-1P-230V...-10** ❸)
- Accessories: description plates **PI6W-1246**
- Recognitions, certifications, directives: RoHS,

Output circuit (RM699BV) - contact data ❶

Number and type of contacts		1 CO	
Contact material		**$AgSnO_2$**	$AgSnO_2/Au$ hard gold plating ❷
Max. switching voltage		400 V AC / 250 V DC	30 V AC / 36 V DC ❷
Min. switching voltage	AC / DC	10 V	5 V
Rated load	AC1	6 A / 250 V AC	0,05 A / 30 V AC ❷
	DC1	6 A / 30 V DC; 0,15 A / 250 V DC	0,05 A / 36 V DC ❷
Min. switching current		100 mA	10 mA
Max. inrush current		10 A 20 ms	0,1 A 20 ms ❷
Rated current		6 A	0,05 A ❷
Max. breaking capacity	AC1	1 500 VA	1,2 VA ❷
Min. breaking capacity		1 W	0,05 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V	≤ 30 mΩ 10 mA, 5 V
Max. operating frequency			
• at rated load	AC1	360 cycles/hour	
• no load		72 000 cycles/hour	

Input circuit

Rated voltage	50/60 Hz AC	230 V	
	DC	12 ... 36 V	
	AC: 50/60 Hz AC/DC	24 ... 230 V	
Must release voltage		AC: ≥ 0,2 U_n	AC: ≥ 0,1 U_n 230 V AC
		AC: ≥ 0,35 U_n 230 V AC ❸	AC: ≥ 0,35 U_n 230 V AC/DC ❸
		DC: ≥ 0,1 U_n	
Operating range of supply voltage		see Table 1	
Must operate voltage		AC: ≤ 0,8 U_n	AC: 0,6...0,85 U_n ❸
		DC: ≤ 0,8 U_n	
Rated power consumption	AC	≤ 0,8 ... 0,9 VA	
	DC	0,3 W	
	AC/DC	0,3 ... 2,1 VA / 0,3 ... 1,0 W	
Max. length of control line		≤ 300 m	AC control voltage ❸

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC	
Rated surge voltage	4 000 V	1,2 / 50 µs
Overvoltage category	III	
Insulation pollution degree	3	
Dielectric strength		
• input - output	4 000 V AC	50/60 Hz, 1 min., type of insulation: reinforced
• input - output	6 000 V	1,2 / 50 µs
• mass - input, output	2 500 V AC	50/60 Hz, 1 min.
• contact clearance	1 000 V AC	50/60 Hz, 1 min., type of clearance: micro-disconnection
Input - output distance		
• clearance	≥ 6 mm	
• creepage	≥ 8 mm	
Mass - output distance		
• clearance	≥ 3 mm	
• creepage	≥ 3,6 mm	

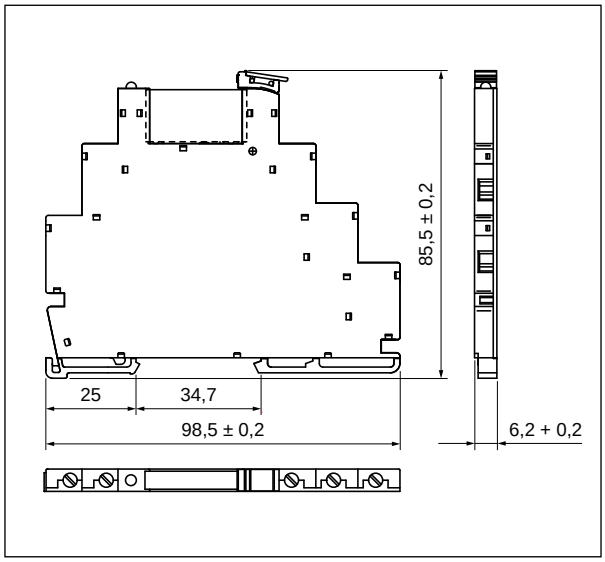
The data in bold type relate to the standard versions of the relays. ❶ Characteristics of the contact capacity of relays **PIR6W-1P-... with RM699BV** - see page 80. ❷ For gold-plated contacts - when the maximum values given have been exceeded, the gold layer is destroyed. Then, the advantages of gold-plating disappear and the values are as for $AgSnO_2$ contacts (see beside), and electrical life of these contacts may be shorter than of normal contacts. ❸ Refers version for long control lines (max. 300 m) **PIR6W-1P-230V...-10** - relay which includes the socket **PI6W-1P-230V...-10** with integrated anti-interference filter (desigend on the basis of appropriately selected elements R and C, and Zener diode), resistant to occurrence of induced voltages in long distances of control wires, and operational miniature relay **RM699BV-3011-85-1060**.

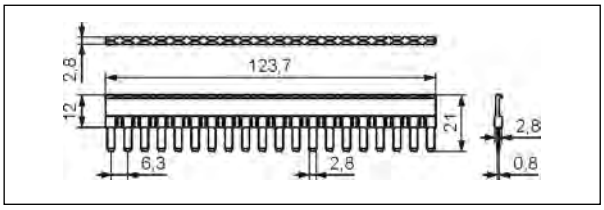
General data

Operating time (typical value)	AC: 11 ms	DC: 8 ms	AC, AC/DC: 20 ms 0,85 U_n ❸
Release time (typical value)	AC: 15 ms	DC: 10 ms	AC, AC/DC: 18 ms ❸
Electrical life			
• resistive AC1	> 0,6 x 10^5	6 A, 250 V AC, 360 cycles/hour	
• cos φ = 0,4	> 2 x 10^5	2 A, 250 V AC	
Mechanical life (cycles)	> 2 x 10^7		
Dimensions (L x W x H)	98,5 x 6,2 x 85,5 mm		
Weight	45 g		
Ambient temperature			
• storage	-40...+70 °C		
• operating	-40...+60 °C	12 V DC, 24 V DC	
	-40...+50 °C	230 V AC ❸, 230 V AC/DC ❹	
	-40...+55 °C	other voltages	
Cover protection category	IP 20	PN-EN 60529	
Environmental protection	RTI	PN-EN 116000-3	
Shock resistance	10 g		
Vibration resistance	5 g	10...500 Hz	

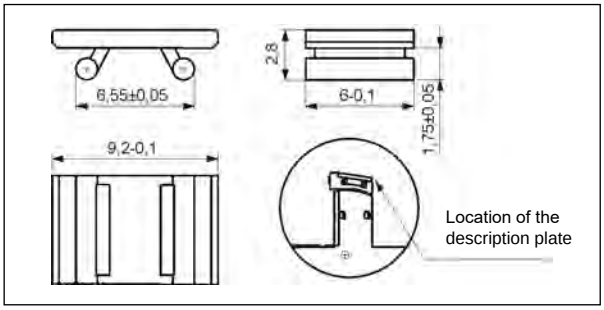
❸ Refers version for long control lines (max. 300 m) **PIR6W-1P-230V...-10** - relay which includes the socket **PI6W-1P-230V...-10** with integrated anti-interference filter (desigend on the basis of appropriately selected elements R and C, and Zener diode), resistant to occurrence of induced voltages in long distances of control wires, and operational miniature relay **RM699BV-3011-85-1060**. ❹ For versions 230VAC/DC and 230VAC/DC-10: the distance of min. 5 mm between the mounting relays.

Dimensions





Interconnection strip type **ZG20**



Description plate **PI6W-1246**

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Mounting

Relays **PIR6W-1P-...** ❹ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 9 mm, max. tightening moment for the terminal: 0,3 Nm.
Interface relay **PIR6W-1P-...** consists of: screw terminals socket, with electronic **PI6W-1P-...**, miniature operational relay - electromagnetic **RM699BV**.
PIR6W-1P-... may be linked with interconnection strip type **ZG20**. Strip **ZG20** bridges common input or output signals, maximum permissible current is 36 A / 250 V AC. Colours of strips: **ZG20-1** red, **ZG20-2** black, **ZG20-3** blue. Description plates of **PI6W-1246** type are offered for **PIR6W-1P-...** relays; they are delivered with the relays, not mounted.

❹ For versions 230VAC/DC and 230VAC/DC-10: the distance of min. 5 mm between the mounting relays.

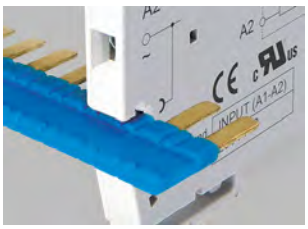
PI6W-1P-...

RM699BV

ZG20

PI6W-1246

Green LED:
signalling the operation
status of the relay.



Interconnection strip ZG20:
bridging of common
input or output signals.

Movable ejector: protection
and easy replacement
of the operational relay.

Interface relay PIR6W-1P-...

set: relay RM699BV
+ socket PI6W-1P-...

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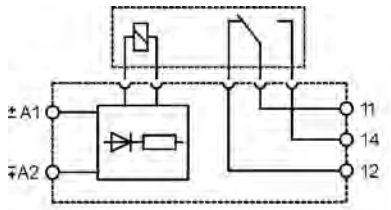
Input data

Table 1

Interface relay code	Input - voltage range V	
	min.	max.
PIR6W-1P-12VDC	9,6	14,4
PIR6W-1P-24VDC	**19,2**	**28,0**
PIR6W-1P-36VDC	28,8	40,0
PIR6W-1P-24VAC/DC	19,2	26,4
PIR6W-1P-42VAC/DC	33,6	50,0
PIR6W-1P-115VAC/DC	92,0	130,0
PIR6W-1P-230VAC/DC ❹	**184,0**	**253,0**
PIR6W-1P-230VAC	184,0	253,0
PIR6W-1P-230VAC/DC-10 ❸ ❹	❺ 196,0	253,0
PIR6W-1P-230VAC-10 ❸	196,0	253,0
PIR6W-1P-12VDC-01 ❷	9,6	14,4
PIR6W-1P-24VDC-01 ❷	**19,2**	**28,0**
PIR6W-1P-36VDC-01 ❷	28,8	40,0
PIR6W-1P-24VAC/DC-01 ❷	19,2	26,4
PIR6W-1P-42VAC/DC-01 ❷	33,6	50,0
PIR6W-1P-115VAC/DC-01 ❷	92,0	130,0
PIR6W-1P-230VAC/DC-01 ❷ ❹	**184,0**	**253,0**
PIR6W-1P-230VAC-01 ❷	184,0	253,0

Connection diagrams

PIR6W-1P-..., PIR6W-1P-...-01



PIR6W-1P-230V...-10

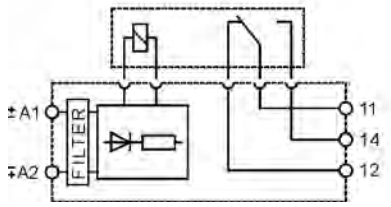


Table of codes

Table 2

Interface relay code	Rated input voltage U_n ❻	Power of input circuit	Socket code	Operational relay code	Rated voltage of operational relay U_s ❻
PIR6W-1P-12VDC	12 V DC	0,3 W	PI6W-1P-12VDC	RM699BV-3011-85-1012	12 V DC
PIR6W-1P-24VDC	**24 V DC**	**0,3 W**	**PI6W-1P-24VDC**	**RM699BV-3011-85-1024**	**24 V DC**
PIR6W-1P-36VDC	36 V DC	0,3 W	PI6W-1P-36VDC	RM699BV-3011-85-1024	24 V DC
PIR6W-1P-24VAC/DC	24 V AC/DC	0,3 VA / 0,3 W	PI6W-1P-24VAC/DC	RM699BV-3011-85-1024	24 V DC
PIR6W-1P-42VAC/DC	42 V AC/DC	0,4 VA / 0,4 W	PI6W-1P-42VAC/DC	RM699BV-3011-85-1024	24 V DC
PIR6W-1P-115VAC/DC	115 V AC/DC	0,9 VA / 0,9 W	PI6W-1P-115VAC/DC	RM699BV-3011-85-1024	24 V DC
PIR6W-1P-230VAC/DC ❹	**230 V AC/DC**	**0,8 VA / 0,8 W**	**PI6W-1P-230VAC/DC**	**RM699BV-3011-85-1060**	**60 V DC**
PIR6W-1P-230VAC	230 V AC	≤ 0,8 VA	PI6W-1P-230VAC	RM699BV-3011-85-1060	60 V DC
PIR6W-1P-230VAC/DC-10 ❸ ❹	230 V AC/DC	2,1 VA / 1,0 W	PI6W-1P-230VAC/DC-10	RM699BV-3011-85-1060	60 V DC
PIR6W-1P-230VAC-10 ❸	230 V AC	≤ 0,9 VA	PI6W-1P-230VAC-10	RM699BV-3011-85-1060	60 V DC
PIR6W-1P-12VDC-01 ❷	12 V DC	0,3 W	PI6W-1P-12VDC	RM699BV-3211-85-1012	12 V DC
PIR6W-1P-24VDC-01 ❷	**24 V DC**	**0,3 W**	**PI6W-1P-24VDC**	**RM699BV-3211-85-1024**	**24 V DC**
PIR6W-1P-36VDC-01 ❷	36 V DC	0,3 W	PI6W-1P-36VDC	RM699BV-3211-85-1024	24 V DC
PIR6W-1P-24VAC/DC-01 ❷	24 V AC/DC	0,3 VA / 0,3 W	PI6W-1P-24VAC/DC	RM699BV-3211-85-1024	24 V DC
PIR6W-1P-42VAC/DC-01 ❷	42 V AC/DC	0,4 VA / 0,4 W	PI6W-1P-42VAC/DC	RM699BV-3211-85-1024	24 V DC
PIR6W-1P-115VAC/DC-01 ❷	115 V AC/DC	0,9 VA / 0,9 W	PI6W-1P-115VAC/DC	RM699BV-3211-85-1024	24 V DC
PIR6W-1P-230VAC/DC-01 ❷ ❹	**230 V AC/DC**	**0,8 VA / 0,8 W**	**PI6W-1P-230VAC/DC**	**RM699BV-3211-85-1060**	**60 V DC**
PIR6W-1P-230VAC-01 ❷	230 V AC	≤ 0,8 VA	PI6W-1P-230VAC	RM699BV-3211-85-1060	60 V DC

The data in bold type relate to the standard versions of the relays. ❷ Version with gold-plated contacts. ❸ Version for long control lines (max. 300 m), with anti-interference filter. ❹ For versions 230VAC/DC and 230VAC/DC-10: the distance of min. 5 mm between the mounting relays. ❺ 196,0 V at supply voltage AC; 184,0 V at supply voltage DC. ❻ It shall be remarked that rated input voltage of the operational relay U_s not always complies with the rated input voltage U_n (which is important on ordering operational relays for sockets).

Ordering codes

Ordering codes **PIR6W-1P-...** are specified in Tables 1, 2, ”Interface relay code” column.

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RM699BV + PI6W-1PS-...

RSR30 + PI6W-1PS-...

- Width 6,2 mm • Interface relay **PIR6W-1PS-...** consists of: screw terminals universal socket, with electronic **PI6W-1PS-...**, miniature operational relay - electromagnetic **RM699BV** or solid state **RSR30** ❶
- 35 mm rail mount acc. to PN-EN 60715 • May be linked with interconnection strip type **ZG20** • Equipped in LED green
- Accessories: description plates **PI6W-1246**
- Recognitions, certifications, directives: RoHS,

Output circuit (RM699BV) - contact data ❶

Number and type of contacts (code of output)		1 CO (R) ❸	1 CO (R01) ❸
Contact material		**$AgSnO_2$**	$AgSnO_2$/Au hard gold plating ❷
Max. switching voltage		400 V AC / 250 V DC	30 V AC / 36 V DC ❷
Min. switching voltage	AC / DC	10 V	5 V
Rated load	AC1	6 A / 250 V AC	0,05 A / 30 V AC ❷
	DC1	6 A / 30 V DC; 0,15 A / 250 V DC	0,05 A / 36 V DC ❷
Min. switching current		100 mA	10 mA
Max. inrush current		10 A 20 ms	0,1 A 20 ms ❷
Rated current		6 A	0,05 A ❷
Max. breaking capacity	AC1	1 500 VA	1,2 VA ❷
Min. breaking capacity		1 W	0,05 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V	≤ 30 mΩ 10 mA, 5 V
Max. operating frequency			
• at rated load	AC1	360 cycles/hour	
• no load		72 000 cycles/hour	

Output circuit (RSR30) - output data ❶

Type of output (code of output)		Triac (T) ❸ max. 2 A	Transistor (C) ❸ max. 1 A	Transistor (O) ❸ max. 2 A
Number and type of outputs		1 NO	1 NO	1 NO
Rated voltage		240 V AC	48 V DC	24 V DC
Max. output voltage		280 V AC	60 V DC	32 V DC
Min. output voltage		12 V AC	1,5 V DC	1,5 V DC
Rated continuous output current	AC1	1 A		
	DC1		1 A	2 A
Min. making capacity current		50 mA	1 mA	1 mA
Max. off-state leakage current (rest condition)		1,5 mA	1 mA	1 mA
Max. on-state voltage drop on the connection (operating state)		1,2 V	0,4 V	0,24 V
Operating switching frequency			10 Hz	10 Hz

Input circuit

Rated voltage	50/60 Hz AC	230 V	
	DC	6 ... 60 V	
	AC: 50/60 Hz AC/DC	24 ... 230 V	
Must release voltage		AC: ≥ 0,2 U_n	AC: ≥ 0,1 U_n 230 V AC
		DC: ≥ 0,1 U_n	
Operating range of supply voltage		0,8...1,2 U_n	0,85...1,2 U_n 6 V DC
Must operate voltage		AC: ≤ 0,8 U_n	
		DC: ≤ 0,8 U_n	DC: ≤ 0,85 U_n 6 V DC
Rated power consumption	AC	≤ 0,8 VA	
	DC	0,2 ... 0,5 W	
	AC/DC	0,5 ... 1,2 VA / 0,4 ... 1,2 W	

The data in bold type relate to the standard versions of the relays. ❶ Characteristics of the contact capacity of relays **PIR6W-1PS-... with RM699BV** - see page 80; **PIR6W-1PS-... with RSR30** - see www.relpol.com.pl ❷ For gold-plated contacts - when the maximum values given have been exceeded, the gold layer is destroyed. Then, the advantages of gold-plating disappear and the values are as for $AgSnO_2$ contacts (see beside), and electrical life of these contacts may be shorter than of normal contacts. ❸ Type of outputs: **R** - contacts $AgSnO_2$; **R01** - contacts $AgSnO_2$/Au hard gold plating; **T** - triac; **C** - transistor; **O** - transistor.

Insulation according to PN-EN 60664-1

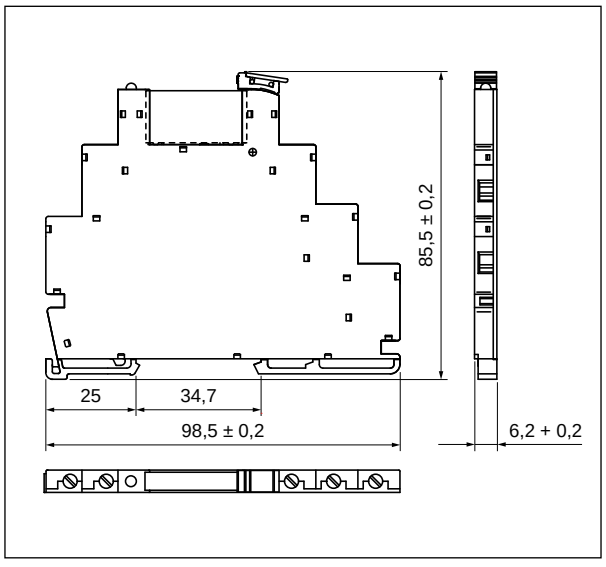
Insulation rated voltage	250 V AC	
Rated surge voltage	4 000 V	1,2 / 50 µs
Overvoltage category	III	
Insulation pollution degree	3	
Dielectric strength		
• input - output	4 000 V AC	50/60 Hz, 1 min., type of insulation: reinforced
• input - output	6 000 V	1,2 / 50 µs
• mass - input, output	2 500 V AC	50/60 Hz, 1 min.
• contact clearance	1 000 V AC	50/60 Hz, 1 min., output R and R01, type of clearance: micro-disconnection
Input - output distance		
• clearance / creepage	≥ 6 mm / ≥ 8 mm	
Mass - output distance		
• clearance / creepage	≥ 3 mm / ≥ 3,6 mm	

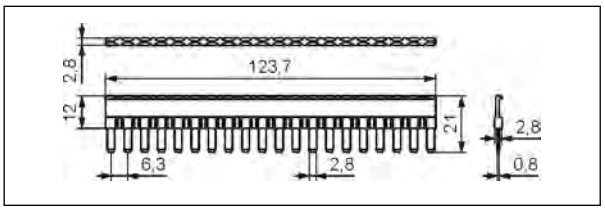
General data

Operating time (typical value)	PIR6W-1PS-...-R/-R01:	DC: 8 ms	AC: 10 ms	AC/DC: 20 ms
	PIR6W-1PS-...-T:	DC: 100 µs		AC, AC/DC: 10 ms
	PIR6W-1PS-...-C/-O:	DC: 50 µs		AC, AC/DC: 10 ms
Release time (typical value)	PIR6W-1PS-...-R/-R01:	DC: 10 ms	AC: 20 ms	AC/DC: 25 ms
	PIR6W-1PS-...-T:	DC: 1/2 cycle + 1 ms		AC, AC/DC: 30 ms
	PIR6W-1PS-...-C/-O:	DC: 600 µs		AC, AC/DC: 20 ms
Electrical life				
• resistive AC1	PIR6W-1PS-...-R:	> 0,5 x 10^5	6 A, 250 V AC	
Mechanical life (cycles)	PIR6W-1PS-...-R/-R01:	> 10^7		
Dimensions (L x W x H)	98,5 x 6,2 x 85,5 mm			
Weight	45 g			
Ambient temperature				
• storage	PIR6W-1PS-...-R/-R01/-T:	-40...+70 °C	...-C/-O:	-25...+70 °C
• operating	PIR6W-1PS-...-R/-R01:	-40...+55 °C	...-T/-C/-O:	-20...+55 °C
	PIR6W-1PS-230VAC/DC-R/-R01:	-40...+50 °C ❹	...-C/-O:	-20...+50 °C ❹
Cover protection category	IP 20	PN-EN 60529		
Environmental protection	RTI	PN-EN 116000-3		
Shock resistance	10 g			
Vibration resistance	5 g	10...500 Hz		

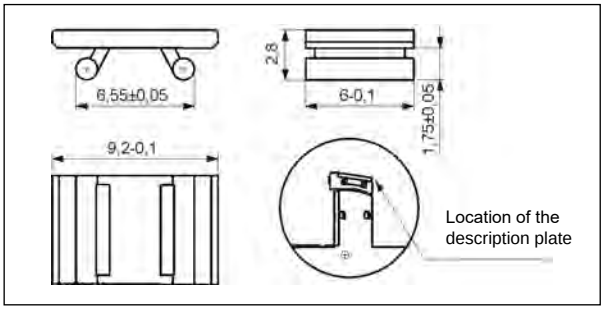
❹ For versions 230VAC/DC: the distance of min. 5 mm between the mounting relays.

Dimensions





Interconnection strip type **ZG20**



Description plate **PI6W-1246**

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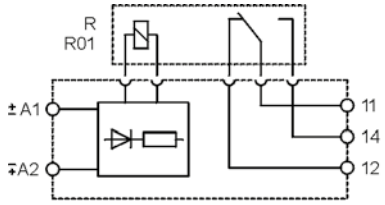
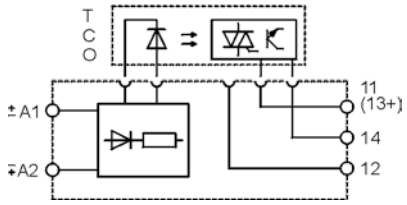
Connection diagrams

PIR6W-1PS-...-R, PIR6W-1PS-...-R01



PIR6W-1PS-...-T, PIR6W-1PS-...-C, PIR6W-1PS-...-O



Mounting

Relays **PIR6W-1PS-...** ❹ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 9 mm, max. tightening moment for the terminal: 0,3 Nm. Interface relay **PIR6W-1PS-...** consists of: screw terminals universal socket, with electronic **PI6W-1PS-...**, miniature operational relay - electromagnetic **RM699BV** or solid state **RSR30** ❸.

PIR6W-1PS-... may be linked with interconnection strip type **ZG20**. Strip **ZG20** bridges common input or output signals, maximum permissible current is 36 A / 250 V AC. Colours of strips: **ZG20-1** red, **ZG20-2** black, **ZG20-3** blue. Description plates of **PI6W-1246** type are offered for **PIR6W-1PS-...** relays; they are delivered with the relays, not mounted.

❸ Type of outputs: **R** - contacts $AgSnO_2$; **R01** - contacts $AgSnO_2$/Au hard gold plating; **T** - triac; **C** - transistor; **O** - transistor. ❹ For versions 230VAC/DC: the distance of min. 5 mm between the mounting relays.

PI6W-1PS-...

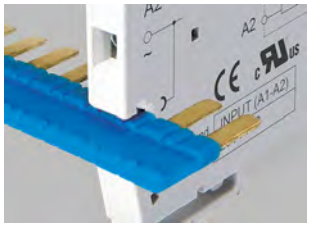
RM699BV

RSR30

ZG20

PI6W-1246

Green LED:
signalling the operation status of the relay.



Interconnection strip ZG20:
bridging of common input or output signals.

Movable ejector: protection and easy replacement of the operational relay.

Ordering codes

Ordering codes **PIR6W-1PS-...** are specified in Table 1, ”Interface relay code” column.

Table of codes Table 1

Interface relay code	Rated input voltage U_n ❺	Power of input circuit	Socket code	Operational relay code	Rated voltage of operational relay U_s ❺
PIR6W-1PS-6VDC-R	6 V DC	0,3 W	PI6W-1PS-6VDC	RM699BV-3011-85-1005	5 V DC
PIR6W-1PS-12VDC-R	12 V DC	0,2 W	PI6W-1PS-12/24VDC	RM699BV-3011-85-1012	12 V DC
PIR6W-1PS-24VDC-R	**24 V DC**	**0,3 W**	**PI6W-1PS-12/24VDC**	**RM699BV-3011-85-1024**	**24 V DC**
PIR6W-1PS-36VDC-R	36 V DC	0,3 W	PI6W-1PS-36VDC	RM699BV-3011-85-1024	24 V DC
PIR6W-1PS-48VDC-R	48 V DC	0,4 W	PI6W-1PS-48VDC	RM699BV-3011-85-1024	24 V DC
PIR6W-1PS-60VDC-R	60 V DC	0,5 W	PI6W-1PS-60VDC	RM699BV-3011-85-1024	24 V DC
PIR6W-1PS-24VAC/DC-R	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6W-1PS-24VAC/DC**	**RM699BV-3011-85-1012**	**12 V DC**
PIR6W-1PS-42VAC/DC-R	42 V AC/DC	0,5 VA / 0,4 W	PI6W-1PS-42VAC/DC	RM699BV-3011-85-1024	24 V DC
PIR6W-1PS-115VAC/DC-R	115 V AC/DC	1,2 VA / 1,2 W	PI6W-1PS-115VAC/DC	RM699BV-3011-85-1024	24 V DC
PIR6W-1PS-230VAC/DC-R ❹	**230 V AC/DC**	**1,2 VA / 1,2 W**	**PI6W-1PS-230VAC/DC**	**RM699BV-3011-85-1060**	**60 V DC**
PIR6W-1PS-230VAC-R	230 V AC	≤ 0,8 VA	PI6W-1PS-230VAC	RM699BV-3011-85-1060	60 V DC
PIR6W-1PS-6VDC-R01 ❷	6 V DC	0,3 W	PI6W-1PS-6VDC	RM699BV-3211-85-1005	5 V DC
PIR6W-1PS-12VDC-R01 ❷	12 V DC	0,2 W	PI6W-1PS-12/24VDC	RM699BV-3211-85-1012	12 V DC
PIR6W-1PS-24VDC-R01 ❷	**24 V DC**	**0,3 W**	**PI6W-1PS-12/24VDC**	**RM699BV-3211-85-1024**	**24 V DC**
PIR6W-1PS-36VDC-R01 ❷	36 V DC	0,3 W	PI6W-1PS-36VDC	RM699BV-3211-85-1024	24 V DC
PIR6W-1PS-48VDC-R01 ❷	48 V DC	0,4 W	PI6W-1PS-48VDC	RM699BV-3211-85-1024	24 V DC
PIR6W-1PS-60VDC-R01 ❷	60 V DC	0,5 W	PI6W-1PS-60VDC	RM699BV-3211-85-1024	24 V DC
PIR6W-1PS-24VAC/DC-R01 ❷	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6W-1PS-24VAC/DC**	**RM699BV-3211-85-1012**	**12 V DC**
PIR6W-1PS-42VAC/DC-R01 ❷	42 V AC/DC	0,5 VA / 0,4 W	PI6W-1PS-42VAC/DC	RM699BV-3211-85-1024	24 V DC
PIR6W-1PS-115VAC/DC-R01 ❷	115 V AC/DC	1,2 VA / 1,2 W	PI6W-1PS-115VAC/DC	RM699BV-3211-85-1024	24 V DC
PIR6W-1PS-230VAC/DC-R01 ❷ ❹	**230 V AC/DC**	**1,2 VA / 1,2 W**	**PI6W-1PS-230VAC/DC**	**RM699BV-3211-85-1060**	**60 V DC**
PIR6W-1PS-230VAC-R01 ❷	230 V AC	≤ 0,8 VA	PI6W-1PS-230VAC	RM699BV-3211-85-1060	60 V DC
PIR6W-1PS-6VDC-T	6 V DC	0,2 W	PI6W-1PS-6VDC	RSR30-D05-A1-24-020-1	5 V DC
PIR6W-1PS-12VDC-T	12 V DC	0,2 W	PI6W-1PS-12/24VDC	RSR30-D12-A1-24-020-1	12 V DC
PIR6W-1PS-24VDC-T	**24 V DC**	**0,3 W**	**PI6W-1PS-12/24VDC**	**RSR30-D24-A1-24-020-1**	**24 V DC**
PIR6W-1PS-36VDC-T	36 V DC	0,3 W	PI6W-1PS-36VDC	RSR30-D24-A1-24-020-1	24 V DC
PIR6W-1PS-48VDC-T	48 V DC	0,4 W	PI6W-1PS-48VDC	RSR30-D24-A1-24-020-1	24 V DC
PIR6W-1PS-60VDC-T	60 V DC	0,5 W	PI6W-1PS-60VDC	RSR30-D24-A1-24-020-1	24 V DC
PIR6W-1PS-24VAC/DC-T	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6W-1PS-24VAC/DC**	**RSR30-D12-A1-24-020-1**	**12 V DC**
PIR6W-1PS-42VAC/DC-T	42 V AC/DC	0,5 VA / 0,4 W	PI6W-1PS-42VAC/DC	RSR30-D24-A1-24-020-1	24 V DC
PIR6W-1PS-115VAC/DC-T	115 V AC/DC	1,0 VA / 1,0 W	PI6W-1PS-115VAC/DC	RSR30-D24-A1-24-020-1	24 V DC
PIR6W-1PS-6VDC-C	6 V DC	0,2 W	PI6W-1PS-6VDC	RSR30-D05-D1-04-025-1	5 V DC
PIR6W-1PS-12VDC-C	12 V DC	0,2 W	PI6W-1PS-12/24VDC	RSR30-D12-D1-04-025-1	12 V DC
PIR6W-1PS-24VDC-C	**24 V DC**	**0,3 W**	**PI6W-1PS-12/24VDC**	**RSR30-D24-D1-04-025-1**	**24 V DC**
PIR6W-1PS-36VDC-C	36 V DC	0,3 W	PI6W-1PS-36VDC	RSR30-D24-D1-04-025-1	24 V DC
PIR6W-1PS-48VDC-C	48 V DC	0,4 W	PI6W-1PS-48VDC	RSR30-D24-D1-04-025-1	24 V DC
PIR6W-1PS-60VDC-C	60 V DC	0,5 W	PI6W-1PS-60VDC	RSR30-D24-D1-04-025-1	24 V DC
PIR6W-1PS-24VAC/DC-C	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6W-1PS-24VAC/DC**	**RSR30-D12-D1-04-025-1**	**12 V DC**
PIR6W-1PS-42VAC/DC-C	42 V AC/DC	0,5 VA / 0,4 W	PI6W-1PS-42VAC/DC	RSR30-D24-D1-04-025-1	24 V DC
PIR6W-1PS-115VAC/DC-C	115 V AC/DC	1,0 VA / 1,0 W	PI6W-1PS-115VAC/DC	RSR30-D24-D1-04-025-1	24 V DC
PIR6W-1PS-230VAC/DC-C ❹	**230 V AC/DC**	**1,0 VA / 1,0 W**	**PI6W-1PS-230VAC/DC**	**RSR30-D48-D1-04-025-1**	**48 V DC**
PIR6W-1PS-230VAC-C	230 V AC	≤ 0,8 VA	PI6W-1PS-230VAC	RSR30-D48-D1-04-025-1	48 V DC
PIR6W-1PS-6VDC-O	6 V DC	0,2 W	PI6W-1PS-6VDC	RSR30-D05-D1-02-040-1	5 V DC
PIR6W-1PS-12VDC-O	12 V DC	0,2 W	PI6W-1PS-12/24VDC	RSR30-D12-D1-02-040-1	12 V DC
PIR6W-1PS-24VDC-O	**24 V DC**	**0,3 W**	**PI6W-1PS-12/24VDC**	**RSR30-D24-D1-02-040-1**	**24 V DC**
PIR6W-1PS-36VDC-O	36 V DC	0,3 W	PI6W-1PS-36VDC	RSR30-D24-D1-02-040-1	24 V DC
PIR6W-1PS-48VDC-O	48 V DC	0,4 W	PI6W-1PS-48VDC	RSR30-D24-D1-02-040-1	24 V DC
PIR6W-1PS-60VDC-O	60 V DC	0,5 W	PI6W-1PS-60VDC	RSR30-D24-D1-02-040-1	24 V DC
PIR6W-1PS-24VAC/DC-O	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6W-1PS-24VAC/DC**	**RSR30-D12-D1-02-040-1**	**12 V DC**
PIR6W-1PS-42VAC/DC-O	42 V AC/DC	0,5 VA / 0,4 W	PI6W-1PS-42VAC/DC	RSR30-D24-D1-02-040-1	24 V DC
PIR6W-1PS-115VAC/DC-O	115 V AC/DC	1,0 VA / 1,0 W	PI6W-1PS-115VAC/DC	RSR30-D24-D1-02-040-1	24 V DC
PIR6W-1PS-230VAC/DC-O ❹	**230 V AC/DC**	**1,0 VA / 1,0 W**	**PI6W-1PS-230VAC/DC**	**RSR30-D48-D1-02-040-1**	**48 V DC**
PIR6W-1PS-230VAC-O	230 V AC	≤ 0,8 VA	PI6W-1PS-230VAC	RSR30-D48-D1-02-040-1	48 V DC

The data in bold type relate to the standard versions of the relays. ❷ Version with gold-plated contacts. ❹ For versions 230VAC/DC: the distance of min. 5 mm between the mounting relays. ❺ It shall be remarked that rated input voltage of the operational relay U_s not always complies with the rated input voltage U_n (which is important on ordering operational relays for sockets).

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RM699BV + PI6WB-1PS-...

RSR30 + PI6WB-1PS-...

- Width 6,2 mm • Interface relay **PIR6WB-1PS-...** consists of: spring terminals ❶ universal socket, with electronic **PI6WB-1PS-...**, miniature operational relay - electromagnetic **RM699BV** or solid state **RSR30** ❷
- 35 mm rail mount acc. to PN-EN 60715 • May be linked with interconnection strip type **ZG20** • Equipped in LED green • Version for long control lines, with anti-interference filter (**PIR6WB-1P-230V...-10** ❹)
- Accessories: description plates **PI6W-1246**
- Recognitions, certifications, directives: RoHS,

Output circuit (RM699BV) - contact data ❷

Number and type of contacts (code of output)		1 CO (R) ❺	1 CO (R01) ❺
Contact material		**$AgSnO_2$**	$AgSnO_2$/Au hard gold plating ❸
Max. switching voltage		400 V AC / 250 V DC	30 V AC / 36 V DC ❸
Min. switching voltage	AC / DC	10 V	5 V
Rated load	AC1	6 A / 250 V AC	0,05 A / 30 V AC ❸
	DC1	6 A / 30 V DC; 0,15 A / 250 V DC	0,05 A / 36 V DC ❸
Min. switching current		100 mA	10 mA
Max. inrush current		10 A 20 ms	0,1 A 20 ms ❸
Rated current		6 A	0,05 A ❸
Max. breaking capacity	AC1	1 500 VA	1,2 VA ❸
Min. breaking capacity		1 W	0,05 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V	≤ 30 mΩ 10 mA, 5 V
Max. operating frequency			
• at rated load	AC1	360 cycles/hour	
• no load		72 000 cycles/hour	

Output circuit (RSR30) - output data ❷

Type of output (code of output)		Triac (T) ❺ max. 2 A	Transistor (C) ❺ max. 1 A	Transistor (O) ❺ max. 2 A
Number and type of outputs		1 NO	1 NO	1 NO
Rated voltage		240 V AC	48 V DC	24 V DC
Max. output voltage		280 V AC	60 V DC	32 V DC
Min. output voltage		12 V AC	1,5 V DC	1,5 V DC
Rated continuous output current	AC1	1 A		
	DC1		1 A	2 A
Min. making capacity current		50 mA	1 mA	1 mA
Max. off-state leakage current (rest condition)		1,5 mA	1 mA	1 mA
Max. on-state voltage drop on the connection (operating state)		1,2 V	0,4 V	0,24 V
Operating switching frequency			10 Hz	10 Hz

Input circuit

Rated voltage	50/60 Hz AC	230 V	
	DC	6 ... 60 V	
	AC: 50/60 Hz AC/DC	24 ... 230 V	
Must release voltage		AC: ≥ 0,2 U_n	AC: ≥ 0,1 U_n 230 V AC
		AC: ≥ 0,35 U_n 230 V AC ❹	AC: ≥ 0,35 U_n 230 V AC/DC ❹
		DC: ≥ 0,1 U_n	
Operating range of supply voltage		0,8...1,2 U_n	0,85...1,2 U_n 6 V DC
Must operate voltage		AC: ≤ 0,8 U_n	AC: 0,6...0,85 U_n ❹
		DC: ≤ 0,8 U_n	DC: ≤ 0,85 U_n 6 V DC
Rated power consumption	AC	≤ 0,8 ... 0,9 VA	
	DC	0,2 ... 0,5 W	
	AC/DC	0,5 ... 1,2 VA / 0,4 ... 1,2 W	
Max. length of control line		≤ 300 m	AC control voltage ❹

The data in bold type relate to the standard versions of the relays. ❶ Spring fixing terminals for electric wires (cage springs CAGE CLAMP® - is the registered trademark of WAGO Kontakttechnik GmbH & Co. KG, Germany). ❷ Characteristics of the contact capacity of relays **PIR6WB-1PS-... with RM699BV** - see page 80; **PIR6WB-1PS-... with RSR30** - see www.relpol.com.pl ❸ For gold-plated contacts - when the maximum values given have been exceeded, the gold layer is destroyed. Then, the advantages of gold-plating disappear and the values are as for $AgSnO_2$ contacts (see beside), and electrical life of these contacts may be shorter than of normal contacts. ❹ Refers version for long control lines (max. 300 m) **PIR6WB-1P-230V...-10** - relay which includes the socket **PI6WB-1P-230V...-10** with integrated anti-interference filter (desigend on the basis of appropriately selected elements R and C, and Zener diode), resistant to occurrence of induced voltages in long distances of control wires, and operational miniature relay **RM699BV-3011-85-1060**. ❺ Type of outputs: **R** - contacts $AgSnO_2$; **R01** - contacts $AgSnO_2$/Au hard gold plating; **T** - triac; **C** - transistor; **O** - transistor.

Insulation according to PN-EN 60664-1

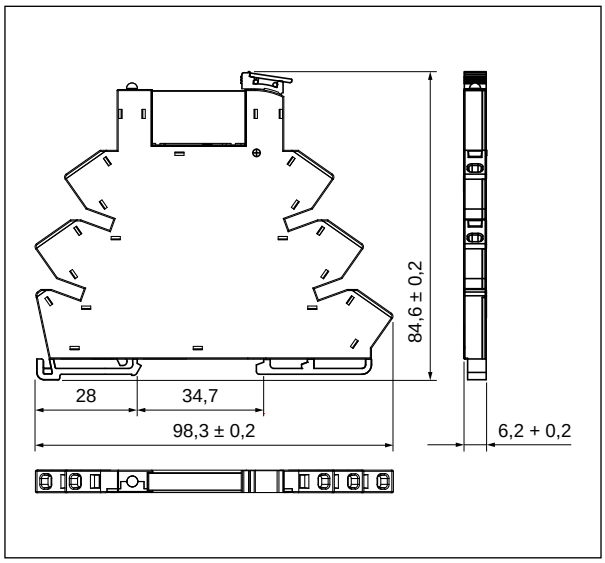
Insulation rated voltage		250 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3
Dielectric strength	• input - output	4 000 V AC 50/60 Hz, 1 min., type of insulation: reinforced
	• input - output	6 000 V 1,2 / 50 µs
	• mass - input, output	2 500 V AC 50/60 Hz, 1 min.
	• contact clearance	1 000 V AC 50/60 Hz, 1 min., output R and R01, type of clearance: micro-disconnection
Input - output distance		clearance / creepage: ≥ 6 mm / ≥ 8 mm
Mass - output distance		clearance / creepage: ≥ 3 mm / ≥ 4 mm

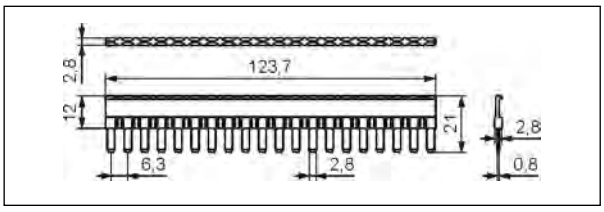
General data

Operating time (typical value)		PIR6WB-1PS-...-R/-R01: DC: 8 ms AC, AC/DC: 20 ms PIR6WB-1PS-...-T: DC: 100 µs AC, AC/DC: 10 ms PIR6WB-1PS-...-C/-O: DC: 50 µs AC, AC/DC: 10 ms
Release time (typical value)		PIR6WB-1PS-...-R/-R01: DC: 10 ms AC, AC/DC: 25 ms (18 ms ❹) PIR6WB-1PS-...-T: DC: 1/2 cycle + 1 ms AC, AC/DC: 30 ms PIR6WB-1PS-...-C/-O: DC: 600 µs AC, AC/DC: 20 ms
Electrical life	• resistive AC1	PIR6WB-1PS-...-R: > 0,5 x 10^5 6 A, 250 V AC
Mechanical life (cycles)		PIR6WB-1PS-...-R/-R01: > 10^7
Dimensions (L x W x H)		98,3 x 6,2 x 84,6 mm
Weight		55 g
Ambient temperature	• storage	PIR6WB-1PS-...-R/-R01/-T: -40...+70 °C ...-C/-O: -25...+70 °C PIR6WB-1P-230V...-10 ❹: -25...+70 °C
	• operating	PIR6WB-1PS-...-R/-R01: -40...+55 °C ...-T/-C/-O: -25...+55 °C PIR6WB-1PS-230VAC/DC-R/-R01/-C/-O: -25...+50 °C ❻ PIR6WB-1P-230V...-10 ❹: -25...+50 °C ❻
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance		10 g
Vibration resistance		5 g 10...500 Hz

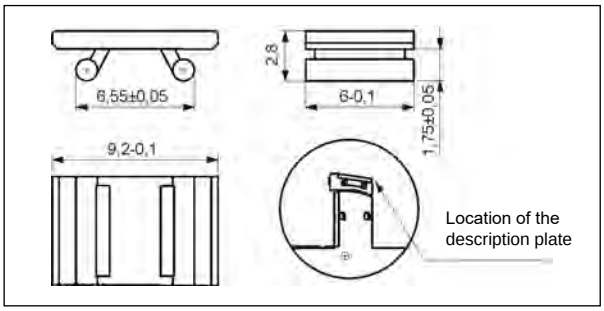
❹ Version for long control lines (max. 300 m), with anti-interference filter.
❻ For versions 230VAC/DC and 230VAC/DC-10: the distance of min. 5 mm between the mounting relays.

Dimensions





Interconnection strip type **ZG20**



Description plate **PI6W-1246**

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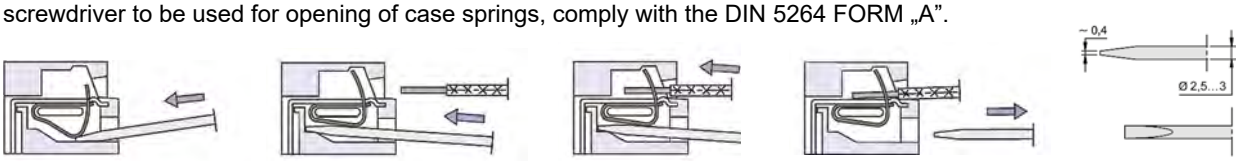
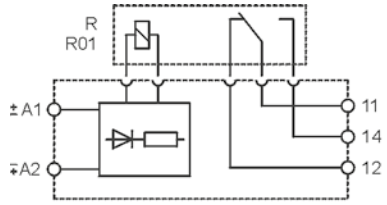
Wire connection

The drawings present the sequence of operations in course of inserting wires to the spring terminal, and the recommended screwdriver to be used for opening of case springs, comply with the DIN 5264 FORM „A".

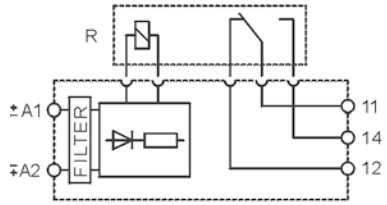


Connection diagrams

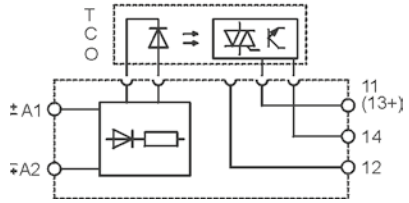
PIR6WB-1PS-...-R, PIR6WB-1PS-...-R01



PIR6WB-1P-230V...-10



PIR6WB-1PS-...-T, PIR6WB-1PS-...-C, PIR6WB-1PS-...-O



Ordering codes

Ordering codes **PIR6WB-1PS-...** are specified in Table 1, "Interface relay code" column.

Montaż

Relays **PIR6WB-1PS-...** ❻ are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 0,22...2,5 mm² (1 x 24...14 AWG), length of the cable deinsulation: 9 mm. Interface relay **PIR6WB-1PS-...** consists of: spring terminals universal socket, with electronic **PI6WB-1PS-...**, miniature operational relay - electromagnetic **RM699BV** or solid state **RSR30** ❺.

PIR6WB-1PS-... may be linked with interconnection strip type **ZG20**. Strip **ZG20** bridges common input or output signals, maximum permissible current is 36 A / 250 V AC. Colours of strips: **ZG20-1** red, **ZG20-2** black, **ZG20-3** blue. Description plates of **PI6W-1246** type are offered for **PIR6WB-1PS-...** relays; they are delivered with the relays, not mounted.

❺ Type of outputs: **R** - contacts $AgSnO_2$; **R01** - contacts $AgSnO_2$/Au hard gold plating; **T** - triac; **C** - transistor; **O** - transistor. ❻ For versions 230VAC/DC and 230VAC/DC-10: the distance of min. 5 mm between the mounting relays.

PI6WB-1PS-...

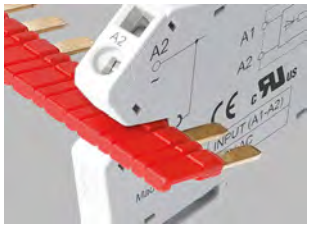
RM699BV

RSR30

ZG20

PI6W-1246

Green LED: signalling the operation status of the relay.



Interconnection strip ZG20: bridging of common input or output signals.

Movable ejector: protection and easy replacement of the operational relay.

Table of codes Table 1

Interface relay code	Rated input voltage Un ❼	Power of input circuit	Socket code	Operational relay code	Rated voltage of operational relay Us ❼
PIR6WB-1PS-6VDC-R	6 V DC	0,3 W	PI6WB-1PS-6VDC	RM699BV-3011-85-1005	5 V DC
PIR6WB-1PS-12VDC-R	12 V DC	0,2 W	PI6WB-1PS-12/24VDC	RM699BV-3011-85-1012	12 V DC
PIR6WB-1PS-24VDC-R	**24 V DC**	**0,3 W**	**PI6WB-1PS-12/24VDC**	**RM699BV-3011-85-1024**	**24 V DC**
PIR6WB-1PS-36VDC-R	36 V DC	0,3 W	PI6WB-1PS-36VDC	RM699BV-3011-85-1024	24 V DC
PIR6WB-1PS-48VDC-R	48 V DC	0,4 W	PI6WB-1PS-48VDC	RM699BV-3011-85-1024	24 V DC
PIR6WB-1PS-60VDC-R	60 V DC	0,5 W	PI6WB-1PS-60VDC	RM699BV-3011-85-1024	24 V DC
PIR6WB-1PS-24VAC/DC-R	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6WB-1PS-24VAC/DC**	**RM699BV-3011-85-1012**	**12 V DC**
PIR6WB-1PS-42VAC/DC-R	42 V AC/DC	0,5 VA / 0,4 W	PI6WB-1PS-42VAC/DC	RM699BV-3011-85-1024	24 V DC
PIR6WB-1PS-115VAC/DC-R	115 V AC/DC	1,2 VA / 1,2 W	PI6WB-1PS-115VAC/DC	RM699BV-3011-85-1024	24 V DC
PIR6WB-1PS-230VAC/DC-R ❻	**230 V AC/DC**	**1,2 VA / 1,2 W**	**PI6WB-1PS-230VAC/DC**	**RM699BV-3011-85-1060**	**60 V DC**
PIR6WB-1PS-230VAC-R	230 V AC	≤ 0,8 VA	PI6WB-1PS-230VAC	RM699BV-3011-85-1060	60 V DC
PIR6WB-1P-230VAC/DC-10 ❹ ❻	230 V AC/DC	2,1 VA / 1,0 W	PI6WB-1P-230VAC/DC-10	RM699BV-3011-85-1060	60 V DC
PIR6WB-1P-230VAC-10 ❹	230 V AC	≤ 0,9 VA	PI6WB-1P-230VAC-10	RM699BV-3011-85-1060	60 V DC
PIR6WB-1PS-6VDC-R01 ❸	6 V DC	0,3 W	PI6WB-1PS-6VDC	RM699BV-3211-85-1005	5 V DC
PIR6WB-1PS-12VDC-R01 ❸	12 V DC	0,2 W	PI6WB-1PS-12/24VDC	RM699BV-3211-85-1012	12 V DC
PIR6WB-1PS-24VDC-R01 ❸	**24 V DC**	**0,3 W**	**PI6WB-1PS-12/24VDC**	**RM699BV-3211-85-1024**	**24 V DC**
PIR6WB-1PS-36VDC-R01 ❸	36 V DC	0,3 W	PI6WB-1PS-36VDC	RM699BV-3211-85-1024	24 V DC
PIR6WB-1PS-48VDC-R01 ❸	48 V DC	0,4 W	PI6WB-1PS-48VDC	RM699BV-3211-85-1024	24 V DC
PIR6WB-1PS-60VDC-R01 ❸	60 V DC	0,5 W	PI6WB-1PS-60VDC	RM699BV-3211-85-1024	24 V DC
PIR6WB-1PS-24VAC/DC-R01 ❸	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6WB-1PS-24VAC/DC**	**RM699BV-3211-85-1012**	**12 V DC**
PIR6WB-1PS-42VAC/DC-R01 ❸	42 V AC/DC	0,5 VA / 0,4 W	PI6WB-1PS-42VAC/DC	RM699BV-3211-85-1024	24 V DC
PIR6WB-1PS-115VAC/DC-R01 ❸	115 V AC/DC	1,2 VA / 1,2 W	PI6WB-1PS-115VAC/DC	RM699BV-3211-85-1024	24 V DC
PIR6WB-1PS-230VAC/DC-R01 ❸ ❻	**230 V AC/DC**	**1,2 VA / 1,2 W**	**PI6WB-1PS-230VAC/DC**	**RM699BV-3211-85-1060**	**60 V DC**
PIR6WB-1PS-230VAC-R01 ❸	230 V AC	≤ 0,8 VA	PI6WB-1PS-230VAC	RM699BV-3211-85-1060	60 V DC
PIR6WB-1PS-6VDC-T	6 V DC	0,2 W	PI6WB-1PS-6VDC	RSR30-D05-A1-24-020-1	5 V DC
PIR6WB-1PS-12VDC-T	12 V DC	0,2 W	PI6WB-1PS-12/24VDC	RSR30-D12-A1-24-020-1	12 V DC
PIR6WB-1PS-24VDC-T	**24 V DC**	**0,3 W**	**PI6WB-1PS-12/24VDC**	**RSR30-D24-A1-24-020-1**	**24 V DC**
PIR6WB-1PS-36VDC-T	36 V DC	0,3 W	PI6WB-1PS-36VDC	RSR30-D24-A1-24-020-1	24 V DC
PIR6WB-1PS-48VDC-T	48 V DC	0,4 W	PI6WB-1PS-48VDC	RSR30-D24-A1-24-020-1	24 V DC
PIR6WB-1PS-60VDC-T	60 V DC	0,5 W	PI6WB-1PS-60VDC	RSR30-D24-A1-24-020-1	24 V DC
PIR6WB-1PS-24VAC/DC-T	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6WB-1PS-24VAC/DC**	**RSR30-D12-A1-24-020-1**	**12 V DC**
PIR6WB-1PS-42VAC/DC-T	42 V AC/DC	0,5 VA / 0,4 W	PI6WB-1PS-42VAC/DC	RSR30-D24-A1-24-020-1	24 V DC
PIR6WB-1PS-115VAC/DC-T	115 V AC/DC	1,0 VA / 1,0 W	PI6WB-1PS-115VAC/DC	RSR30-D24-A1-24-020-1	24 V DC
PIR6WB-1PS-6VDC-C	6 V DC	0,2 W	PI6WB-1PS-6VDC	RSR30-D05-D1-04-025-1	5 V DC
PIR6WB-1PS-12VDC-C	12 V DC	0,2 W	PI6WB-1PS-12/24VDC	RSR30-D12-D1-04-025-1	12 V DC
PIR6WB-1PS-24VDC-C	**24 V DC**	**0,3 W**	**PI6WB-1PS-12/24VDC**	**RSR30-D24-D1-04-025-1**	**24 V DC**
PIR6WB-1PS-36VDC-C	36 V DC	0,3 W	PI6WB-1PS-36VDC	RSR30-D24-D1-04-025-1	24 V DC
PIR6WB-1PS-48VDC-C	48 V DC	0,4 W	PI6WB-1PS-48VDC	RSR30-D24-D1-04-025-1	24 V DC
PIR6WB-1PS-60VDC-C	60 V DC	0,5 W	PI6WB-1PS-60VDC	RSR30-D24-D1-04-025-1	24 V DC
PIR6WB-1PS-24VAC/DC-C	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6WB-1PS-24VAC/DC**	**RSR30-D12-D1-04-025-1**	**12 V DC**
PIR6WB-1PS-42VAC/DC-C	42 V AC/DC	0,5 VA / 0,4 W	PI6WB-1PS-42VAC/DC	RSR30-D24-D1-04-025-1	24 V DC
PIR6WB-1PS-115VAC/DC-C	115 V AC/DC	1,0 VA / 1,0 W	PI6WB-1PS-115VAC/DC	RSR30-D24-D1-04-025-1	24 V DC
PIR6WB-1PS-230VAC/DC-C ❻	**230 V AC/DC**	**1,0 VA / 1,0 W**	**PI6WB-1PS-230VAC/DC**	**RSR30-D48-D1-04-025-1**	**48 V DC**
PIR6WB-1PS-230VAC-C	230 V AC	≤ 0,8 VA	PI6WB-1PS-230VAC	RSR30-D48-D1-04-025-1	48 V DC
PIR6WB-1PS-6VDC-O	6 V DC	0,2 W	PI6WB-1PS-6VDC	RSR30-D05-D1-02-040-1	5 V DC
PIR6WB-1PS-12VDC-O	12 V DC	0,2 W	PI6WB-1PS-12/24VDC	RSR30-D12-D1-02-040-1	12 V DC
PIR6WB-1PS-24VDC-O	**24 V DC**	**0,3 W**	**PI6WB-1PS-12/24VDC**	**RSR30-D24-D1-02-040-1**	**24 V DC**
PIR6WB-1PS-36VDC-O	36 V DC	0,3 W	PI6WB-1PS-36VDC	RSR30-D24-D1-02-040-1	24 V DC
PIR6WB-1PS-48VDC-O	48 V DC	0,4 W	PI6WB-1PS-48VDC	RSR30-D24-D1-02-040-1	24 V DC
PIR6WB-1PS-60VDC-O	60 V DC	0,5 W	PI6WB-1PS-60VDC	RSR30-D24-D1-02-040-1	24 V DC
PIR6WB-1PS-24VAC/DC-O	**24 V AC/DC**	**0,5 VA / 0,4 W**	**PI6WB-1PS-24VAC/DC**	**RSR30-D12-D1-02-040-1**	**12 V DC**
PIR6WB-1PS-42VAC/DC-O	42 V AC/DC	0,5 VA / 0,4 W	PI6WB-1PS-42VAC/DC	RSR30-D24-D1-02-040-1	24 V DC
PIR6WB-1PS-115VAC/DC-O	115 V AC/DC	1,0 VA / 1,0 W	PI6WB-1PS-115VAC/DC	RSR30-D24-D1-02-040-1	24 V DC
PIR6WB-1PS-230VAC/DC-O ❻	**230 V AC/DC**	**1,0 VA / 1,0 W**	**PI6WB-1PS-230VAC/DC**	**RSR30-D48-D1-02-040-1**	**48 V DC**
PIR6WB-1PS-230VAC-O	230 V AC	≤ 0,8 VA	PI6WB-1PS-230VAC	RSR30-D48-D1-02-040-1	48 V DC

The data in bold type relate to the standard versions of the relays. ❸ Version with gold-plated contacts. ❹ Version for long control lines (max. 300 m), with anti-interference filter. ❻ For versions 230VAC/DC and 230VAC/DC-10: the distance of min. 5 mm between the mounting relays. ❼ It shall be remarked that rated input voltage of the operational relay Us not always complies with the rated input voltage Un (which is important on ordering operational relays for sockets).

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Relays
installation

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Electromagnetic relays of the MT-PI-... series in modular covers, designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715.

They meet the requirements of RoHS Directive.
The relays are recognized and certified by:

CE

MT-PI-... 261

MT-PI-...-11-...

MT-PI-...-22-...

- Installation relays - electromagnetic • AC, DC and AC/DC coils
- Cover - modular, width 17,5 mm • Load of AC1 up to 16 A / 250 V (versions 1 CO, 1 NO) and up to 8 A / 250 V (versions 2 CO, 2 NO)
- Light indicator (LED diode) - supply voltage
- Applications: automatic systems in buildings - in cooperation with control timers, switches, control switches; electric systems; industrial automation and power engineering automation; switchgears of modular equipment
- Recognitions, certifications, directives: CE

Contact data

Number and type of contacts			1 CO, 1 NO	2 CO, 2 NO
Contact material			**$AgSnO_2$**	
Max. switching voltage			400 V AC / 300 V DC	
Min. switching voltage			10 V	
Rated load		AC1	16 A / 250 V AC	8 A / 250 V AC
		DC1	16 A / 24 V DC	8 A / 24 V DC
Min. switching current			10 mA	
Max. inrush current			30 A ❶	15 A
Rated current			16 A	8 A
Max. breaking capacity		AC1	4 000 VA	2 000 VA
Min. breaking capacity			1 W	
Contact resistance			≤ 100 mΩ	
Max. operating frequency				
• at rated load		AC1	600 cycles/hour	
• no load			72 000 cycles/hour	

Coil data

Rated voltage	• versions 1 CO, 2 CO	50/60 Hz AC	115 ... 230 V	
		DC	12 ... 48 V	
	• versions 1 NO, 2 NO	50 Hz AC	230 V	
		AC: 50 Hz AC/DC	12 ... 115 V	
Must release voltage			AC: ≥ 0,15 U_n	DC: ≥ 0,05 U_n
Operating range of supply voltage			0,85...1,1 U_n AC: 50/60 Hz	see Tables 2, 3, 4
Rated power consumption	• versions 1 CO, 2 CO	AC	≤ 1,0 VA	115 V AC, 230 V AC, AC: 50 Hz
		DC	≤ 0,5 W	12 V DC
		DC	≤ 0,65 W	24 V DC, 48 V DC
	• versions 1 NO, 2 NO	AC	≤ 5,5 VA	230 V AC, AC: 50 Hz
		AC/DC	≤ 0,75 VA / 0,75 W	12 V AC/DC, AC: 50 Hz
		AC/DC	≤ 0,65 VA / 0,65 W	24 V AC/DC, 48 V AC/DC, 115 V AC/DC, AC: 50 Hz

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC	
Rated surge voltage		4 000 V	1,2 / 50 µs
Overvoltage category		II	
Insulation pollution degree		1	
Flammability class		contact plate: V-0	cover: V-1 UL94
Dielectric strength	• between coil and contacts	3 000 V AC	contacts 1 CO and 2 CO, type of insulation: basic
		4 000 V AC	contacts 1 NO and 2 NO, type of insulation: reinforced
	• contact clearance	1 000 V AC	type of clearance: micro-disconnection
	• pole - pole	2 000 V AC	contacts 2 CO, type of insulation: basic
		2 500 V AC	contacts 2 NO, type of insulation: basic

General data

Operating / release time (typical values)		15 ms / 20 ms	
Mechanical life (cycles)		> 10^7	
Dimensions (L x W x H)		90 ❷ x 17,5 x 63,5 mm	
Weight		60 g	65 g
Ambient temperature	• storage	-40...+70 °C	
	• operating	-20...+45 °C	
Cover protection category		IP 20	PN-EN 60529
Relative humidity		up to 90%	
Shock resistance		15 g	
Vibration resistance	(NO/NC)	9 g / 5 g	10...150 Hz

The data in bold type relate to the standard versions of the relays.
❶ UL only for 15 A.
❷ Length with 35 mm rail taps: 98,8 mm.

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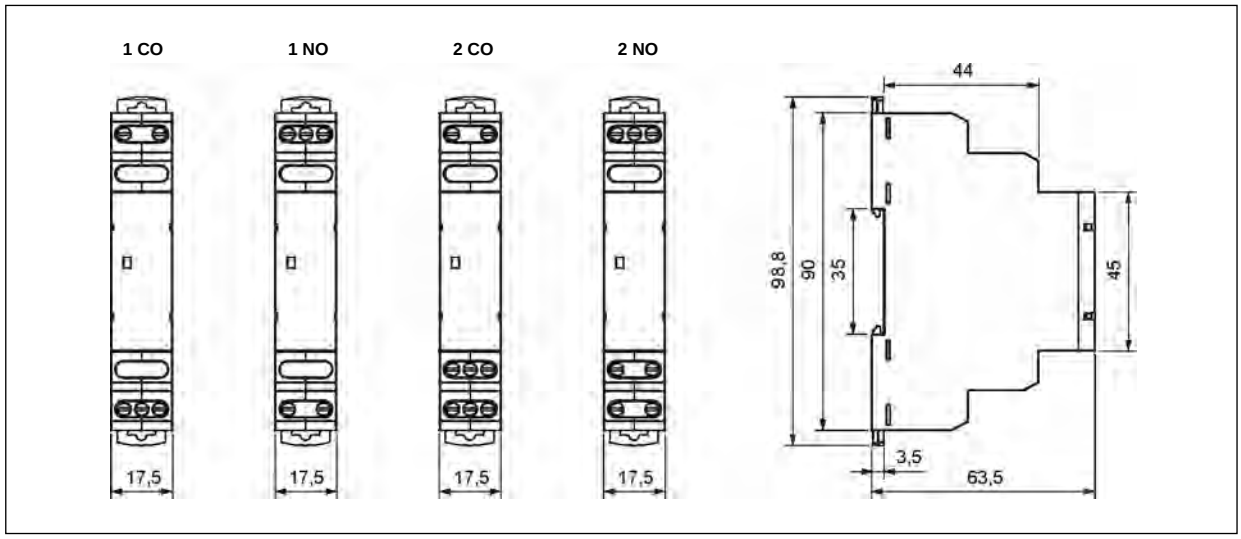
Dimensions



Connection diagrams

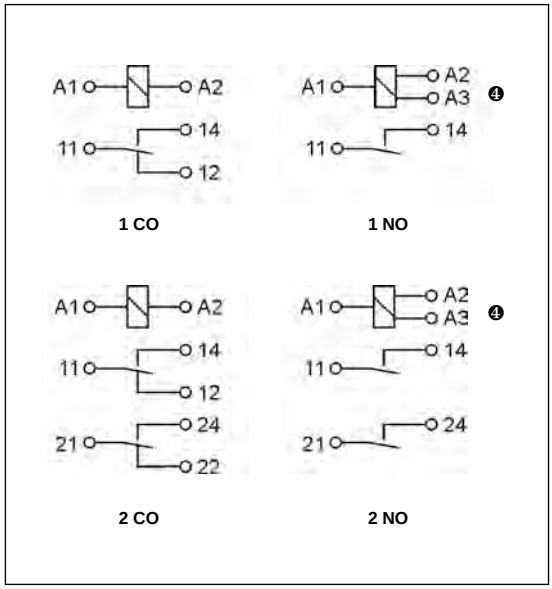


Table of codes

Table 1

Installation relay code		Rated coil voltage
with 1 CO contact	**with 2 CO contacts**	
MT-PI-17S-11-1012	MT-PI-17S-12-1012	12 V DC
MT-PI-17S-11-1024	MT-PI-17S-12-1024	24 V DC
MT-PI-17S-11-1048	MT-PI-17S-12-1048	48 V DC
MT-PI-17S-11-5115	MT-PI-17S-12-5115	115 V AC 50/60 Hz
MT-PI-17S-11-5230	MT-PI-17S-12-5230	230 V AC 50/60 Hz
with 1 NO contact	**with 2 NO contacts**	
MT-PI-17S-21-8012	MT-PI-17S-22-8012	12 V AC/DC
MT-PI-17S-21-8048	MT-PI-17S-22-8048	48 V AC/DC
MT-PI-17S-21-8115	MT-PI-17S-22-8115	115 V AC/DC
MT-PI-17S-21-9024 ❸	MT-PI-17S-22-9024 ❸	24 V AC/DC 230 V AC 50 Hz

❸ Selection of supply voltage via wires connection:
24 V AC/DC - to the terminals A1-A2; 230 V AC - to the terminals A1-A3.

❹ Terminal A3 occurs only in versions MT-PI-17S-21-9024, MT-PI-17S-22-9024; used to supply relays with rated voltage 230 V AC 50 Hz - connection to the terminals A1-A3.

Mounting

Relays **MT-PI-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail, firm tapping (top and bottom).

Green LED:
signalling the operation status of the relay.

Coil data - DC voltage version (1 CO, 2 CO contacts) Table 2

Coil code	Coil operating range V DC	Coil operating range V DC	
		min. (at 20 °C)	max. (at 55 °C)
1012	12	10,2	13,2
1024	24	20,4	26,4
1048	48	40,8	52,8

Coil data - AC 50/60 Hz voltage version (1 CO, 2 CO contacts) Table 3

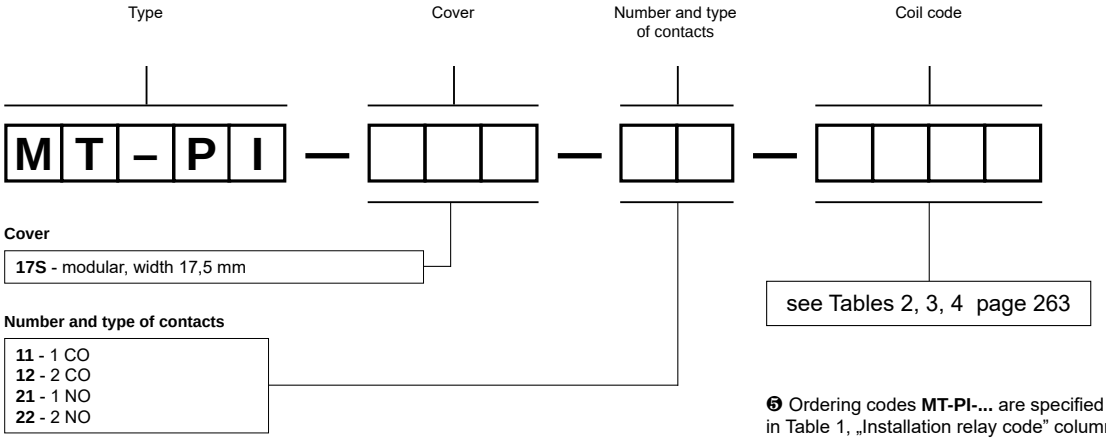
Coil code	Coil operating range V AC	Coil operating range V AC	
		min. (at 20 °C)	max. (at 55 °C)
5115	115	97,8	126,5
5230	230	195,5	253,0

Coil data - AC/DC 50 Hz voltage version (1 NO, 2 NO contacts) Table 4

Coil code	Coil operating range V AC/DC	Coil operating range V AC/DC	
		min. (at 20 °C)	max. (at 55 °C)
8012	12	10,2	13,2
9024 ❸	24 V AC/DC ❸	20,4	26,4
	230 V AC ❸	195,5	253,0
8048	48	40,8	52,8
8115	115	97,8	126,5

❸ Selection of supply voltage via wires connection: 24 V AC/DC - to the terminals A1-A2; 230 V AC - to the terminals A1-A3.

Ordering codes ❺



❺ Ordering codes **MT-PI-...** are specified in Table 1, „Installation relay code" column.

Example of ordering code ❺:

MT-PI-17S-22-9024 relay **MT-PI-...**, cover - modular, width 17,5 mm, two normally open contacts, contact material $AgSnO_2$, coil voltage 230 V AC 50 Hz or 24 V AC/DC AC: 50 Hz ❸

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Relays programmable

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Programmable relays NEED are offered in versions: 8 inputs / 4 relay or transistor outputs, 16 inputs / 8 relay or transistor outputs; with LCD display, without display.

Supply voltages: 12 V DC, 24 V DC, 220 V DC, 230 V AC; programming: LAD, STL; LED signaling the status of the relay and inputs/outputs; designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting.

NEED-MODBUS: communication modules NEED Master / ModBus RTU Slave; designed for cooperation with NEED relays; for direct mounting on 35 mm rail mount acc. to PN-EN 60715.

They meet the requirements of RoHS Directive.
The relays are recognized and certified by:

CE EAC

NEED-...-08-4..... 265
NEED-...-16-8..... 269
NEED-MODBUS 275

NEED-...-22-...-D

NEED-...-11-...

- Programmable relays with LCD display or without display, exceptional simplicity of programming in language LAD and STL - page 273
- 8 inputs: AC or DC voltages • 4 outputs: relay or transistor
- LED signaling the status of the relay and inputs/outputs • Cooperation with communication modules NEED-MODBUS • Mounting on 35 mm rail mount or on panel mounting • Control of applications - page 274
- Compliance with standards PN-EN 61131-2, PN-EN 50178
- Recognitions, certifications, directives: CE EAC

Supply voltage

Rated supply voltage	50/60 Hz AC	230 V		
	DC	12 V, 24 V, 220 V		
Operating range of supply voltage		230 V AC: 95...260 V AC	12 V DC: 10,2...14,4 V DC	
		24 V DC: 19,6...28,8 V DC	220 V DC: 154...242 V DC	
Rated power consumption	AC	< 8,0 VA		
	DC	< 3,0 W		
Range of supply frequency	AC	47...63 Hz		

Inputs

Number of digital inputs		6 (I1 - I6)		
Number and type of analog-digital inputs		2 (I7 - I8)	AC or DC voltage	
Rated voltage	• for logic state „1”	230 V AC: 85...260 V AC 50 Hz	12 V DC: 8...26 V DC	
		24 V DC: 15...40 V DC	220 V DC: 80...260 V DC	
	• for logic state „0”	230 V AC: 0...40 V AC 50 Hz	12 V DC: -1,5...4 V DC	
		24 V DC: -3...5 V DC	220 V DC: 0...40 V DC	
Input current for logic state „1” ❶		230 V AC: 0,6 mA (I1 - I4)	8,0 mA (I5 - I6)	0,9 mA (I7 - I8)
		12 V DC: 3,3 mA (I1 - I6)		1,1 mA (I7 - I8)
		24 V DC: 3,3 mA (I1 - I6)		2,0 mA (I7 - I8)
		220 V DC: 0,6 mA (I1 - I6)	1,1 mA (I7 - I8)	
Range of analog input signals		230 V AC: 0...255 V AC 50 Hz		
		12 V DC, 24 V DC: 0...12,75 / 0...25,5 V DC		
		220 V DC: 0...255 V DC		

Outputs

Number and type of outputs		relay: 4 NO (Q1 - Q4) ❷	
		transistor: 4 NO (Q1 - Q4) ❸	
Max. voltage		250 V AC ❷, 30 V DC ❸	
Min. voltage		10 V ❷	
Rated load	AC1	10 A / 250 V AC ❷	
	DC1	0,5 A / 24 V DC ❸	
Min. current		10 mA ❷	1 mA ❸
Resistance		≤ 100 mΩ ❷	

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC	
Rated surge voltage		
• inputs - outputs	2 500 V	1,2 / 50 µs
Overvoltage category	II	
Insulation pollution degree	2	
Dielectric strength		
• inputs - outputs	2 000 V AC	type of insulation: reinforced
• contact clearance	1 000 V AC	type of clearance: micro-disconnection ❷

General data

Operating / release time (typical values)	7 ms / 3 ms ❷	
Electrical life		
• resistive AC1	> 0,7 x 10^5	10 A, 250 V AC ❷
• DC L/R=40 ms	> 10^5	0,15 A, 220 V DC ❷
Mechanical life (cycles)	> 3 x 10^7	
Dimensions (L x W x H)	90 x 72 x 55 mm	
Weight	max. 250 g	
Ambient temperature • storage	-40...+70 °C	
Ambient temperature • operating	-20...+55 °C	
Cover protection category	IP 20	PN-EN 60529

❶ At rated voltage U_n. ❷ Versions with unprotected relay outputs. ❸ Version 24 V DC with protected transistor outputs: max. off-state leakage current < 0,1mA; max. on-state voltage drop on the connection < 2,5 V.

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Physical resources

Mode switch	STOP/RUN
LCD display ❹	preview of variables, illuminated, of high contrast (4 lines 12 characters each)
Keyboard ❹	set of program parameters
Programmable function buttons ❹	4 (B1 - B4)
LED indicators	LED three-coloured - relay status (green: RUN, yellow: STOP, red: ERROR) yellow LEDs - output status green LEDs - input status
Internal potentiometer ❺	for analog value setting
Real time RTC clock	with automatic time change summer / winter for various time zones (EU, GB, US, RU)
Connection with stopper	for relay programming and external memory card connection

Program resources

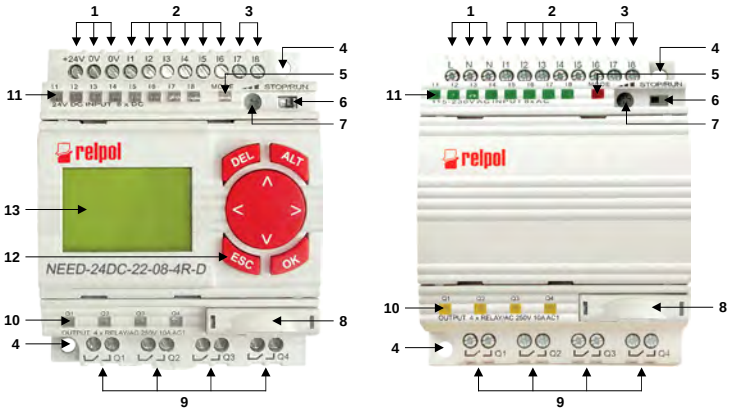
Timers ❻	NEED-...-22-...-D: 32 (T1 - T32) NEED-...-11-...: 8 (T1 - T8) time range 10 ms...99 h 59 min., resolution 10 ms, accuracy ±1% of the set value +0...1 ms
Bidirectional counters ❻	8 (C1 - C8), values 0-65535
Fast bidirectional counter / meter ❹	measurement of frequency up to 20 kHz (digital input I4)
Clocks	NEED-...-22-...-D: 8 (H1 - H8) NEED-...-11-...: 4 (H1 - H4)
Comparators of analog values	NEED-...-22-...-D: 16 (A1 - A16) NEED-...-11-...: 8 (A1 - A8)
Markers	NEED-...-22-...-D: 64 (M1 - M64) NEED-...-11-...: 16 (M1 - M16)
Text markers ❹	8 (MT1 - MT8)

System structure

NEED-...	programmable relay (see „Table of codes”)
NEED-PC-15B (RS232) NEED-PC-15C (USB)	cables for programming and diagnostics, for connection to PC computer
NEED-M-4KB (NEED-...-22-...-D) NEED-M-1KB (NEED-...-11-...)	external memory cards (4 kB or 1 kB) ❼
PC NEED	software for editing, compiling, programming of the relay and the external memory card (language: graphic LAD and text STL), user’s manual: www.need.com.pl
NEED-MODBUS	communication module NEED Master / ModBus RTU Slave

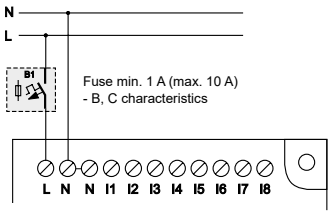
❹ Only for NEED-...-22-...-D ❺ For versions 12 V DC, 24 V DC: possibility of connecting external potentiometer. ❻ Possibility of configuration from analog inputs. ❼ The external memory card is not required and is an optional extension of the relay program memory.

Front panel description



1 Supply terminals
2 Digital input terminals
3 Analog-digital input terminals
4 Openings of 5,5 mm diameter for panel mounting with two M4 screws
5 LED indicator (three-coloured) of the relay status
6 STOP/RUN mode switch
7 Potentiometer for analog value setting
8 Relay programming and external memory card connection, secured by stopper
9 Output terminals
10 LED indicators (yellow) of output status
11 LED indicators (green) of input status
12 Keyboard
13 LCD display

Connection diagram - supply connection



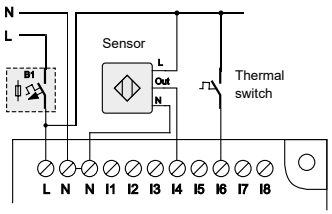
NEED-230AC-..-08-4R-.
230 V AC 50/60 Hz (95...260 V AC), L = 230 V AC, N = 0 V

NEED-12DC-..-08-4R-.
12 V DC (10,2...14,4 V DC), L = +12 V DC, N = 0 V

NEED-24DC-..-08-4.-.
24 V DC (19,6...28,8 V DC), L = +24 V DC, N = 0 V

NEED-220DC-..-08-4R-.
220 V DC (154...242 V DC), L = +220 V DC, N = 0 V

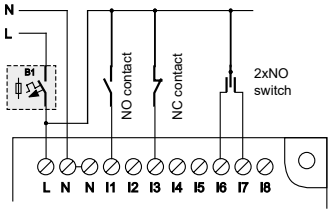
Connection diagrams - digital inputs



NEED-12DC-..-08-4R-. L = +12 V DC, N = 0 V
Logic state „1": 8...26 V DC **I1 - I6**: 3,3 mA, **I7 - I8**: 1,1 mA
Logic state „0": -1,5...4 V DC

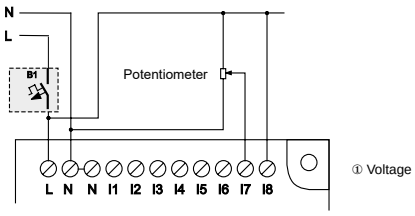
NEED-24DC-..-08-4.-. L = +24 V DC, N = 0 V
Logic state „1": 15...40 V DC **I1 - I6**: 3,3 mA, **I7 - I8**: 2,0 mA
Logic state „0": -3...5 V DC

NEED-220DC-..-08-4R-. L = +220 V DC, N = 0 V
Logic state „1": 80...260 V DC **I1 - I6**: 0,6 mA, **I7 - I8**: 1,1 mA
Logic state „0": 0...40 V DC



NEED-230AC-..-08-4R-. L = 230 V AC, N = 0 V
Logic state „1": 85...260 V AC 50 Hz **I1 - I4**: 0,6 mA
I5 - I6: 8,0 mA
I7 - I8: 0,9 mA
Logic state „0": 0...40 V AC 50 Hz

Connection diagram - analog-digital inputs



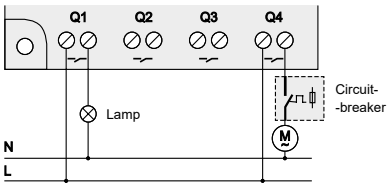
NEED-230AC-..-08-4R-.
0...255 V AC 50 Hz ① **I7 - I8**: 0,9 mA

NEED-12DC-..-08-4R-.
0...12,75 / 0...25,5 V DC ① **I7 - I8**: 1,1 mA

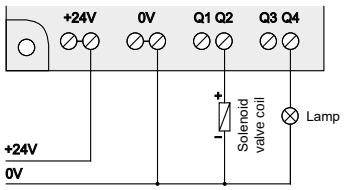
NEED-24DC-..-08-4.-.
0...12,75 / 0...25,5 V DC ① **I7 - I8**: 2,0 mA

NEED-220DC-..-08-4R-.
0...255 V DC ① **I7 - I8**: 1,1 mA

Connection diagrams - digital outputs

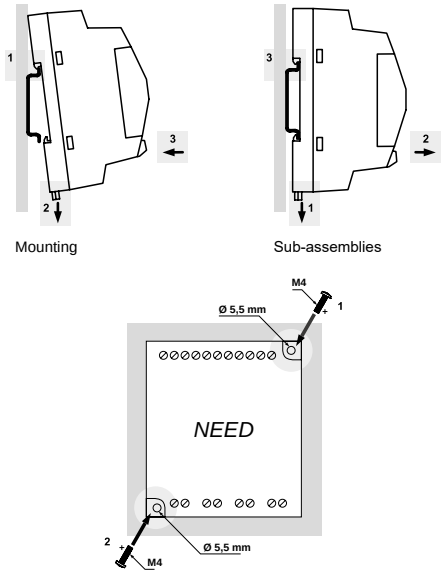


NEED-...-..-08-4R-.
relay outputs Q1 - Q4: 10 A, 250 V AC

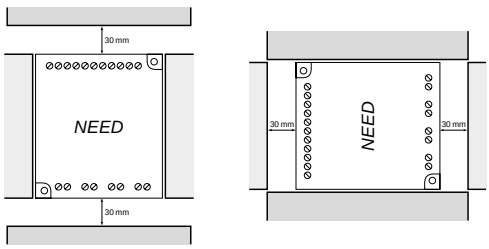


NEED-24DC-..-08-4T-.
transistor outputs Q1 - Q4: 0,5 A, 24 V DC

Mechanical mounting



Any operation position - mounting distances for walls with terminals



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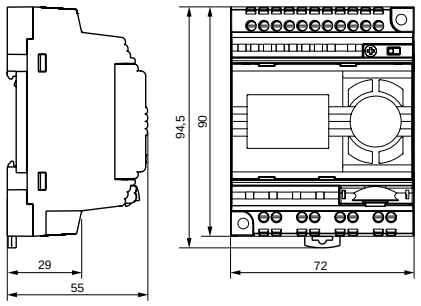
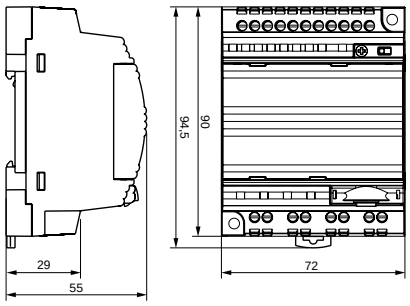
Dimensions



NEED-...-22-...-D



NEED-...-11-...

Mounting, connection to PC computer

Relays **NEED-...-08-4...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M4 screws). Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,0 mm^2 (1 x 14 / 2 x 17 AWG).

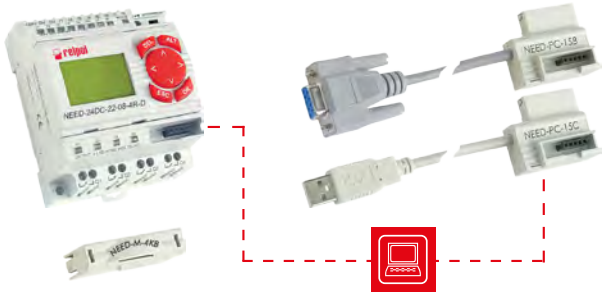


Table of codes

Table 1

Programmable relay code	Supply voltage	Version	Number of inputs	Number and type of outputs	Features
NEED-230AC-22-08-4R-D	230 V AC	22	8	4 relay	LCD display, keyboard
NEED-230AC-11-08-4R	230 V AC	11	8	4 relay	–
NEED-12DC-22-08-4R-D	12 V DC	22	8	4 relay	LCD display, keyboard
NEED-12DC-11-08-4R	12 V DC	11	8	4 relay	–
NEED-24DC-22-08-4R-D	**24 V DC**	**22**	**8**	**4 relay**	**LCD display, keyboard**
NEED-24DC-11-08-4R	**24 V DC**	**11**	**8**	**4 relay**	**–**
NEED-24DC-22-08-4T-D	24 V DC	22	8	4 transistor	LCD display, keyboard
NEED-24DC-11-08-4T	24 V DC	11	8	4 transistor	–
NEED-220DC-22-08-4R-D	220 V DC	22	8	4 relay	LCD display, keyboard
NEED-220DC-11-08-4R	220 V DC	11	8	4 relay	–

The data in bold type relate to the standard versions of the relays.

NEED-...-22-...-D

NEED-...-11-...

- Programmable relays with LCD display or without display, exceptional simplicity of programming in language LAD and STL - page 273
- 16 inputs: AC or DC voltages • 8 outputs: relay or transistor
- LED signaling the status of the relay and inputs/outputs • Cooperation with communication modules NEED-MODBUS • Mounting on 35 mm rail mount or on panel mounting • Control of applications - page 274
- Compliance with standards PN-EN 61131-2, PN-EN 50178
- Recognitions, certifications, directives: CE EAC

Supply voltage

Rated supply voltage	50/60 Hz AC	230 V		
	DC	12 V, 24 V, 220 V		
Operating range of supply voltage		230 V AC: 95...260 V AC	12 V DC: 10,2...14,4 V DC	
		24 V DC: 19,6...28,8 V DC	220 V DC: 154...242 V DC	
Rated power consumption	AC	< 10,0 VA		
	DC	12 V DC, 24 V DC: < 5,0 W	220 V DC: < 6,0 W	
Range of supply frequency	AC	47...63 Hz		

Inputs

Number of digital inputs		13 (I1 - I13)		
Number and type of analog-digital inputs		3 (I14 - I16)	AC or DC voltage ❷	
Rated voltage	• for logic state „1”	230 V AC: 85...260 V AC 50 Hz	12 V DC: 8...26 V DC	
		24 V DC: 15...40 V DC	220 V DC: 80...260 V DC	
	• for logic state „0”	230 V AC: 0...32 V AC 50 Hz	12 V DC: -1,5...4 V DC	
		24 V DC: -3...5 V DC	220 V DC: 0...40 V DC	
Input current for logic state „1” ❶		230 V AC: 0,6 mA (I1 - I11)	8,0 mA (I12 - I13)	1,5 mA (I14 - I16)
		12 V DC: 3,3 mA (I1 - I13)		1,1 mA (I14 - I16)
		24 V DC: 3,3 mA (I1 - I13)		2,0 mA (I14 - I16)
		220 V DC: 0,6 mA (I1 - I13)		1,1 mA (I14 - I16)
Range of analog input signals		230 V AC: 0...255 V AC 50 Hz		
		12 V DC, 24 V DC: 0...12,75 / 0...25,5 V DC		0...25,5 / 0...51 mA ❸
		220 V DC: 0...255 V DC		

Outputs

Number and type of outputs		relay: 8 NO (Q1 - Q8) ❹	
		transistor: 8 NO (Q1 - Q8) ❺	
Max. voltage		250 V AC ❹, 30 V DC ❺	
Min. voltage		10 V ❹	
Rated load	AC1	10 A / 250 V AC ❹	
	DC1	0,5 A / 24 V DC ❺	
Min. current		10 mA ❹	1 mA ❺
Resistance		≤ 100 mΩ ❹	

Insulation according to PN-EN 60664-1

Insulation rated voltage	300 V AC	
Rated surge voltage		
• inputs - outputs	2 500 V	1,2 / 50 µs
Overvoltage category	II	
Insulation pollution degree	2	
Dielectric strength		
• inputs - outputs	2 000 V AC	type of insulation: reinforced
• contact clearance	1 000 V AC	type of clearance: micro-disconnection ❹

General data

Operating / release time (typical values)	7 ms / 3 ms ❹	
Electrical life		
• resistive AC1	> 0,7 x 10^5	10 A, 250 V AC ❹
• DC L/R=40 ms	> 10^5	0,15 A, 220 V DC ❹
Mechanical life (cycles)	> 3 x 10^7	
Dimensions (L x W x H)	90 x 132 x 55 mm	
Weight	max. 413 g	
Ambient temperature • storage	-40...+70 °C	
Ambient temperature • operating	-20...+55 °C	
Cover protection category	IP 20	PN-EN 60529

❶ At rated voltage U_n. ❷ For versions 12 V DC, 24 V DC: it is possible to program configuration the type of inputs as voltage or current ones. ❸ Range for current mode in versions DC. ❹ Versions with unprotected relay outputs. ❺ Version 24 V DC with protected transistor outputs: max. off-state leakage current < 0,1mA; max. on-state voltage drop on the connection < 2,5 V.

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Physical resources

Mode switch	STOP/RUN
LCD display ❻	preview of variables, illuminated, of high contrast (4 lines 12 characters each)
Keyboard ❻	set of program parameters
Programmable function buttons ❻	4 (B1 - B4)
LED indicators	LED three-coloured - relay status (green: RUN, yellow: STOP, red: ERROR) yellow LEDs - output status green LEDs - input status
Internal potentiometer ❼	for analog value setting
Real time RTC clock	with automatic time change summer / winter for various time zones (EU, GB, US, RU)
Connection with stopper	for relay programming and external memory card connection
Three-phase network equipment control system	monitoring of voltage, asymmetry and phase sequence ❽

Program resources

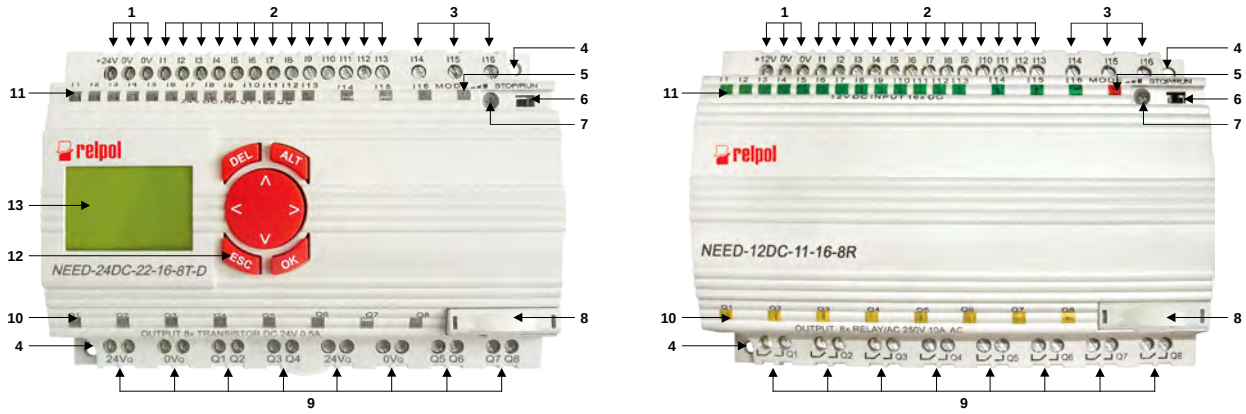
Timers ❾	NEED-...-22-...-D: 32 (T1 - T32) NEED-...-11-...: 16 (T1 - T16) time range 10 ms...99 h 59 min., resolution 10 ms, accuracy ±1% of the set value +0...1 ms
Bidirectional counters ❾	8 (C1 - C8), values 0-65535
Fast bidirectional counter / meter ❻	measurement of frequency up to 20 kHz (digital input I11)
Clocks	NEED-...-22-...-D: 8 (H1 - H8) NEED-...-11-...: 4 (H1 - H4)
Comparators of analog values	NEED-...-22-...-D: 16 (A1 - A16) NEED-...-11-...: 12 (A1 - A12)
Markers	NEED-...-22-...-D: 64 (M1 - M64) NEED-...-11-...: 16 (M1 - M16)
Text markers ❻	8 (MT1 - MT8)
Marker of phase sequence	❽

System structure

NEED-...	programmable relay (see „Table of codes”)
NEED-PC-15B (RS232) NEED-PC-15C (USB)	cables for programming and diagnostics, for connection to PC computer
NEED-M-4KB (NEED-...-22-...-D) NEED-M-1KB (NEED-...-11-...)	external memory cards (4 kB or 1 kB) ❿
PC NEED	software for editing, compiling, programming of the relay and the external memory card (language: graphic LAD and text STL), user’s manual: www.need.com.pl
NEED-MODBUS	communication module NEED Master / ModBus RTU Slave

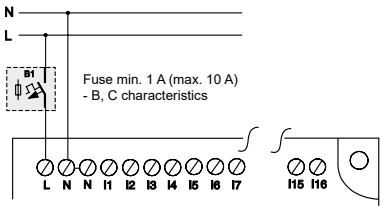
❻ Only for NEED-...-22-...-D ❼ For versions 12 V DC, 24 V DC: possibility of connecting external potentiometer. ❽ Only for version 230 V AC.
❾ Possibility of configuration from analog inputs. ❿ The external memory card is not required and is an optional extension of the relay program memory.

Front panel description



1 Supply terminals
2 Digital input terminals
3 Analog-digital input terminals
4 Openings of 5,5 mm diameter for panel mounting with two M4 screws
5 LED indicator (three-coloured) of the relay status
6 STOP/RUN mode switch
7 Potentiometer for analog value setting
8 Relay programming and external memory card connection, secured by stopper
9 Output terminals
10 LED indicators (yellow) of output status
11 LED indicators (green) of input status
12 Keyboard
13 LCD display

Connection diagram - supply connection



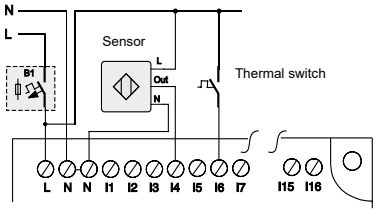
NEED-230AC-..-16-8R-.
230 V AC 50/60 Hz (95...260 V AC), L = 230 V AC, N = 0 V

NEED-12DC-..-16-8R-.
12 V DC (10,2...14,4 V DC), L = +12 V DC, N = 0 V

NEED-24DC-..-16-8.-.
24 V DC (19,6...28,8 V DC), L = +24 V DC, N = 0 V

NEED-220DC-..-16-8R-.
220 V DC (154...242 V DC), L = +220 V DC, N = 0 V

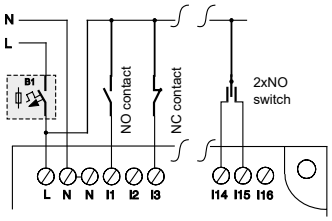
Connection diagrams - digital inputs



NEED-12DC-..-16-8R-. L = +12 V DC, N = 0 V
Logic state „1": 8...26 V DC **I1 - I13**: 3,3 mA, **I14 - I16**: 1,1 mA
Logic state „0": -1,5...4 V DC

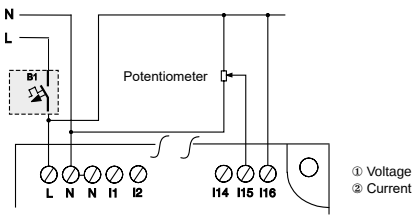
NEED-24DC-..-16-8.-. L = +24 V DC, N = 0 V
Logic state „1": 15...40 V DC **I1 - I13**: 3,3 mA, **I14 - I16**: 2,0 mA
Logic state „0": -3...5 V DC

NEED-220DC-..-16-8R-. L = +220 V DC, N = 0 V
Logic state „1": 80...260 V DC **I1 - I13**: 0,6 mA, **I14 - I16**: 1,1 mA
Logic state „0": 0...40 V DC



NEED-230AC-..-16-8R-. L = 230 V AC, N = 0 V
Logic state „1": 85...260 V AC 50 Hz **I1 - I11**: 0,6 mA
I12 - I13: 8,0 mA
I14 - I16: 1,5 mA
Logic state „0": 0...32 V AC 50 Hz

Connection diagram - analog-digital inputs



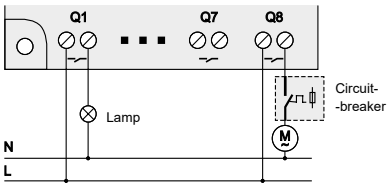
NEED-230AC-..-16-8R-.
0...255 V AC 50 Hz ① **I14 - I16**: 1,5 mA

NEED-12DC-..-16-8R-.
0...12,75 / 0...25,5 V DC ① **I14 - I16**: 1,1 mA
0...25,5 / 0...51 mA ② **I14 - I16**: 1,1 mA

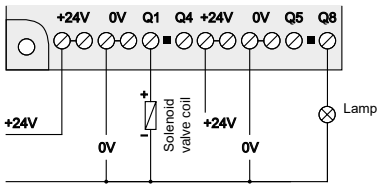
NEED-24DC-..-16-8.-.
0...12,75 / 0...25,5 V DC ① **I14 - I16**: 2,0 mA
0...25,5 / 0...51 mA ② **I14 - I16**: 2,0 mA

NEED-220DC-..-16-8R-.
0...255 V DC ① **I14 - I16**: 1,1 mA

Connection diagrams - digital outputs

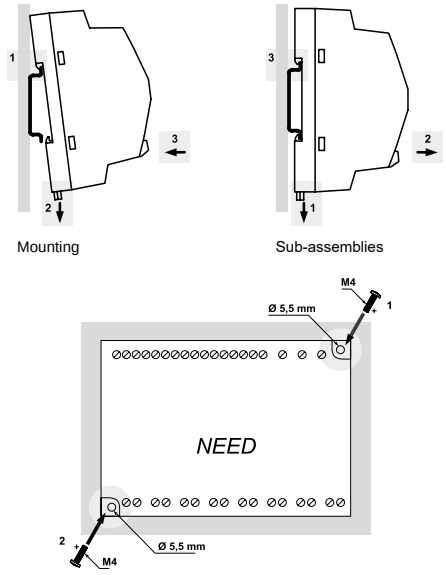


NEED-...-..-16-8R-.
relay outputs Q1 - Q8: 10 A, 250 V AC

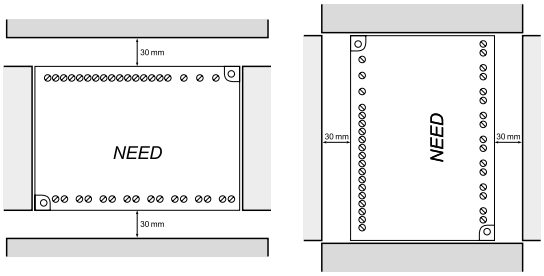


NEED-24DC-..-16-8T-.
transistor outputs Q1 - Q8: 0,5 A, 24 V DC

Mechanical mounting



Any operation position - mounting distances for walls with terminals



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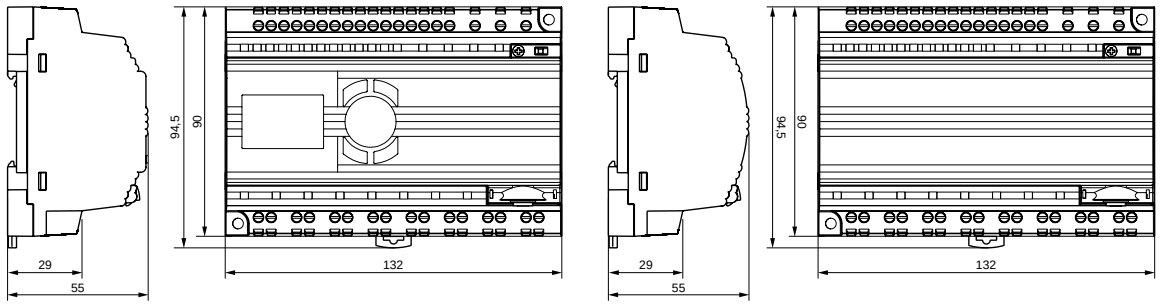
Dimensions



Mounting, connection to PC computer

Relays **NEED-...-16-8...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M4 screws). Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,0 mm^2 (1 x 14 / 2 x 17 AWG).

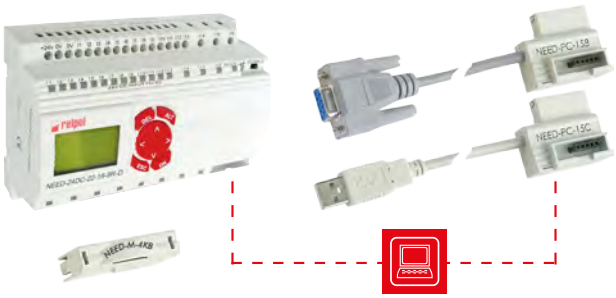


Table of codes

Table 1

Programmable relay code	Supply voltage	Version	Number of inputs	Number and type of outputs	Features
NEED-230AC-22-16-8R-D	230 V AC	22	16	8 relay	LCD display, keyboard
NEED-230AC-11-16-8R	230 V AC	11	16	8 relay	–
NEED-12DC-22-16-8R-D	12 V DC	22	16	8 relay	LCD display, keyboard
NEED-12DC-11-16-8R	12 V DC	11	16	8 relay	–
NEED-24DC-22-16-8R-D	**24 V DC**	**22**	**16**	**8 relay**	**LCD display, keyboard**
NEED-24DC-11-16-8R	**24 V DC**	**11**	**16**	**8 relay**	**–**
NEED-24DC-22-16-8T-D	24 V DC	22	16	8 transistor	LCD display, keyboard
NEED-24DC-11-16-8T	24 V DC	11	16	8 transistor	–
NEED-220DC-22-16-8R-D	220 V DC	22	16	8 relay	LCD display, keyboard
NEED-220DC-11-16-8R	220 V DC	11	16	8 relay	–

The data in bold type relate to the standard versions of the relays.

Exceptional simplicity of programming

Software PC NEED

A computer program which allows editing, compiling and downloading of a program to the memory of a programmable relay.

The resources of the relay may be monitored in course of operation, owing to which the user may be currently informed about the status of the inputs, outputs, timers, counters, clocks, comparators, etc.

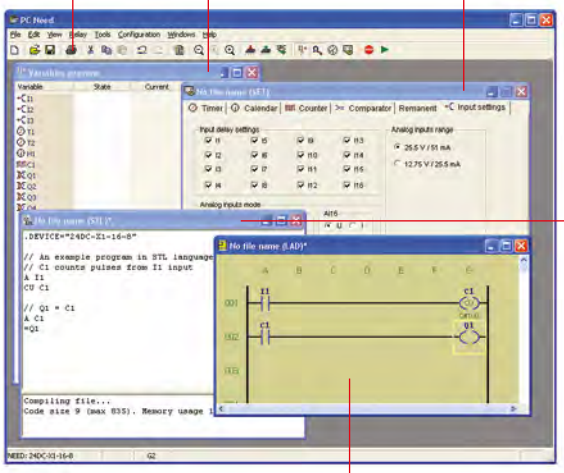
The simplicity and variety of the program edition (text or graphics) make the PC NEED a very convenient tool, owing to which even complex applications are made very quickly, and their start-up time is short.

Hardware requirements: any computer of PC class with RS232 or USB interface and VGA graphic card, operating system – Windows 2000®, Windows XP®, Windows Vista®, Windows 7®, Windows 8®.

Program printout:
- LAD or STL,
- configuration parameters.

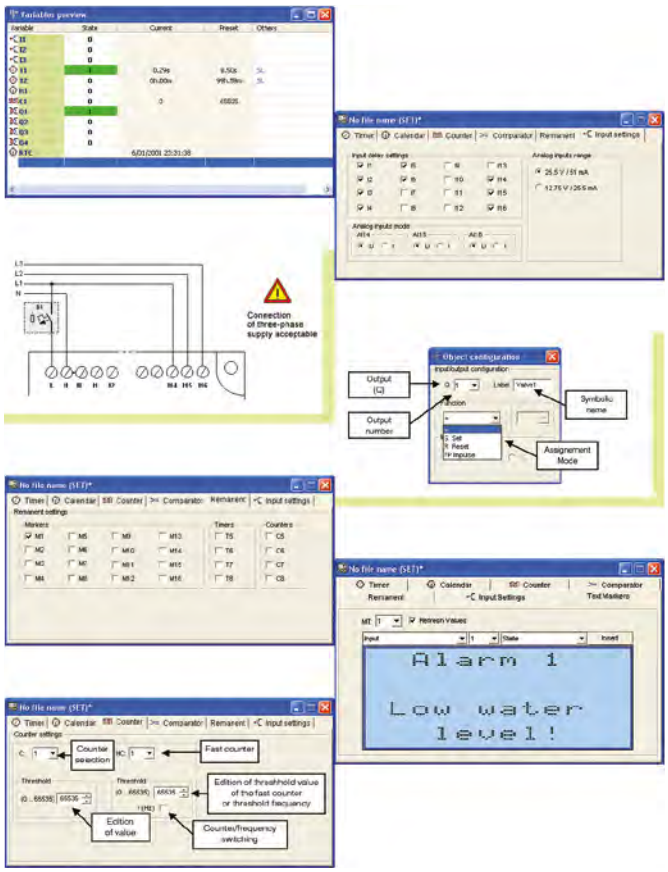
Preview of variables:
- possibility to monitor the relay's resources.

Resources settings:
- possibility to set the parameters of timers, counters, clocks, comparators, etc.,
- simple operation and understandable menu,
- editable alert texts and definitions of keyboard buttons.



STL language:
- possibility of conversion from LAD to text language,
- possibility of programming in text editor and further copying of the application,
- the language syntax highlighted,
- setting customized colors and fonts.

LAD language:
- simplicity of programming which allows quick application designing,
- symbolic labels of individual elements,
- easy creation of applications based upon an electrical chart,
- possibility of inserting comments, color and font configurations,
- ladder preview to facilitate the start of the software.



Functions of NEED relay

The NEED programmable relay is a product based on the Polish know-how which is perfectly implemented in applications of industrial automatics. The relay is an interesting alternative for similar solutions offered by other manufacturers due to its numerous outstanding advantages.

1) Preview of variables as a tool for monitoring all the resources in the relay.

2) A wide range of analog-digital inputs and possibility of configuration of DC inputs as voltage or current ones.

3) The mode of monitoring three-phase voltage for the 230AC-...-16-8R-. version.

4) Possibility to read the program structure existing in the relay, including the symbolic names assigned to individual elements.

5) Remanence mode - possibility of identifying some resources of the relay, which might be maintained when the supply voltage is off.

6) Fast bidirectional counter / meter of frequency - measurement up to 20 kHz.

7) Edition of texts of alerts shown on the display, which include the variables of the relay.

8) Four keys of the keyboard to be used in LAD or STL languages.

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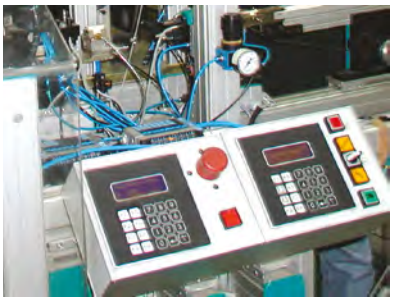
Control of applications

Management of a parking lot with limited number of places

The parking lot may operate in timing mode (from ... to ...) or in permanent mode. The sensors at the entrance and exit help to define the number of cars in the parking lot and to compare the number with the preset number of places. When the maximum number of vehicles are parked, the information „NO PLACES AVAILABLE" is lit at the entrance. Additionally, the entrance gate remains closed as long as a vehicle leaves the parking lot.

Controller of two pumps – direct start-up

Alternate operation of pumps - automatic or manual. Sequence control of the pumps - two levels of switching on, one level of switching off. Automatic start-up of the second pump in case of a failure of the first one. Protection against dry operation. Outlets to the external alarm signaling (failure of the pump).



Control of a machine for wire mesh production

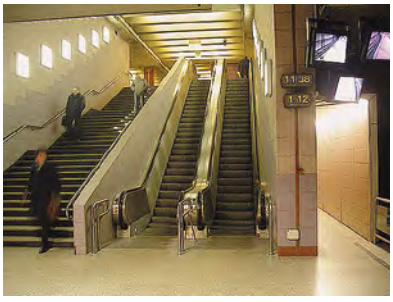
Control of the squashing unit which bends the end parts of the wires of the mesh so to avoid injuries. The design of the unit is based on two pneumatic servo-motors connected to the compressed air supply source. The control system protects also against failures in course of production.

Segregation of details in production process

Segregation of details on stroke feed according to their height. Two height sensors of the appropriate range.

Control of lighting and drives of ventilators

Voltage central switching on and off - manual or automatic switching according to timing schedule. Possibility of flexible shaping of the function of lighting for each room.



Control of moving stairways

Control of the direction of movement (up and down). Detection of passengers on the stairway on the basis of the signals from movement detectors.

- **Appropriation**: data reading from NEED relays and availability of the data values with the ModBus RTU protocol; transmission of control commands to NEED; modification of the real time RTC clock setting; operation from COM1 side as NEED Master and from COM2 side as a device of ModBus RTU Slave type
- **Options**: operation mode change: STOP/RUN; RTC clock: current data reading (in the RUN mode) and setting change record (in the STOP mode); current data reading (in the RUN mode): status, program name and version, digital and analog inputs, digital outputs, phase sequence, timers, counters, fast counter current value, clocks, comparators, markers; setting reading and record (in the STOP mode): timers, counters, fast counter, comparators.

Input circuit

Rated supply voltage	7....26 V AC 50/60 Hz	7…35 V DC
Max. power consumption	no load: 2 VA	

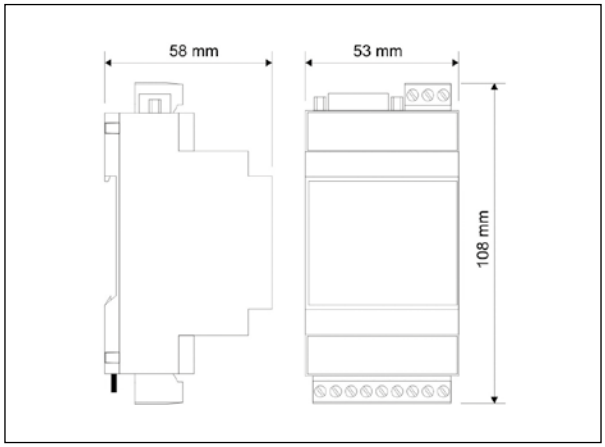
Max. power consumption

Parameter memory	EEPROM
Introduction of the basic parameter transmission	with the use of DIP SWITCH
Transmission parameters for ModBus RTU Slave	9600 bits/s, 1 bit start, 8 bits of data, 1 bit stop, without parity control
RS232	standard EIA/TIA-574
• max. length of line	15 m
RS485	standard EIA/TIA-485
• max. length of line	1200 m
• max. number of devices on the line	32
• port protection	100 mA / 600 W surge and short circuit protection
• port line terminator	yes
Connections • RS232 (COM1)	SUB-D 9M connection
• RS485/RS232 (COM2)	N/O connectors
EMC electromagnet compatibility	according to EN-61000-6-1/2/3/4ABS

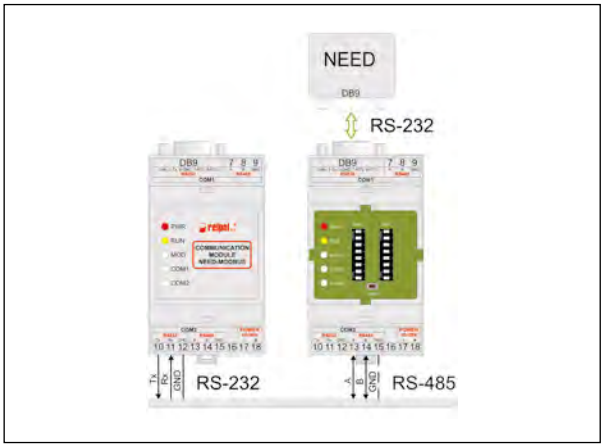
General data

Cover	ABS	
Insulation rated voltage	COM1: supply	COM2: 1 kV DC
Dimensions with connectors / Weight	108 x 53 x 58 mm / 116 g	
Ambient temperature • storage	-30…70 °C	
• operating	-30…60 °C	
Protection category	cover: IP 43	terminals: IP 20
Relative humidity	20...95%	

Dimensions



Connection manner



Mounting

Modules **NEED-MODBUS** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 0,22...2,5 mm^2 (1 x 24...14 AWG).

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Relays
time

relpol® S.A.

Time relays are available in modular covers (MT-W...M with LED display, MT series, TR series) and in industrial covers (TR4N series, T-R4, PIR15...T).

Design features (depending on the type of relay): multifunctions, single-functions; with settings of T interval, with independent settings of T1 and T2 intervals, with independent settings of T1, T2 and T3 intervals (MT-W...M); contacts / outputs: 1 CO, 2 CO, 3 CO, 4 CO; supply: universal AC/DC; specified voltage.

Applications in low voltage systems: in industrial automation; in BMS automation; in air-conditioning, ventilation, heating systems; in protection, signalling, alarm systems; in lighting systems; various other applications.

They meet the requirements of RoHS Directive.
The relays are recognized and certified by:

CE EAC

modular covers

MT-W...M 277
MT-TUA-... 284
MT-TUB-... 287
MT-TE-... 290
MT-TWU-... 293
MT-TBP-... 296
MT-TER-... 299
MT-TEA-... 302
MT-TES-... 305
MT-TEU-... 308
MT-TIP-... 311
MT-TSA-... 314
MT-TWT-... 317
MT-TSD-... 320
TR-EM1P-UNI 323
TR-EM2P-UNI 326
TR-EI1P-UNI 329
TR-EI2P-UNI 332
TR-ES2P-UNI 335

industrial covers

TR4N 1 CO, 2 CO 337
TR4N 4 CO 341
T-R4 345
PIR15...T with time module COM3 349
COM3 354

- **Universal, multifunction time relays with independently controled times T1, T2 and T3 (25 time functions + functions ON and OFF; quick times set with the accuracy of 0,1 s)**
- Two digit LED display • Programming with two buttons only • Cadmium - free contacts • AC/DC input voltages • Cover - modular, width 17,5 mm • Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems • Compliance with standard PN-EN 61812-1 • Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		440 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC
Max. inrush current		16 A
Rated current		10 A
Max. breaking capacity	AC1	2 500 VA
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour
• no load		72 000 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC	≤ 2,0 VA AC: 50 Hz
	DC	≤ 1,5 W
Range of supply frequency	AC	48...63 Hz
Residual ripple to DC		5%
Control contact S ❶		
• min. voltage ❷		0,9 U_n
• min. time of pulse duration ❷		≥ 30 ms
• max. length of control line		10 m

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	2 500 V 1,2 / 50 µs
Overvoltage category	II
Insulation pollution degree	1
Flammability class	V-0 UL94
Dielectric strength	
• input - output	2 500 V AC type of insulation: basic
• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life		
• resistive AC1		> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		90 ❸ x 17,5 x 65,5 mm
Weight		70 g
Ambient temperature	• storage	-40...+85 °C
	• operating	-20...+50 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Relative humidity		up to 85%
Shock resistance		15 g
Vibration resistance		0,35 mm DA 10...55 Hz

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.
❷ Where the control signal is recognizable.
❸ Length with 35 mm rail taps: 98,8 mm.

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Time module data

Functions	Es, E, E(S), E(r), R, Wu, Wu(S), Wu(r), Ws, Wa, B, Wi, ER, EWs, EWa, EWu, WsWa, EWf, Wt, Pi, Pi(S), Pp, Pp(S), Est, Esp, ON, OFF
Selection of function and settings of T1, T2, T3 intervals	with two buttons: „F/T" and „OK", to be with viewed on the LED display
Timing adjustments	0,1 s ... 99 h 59 min. 59,9 s
Setting accuracy / Repeatability	0,1 s / 0,12 s
Values affecting the timing adjustment	temperature: ≤ 0,01% / °C supply voltage: ≤ 0,1% / V
Recovery time	controlled by contact S / supply voltage: ≤ 50 ms / ≤ 650 ms

LED indicator

LEDs

green "U" - indication of supply voltage U
yellow "h" - indication of setting hours T1, T2, T3 times ❹
yellow "m" - indication of setting minutes T1, T2, T3 times ❹
yellow "s" - indication of setting seconds T1, T2, T3 times ❹
green "T2" - indication of setting T2 time ❹
green "T3" - indication of setting T3 time ❹ ❺
green "T3" flashing - measurement of T3 time / request for programming T3 time ❺
yellow "R" - status ON of operational relay R

LED display

strip spinning to the right - measurement of T1 time
strip spinning to the left - measurement of T2 time
message "End" - stop of the function being carried out
pulsating point during programming - indication of setting decimal parts of a second

Instruction of programming

1. Hold the lower button "F/T" for a longer time (> 2 s). A symbol of service function F0 will appear on LED display.
2. By pressing the button "F/T" choose the required number of function (F0 ... F21 - see table below).
3. Save the number of the selected function by shortly pressing the upper button "OK". The display will show two digits "Zero" and the yellow LED "h" will appear (T1 time hours setting). The first "Zero" is for tens of hours, the other "Zero" specifies the units of hours. Each number set has to be confirmed with the "OK" button. Note: similar situation applies for setting minutes and seconds.
4. By clicking the lower button "F/T" select the required number of T1 time hours.
5. After selecting the number of T1 time hours click the "OK" button in order to confirm the selection.
6. Again two digits "Zero" will appear and the yellow LED "m" will appear - setting minutes. Next, act accordingly to points 4 and 5. Similarly set seconds when the yellow LED "s" appears. Then set decimal parts of second when a point is pulsing on the display.
7. After confirming with the "OK" button the decimal parts of second the green LED "T2" will start flashing (if T2 time appears in a given function).
8. If we select T2 time, then we do everything accordingly to the way of T1 time setting.
9. Next the green LED "T3" will start flashing (if T3 time appears in a given function) - request for setting T3 time ❺. T3 time setting may be confirmed with "OK" or rejected with "F/T". T3 time is set similarly to T1 or T2.
10. Turn off feeding. After another provision of feeding the function will start. Some functions are started by the external control contact S ❶.
11. During carrying out of the function (lasting longer than 60 s) it is possible to check the used time [%] by shortly pressing the "OK" button. A longer pressing will show the "presentation" of settings (checking the set function and times).
12. In order to "exit" the set service function F0 or F1 press the lower button "F/T" for a longer time until the symbol of a given function disappears from the display.

Note: a new function can be programmed during the operation of the relay (during the operation of any function). The newly programmed function will be active only after turning on and providing feeding voltage.

Number	Name	Times ❺	Control ❶
F0	OFF	–	U
F1	ON	–	U
F2	Es	T1	U, S
F3	E E(S)	T1 T1	U U, S
F4	E(r)	T1	U, S
F5	R	T1	U, S
F6	Wu Wu(S)	T1 T1	U U, S
F7	Wu(r)	T1	U, S
F8	Ws	T1	U, S
F9	Wa	T1	U, S
F10	B Wi	T1 = 0 ❻ T1	U, S U, S
F11	ER	T1, T2	U, S
F12	EWs	T1, T2	U, S
F13	EWa	T1, T2	U, S
F14	EWu	T1, T2	U
F15	WsWa	T1, T2	U, S
F16	EWf	T1, T2	U, S
F17	Wt	T1, T2	U, S
F18	Pi Pi(S)	T1, T2, T3 T1, T2, T3	U U, S
F19	Pp Pp(S)	T1, T2, T3 T1, T2, T3	U U, S
F20	Est	T1	U, S
F21	Esp	T1	U, S

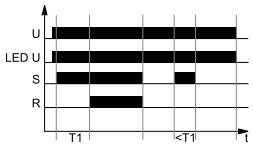
❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❹ View on LED display. ❺ Option: possibility of turninig on or omitting T3 time. ❻ Time T1 has to be set with "Zero" value.

Time functions

F0 – OFF - Constant service off.
F0 function can be turned on at any time, during feeding the time relay with U_n voltage. Turning on F0 function during carrying out any time function will cause the function to stop as well as constant operating relay R off (LED diode "R" is off). Function F0 is activated by pressing "F/T" button for a longer time (more than 2 seconds) and selecting F0 function. Confirm this function with red button "OK" (after confirmation display will show digit 0). Exiting the service function needs a longer pressing of "F/T" button - until the display stops showing F0 function symbol. Next, after a short time, display will show "End". Going back to the function previously carried out is done by turning off feeding voltage U_n and turning it on again. If the "T/F" button is being pressed for too long and it will cause, after turning off F0 function symbol, showing the symbols of other functions, then going back to the function previously carried out (set before F0 function) is done by turning off feeding voltage U_n and turning it on again.

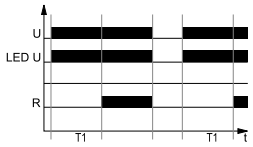
F1 – ON - Constant service on.
F1 function can be turned on at any time, during feeding the time relay with U_n voltage. Turning on F1 function during carrying out any time function will cause the function to stop as well as constant operating relay R on (LED diode "R" is on). Function F1 is activated by pressing "F/T" button for a longer time (more than 2 seconds) and selecting F1 function. Confirm this function with red button "OK" (after confirmation display will show digit 1). Exiting the service function needs a longer pressing of "F/T" button - until the display stops showing F1 function symbol. Next, after a short time, display will show "End". Going back to the function previously carried out is done by turning off feeding voltage U_n and turning it on again. If the "T/F" button is being pressed for too long and it will cause, after turning off F1 function symbol, showing the symbols of other functions, then going back to the function previously carried out (set before F1 function) is done by turning off feeding voltage U_n and turning it on again.

F2 – Es - ON delay with the control contact S.



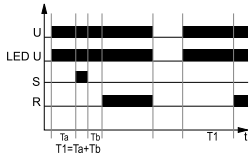
Feeding voltage U has to be put onto time relay in a constant way (LED diode "U" gives constant light). Turning off controlling contact S starts measuring the set time T1 (display shows a vertical strip spinning to the right). When T1 time is finished operating relay R turns on (display shows "End", LED diode "R" is on). Such state lasts until the moment of opening control contact S. Opening the control contact S causes immediate turning off the operating relay R (display still shows "End", and LED diode "R" is off). When the control contact S is open before T1 time is finished, the operating relay will not turn on and the measurement of T time will be cancelled.

F3 – E - ON delay.



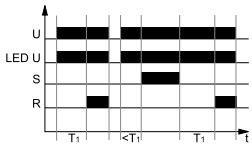
Turning on the feeding voltage U starts measuring set T1 time (display shows vertical strip spinning to the right). After measuring T1 time the operating relay R turns on and stays in this state until feeding U is turned off (display shows "End", and LED diode "R" is on).

F3 – E(S) - ON delay, with time measurement stopped with contact S.



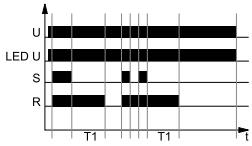
Turning on the feeding voltage U starts measuring set T1 time (display shows vertical strip spinning to the right). If during measuring T1 time control contact S is closed, measuring of T1 time is stopped for the time of closing contact S (display shows two horizontal strips). Opening of control contact S resumes measuring of T1 time (display shows a vertical strip spinning to the right). After finishing measuring T1 time the operating relay R turns on and stays in this state until feeding U is turned off (display shows "End", and LED diode "R" is on).

F4 – E(r) - ON delay with the Reset function.



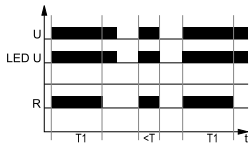
Turning on the feeding voltage U starts measuring set T1 time (display shows vertical strip spinning to the right). After measuring T1 time operating relay R turns on. If control contact S is closed during measuring T1 time measuring of T1 time is stopped for the time of closing contact S (display shows two horizontal strips). After opening contact S T1 time is measured from the start. After measuring T1 time operating relay R turns on (display shows "End", and LED diode "R" is on). and this state lasts until the moment of turning off feeding voltage U or when the control contact is closed again.

F5 – R - OFF delay with the control contact S.



Time relay input is powered by voltage U in a constant way. Closing the control contact S causes immediate turning on of the operating relay R (display shows two horizontal strips, LED diode "R" is on). Opening the control contact S starts measuring of the set T1 time (display shows vertical strip spinning to the right). After measuring T1 time the operating relay turns off (display shows "End", and LED diode "R" is off). If control contact S is closed before T1 time is finished, the previously measured time will be restarted and the operating relay will stay on. The delay of turning off the operating relay R will start at the moment of another opening of control contact S.

F6 – Wu - ON for the set interval.



Turning on the feeding voltage U causes immediate turning on the operating relay R at the set time T1 (display shows vertical strip spinning to the right, LED diode "R" is on). After measuring T1 time the operating relay R turns off (display shows "End", and LED diode "R" is off).

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T1, T2, T3** - measured times;
Ts - pause in function performance - time measurement stop period (applies to F18 and F19); **t** - time axis

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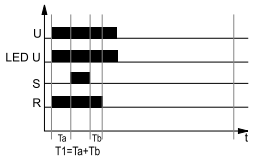
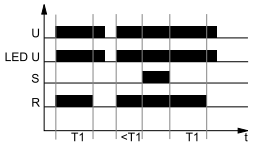
F6 – Wu(S) - ON for the set interval, with time measurement stopped with contact S closing.



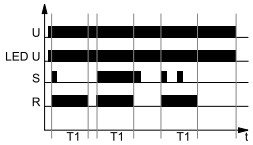
Turning on the feeding voltage U causes immediate turning on the operating relay R at the set time T1 (display shows vertical strip spinning to the right, LED diode "R" is on). If the control contact S is closed, measuring T1 time will be stopped (display shows two horizontal strips) until the moment when control contact is opened. Opening contact S starts further measuring of T1 time. After finishing measuring T1 time the operating relay turns off (display shows "End", and LED diode "R" is off).

F7 – Wu(r) - ON for the set interval with the Reset function.



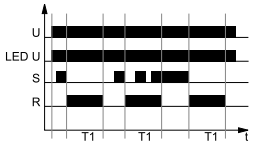
Turning on feeding voltage U causes immediate turning on the operating relay R at the set time T1 (display shows vertical strip spinning to the right, LED diode "R" is on). When control contact S is closed, measuring time T1 is stopped for the time of closing contact S (with operating relay being on, and display showing two horizontal strips). After opening contact S T1 time is measured from the start. After measuring T1 time the operating relay R turns off (display shows "End", and LED diode "R" is off).

F8 – Ws - Single shot for the set interval triggered by closing of the control contact S.



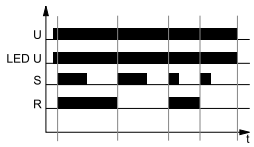
Time relay input is powered by voltage U in a constant way. Closing the control contact S causes immediate turning on operating relay R for the T1 time (display shows vertical strip spinning to the right, LED diode "R" is on). After measuring T1 time the operating relay R turns off display shows "End", and LED diode "R" is off). Opening and closing the control contact S during measuring T1 time does not affect the function being carried out. Turning on the operating relay R again is possible (after measuring T1 time) by another closing of control contact S.

F9 – Wa - ON for the set interval triggered with the control contact S.



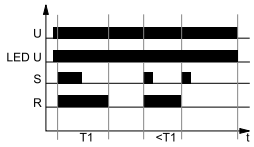
Time relay input is powered by voltage U in a constant way. Opening the control contact S causes immediate turning on operating relay R for the T1 time (display shows vertical strip spinning to the right, LED diode "R" is on). After measuring T1 time the operating relay R turns off display shows "End", and LED diode "R" is off). Opening and closing the control contact S during measuring T1 time does not affect the function being carried out. Turning on the operating relay R again is possible (after measuring T1 time) by another closing of control contact S.

F10 – B - Cyclical operation with the control contact S (the feature of a bistable relay) - setting T1 time to the value of "Zero" is required.



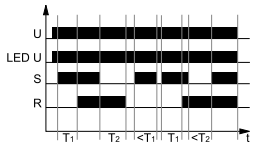
Time relay input is powered by voltage U in a constant way. Each closing of control contact S causes the change of the state of the operating relay R into the opposite one (the feature of a bistable relay).

F10 – Wi - ON for the set interval controlled by closing of the control contact S, with the function of switching off the output relay R prior to the lapse of the interval T1 (the feature of a bistable relay).



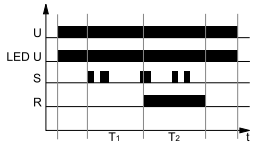
Time relay input is powered by voltage U in a constant way. Closing the control contact S causes immediate turning on the operating relay for T1 time (display shows a vertical strip spinning to the right, and LED diode "R" is on). After measuring T1 time the operating relay R turns off (display shows "End", and LED diode "R" is off). If during the measuring T1 time the control contact is closed, the measured time T1 will be restarted, and the operating relay R turns off. Another closing of the control contact S causes another turning on the operating relay R for the T1 time. Relay with this function adopts the feature of bistable relay.

F11 – ER - ON delay and OFF delay with control contact S. Independent settings of T1 and T2 intervals.



Time relay input is powered by voltage U in a constant way Closing the control contact S starts measuring the T1 time (display shows a vertical strip spinning to the right) and after measuring the T1 time the operating relay R turns on (display shows two horizontal strips, and LED diode "R" is on). Opening the control contact S starts measuring T1 time - the delayed turning off the operating relay R (display shows a vertical strip spinning to the left) and after the time is finished the operating relay R turns off display shows "End", and LED diode "R" is off). If during the measuring T2 time the control contact S is closed, the measured time will be restarted, and the operating relay R stays on. If the control contact S is closed for a shorter time than T1 time, the system will not turn on the operating relay R.

F12 – EWs - ON delay and ON for the set time with closing of the control contact S. Independent settings of T1 and T2 intervals.

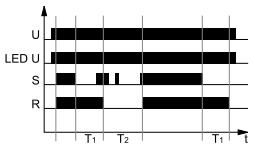


Time relay input is powered by voltage U in a constant way. Closing the control contact (impulsive or constant) starts measuring T1 time (Time relay input is powered by voltage U in a constant way.), and after its completion the operating relay R turns on for T2 time (display shows a vertical strip spinning to the left, LED diode "R" is on). After the T2 time the operating relay R turns off (display shows "End", and LED diode is off). The system is waiting for another closing of the control contact S. During measuring times T1 and T2 the state of the contact S does not matter.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T1, T2, T3** - measured times;
Ts - pause in function performance - time measurement stop period (applies to F18 and F19); **t** - time axis

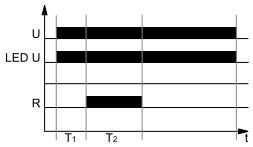
Time functions

F13 – EWa - OFF delay and breaking time delay with opening of the control contact S. Independent settings of T1 and T2 intervals.



Time relay input is powered by voltage U in a constant way. Closing the control contact S causes immediate turning on the operating relay R (display shows two horizontal strips, and LED diode "R" is on). Opening the control contact S starts measuring the time T1 (display shows a vertical strip spinning to the right), and after measuring is finished the operating relay R turns off and measuring of T2 time starts (display shows a vertical strip spinning to the left, and LED diode "R" is off) After measuring T2 time display shows "End", and the operating relay R - depending on the state of the control contact S - stays off when the control contact S is open or turns on when the control contact S is closed, and LED diode "R" goes on.

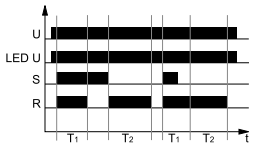
F14 – EWu - ON delay for the set interval. Independent settings of T1 and T2 intervals.



Turning on feeding U starts work from measuring the time T1 (display shows a vertical strip spinning to the right), and after its completion the operating relay R starts at T2 time (display shows a vertical strip spinning to the left, and LED diode "R" is on). After measuring T2 time the operating relay turns off (display shows "End", and LED diode "R" is off).

F15 – WsWa - ON for the set intervals T1 and T2 with the control contact S. Independent settings of T1 and T2 intervals.

Diagram 1

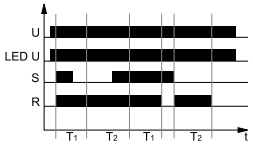


Time relay input is powered by voltage U in a constant way. Closing the control contact S turns on the operating relay R for T1 time (display shows a vertical strip spinning to the right, and the LED diode "R" is on). After measuring T1 time the operating relay R turns off (display shows two horizontal strips, and LED diode "R" is off). Opening the control contact S causes another turning on the operating relay R for T2 time (display shows a vertical strip spinning to the left, and the LED diode "R" is on). After measuring T2 time the operating relay turns off (display shows "End", and LED diode "R" is off).

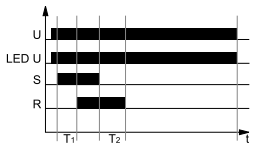
a/ If during measuring T1 time the control contact S is opened, then (after measuring T1 time) the operating relay will stay on until the moment of the end of measuring T2 time. After measuring T2 time the operating relay R will turn off (display shows "End", and LED diode "R" turns off) - see Diagram 1.

b/ If during measuring T1 time the control contact S is opened, and next, during measuring T2 time, it is closed, then (after measuring T1 and T2 times) the operating relay R will turn on for the additional T1 time. After measuring additional T1 time the operating relay R will turn off (display shows two horizontal strips, and LED diode will turn off). Such state will last until the opening of the control contact S. After opening the control contact S the operating relay R will turn on again and the measuring of T2 time will start (display shows a vertical strip spinning to the left, and LED diode "R" is on). After measuring T2 time the operating relay R will turn off (display shows "End", and LED diode "R" will turn off) - see Diagram 2.

Diagram 2

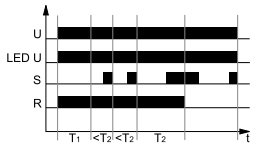


F16 – EWf - ON delay and OFF delay with the control contact S. Independent settings of T1 and T2 intervals.



Time relay input is powered by voltage U in a constant way. Closing the control contact S starts measuring the time T1 (display shows a vertical strip spinning to the gight). After T1 time is finished, the relay R turns on (display shows two horizontal strips, and LED diode "R" is on). Opening the control contact S starts measuring the time T2 - delayed turning off the operating relay R (display shows a vertical strip spinning to the left). After measuring T2 time the operating relay R turns off (display shows "End", and LED diode "R" is off).

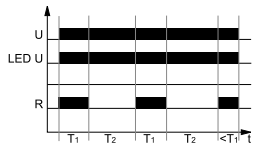
F17 – Wt - Monitoring of the sequence of pulses. Switching on T2 interval is extended with consecutive pulses (closing and opening of the contact S). Independent settings of T1 and T2 intervals.



Turning on the feeding voltage U causes immediate turning on of the operating relay R fot the set T1 time (display shows a vertical strip spinning to the right, and LED diode "R" is on). After measuring T1 time measuring T2 time starts with the operating relay R still being on (display shows a vertical strip spinning to the left, and LED diode "R" is on) In order to keep the operating relay R on, during measuring T2 time closing, and next opening of the control contact S must occur (single impulse), which will cause resetting the time measured so far and start measuring T2 time again. If before T2 time is finished the single impulse of the control contact S does not occur, the operating relay will turn off (display shows "End", and LED diode "R" will turn off). Another turning on of the operating relay will be possible after turning off feeding U and turning it on again.

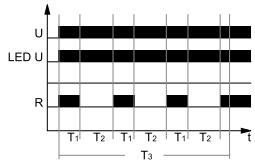
F18 – Pi - Cyclical operation pulse first. Independent settings of T1 and T2 intervals. Possibility of turninig on or omitting T3 time.

Diagram 1



Turning on feeding voltage U starts cyclic work from turning on the operating relay R for the T1 time (display shows a vertical strip spinning to the right, and LED diode "R" is on), after which occurs turning off of the operating relay R for T2 time (display shows a vertical strip spinning to the left, and LED diode "R" is off). Cyclic work lasts until the moment of turning off feeding voltage - see Diagram 1.

Diagram 2



Note: it is possible **to turn on T3 time** (i.e. the time of cyclic work) during programming the relay (when the LED T3 diode is flashing) by confirming it with the OK button, or omitting the T3 time by pressing "F/T" button. When T3 time has been turned on and set, during cyclic work green LED diode T3 is flashing. After T3 time is finished display shows "End", LED diode T3 is off, and operating relay R remains in the state which it was in at the moment of the end of T3 time. If T3 time finishes during measuring T1 time, the operating relay R will remain on (LED "R" is on), and if it finishes during measuring T2 time, the operating relay R will remain off (LED diode "R" is off). Another turning on the function of cyclic work will be possible after turning off feeding U and turning it on again - see Diagram 2.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T1, T2, T3** - measured times; **Ts** - pause in function performance - time measurement stop period (applies to F18 and F19); **t** - time axis

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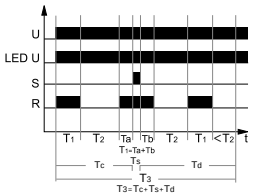
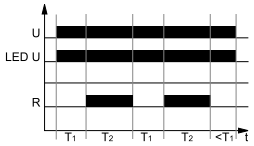
F18 – Pi(S) - Cyclical operation pulse first. Independent settings of T1 and T2 intervals. Possibility of turninig on or omitting T3 time. Possibility of stopping and resuming cyclic work by control contact S.



Turning on the feeding voltage U starts cyclic work from turning on the operating relay R for the T1 time (display shows a vertical strip spinning to the right, and LED diode "R" is on), after which the operating relay turns off for T2 time (display shows a vertical strip spinning to the left, and LED diode "R" is off). Cyclic work lasts until the moment of turning off feeding voltage U.
Note: it is possible **to turn on T3 time** (i.e. the time of cyclic work) during programming the relay (when the LED T3 diode is flashing) by confirming it with the OK button, or omitting the T3 time by pressing "F/T" button. When T3 time has been turned on and set, during cyclic work green LED diode T3 is flashing. After T3 time is finished display shows "End", LED diode T3 is off, and operating relay R remains in the state which it was in at the moment of the end of T3 time. If T3 time finishes during measuring T1 time, the operating relay R will remain on (LED "R" is on), and if it finishes during measuring T2 time, the operating relay R will remain off (LED diode "R" is off). Another turning on the function of cyclic work will be possible after turning off feeding U and turning it on again.
Operation of contact S: closing control contact S immediately stops measuring times. Opening control contact S resumes measuring times. The break in carrying out the function Pi(S) (by the period of closing contact S) is included in T3.

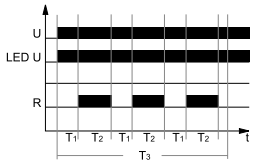
F19 – Pp - Cyclical operation pause first. Independent settings of T1 and T2 intervals. Possibility of turninig on or omitting T3 time.

Diagram 1



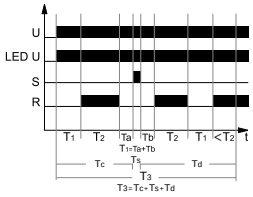
Turning on feeding voltage U starts cyclic work from measuring the time of break T1 - the time of turning off the operating relay R (display shows a vertical strip spinning to the right), after which occurs turning off of the operating relay R for the T2 time (Display shows a vertical strip spinning to the left, and LED diode "R" is on). Cyclic work lasts until the moment of turning off feeding voltage U - see Diagram 1.

Diagram 2



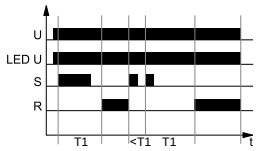
Note: it is possible **to turn on T3 time** (i.e. the time of cyclic work) during programming the relay (when the LED T3 diode is flashing) by confirming it with the OK button, or omitting the T3 time by pressing "F/T" button. When T3 time has been turned on and set, during cyclic work green LED diode T3 is flashing. After T3 time is finished display shows "End", LED diode T3 is off, and operating relay R remains in the state which it was in at the moment of the end of T3 time. If T3 time finishes during measuring T1 time, the operating relay R will remain on (LED "R" is on), and if it finishes during measuring T2 time, the operating relay R will remain off (LED diode "R" is off). Another turning on the function of cyclic work will be possible after turning off feeding U and turning it on again - see Diagram 2.

F19 – Pp(S) - Cyclical operation pause first. Independent settings of T1 and T2 intervals. Possibility of turninig on or omitting T3 time. Possibility of stopping and resuming cyclic work by control contact S.



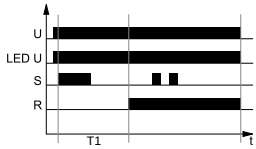
Turning on feeding voltage U starts cyclic work from measuring break time T1 - time of turning off the operating relay R (display shows a vertical strip spinning to the right), after which occurs turning on the operating relay R for the T2 time (display shows a vertical strip spinning to the left, and LED diode "R" is on). Cyclic work lasts until the moment of turning off feeding voltage U.
Note: it is possible **to turn on T3 time** (i.e. the time of cyclic work) during programming the relay (when the LED T3 diode is flashing) by confirming it with the OK button, or omitting the T3 time by pressing "F/T" button. When T3 time has been turned on and set, during cyclic work green LED diode T3 is flashing. After T3 time is finished display shows "End", LED diode T3 is off, and operating relay R remains in the state which it was in at the moment of the end of T3 time. If T3 time finishes during measuring T1 time, the operating relay R will remain on (LED "R" is on), and if it finishes during measuring T2 time, the operating relay R will remain off (LED diode "R" is off). Another turning on the function of cyclic work will be possible after turning off feeding U and turning it on again.
Operation of contact S: closing control contact S immediately stops measuring times. Opening control contact S resumes measuring times. The break in carrying out the function Pi(S) (by the period of closing contact S) is included in T3.

F20 – Est - ON delay with closing of the control contact S, with the interval T1 extended.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S for a shorter time than T1 time starts the T1 time, and after the T1 time has lapsed, the output relay R switches on and remains in this position until the control contact S is closed again or until the supply voltage U is interrupted. Closing of the control contact S resets the thus far measured time and starts the new T1 time.

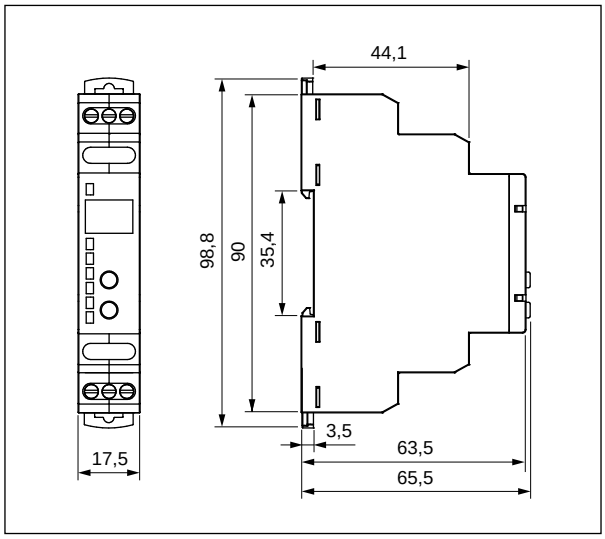
F21 – Esp - ON delay - one cycle, with closing of the control contact S.



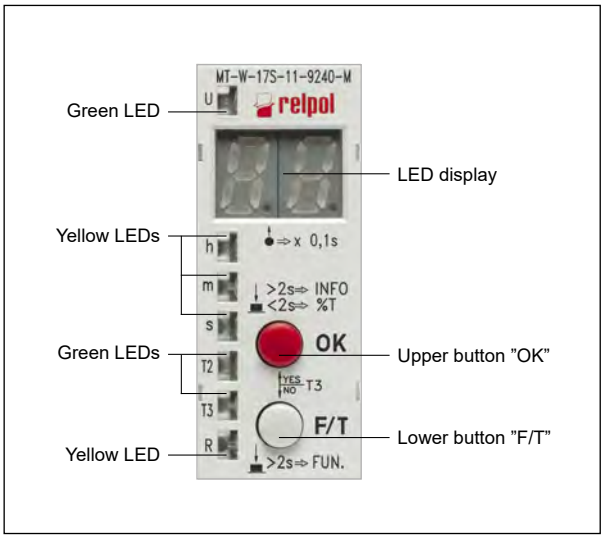
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the T1 time, and after the T1 time has lapsed, the output relay R switches on and remains in this position until the supply voltage U is interrupted. When the output relay R is on, opening or closing of the control contact S does not affect its status.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T1, T2, T3** - measured times;
Ts - pause in function performance - time measurement stop period (applies to F18 and F19); **t** - time axis

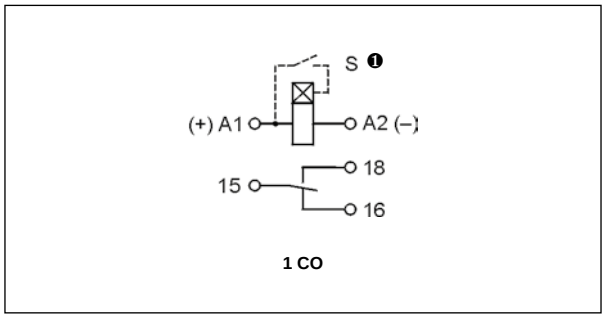
Dimensions



Front panel description



Connection diagram



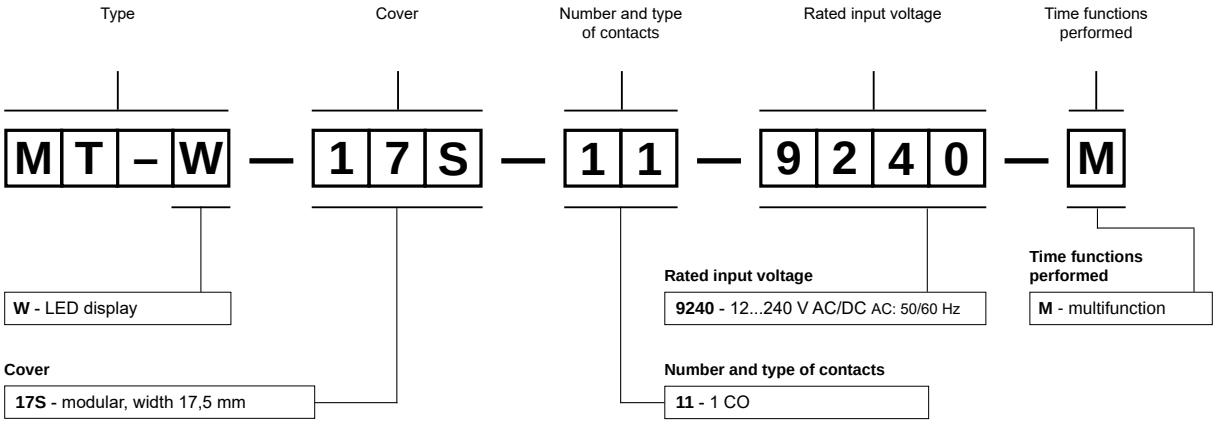
❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-W...M** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm² / 2 x 1,5 mm² (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps: easy assembly on 35 mm rail, firm tapping (top and bottom).

Ordering codes



Example of ordering codes:

MT-W-17S-11-9240-M universal time relay **MT-W...M** with LED display, multifunction (relay perform 6 functions), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Multifunction time relays (7 time functions; 8 time ranges)**
- Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz
	DC	≤ 1,5 W
Range of supply frequency	AC	48...63 Hz
Control contact S ❶		
• min. voltage ❷		0,7 U_n
• min. time of pulse duration ❷		AC: ≥ 50 ms DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock / vibration resistance		15 g / 0,35 mm 10...55 Hz

Time module data

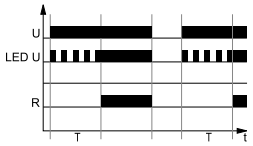
Functions		E, Wu, Bp, T, R, Ws, Wa permanent switching ON and OFF
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting the timing adjustment	• temperature	± 0,05% / °C
	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

Time functions

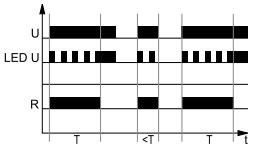
Permanent switching **ON and OFF**.
The functions ON and OFF are selected with TIME potentiometer. In the ON function, the normally open contacts are closed all the time whereas in the OFF function they are open. The position of the FUNC potentiometer is of no significance in these functions as is the preset measurement time. The ON or OFF functions are used for the time relay operation control in electric systems.

E - ON delay.



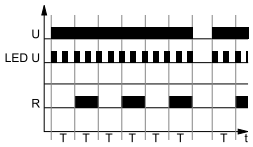
On applying the supply voltage U the set interval T begins - off-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains on until supply voltage U is interrupted.

Wu - ON for the set interval.



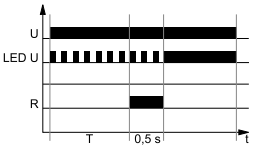
Applying the supply voltage U immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R switches off.

Bp - Symmetrical cyclical operation pause first.



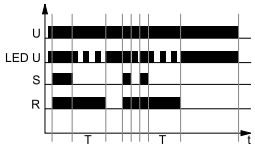
Applying the supply voltage U starts the cyclical operation from the T interval - switching the output relay R off followed by switching on the output relay R for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

T - Generation of the 0,5 s pulse after the interval T.



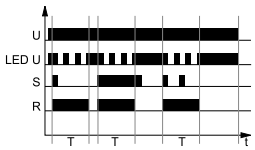
Applying the supply voltage U starts the interval T. After the interval T has lapsed, the output relay switches on for 0,5 s (the time of the NO contact of the output relay).

R - OFF delay with the control contact S.



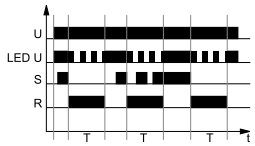
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches on the output relay R. Opening of the control contact S starts the set time of the delayed switching off of the output relay R. After the interval T has lapsed, the output relay R switches off. If the control contact S is closed during the interval T, the already measured time is reset, and the output relay R is switched on again. The OFF delay of the output relay R will start when the control contact S is opened again.

Ws - Single shot for the set interval triggered by closing of the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. In the course of the interval T, any opening of the control contact S does not affect the function to be performed. The output relay R may be switched on again for the set interval, after the interval T has lapsed, by closing the control contact S again.

Wa - ON for the set interval triggered with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S does not start the interval T, and it does not change the position of the output relay R. Opening of the control contact S immediately switches on the output relay R for the set time. After the interval T has lapsed, the output relay R switches off. Opening and closing of the control contact S in the course of the interval T does not affect the function to be performed. The output relay R may be switched on again for the set interval with another closing and opening of the control contact S.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T** - measured time; **t** - time axis

Additional functions

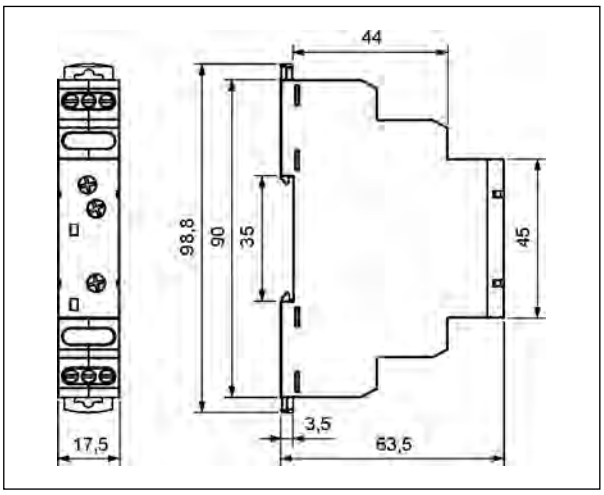
Supply diode: it is lit permanently when the time is not being measured. In course of the T time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time.

Adjustment of the set values:
- the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment,
- no change of the function is possible in the course of the relay's operation. Any change of the settings of the relay shall be read only after the supply voltage has been switched off and on again.

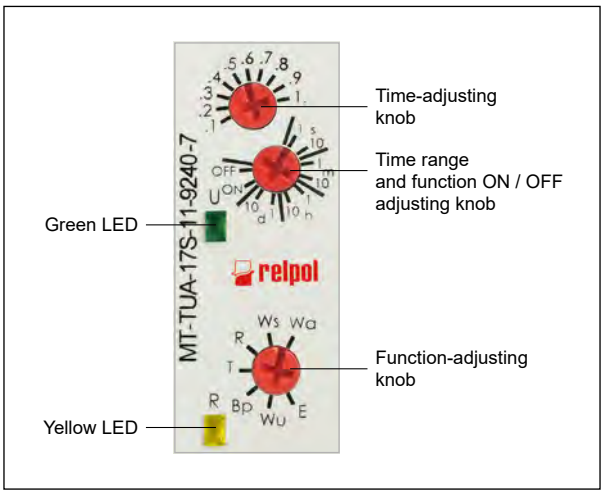
Release: depending on the function to be performed, the relay is released with the supply voltage or by connection of the S contact to the A1 line. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

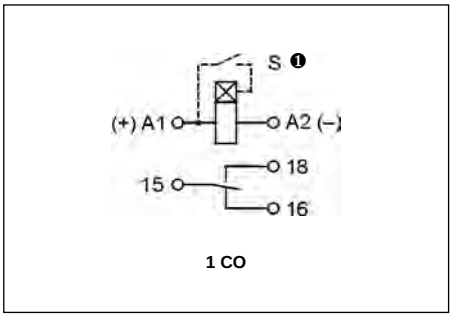
Dimensions



Front panel description



Connection diagram



1 CO

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TUA-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm² / 2 x 1,5 mm² (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time functions performed	Cover	Number and type of contacts	Rated input voltage	Number of functions
MT-	TUA	— 17S	— 11	— 9240	— 7

Time functions performed
UA - multifunction

Cover
17S - modular, width 17,5 mm

Number and type of contacts
11 - 1 CO

Rated input voltage
9240 - 12...240 V AC/DC AC: 50/60 Hz

Number of functions
7 - relay perform 7 functions

Example of ordering code:

MT-TUA-17S-11-9240-7 time relay **MT-TUA-...**, multifunction (relay perform 7 functions), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

- **Multifunction time relays (7 time functions; 8 time ranges)**
- Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n	
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz	
	DC	≤ 1,5 W	
Range of supply frequency	AC	48...63 Hz	
Control contact S ❶			
• min. voltage ❷		0,7 U_n	
• min. time of pulse duration ❷		AC: ≥ 50 ms	DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock / vibration resistance		15 g / 0,35 mm 10...55 Hz

Time module data

Functions		B, Ra, Esf, Wi, Wst, Est, Esp permanent switching ON and OFF
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting	• temperature	± 0,05% / °C
the timing adjustment	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

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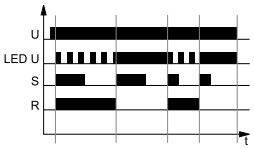
Time functions

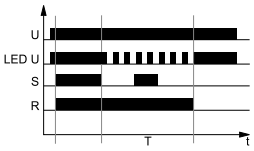
Permanent switching **ON and OFF**.
The functions ON and OFF are selected with TIME potentiometer. In the ON function, the normally open contacts are closed all the time whereas in the OFF function they are open. The position of the FUNC potentiometer is of no significance in these functions as is the preset measurement time. The ON or OFF functions are used for the time relay operation control in electric systems.

B - Cyclical operation controlled with closing of the control contact S.



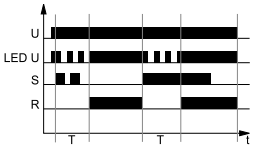
The input of the time relay is supplied with U voltage continuously. Closing of the control contact S immediately switches on the output relay R. Each next closing of the control contact S results in a change of the status of the output relay R to an opposite one (the feature of a bistable relay).

Ra - OFF delay with the control contact S, without extension of the interval T.



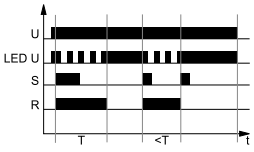
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches on the output relay R. Opening of the control contact S starts the set time of the delayed switching off of the output relay R. After the interval T has lapsed, the output relay R switches off. Opening or closing of the control contact S within the interval T does not affect the function to be performed.

Esf - ON delay with the control contact S without the interval T extension.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T - on-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains in this position until the control contact S is closed again, which instantly switches the output relay off for the time T, and after the interval T has lapsed, the output relay R switches on again. In the course of measurement of the interval T, opening or closing of the control contact S does not affect the status of the output relay R. The output relay R may be switched on again after the current cycle has been completed.

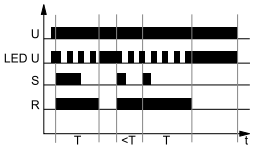
Wi - ON for the set interval controlled by closing of the control contact S, with the function of switching off the output relay R prior to the lapse of the interval T.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. Any next closing of the control contact S switches on the output relay R again. In case the control contact S is closed again during the interval T, the output relay is immediately switched off, and the measured interval is cancelled. In the course of the interval T, any opening of the control contact S does not affect the function to be performed.

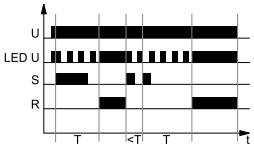
U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T** - measured time; **t** - time axis

Wst - ON for the set interval by closing the control contact S, with extension of the interval T - extension of the time of switching on the output relay R.



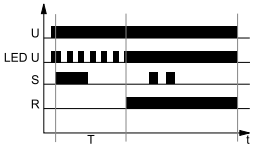
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. The next closing of the control contact S immediately switches on the output relay R for the interval T. In case the control contact S is closed within the interval T, the measured time is cancelled, and the interval T starts again.

Est - ON delay with closing of the control contact S, with the interval T extended.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T, and after the interval T has lapsed, the output relay R switches on and remains in this position until the control contact S is closed again or until the supply voltage U is interrupted. Closing of the control contact S resets the thus far measured time and starts the new interval T.

Esp - ON delay - one cycle, with closing of the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T, and after the interval T has lapsed, the output relay R switches on and remains in this position until the supply voltage U is interrupted. When the output relay R is on, opening or closing of the control contact S does not affect its status.

Additional functions

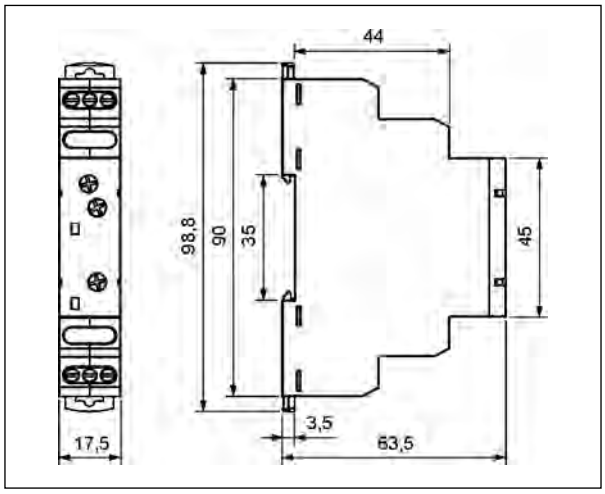
Supply diode: it is lit permanently when the time is not being measured. In course of the T time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time.

Adjustment of the set values:
- the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment,
- no change of the function is possible in the course of the relay's operation. Any change of the settings of the relay shall be read only after the supply voltage has been switched off and on again.

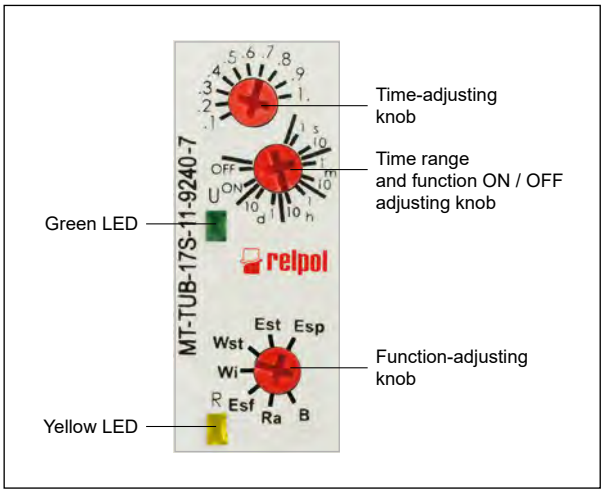
Release: depending on the function to be performed, the relay is released with the supply voltage or by connection of the S contact to the A1 line. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

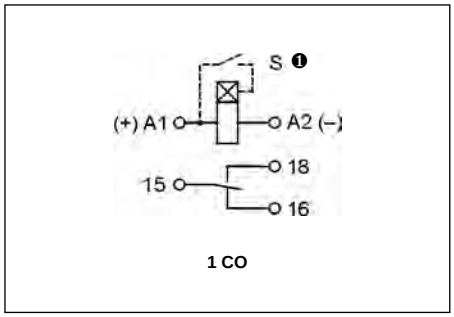
Dimensions



Front panel description



Connection diagram



❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TUB-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm² / 2 x 1,5 mm² (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time functions performed		Cover		Number and type of contacts		Rated input voltage				Number of functions
M	T	–	T	U	B	— 1	7	S	— 1	1	— 9	2	4	0	— 7

Time functions performed
UB - multifunction

Cover
17S - modular, width 17,5 mm

Number and type of contacts
11 - 1 CO

Rated input voltage
9240 - 12...240 V AC/DC AC: 50/60 Hz

Number of functions
7 - relay perform 7 functions

Example of ordering code:

MT-TUB-17S-11-9240-7 time relay **MT-TUB-...**, multifunction (relay perform 7 functions), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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NEW

- **Single-function time relays**, **time function E** (ON delay), **8 time ranges**
- Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz
	DC	≤ 1,5 W
Range of supply frequency	AC	48...63 Hz

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		90 ❶ x 17,5 x 63,5 mm
Weight		64 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock resistance		15 g
Vibration resistance		0,35 mm DA 10...55 Hz

Time module data

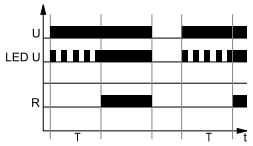
Functions		E permanent switching ON and OFF
Time ranges		1 s ❷; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❸ ❷
Repeatability		± 0,5% ❷
Values affecting	• temperature	± 0,05% / °C
the timing adjustment	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LED R ON/OFF - output relay status

❶ Length with 35 mm rail taps: 98,8 mm. ❷ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❸ Calculated from the final range values, for the setting direction from minimum to maximum.

Time functions

Permanent switching **ON and OFF**.
The functions ON and OFF are selected with TIME potentiometer. In the ON function, the normally open contacts are closed all the time whereas in the OFF function they are open. The position of the FUNC potentiometer is of no significance in these functions as is the preset measurement time. The ON or OFF functions are used for the time relay operation control in electric systems.

E - ON delay.



On applying the supply voltage U the set interval T begins - off-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains on until supply voltage U is interrupted.

U - supply voltage; **R** - output state of the relay; **T** - measured time; **t** - time axis

Additional functions

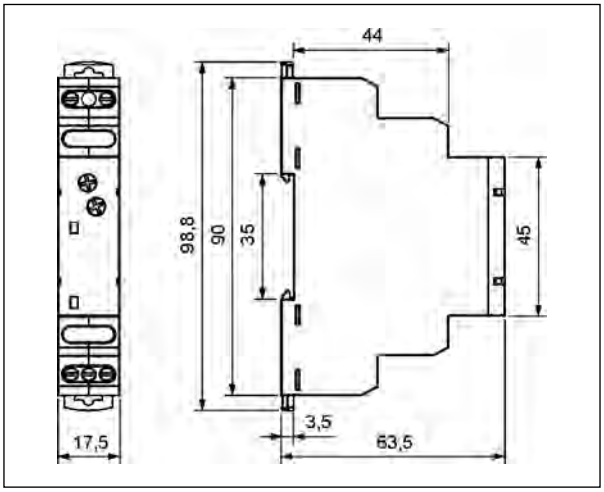
Supply diode: it is lit permanently when the time is not being measured. In course of the T time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

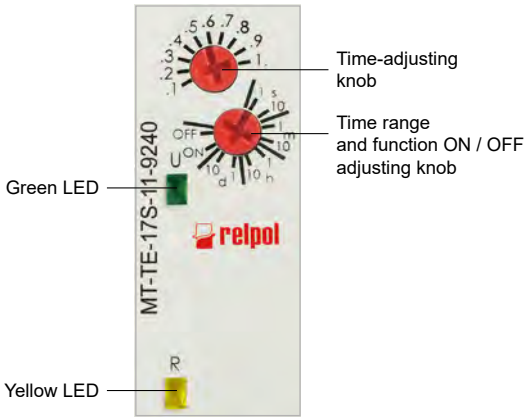
Release: the relay is released with the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

Dimensions



Front panel description



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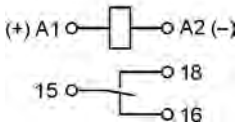
Connection diagram



1 CO

Mounting

Relays **MT-TE-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time functions performed		Cover		Number and type of contacts		Rated input voltage			
M	T	–	T	E	1	7	S	1	1	9	2	4	0

Time functions performed
E - relay performing a function E

Cover
17S - modular, width 17,5 mm

Number and type of contacts
11 - 1 CO

Rated input voltage
9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TE-17S-11-9240 time relay **MT-TE-...**, single-function (relay perform function E), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

NEW

- **Single-function time relays**, **time function Wu** (ON for the set interval), **8 time ranges**
- Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts			1 CO
Contact material			$AgSnO_2$
Max. switching voltage			400 V AC / 300 V DC
Rated load		AC1	10 A / 250 V AC
		DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current			10 A / 250 V AC
Max. breaking capacity		AC1	16 A / 250 V AC
Min. breaking capacity			1 W 10 V, 10 mA
Contact resistance			≤ 100 mΩ
Max. operating frequency			
• at rated load		AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC		12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage			0,9...1,1 U_n
Rated power consumption		AC	≤ 4,5 VA AC: 50 Hz
		DC	≤ 1,5 W
Range of supply frequency		AC	48...63 Hz

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		90 ❶ x 17,5 x 63,5 mm
Weight		64 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock resistance		15 g
Vibration resistance		0,35 mm DA 10...55 Hz

Time module data

Functions		Wu permanent switching ON and OFF
Time ranges		1 s ❷; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❸ ❷
Repeatability		± 0,5% ❷
Values affecting the timing adjustment	• temperature	± 0,05% / °C
	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LED R ON/OFF - output relay status

❶ Length with 35 mm rail taps: 98,8 mm. ❷ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❸ Calculated from the final range values, for the setting direction from minimum to maximum.

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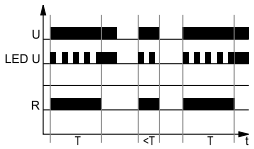
Time functions

Permanent switching **ON and OFF**.
The functions ON and OFF are selected with TIME potentiometer. In the ON function, the normally open contacts are closed all the time whereas in the OFF function they are open. The position of the FUNC potentiometer is of no significance in these functions as is the preset measurement time. The ON or OFF functions are used for the time relay operation control in electric systems.

Wu - ON for the set interval.



Applying the supply voltage U immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R switches off.

U - supply voltage; **R** - output state of the relay; **T** - measured time; **t** - time axis

Additional functions

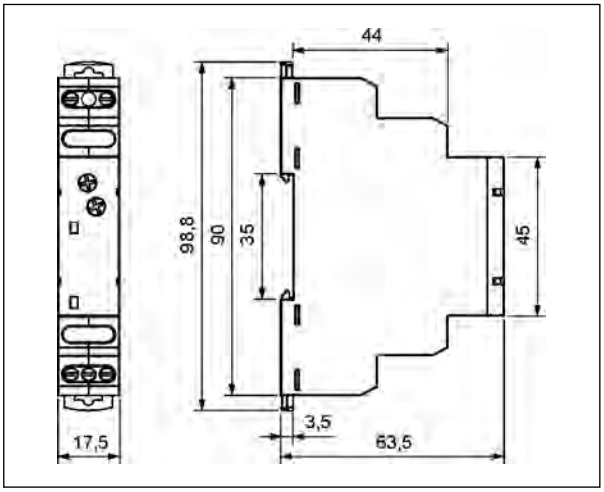
Supply diode: it is lit permanently when the time is not being measured. In course of the T time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

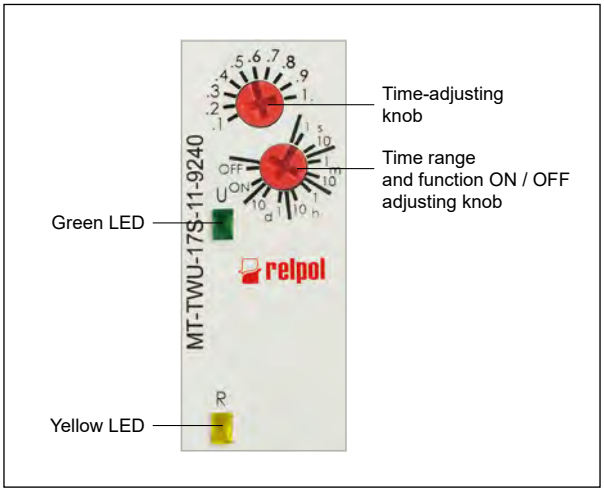
Release: the relay is released with the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

Dimensions



Front panel description



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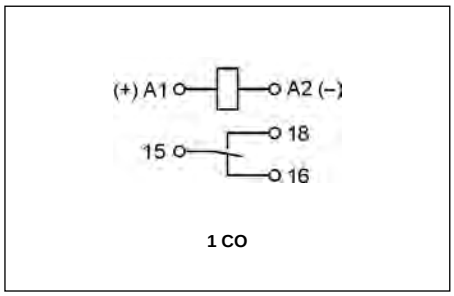
Connection diagram



1 CO

Mounting

Relays **MT-TWU-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time functions performed		Cover		Number and type of contacts		Rated input voltage			
M	T	–	T	W	U	—	1	7	S	—	1	1	—	9	2	4	0

Time functions performed

WU - relay performing a function Wu

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TWU-17S-11-9240 time relay **MT-TWU-...**, single-function (relay perform function Wu), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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NEW

- **Single-function time relays**, **time function Bp** (Symmetrical cyclical operation pause first), **8 time ranges**
- Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz
	DC	≤ 1,5 W
Range of supply frequency	AC	48...63 Hz

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		90 ❶ x 17,5 x 63,5 mm
Weight		64 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock resistance		15 g
Vibration resistance		0,35 mm DA 10...55 Hz

Time module data

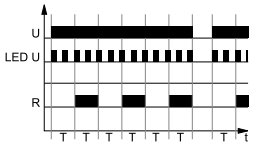
Functions		Bp permanent switching ON and OFF
Time ranges		1 s ❷; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❸ ❷
Repeatability		± 0,5% ❷
Values affecting	• temperature	± 0,05% / °C
the timing adjustment	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LED R ON/OFF - output relay status

❶ Length with 35 mm rail taps: 98,8 mm. ❷ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❸ Calculated from the final range values, for the setting direction from minimum to maximum.

Time functions

Permanent switching **ON and OFF**.
The functions ON and OFF are selected with TIME potentiometer. In the ON function, the normally open contacts are closed all the time whereas in the OFF function they are open. The position of the FUNC potentiometer is of no significance in these functions as is the preset measurement time. The ON or OFF functions are used for the time relay operation control in electric systems.

Bp - Symmetrical cyclical operation pause first.



Applying the supply voltage U starts the cyclical operation from the T interval - switching the output relay R off followed by switching on the output relay R for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

U - supply voltage; **R** - output state of the relay; **T** - measured time; **t** - time axis

Additional functions

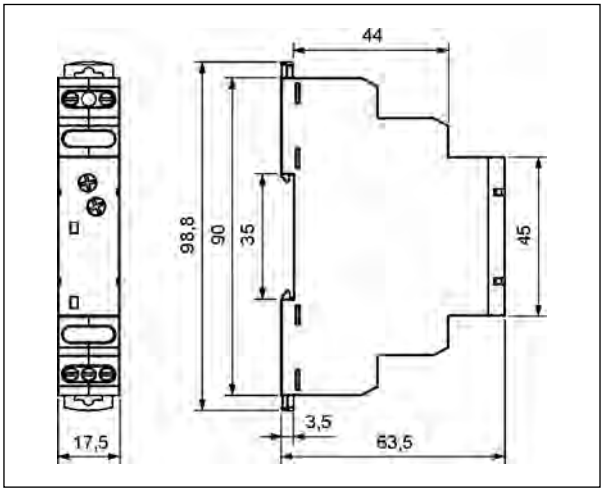
Supply diode: it is lit permanently when the time is not being measured. In course of the T time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

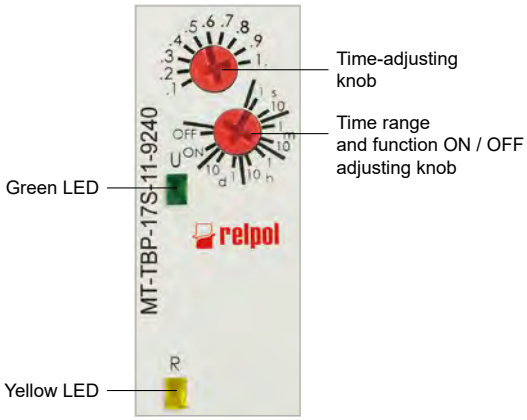
Release: the relay is released with the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

Dimensions



Front panel description



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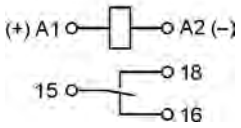
Connection diagram



1 CO

Mounting

Relays **MT-TBP-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time functions performed		Cover		Number and type of contacts		Rated input voltage
M T – T	B P	—	1 7 S	—	1 1	—	9 2 4 0

Time functions performed

BP - relay performing a function Bp

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TBP-17S-11-9240 time relay **MT-TBP-...**, single-function (relay perform function Bp), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

- **Time relays with independently controled times T1 and T2, time function ER** (ON delay and OFF delay), **7 time ranges**
- Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n	
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz	
	DC	≤ 1,5 W	
Range of supply frequency	AC	48...63 Hz	
Control contact S ❶			
• min. voltage ❷		0,7 U_n	
• min. time of pulse duration ❷		AC: ≥ 50 ms	DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5	10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7	
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g	
Ambient temperature	• storage	-40...+70 °C	
	• operating	-20...+45 °C	
Cover protection category		IP 20	PN-EN 60529
Relative humidity		up to 85%	
Shock / vibration resistance		15 g / 0,35 mm	10...55 Hz

Time module data

Functions		ER
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting the timing adjustment	• temperature	± 0,05% / °C
	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

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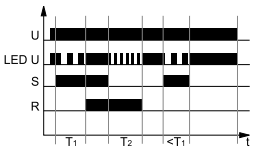
Time functions

ER - ON delay and OFF delay with control contact S. Independent settings of T1 and T2 intervals.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T1, and after it has lapsed, the output relay R switches on. Opening of the control contact S starts the interval T2, and after it has lapsed, the output relay R switches off. In case the control contact S is closed in the course of the interval T2, the measured time is reset and the output relay R remains switched on. In case the control contact S is closed for time shorter than T1, the unit will not switch the output relay R on.

U - supply voltage; **R** - output state of the relay;
S - control contact state; **T1**, **T2** - measured times; **t** - time axis

Additional functions

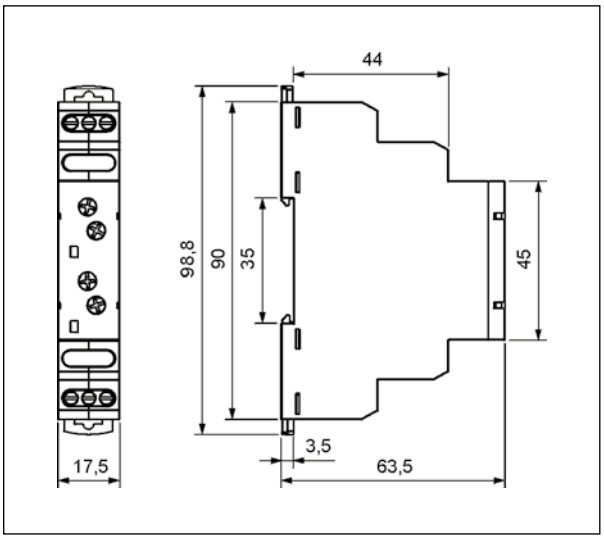
Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

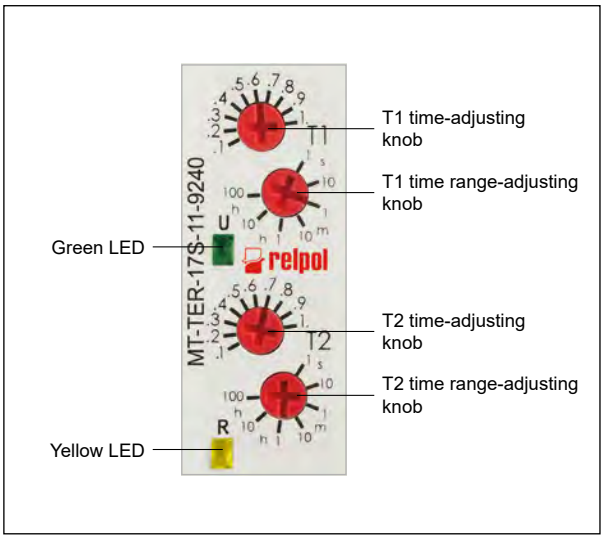
Release: the relay is released by connection of the S contact to the A1 line. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

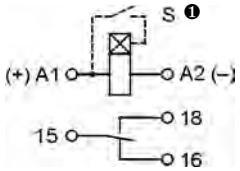
Dimensions



Front panel description



Connection diagram



1 CO

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TER-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time function performed		Cover		Number and type of contacts		Rated input voltage			
M	T	–	T	E	R	—	1	7	S	—	1	1	—	9	2	4	0

Time function performed

ER - relay performing a function ER

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TER-17S-11-9240 time relay **MT-TER-...**, single-function (relay perform function ER), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Time relays with independently controled times T1 and T2, time function EWa** (OFF delay and breaking time delay), **7 time ranges** • Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Operating range of supply voltage	0,9...1,1 U_n	
Rated power consumption AC	≤ 4,5 VA AC: 50 Hz	
DC	≤ 1,5 W	
Range of supply frequency AC	48...63 Hz	
Control contact S ❶		
• min. voltage ❷	0,7 U_n	
• min. time of pulse duration ❷	AC: ≥ 50 ms	DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC	
Rated surge voltage	2 500 V 1,2 / 50 µs	
Overvoltage category	II	
Insulation pollution degree	1	
Flammability class	V-0 UL94	
Dielectric strength • input - output	2 500 V AC	type of insulation: basic
• contact clearance	1 000 V AC	type of clearance: micro-disconnection

General data

Electrical life • resistive AC1	> 0,5 x 10^5	10 A, 250 V AC
Mechanical life (cycles)	> 3 x 10^7	
Dimensions (L x W x H) / Weight	90 ❸ x 17,5 x 63,5 mm / 64 g	
Ambient temperature • storage	-40...+70 °C	
• operating	-20...+45 °C	
Cover protection category	IP 20	PN-EN 60529
Relative humidity	up to 85%	
Shock / vibration resistance	15 g / 0,35 mm 10...55 Hz	

Time module data

Functions	EWa	
Time ranges	1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h	
Timing adjustment	smooth - (0,1...1) x time range	
Setting accuracy	± 5% ❺ ❹	
Repeatability	± 0,5% ❹	
Values affecting • temperature	± 0,05% / °C	
the timing adjustment • humidity	± 0,05% / %HR	
Recovery time	≤ 50 ms	
LED indicator	green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status	

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

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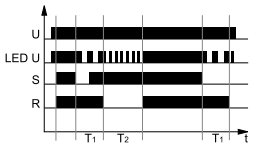
Time functions

EWa - OFF delay and breaking time delay with opening of the control contact S. Independent settings of T1 and T2 intervals.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S switches on the output relay R. Opening of the control contact S starts the interval T1, and after the interval has lapsed, the output relay R switches off for the interval T2. Following the interval T2, the output relay R will be switched on again when the control contact S is closed on the lapse of the interval. In the course of the intervals T1 and T2 the position of the control contact S is of no importance.

U - supply voltage; **R** - output state of the relay;
S - control contact state; **T1**, **T2** - measured times; **t** - time axis

Additional functions

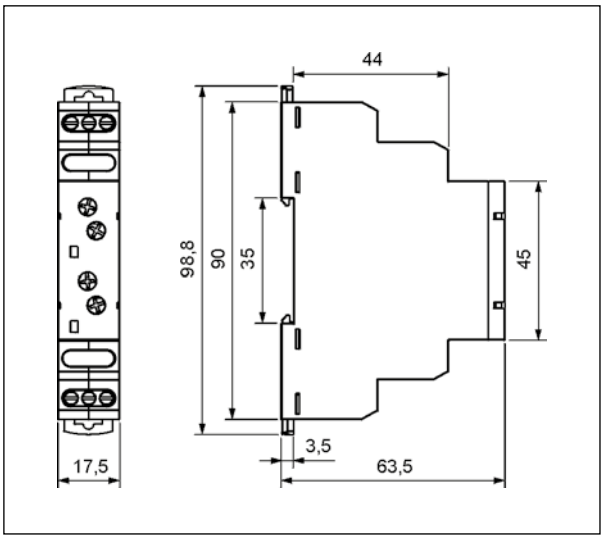
Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

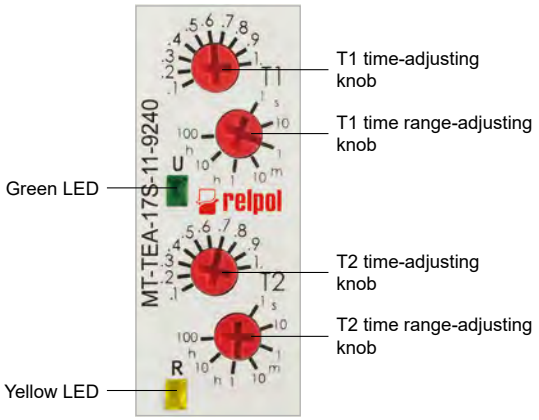
Release: the relay is released by connection of the S contact to the A1 line. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

Dimensions



Front panel description



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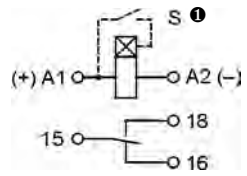
Connection diagram



1 CO

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TEA-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time function performed	Cover	Number and type of contacts	Rated input voltage
MT-	TEA	— 17S	— 11	— 9240

Time function performed

EA - relay performing a function EWa

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TEA-17S-11-9240 time relay **MT-TEA-...**, single-function (relay perform function EWa), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Time relays with independently controled times T1 and T2, time function EWs** (ON delay and ON for the set time), **7 time ranges** • Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n	
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz	
	DC	≤ 1,5 W	
Range of supply frequency	AC	48...63 Hz	
Control contact S ❶			
• min. voltage ❷		0,7 U_n	
• min. time of pulse duration ❷		AC: ≥ 50 ms	DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5	10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7	
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g	
Ambient temperature	• storage	-40...+70 °C	
	• operating	-20...+45 °C	
Cover protection category		IP 20	PN-EN 60529
Relative humidity		up to 85%	
Shock / vibration resistance		15 g / 0,35 mm	10...55 Hz

Time module data

Functions		EWs
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting the timing adjustment	• temperature	± 0,05% / °C
	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

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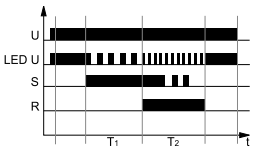
Time functions

EWs - ON delay and ON for the set time with closing of the control contact S. Independent settings of T1 and T2 intervals.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T1, and after the interval has lapsed, the output relay R switches on for the interval T2. Following the interval T2, the output relay switches off, and the circuits awaits for the control contact S to be closed again. In the course of the intervals T1 and T2 the position of the control contact S is of no importance.

U - supply voltage; **R** - output state of the relay;
S - control contact state; **T1**, **T2** - measured times; **t** - time axis

Additional functions

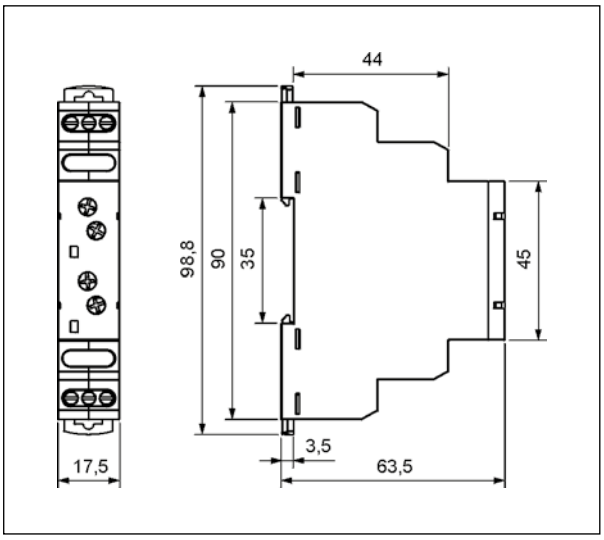
Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

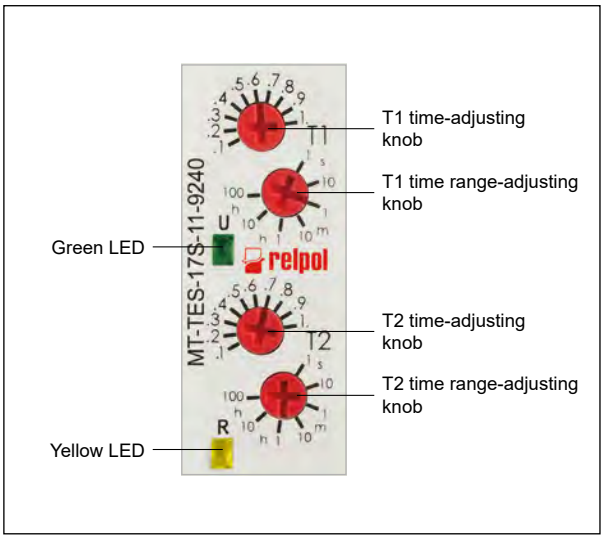
Release: the relay is released by connection of the S contact to the A1 line. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

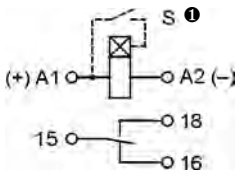
Dimensions



Front panel description



Connection diagram



1 CO

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TES-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time function performed	Cover	Number and type of contacts	Rated input voltage
MT-	TES	— 17S	— 11	— 9240

Time function performed

ES - relay performing a function EWs

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TES-17S-11-9240 time relay **MT-TES-...**, single-function (relay perform function EWs), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Time relays with independently controled times T1 and T2**, **time function EWu + NWu** (ON delay for the set interval or switching ON for the set interval - switching OFF for the set interval - continuous ON), **7 time ranges** • Cadmium - free contacts
- AC/DC input voltages • Cover - modular, width 17,5 mm • Direct mounting on 35 mm rail mount acc. to PN-EN 60715 • Applications: in low-voltage systems • Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz
	DC	≤ 1,5 W
Range of supply frequency	AC	48...63 Hz
Control contact S ❶		
• min. voltage ❷		0,7 U_n
• min. time of pulse duration ❷		AC: ≥ 50 ms DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock / vibration resistance		15 g / 0,35 mm 10...55 Hz

Time module data

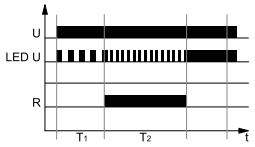
Functions		EWu + NWu
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting the timing adjustment	• temperature	± 0,05% / °C
	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

Time functions

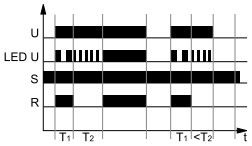
EWu + NWu - ON delay for the set interval (EWu) or switching ON for the set interval-switching OFF for the set interval-continuous ON with the control contact S (NWu). Independent settings of T1 and T2 intervals.

function EWu



When the control contact S is open, application of the supply voltage U starts operation in the EWu function - the interval T1, and after the interval T1 has lapsed, the output relay switches on for the interval T2.

function NWu



When the control contact S is closed, application of the supply voltage U starts operation in the NWu function - from switching on the output relay R for the interval T1, and after the interval T1 has lapsed, the output relay switches off for the interval T2, and following the interval T2, the output relay R switches on for continuous time.

In the course of the relay operation, closing of the control contact S at any time will cause reset and the operation in the NWu function will start whereas opening of the control contact S at any time will cause reset and the operation in the EWu function will start.

Additional functions

Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

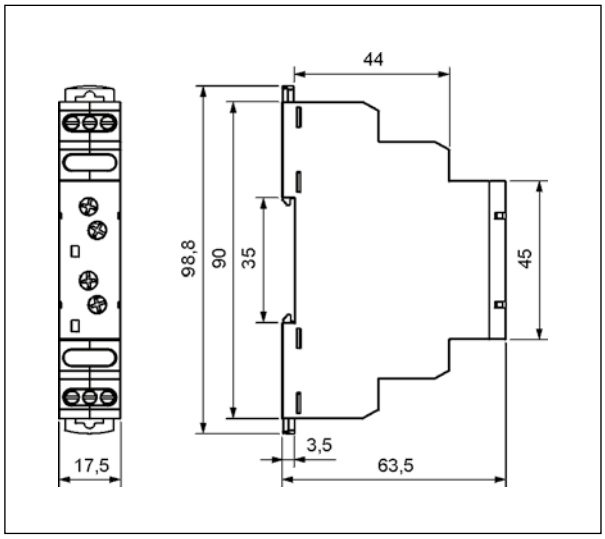
Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

Release: the relay is released with the supply voltage. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

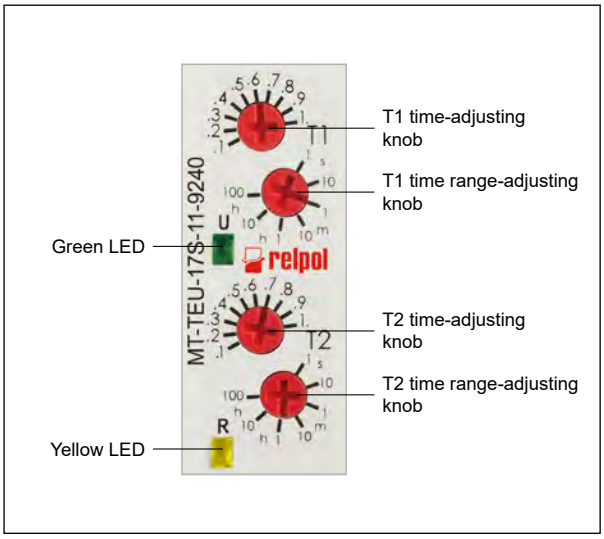
Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

U - supply voltage; **R** - output state of the relay;
S - control contact state; **T1**, **T2** - measured times; **t** - time axis

Dimensions



Front panel description



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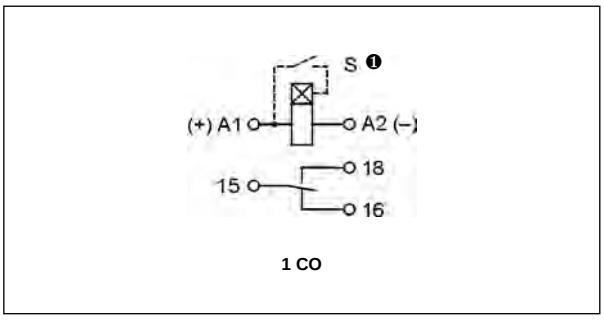
Connection diagram



❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TEU-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time function performed		Cover		Number and type of contacts		Rated input voltage			
M	T	–	T	E	U	—	1	7	S	—	1	1	—	9	2	4	0

Time function performed

EU - relay performing a function EWu + NWu

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TEU-17S-11-9240 time relay **MT-TEU-...**, single-function (relay perform function EWu + NWu), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

- **Time relays with independently controled times T1 and T2, time function Ii + Ip** (Cyclical operation in two independent intervals T1 and T2), **7 time ranges** • Cadmium - free contacts
- AC/DC input voltages • Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n	
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz	
	DC	≤ 1,5 W	
Range of supply frequency	AC	48...63 Hz	
Control contact S ❶			
• min. voltage ❷		0,7 U_n	
• min. time of pulse duration ❷		AC: ≥ 50 ms	DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5	10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7	
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g	
Ambient temperature	• storage	-40...+70 °C	
	• operating	-20...+45 °C	
Cover protection category		IP 20	PN-EN 60529
Relative humidity		up to 85%	
Shock / vibration resistance		15 g / 0,35 mm	10...55 Hz

Time module data

Functions		Ii + Ip
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting the timing adjustment	• temperature	± 0,05% / °C
	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

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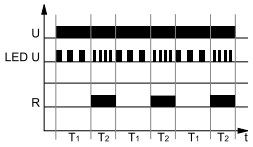
Time functions

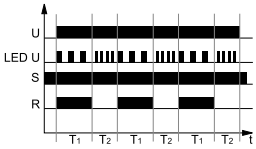
Ii + Ip - Cyclical operation in two independent intervals T1 and T2; operation in the function Ii or Ip depending on the position of the control contact S.

function Ip



Application of the supply voltage U when the control contact S is open start the cyclical operation in the Ip function - from the interval T1 (time of switching off the output relay R), following which the output relay R is switched on for the interval T2. The cyclical operation continues until the supply voltage U is interrupted.

function Ii



When the control contact S is closed, application of the supply voltage U starts operation in the Ii function - from switching on the output relay R for the interval T1, and after the interval T1 has lapsed, the output relay switches off for the interval T2. The cyclical operation continues until the supply voltage U is interrupted.

In the course of the relay operation, closing of the control contact S at any time will cause reset and the operation in the Ii function will start whereas opening of the control contact S at any time will cause reset and the operation in the Ip function will start.

Additional functions

Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

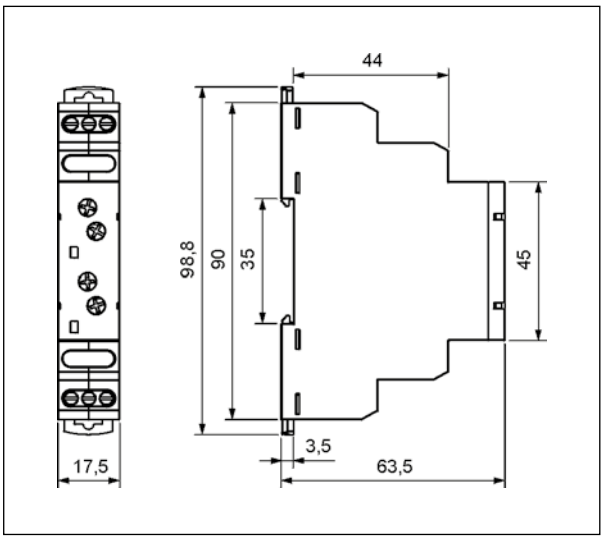
Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

Release: the relay is released with the supply voltage. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

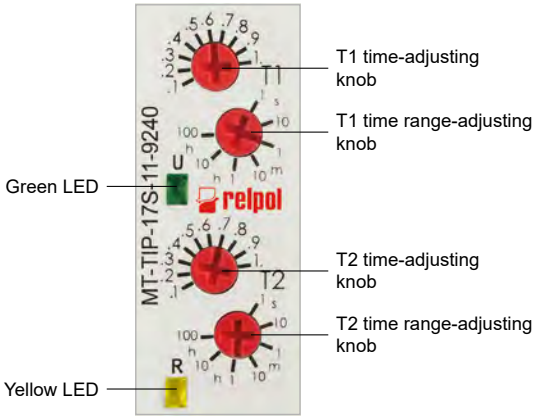
Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

U - supply voltage; **R** - output state of the relay;
S - control contact state; **T1**, **T2** - measured times; **t** - time axis

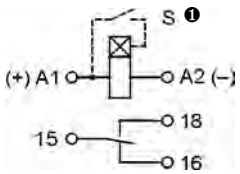
Dimensions



Front panel description



Connection diagram



1 CO

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TIP-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time function performed		Cover		Number and type of contacts		Rated input voltage			
M	T	–	T	I	P	—	1	7	S	—	1	1	—	9	2	4	0

Time function performed

IP - relay performing a function Ii + Ip

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TIP-17S-11-9240 time relay **MT-TIP-...**, single-function (relay perform function Ii + Ip), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Time relays with independently controled times T1 and T2, time function WsWa** (ON for the set intervals T1 and T2), **7 time ranges** • Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage AC: 50/60 Hz AC/DC		12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz
	DC	≤ 1,5 W
Range of supply frequency	AC	48...63 Hz
Control contact S ❶		
• min. voltage ❷		0,7 U_n
• min. time of pulse duration ❷		AC: ≥ 50 ms DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock / vibration resistance		15 g / 0,35 mm 10...55 Hz

Time module data

Functions		WsWa
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting	• temperature	± 0,05% / °C
the timing adjustment	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

Time functions

WsWa - ON for the set intervals T1 and T2 with the control contact S. Independent settings of T1 and T2 intervals.

The input of the time relay is supplied with voltage U continuously. Closing of the control contact S switches the output relay R for the interval T1, and after the interval has lapsed, the relay R is switched off. Opening of the control contact S switches on the output relay R for the interval T2. If the control contact S is open when the interval T1 lapses, the output relay R will remain on for the interval T2. If the control contact S is closed when the interval T2 lapses, the output relay R will remain on for the interval T1.

U - supply voltage; **R** - output state of the relay;
S - control contact state; **T1**, **T2** - measured times; **t** - time axis

Additional functions

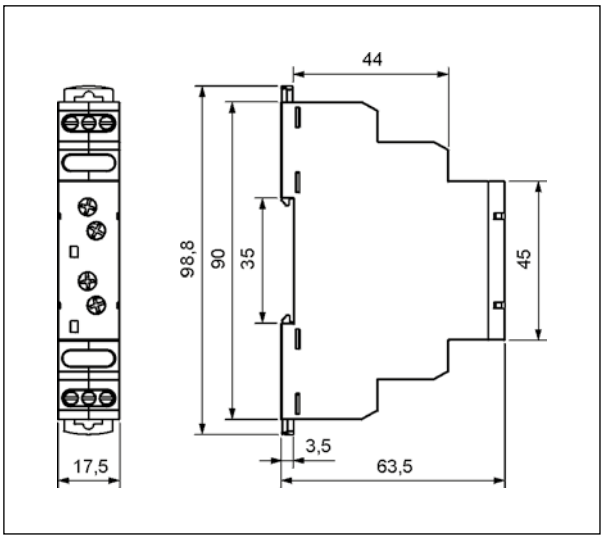
Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

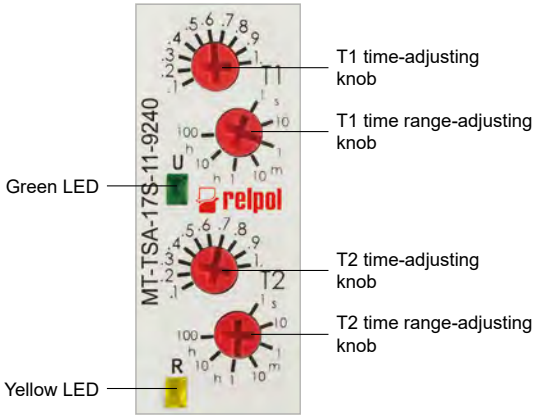
Release: the relay is released by connection of the S contact to the A1 line. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

Dimensions



Front panel description



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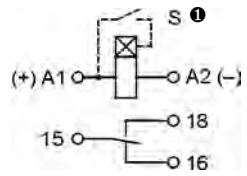
Connection diagram



1 CO

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TSA-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time function performed		Cover		Number and type of contacts		Rated input voltage			
M	T	–	T	S	A	—	1	7	S	—	1	1	—	9	2	4	0

Time function performed

SA - relay performing a function WsWa

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TSA-17S-11-9240 time relay **MT-TSA-...**, single-function (relay perform function WsWa), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Time relays with independently controled times T1 and T2, time function Wt** (Monitoring of the sequence of pulses), **7 time ranges** • Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n	
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz	
	DC	≤ 1,5 W	
Range of supply frequency	AC	48...63 Hz	
Control contact S ❶			
• min. voltage ❷		0,7 U_n	
• min. time of pulse duration ❷		AC: ≥ 50 ms	DC: ≥ 20 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - output	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5	10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7	
Dimensions (L x W x H) / Weight		90 ❸ x 17,5 x 63,5 mm / 64 g	
Ambient temperature	• storage	-40...+70 °C	
	• operating	-20...+45 °C	
Cover protection category		IP 20	PN-EN 60529
Relative humidity		up to 85%	
Shock / vibration resistance		15 g / 0,35 mm	10...55 Hz

Time module data

Functions		Wt
Time ranges		1 s ❹; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment		smooth - (0,1...1) x time range
Setting accuracy		± 5% ❺ ❹
Repeatability		± 0,5% ❹
Values affecting the timing adjustment	• temperature	± 0,05% / °C
	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S. ❷ Where the control signal is recognizable. ❸ Length with 35 mm rail taps: 98,8 mm. ❹ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course). ❺ Calculated from the final range values, for the setting direction from minimum to maximum.

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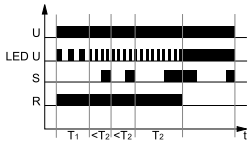
Time functions

Wt - Monitoring of the sequence of pulses. Switching on is extended with consecutive pulses / closings of the contact S. Independent settings of T1 and T2 intervals.



On applying the supply voltage U the output relay R is switched on for the set interval T1. After the interval T1 has lapsed, the interval T2 starts with the output relay R still switched on. For the output relay to switch on, the control contact S must be closed and then opened (single pulse) during the interval T2, which cancels the time already measured an starts the interval T2 again. In case of absence of a single pulse prior to lapse of the interval T2, the output relay R will switch off, and it may be switched on after the supply voltage has been interrupted and applied again.

U - supply voltage; **R** - output state of the relay;
S - control contact state; **T1**, **T2** - measured times; **t** - time axis

Additional functions

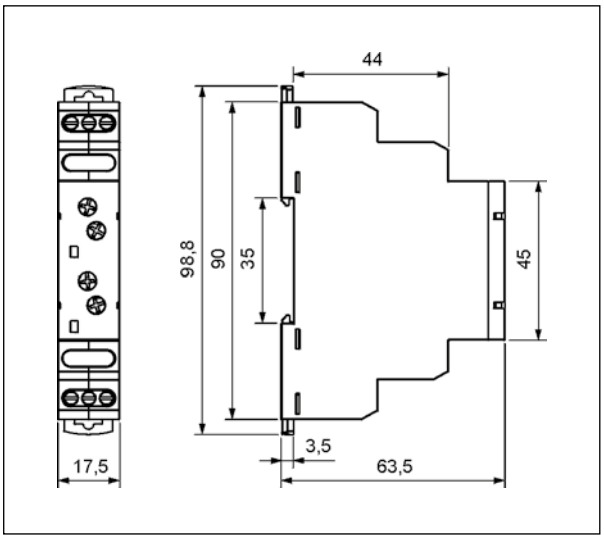
Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

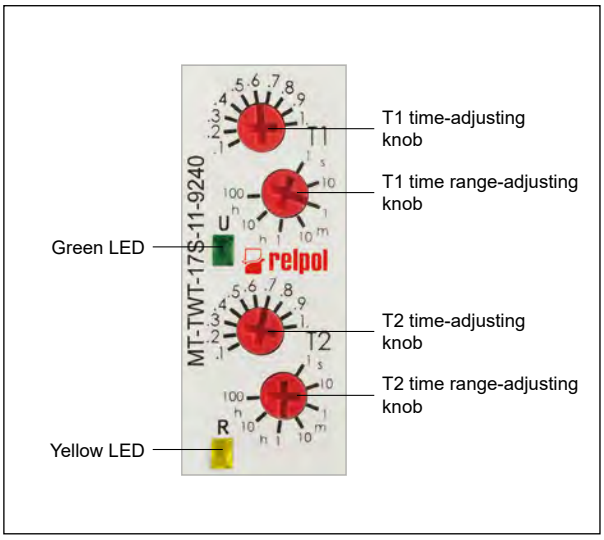
Release: the relay is released by connection of the S contact to the A1 line. For DC supply, the positive pole must be connected to the A1 line. The level of the S contact activation is adjusted automatically depending on the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

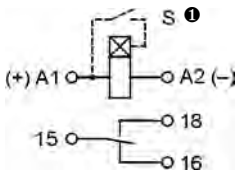
Dimensions



Front panel description



Connection diagram



1 CO

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Mounting

Relays **MT-TWT-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes

Type	Time function performed		Cover		Number and type of contacts		Rated input voltage			
M	T	–	T	W	T	—	1	7	S	—	1	1	—	9	2	4	0

Time function performed

WT - relay performing a function Wt

Cover

17S - modular, width 17,5 mm

Number and type of contacts

11 - 1 CO

Rated input voltage

9240 - 12...240 V AC/DC AC: 50/60 Hz

Example of ordering code:

MT-TWT-17S-11-9240 time relay **MT-TWT-...**, single-function (relay perform function Wt), cover - modular, width 17,5 mm, one changeover contact, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Time relays with independently controled times T1 and T2, time function SD** (Star-Delta start-up), **7 time ranges**
- Cadmium - free contacts • AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives: CE EAC

Output circuits - contact data

Number and type of contacts		2 x 1 CO
Contact material		$AgSnO_2$
Max. switching voltage		400 V AC / 300 V DC
Rated load	AC1	10 A / 250 V AC
	DC1	10 A / 24 V DC; 0,3 A / 250 V DC
Rated current		10 A / 250 V AC
Max. breaking capacity	AC1	16 A / 250 V AC
Min. breaking capacity		1 W 10 V, 10 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	600 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz
	DC	≤ 1,5 W
Range of supply frequency	AC	48...63 Hz

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V 1,2 / 50 µs
Overvoltage category		II
Insulation pollution degree		1
Flammability class		V-0 UL94
Dielectric strength	• input - outputs	2 500 V AC type of insulation: basic
	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 0,5 x 10^5 10 A, 250 V AC
Mechanical life (cycles)		> 3 x 10^7
Dimensions (L x W x H)		90 ❶ x 17,5 x 63,5 mm
Weight		84 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+45 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		up to 85%
Shock resistance		15 g
Vibration resistance		0,35 mm 10...55 Hz

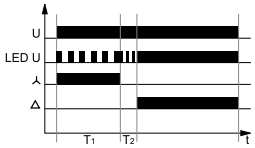
Time module data

Functions		SD
Time ranges (start-up for the star) T1		10 s; 30 s; 1 min.; 3 min.; 10 min.; 30 min.; 1 h
Timing adjustment T1		smooth - (0,05...1) x time range
Transit time (adjustable) ❷ T2		smoothly within the range 0,05...1 s (linear adjustment of time)
Setting accuracy		± 5% ❸
Repeatability		± 3%
Values affecting	• temperature	± 0,05% / °C
the timing adjustment	• humidity	± 0,05% / %HR
Recovery time		≤ 50 ms
LED indicator		green LED U ON - indication of supply voltage U green LED U flashing - measurement of T1 and T2 times yellow LEDs ON/OFF - contactors switching signal

❶ Length with 35 mm rail taps: 98,8 mm.
❷ Pause time between switching off the star contactor and switching on the delta contactor.
❸ Calculated from the final range values, for the setting direction from minimum to maximum.

Time functions

SD - Star-Delta start-up.



When the supply voltage U is applied, the operating star-contact (15-18) becomes closed, which is signaled with illumination of the yellow LED. Measurement of the set time T1 starts, and the greed LED flashes at 500 ms. After the T1 time has lapsed, the star contact is disconnected and the relay begins measuring the T2 time, which is signaled with the green LED flashing at 250 ms. After the T2 time has lapsed, the delta contact (25-28) is switched on together with the yellow LED, and the green LED remains illuminated.

U - supply voltage; **T1**, **T2** - measured times; **t** - time axis

Additional functions

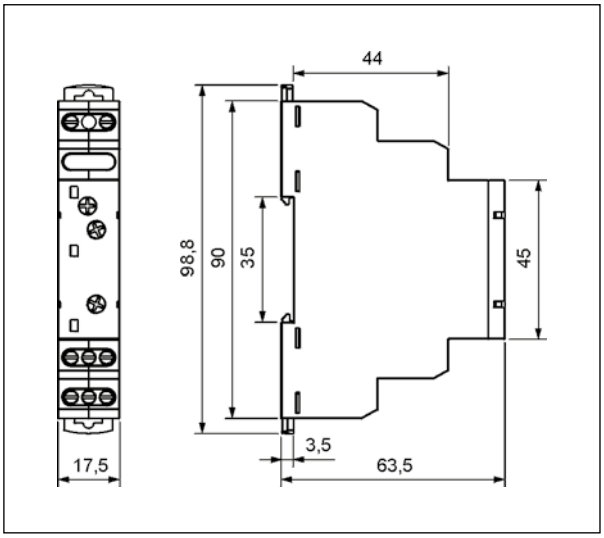
Supply diode: it is lit permanently when the time is not being measured. In course of the T1 time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the T2 time, the period is 250 ms.

Adjustment of the set values: the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

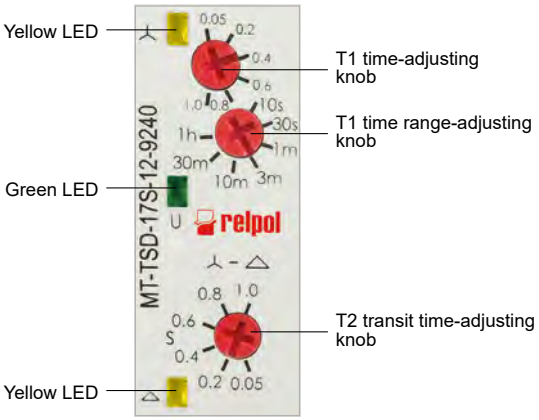
Release: the relay is released with the supply voltage.

Supply: the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10,8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.

Dimensions



Front panel description



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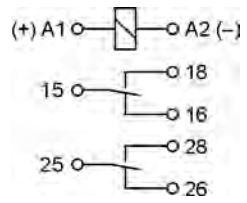
Connection diagram



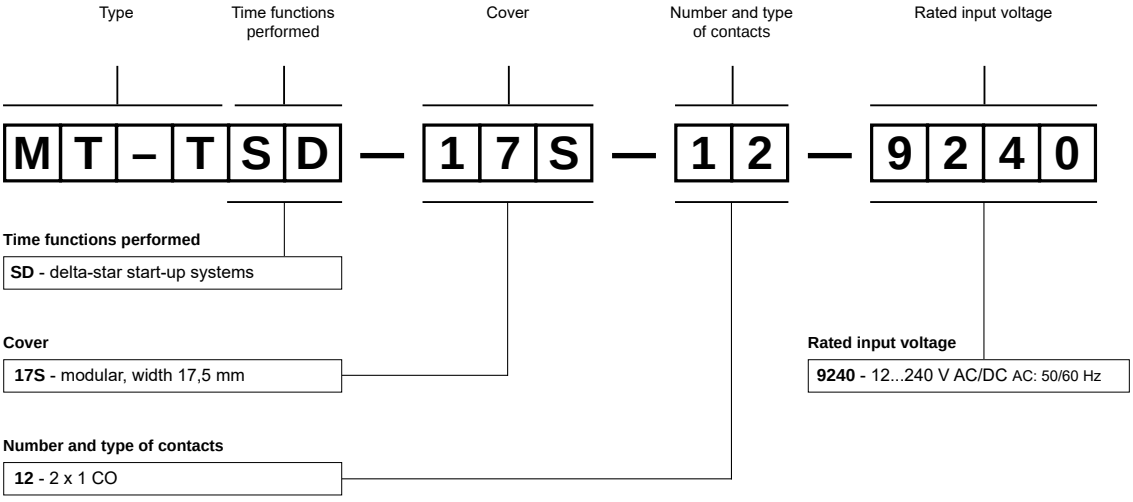
2 x 1 CO

Mounting

Relays **MT-TSD-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Two taps:
easy assembly on 35 mm rail,
firm tapping (top and bottom).

Ordering codes



Example of ordering code:

MT-TSD-17S-12-9240 time relay **MT-TSD-...**, single-function (relay perform function SD), cover - modular, width 17,5 mm, two changeover contacts, contact material $AgSnO_2$, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

- **Multifunction time relays (7 time functions; 7 time ranges)**
- AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		AgNi
Rated load	AC1	8 A / 250 V AC
Max. breaking capacity	AC1	2 000 VA (8 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC DC	4,0 VA 1,5 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Residual ripple to DC		10%
Control contact S ❶ • min. time of pulse duration ❷ • loadable • max. length of control line • trigger level (sensitivity)		 AC: ≥ 100 ms DC: ≥ 50 ms yes 10 m automatic adaption to supply voltage

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3
Dielectric strength	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 17,5 x 65 mm
Weight		63 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Time module data

Functions ❸	E, Wu, Bp, R, Ws, Wa, Es
Time ranges	1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment	smooth - (0,05...1) x time range
Base accuracy	± 1% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 0,5% or ± 5 ms
Temperature influence	± 0,01% / °C
Recovery time	100 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.
❷ Where the control signal is recognizable.
❸ The function has to be set before connecting the relay to the supply voltage.

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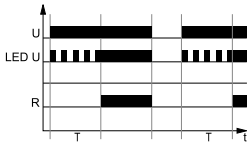
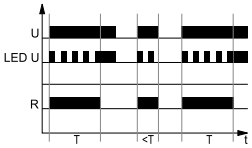
Time functions

E - ON delay.



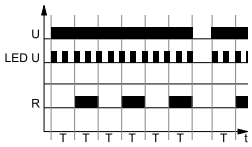
When the supply voltage U is applied, the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay R switches into on-position (yellow LED illuminated). This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the expiry of the interval T, the interval already expired is erased and is restarted when the supply voltage is next applied.

Wu - ON for the set interval.



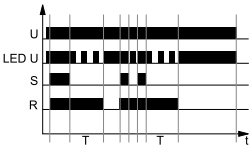
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay switches into off-position (yellow LED not illuminated). This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the interval T has expired, the output relay switches into off-position. The interval already is erased and is restarted when the supply voltage is next applied.

Bp - Symmetrical cyclical operation pause first.



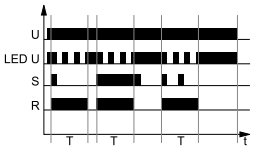
When the supply voltage U is applied, the set interval T begins (green LED flashes). After the interval T has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval T begins again. After the interval T has expired, the output relay switches into off-position (yellow LED not illuminated). The output relay is triggered at a ratio of 1:1 until the supply voltage is interrupted.

R - OFF delay with the control contact S.



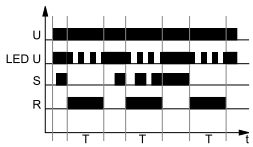
The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the output relay R switches into on-position (yellow LED illuminated). If the control contact is opened, the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay switches into off-position (yellow LED not illuminated). If the control contact is closed again before the interval T has expired, the interval already expired is erased and is restarted.

Ws - Single shot for the set interval triggered by closing of the control contact S.



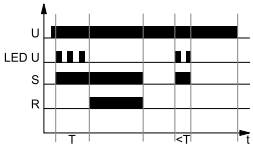
The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the output relay R switches into on-position (green LED illuminated) and the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.

Wa - ON for the set interval triggered with the control contact S.



The supply voltage U must be constantly applied to the device (green LED illuminated). Closing the control contact S has no influence on the condition of the output R. When the control contact is opened, the output relay switches into on-position (yellow LED illuminated) and the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated), the ouput relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.

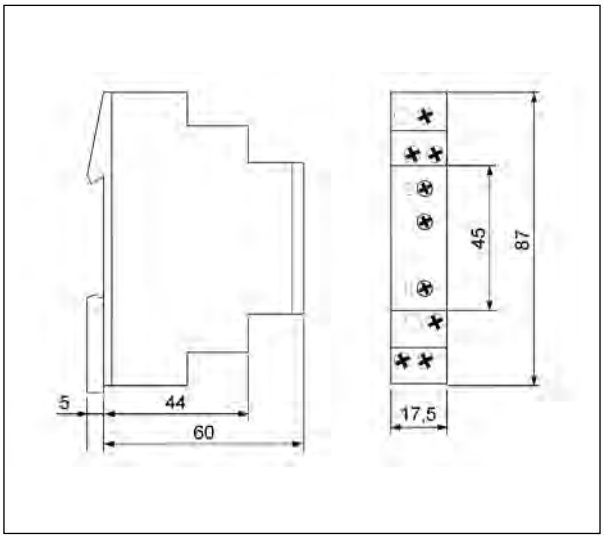
Es - ON delay with the control contact S.



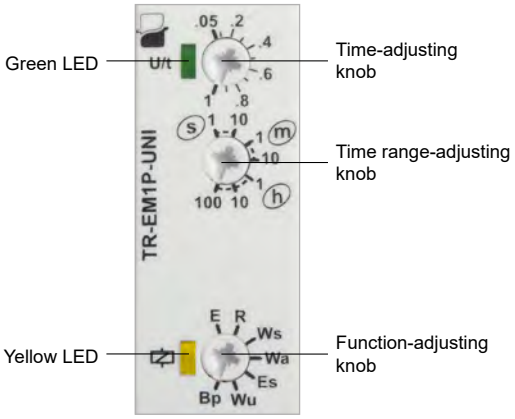
The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay R switches into on-position (yellow LED illuminated). This status remains until the control contact is opened again. If the control contact is opened before the interval T has expired, the interval already expired is erased and is restarted with the next cycle.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T** - measured time; **t** - time axis

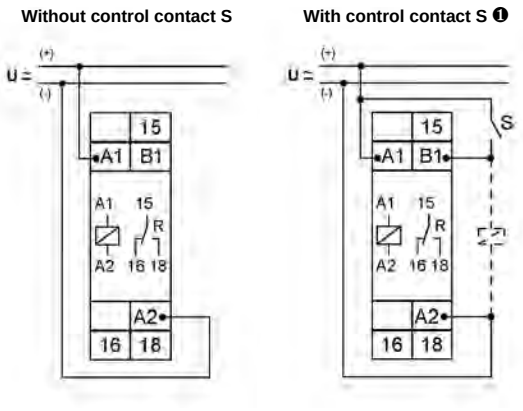
Dimensions



Front panel description



Connection diagrams



Mounting

Relays **TR-EM1P-UNI** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm² / 2 x 1,5 mm² (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 1,0 Nm. Shockproof terminal connection according to VBG 4 (PZ1 required).

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Ordering codes

Type

T	R	–	E	M	1	P	–	U	N	I

Number and type of contacts

1P - 1 CO

Example of ordering codes:

TR-EM1P-UNI

time relay **TR-EM1P-UNI**, multifunction (relay perform 7 functions), cover - modular, width 17,5 mm, one changeover contact, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Multifunction time relays (7 time functions; 7 time ranges)**
- AC/DC input voltages
- Cover - modular, width 35 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Recognitions, certifications, directives:

Output circuit - contact data

Number and type of contacts		2 CO
Contact material		AgNi
Rated load	AC1	8 A / 250 V AC
Max. breaking capacity	AC1	2 000 VA (8 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC DC	6,0 VA 2,0 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Residual ripple to DC		10%
Control contact S ❶ • min. time of pulse duration ❷ • loadable • max. length of control line • trigger level (sensitivity)		 AC: ≥ 100 ms DC: ≥ 50 ms yes 10 m automatic adaption to supply voltage

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3
Dielectric strength	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 35 x 65 mm
Weight		120 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

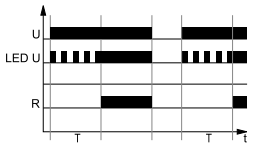
Time module data

Functions ❸	E, Wu, Bp, R, Ws, Wa, Es
Time ranges	1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment	smooth - (0,05...1) x time range
Base accuracy	± 1% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 0,5% or ± 5 ms
Temperature influence	± 0,01% / °C
Recovery time	100 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LED R ON/OFF - output relay status

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.
❷ Where the control signal is recognizable.
❸ The function has to be set before connecting the relay to the supply voltage.

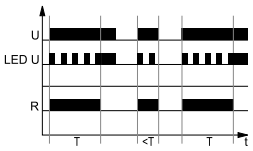
Time functions

E - ON delay.



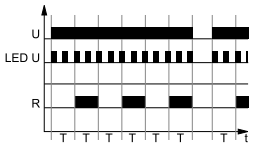
When the supply voltage U is applied, the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay R switches into on-position (yellow LED illuminated). This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the expiry of the interval T, the interval already expired is erased and is restarted when the supply voltage is next applied.

Wu - ON for the set interval.



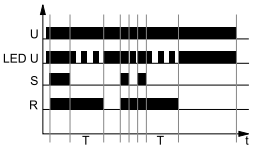
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay switches into off-position (yellow LED not illuminated). This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the interval T has expired, the output relay switches into off-position. The interval already is erased and is restarted when the supply voltage is next applied.

Bp - Symmetrical cyclical operation pause first.



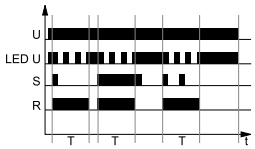
When the supply voltage U is applied, the set interval T begins (green LED flashes). After the interval T has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval T begins again. After the interval T has expired, the output relay switches into off-position (yellow LED not illuminated). The output relay is triggered at a ratio of 1:1 until the supply voltage is interrupted.

R - OFF delay with the control contact S.



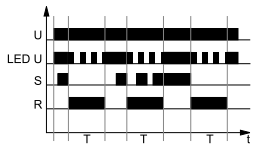
The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the output relay R switches into on-position (yellow LED illuminated). If the control contact is opened, the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay switches into off-position (yellow LED not illuminated). If the control contact is closed again before the interval T has expired, the interval already expired is erased and is restarted.

Ws - Single shot for the set interval triggered by closing of the control contact S.



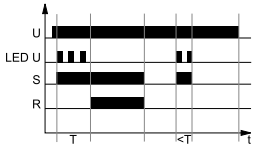
The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the output relay R switches into on-position (green LED illuminated) and the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.

Wa - ON for the set interval triggered with the control contact S.



The supply voltage U must be constantly applied to the device (green LED illuminated). Closing the control contact S has no influence on the condition of the output R. When the control contact is opened, the output relay switches into on-position (yellow LED illuminated) and the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated), the ouput relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.

Es - ON delay with the control contact S.



The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the set interval T begins (green LED flashes). After the interval T has expired (green LED illuminated) the output relay R switches into on-position (yellow LED illuminated). This status remains until the control contact is opened again. If the control contact is opened before the interval T has expired, the interval already expired is erased and is restarted with the next cycle.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T** - measured time; **t** - time axis

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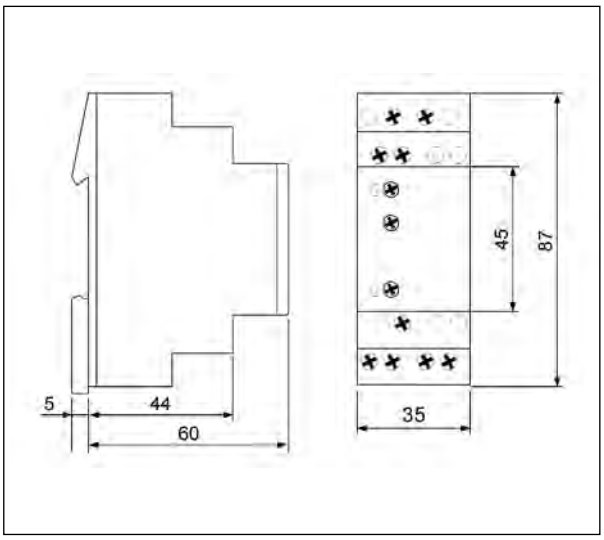
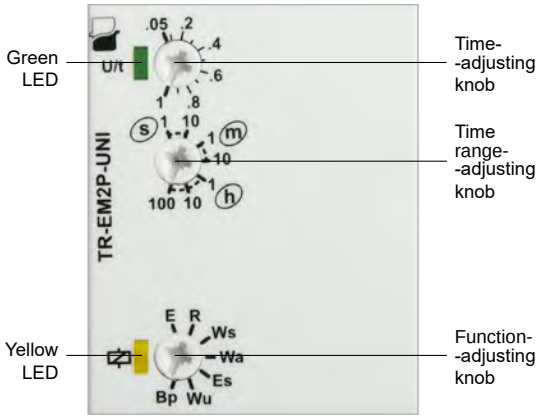
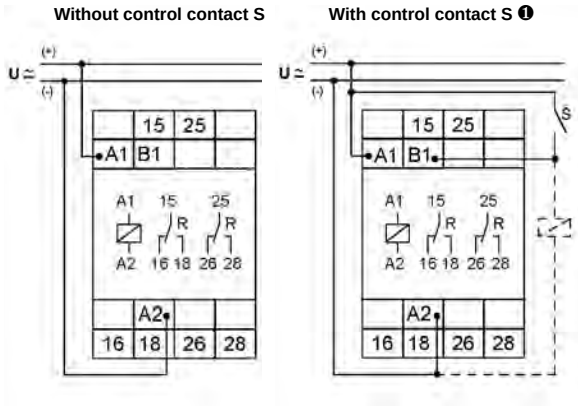
Dimensions



Front panel description



Connection diagrams



Mounting

Relays **TR-EM2P-UNI** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm² / 2 x 1,5 mm² (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 1,0 Nm. Shockproof terminal connection according to VBG 4 (PZ1 required).

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Ordering codes

Type

T	R	–	E	M	2	P	–	U	N	I

Number and type of contacts

2P - 2 CO

Example of ordering codes:

TR-EM2P-UNI

time relay **TR-EM2P-UNI**, multifunction (relay perform 7 functions), cover - modular, width 35 mm, two changeover contacts, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

- **Time relays with independently controled times T1 and T2, time function Ii, Ip** (Cyclical operation in two independent intervals T1 and T2) ❶**, 7 time ranges**
- AC/DC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		1 CO
Contact material		AgNi
Rated load	AC1	8 A / 250 V AC
Max. breaking capacity	AC1	2 000 VA (8 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC DC	4,0 VA 1,5 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Residual ripple to DC		10%

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3
Dielectric strength	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 17,5 x 65 mm
Weight		63 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Time module data

Functions ❶	Ii, Ip
Time ranges	1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment	smooth - (0,05...1) x time range
Base accuracy	± 1% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 0,5% or ± 5 ms
Temperature influence	± 0,01% / °C
Recovery time	100 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ Start by function Ip - terminals A1-B1 are not connected / bridged; start by function Ii - terminals A1-B1 are connected / bridged
- see „**Time functions**", page 330.

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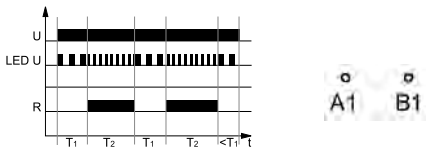
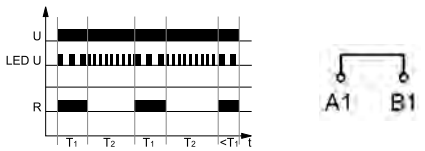
Time functions

Ip - Cyclical operation pause first. Independent settings of T1 and T2 intervals.
❶ Start by function Ip - terminals A1-B1 are not connected / bridged.



When the supply voltage U is applied, the set interval T1 begins (green LED flashes slowly). After the interval T1 has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval T2 begins (green LED flashes fast). After the interval T2 has expired, the output relay switches into off-position (yellow LED not illumninated). The output relay is triggered at the ratio of T1:T2 until the supply voltage is interrupted.

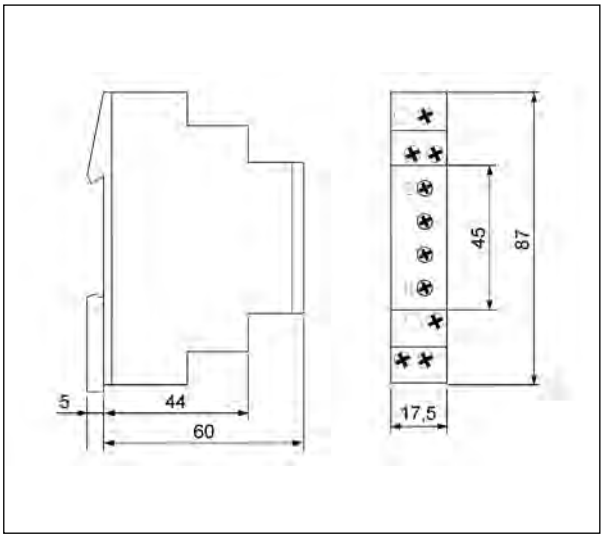
Ii - Cyclical operation pulse first. Independent settings of T1 and T2 intervals.
❶ Start by function Ii - terminals A1-B1 are connected / bridged.



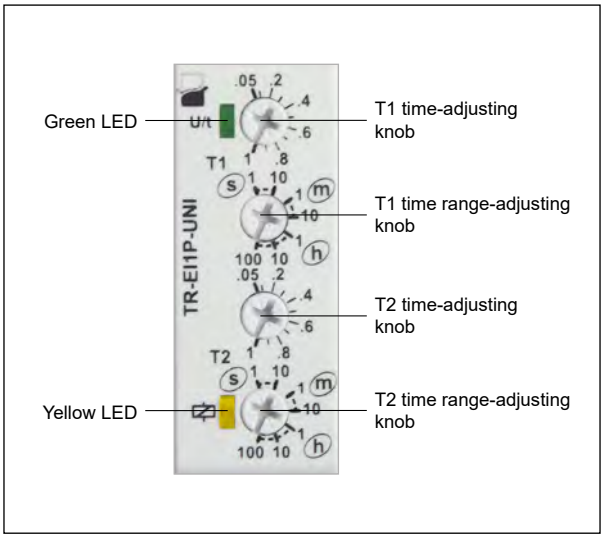
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval T1 begins (green LED flashes slowly). After the interval T1 has expired, the output relay switches into off-position (yellow LED not illuminated) and the set interval T2 begins (green LED flashes fast). After the interval T2 has expired, the output relay switches into on-position (yellow LED illuminated). The output relay is triggered at the ratio of T1:T2 until the supply voltage is interrupted.

U - supply voltage; **R** - output state of the relay; **T1, T2** - measured times; **t** - time axis

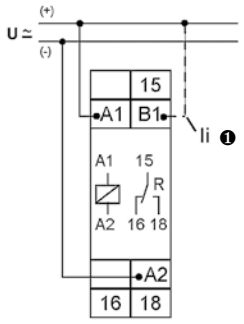
Dimensions



Front panel description



Connection diagram



1 CO

Mounting

Relays **TR-EI1P-UNI** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 1,0 Nm. Shockproof terminal connection according to VBG 4 (PZ1 required).

❶ Start by function Ip - terminals A1-B1 are not connected / bridged; start by function Ii - terminals A1-B1 are connected / bridged - see „**Time functions**”, page 330.

Ordering codes

Type

T	R	–	E	I	1	P	–	U	N	I

Number and type of contacts

1P - 1 CO

Example of ordering codes:

TR-EI1P-UNI time relay **TR-EI1P-UNI**, single-function (relay perform function Ii + Ip), cover - modular, width 17,5 mm, one changeover contact, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

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- **Multifunction time relays with independently controled times T1 and T2 (7 time functions; 7 time ranges)**
- AC/DC input voltages
- Cover - modular, width 35 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Recognitions, certifications, directives:

Output circuit - contact data

Number and type of contacts		2 CO
Contact material		AgNi
Rated load	AC1	8 A / 250 V AC
Max. breaking capacity	AC1	2 000 VA (8 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC DC	6,0 VA 2,0 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Residual ripple to DC		10%
Control contact S ❶ • min. time of pulse duration ❷ • loadable • max. length of control line • trigger level (sensitivity)		 AC: ≥ 100 ms DC: ≥ 50 ms yes 10 m automatic adaption to supply voltage

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3
Dielectric strength	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 35 x 65 mm
Weight		120 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

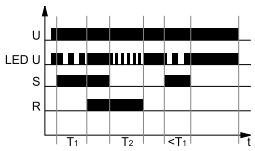
Time module data

Functions ❸	ER, EWs, EWu, Ip, Ii, WsWa, Wt
Time ranges	1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment	smooth - (0,05...1) x time range
Base accuracy	± 1% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 0,5% or ± 5 ms
Temperature influence	± 0,01% / °C
Recovery time	100 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U slow flashing - measurement of T1 time green LED U fast flashing - measurement of T2 time yellow LED R ON/OFF - output relay status

❶ The external control contact S connect terminal A1 with terminal B1 (applies to functions with control contact S).
❷ Where the control signal is recognizable.
❸ The function has to be set before connecting the relay to the supply voltage.

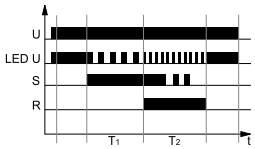
Time functions

ER - ON delay and OFF delay with control contact S. Independent settings of T1 and T2 intervals.



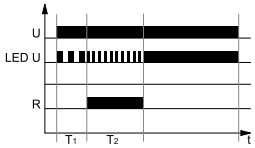
The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the set interval T1 begins (green LED flashes slowly). After the interval T1 has expired, the output relay R switches into on-position (yellow LED illuminated). If the control contact is opened, the set interval T2 begins (green LED flashes fast). After the interval T2 has expired, the output relay switches into off-position (yellow LED not illuminated). If the control contact is opened before the interval T1 has expired, the interval already expired is erased and is restarted with the next cycle.

EWs - ON delay and ON for the set time with closing of the control contact S. Independent settings of T1 and T2 intervals.



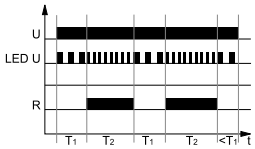
The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the set interval T1 begins (green LED flashes slowly). After the interval T1 has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval T2 begins (green LED flashes fast). After the interval T2 has expired, the output relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.

EWu - ON delay and the set interval. Independent settings of T1 and T2 intervals.



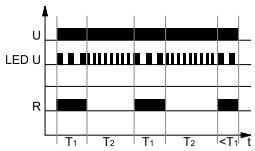
When the supply voltage U is applied, the set interval T1 begins (green LED/t flashes slowly). After the interval T1 has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval T2 begins (green LED flashes fast). After the interval T2 has expired, the output relay switches into off-position (yellow LED not illuminated). If the supply voltage is interrupted before the interval T1+T2 has expired, the interval already expired is erased and is restarted when the supply voltage is next applied.

Ip - Cyclical operation pause first. Independent settings of T1 and T2 intervals.



When the supply voltage U is applied, the set interval T1 begins (green LED flashes slowly). After the interval T1 has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval T2 begins (green LED flashes fast). After the interval T2 has expired, the output relay switches into off-position (yellow LED not illumninated). The output relay is triggered at the ratio of T1:T2 until the supply voltage is interrupted.

Ii - Cyclical operation pulse first. Independent settings of T1 and T2 intervals.

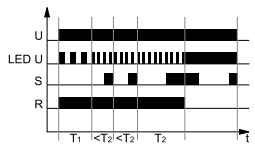


When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval T1 begins (green LED flashes slowly). After the interval T1 has expired, the output relay switches into off-position (yellow LED not illuminated) and the set interval T2 begins (green LED flashes fast). After the interval T2 has expired, the output relay switches into on-position (yellow LED illuminated). The output relay is triggered at the ratio of T1:T2 until the supply voltage is interrupted.

WsWa - ON for the set intervals T1 and T2 with the control contact S. Independent settings of T1 and T2 intervals.

The supply voltage U must be constantly applied to the device (green LED illuminated). When the control contact S is closed, the output relay R switches into on-position (yellow LED illuminated) and the set interval T1 begins (green LED flashes slowly). After the interval T1 has expired, the output relay R switches into off-position (yellow LED not illuminated). If the control contact is opened, the output relay again switches into on-position (yellow LED illuminated) and the set interval T2 begins (green LED flashes fast). After the interval T2 has expired the output relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times.

Wt - Monitoring of the sequence of pulses. Switching on is extended with consecutive pulses / closings of the contact S. Independent settings of T1 and T2 intervals.



When the supply voltage U is applied, the set interval T1 begins (green LED flashes slowly) and the output relay R switches into on-position (yellow LED illuminated). After the interval T1 has expired, the set interval T2 begins (green LED flashes fast). So that the output relay R remains in on-position, the control contact S must be closed and opened again within the set interval T2. If this does not happen, the output relay R switches into off-position (yellow LED not illuminated) and all further pulses at the control contact are ignored. To restart the function the supply voltage must be interrupted and reapplied.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T1, T2** - measured times; **t** - time axis

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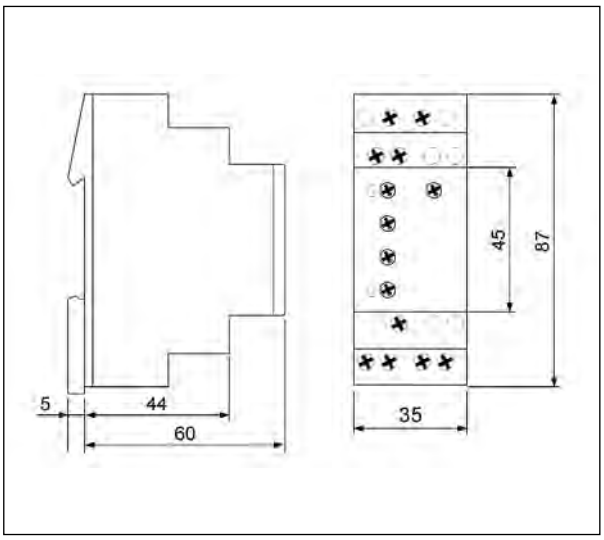
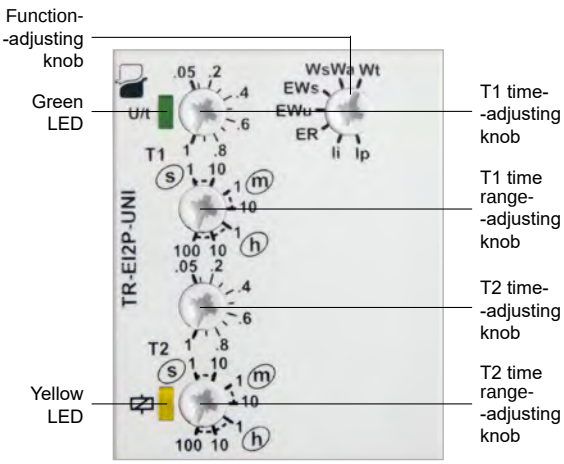
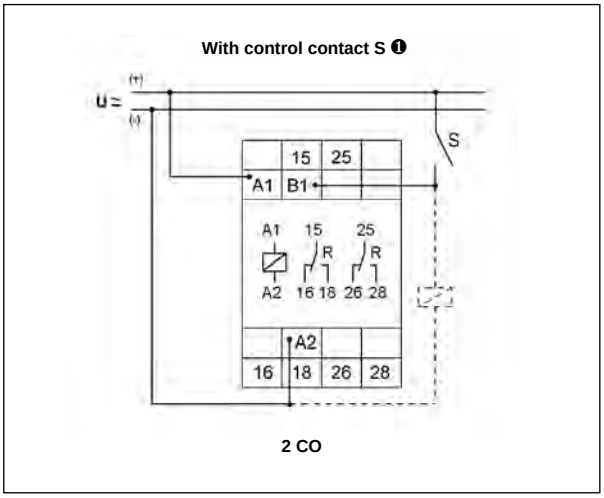
Dimensions



Front panel description



Connection diagram



Mounting

Relays **TR-EI2P-UNI** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm² / 2 x 1,5 mm² (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 1,0 Nm. Shockproof terminal connection according to VBG 4 (PZ1 required).

❶ The external control contact S connect terminal A1 with terminal B1 (applies to functions with control contact S).

Ordering codes

Type

T	R	–	E	I	2	P	–	U	N	I

Number and type of contacts

2P - 2 CO

Example of ordering codes:

TR-EI2P-UNI

time relay **TR-EI2P-UNI**, multifunction (relay perform 7 functions), cover - modular, width 35 mm, two changeover contacts, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

- **Time relays with independently controled times T1 and T2, time function SD** (Star-Delta start-up), **4 time ranges**
- AC/DC input voltages
- Cover - modular, width 35 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Applications: in low-voltage systems
- Recognitions, certifications, directives: CE EAC

Output circuit - contact data

Number and type of contacts		2 x 1 CO
Contact material		AgNi
Rated load	AC1	8 A / 250 V AC
Max. breaking capacity	AC1	2 000 VA 8 A / 250 V AC
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V terminals (+)A1 – (-)A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		0,9...1,1 U_n
Rated power consumption	AC DC	6,0 VA 2,0 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Residual ripple to DC		10%

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3
Dielectric strength	• contact clearance	1 000 V AC type of clearance: micro-disconnection

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 35 x 65 mm
Weight		120 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Time module data

Functions	SD
Time ranges (start-up for the star) T1	10 s; 30 s; 1 min.; 3 min.
Timing adjustment T1	smooth - (0,05...1) x time range
Transit time (fixed) ❶ T2	40 ms; 60 ms; 80 ms; 100 ms
Base accuracy	± 1% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 0,5% or ± 5 ms
Temperature influence	± 0,01% / °C
Recovery time	100 ms
LED indicator	green LED U ON - indication of delta contactor supply voltage U green LED U flashing - measurement of T1 time yellow LED R ON/OFF - indication of star contactor

❶ Pause time between switching off the star contactor and switching on the delta contactor.

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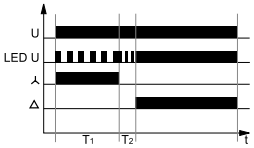
Time functions

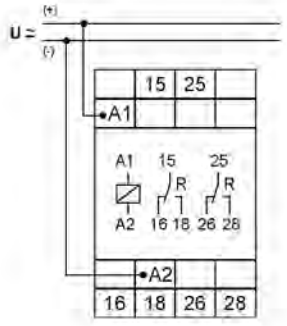
SD - Star-Delta start-up.



When the supply voltage U is applied, the star-contact (15-18) switches into on-position (yellow LED illuminated) and the set star-time T1 begins (green LED flashes). After the interval T1 has expired (green LED illuminated) the star-contact switches into off-position (yellow LED not illuminated) and the set transit-time T2 begins. After the interval T2 has expired the contact for the delta-contactor (25-28) switches into on-position. To restart the function the supply voltage must be interrupted and re-applied.

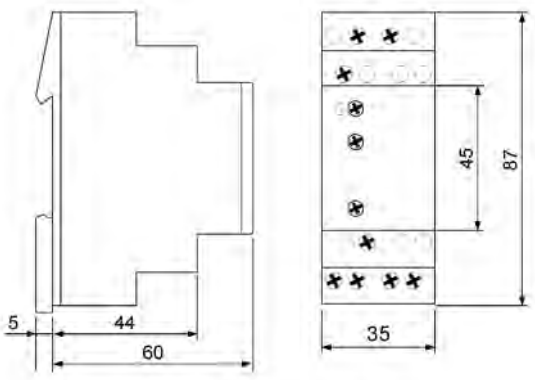
U - supply voltage; **T1, T2** - measured times; **t** - time axis

Connection diagram

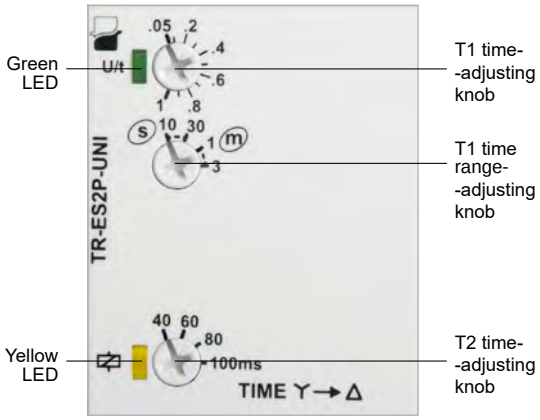


2 CO

Dimensions



Front panel description



Mounting

Relays **TR-ES2P-UNI** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 1,0 Nm. Shockproof terminal connection according to VBG 4 (PZ1 required).

Ordering codes

Type

T	R	–	E	S	2	P	–	U	N	I

Number and type of contacts

2P - 2 x 1 CO

Example of ordering codes:

TR-ES2P-UNI

time relay **TR-ES2P-UNI**, single-function (relay perform function SD), cover - modular, width 35 mm, two changeover contacts, rated input voltage 12...240 V AC/DC AC: 50/60 Hz

• 10-function electronic time relays in compact cover • Cadmium - free contacts • AC and AC/DC input voltages • Direct mounting on 35 mm rail mount acc. to PN-EN 60715 • The main advantages of application: simple selection of the performed function, possibility to control one or two circuits (1 or 2 changeover contacts), esthetic design in the control cabinet • The switching capacity of contacts as in RM85 (1 CO) or RM84 (2 CO) electromagnetic relay • Compliance with standard PN-EN 61812-1
• Recognitions, certifications, directives: CE EAC

Output circuits - contact data

Number and type of contacts		1 CO		2 CO	
Contact material		**AgNi**		**AgNi**	
Max. switching voltage		440 V AC / 300 V DC		440 V AC / 300 V DC	
Rated load	AC1	16 A / 250 V AC		8 A / 250 V AC	
	DC1	16 A / 24 V DC; 0,3 A / 250 V DC		8 A / 24 V DC; 0,3 A / 250 V DC	
Rated current		16 A		8 A	
Max. breaking capacity	AC1	4 000 VA		2 000 VA	
Min. breaking capacity		0,3 W 5 V, 5 mA			
Contact resistance		≤ 100 mΩ			
Max. operating frequency					
• at rated load	AC1	600 cycles/hour			
• no load		18 000 cycles/hour			
Input circuit					
Rated voltage	50/60 Hz AC	115 ... 230 V			
	AC: 50/60 Hz AC/DC	12 ... 24 V			
Operating range of supply voltage		0,9...1,2 U_n	12 V AC/DC		
		0,85...1,2 U_n	24 V AC/DC, 115 V AC, 230 V AC		
Rated power consumption	AC	1,3 VA	115 V AC	1,7 VA	230 V AC
	AC/DC	0,5 VA / 0,5 W	12 V AC/DC	0,7 VA / 0,7 W	24 V AC/DC
Range of supply frequency	AC	48...63 Hz			
	AC/DC	48...100 Hz			
Control contact S ❶					
• min. voltage ❷		0,6 U_n			
• min. time of pulse duration ❷		AC: ≥ 25 ms	DC: ≥ 15 ms		
Insulation according to PN-EN 60664-1					
Insulation rated voltage		250 V AC			
Insulation category		B250			
Overvoltage category		III			
Insulation pollution degree		2			
Flammability class		V-1 UL94			
Dielectric strength	• input - outputs	2 000 V AC	type of insulation: basic		
	• contact clearance	1 000 V AC	type of clearance: micro-disconnection		
Input - outputs distance					
• clearance		≥ 10 mm			
• creepage		≥ 10 mm			
General data					
Electrical life					
• resistive AC1		> 0,7 x 10^5 16 A, 250 V AC		> 10^5 8 A, 250 V AC	
Mechanical life (cycles)		> 3 x 10^7			
Dimensions (L x W x H)		90 x 17,6 x 55 mm			
Weight		67 g			
Ambient temperature	• storage	-40...+70 °C			
	• operating	-20...+55 °C			
Cover protection category		IP 20 PN-EN 60529			
Environmental protection		RTI PN-EN 116000-3			
Shock resistance		15 g			
Vibration resistance		0,35 mm DA 10...55 Hz			

The data in bold type relate to the standard versions of the relays.
❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.
❷ Where the control signal is recognizable.

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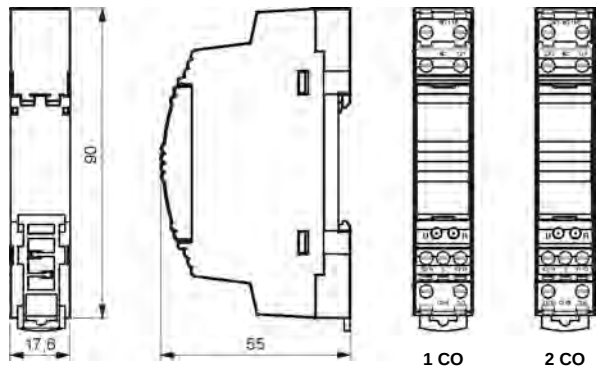
Time module data

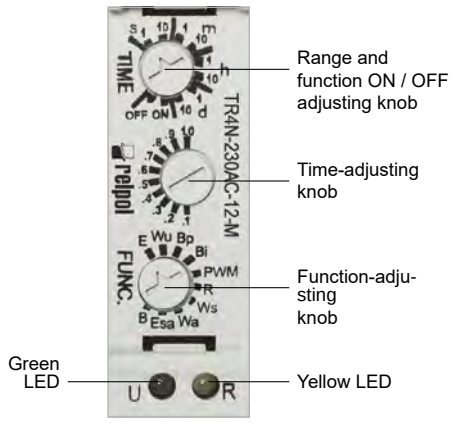
Functions	E, Wu, Bp, Bi, PWM, R, Ws, Wa, Esa, B permanent switching ON and OFF
Time ranges	1 s ❸; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment	smooth - (0,1...1) x time range
Setting accuracy	± 5% (calculated from the final range values) ❸
Repeatability	± 0,5% ❸
Temperature influence	± 0,01% / °C
Recovery time	80 ms
LED indicator	green LED - indication of supply voltage U yellow LED - indication of time period T and the status of outputs after the time T has been measured ❹

❸ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time). Recommend to set measuring time by experimental method. ❹ The yellow LED - T time measurement (pulsating); excited operational relay; time not measured (steady light); de-excited operational relay, time not measured (no light).

Dimensions

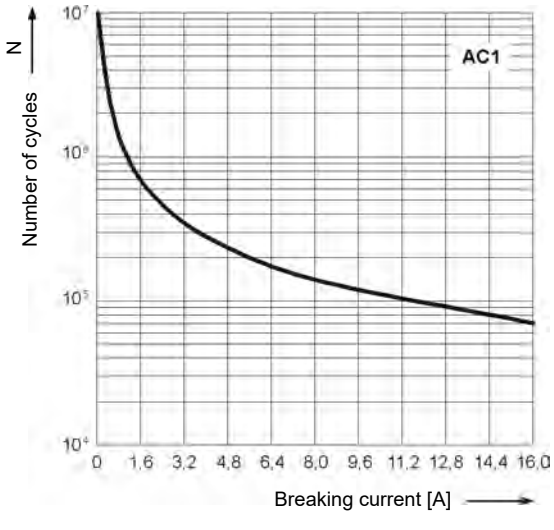


Front panel description



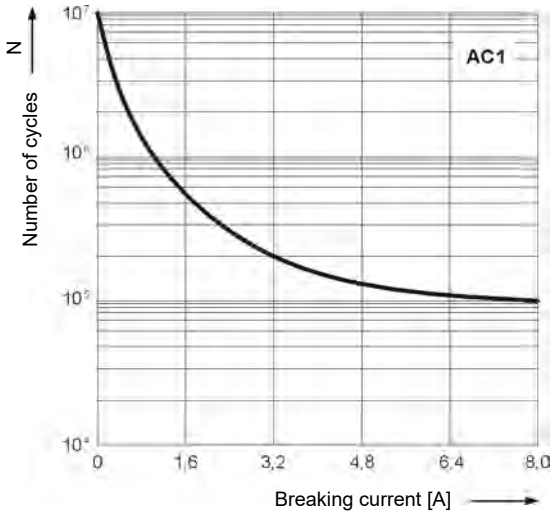
Electrical life at AC resistive current. Switching frequency: 600 cycles/hour - TR4N 1 CO

Fig. 1



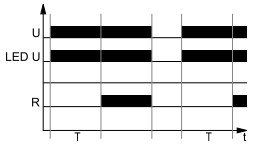
Electrical life at AC resistive current. Switching frequency: 600 cycles/hour - TR4N 2 CO

Fig. 2



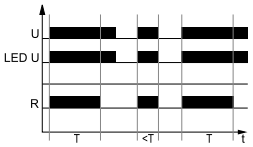
Time functions

E - ON delay.



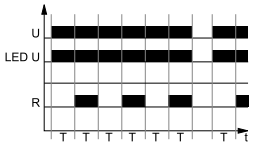
On applying the supply voltage U the set interval T begins - off-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains on until supply voltage U is interrupted.

Wu - ON for the set interval.



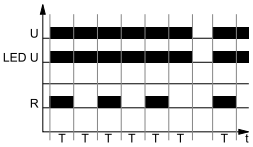
Applying the supply voltage U immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R switches off.

Bp - Symmetrical cyclical operation pause first.



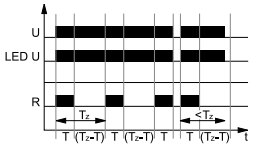
Applying the supply voltage U starts the cyclical operation from the T interval - switching the output relay R off followed by switching on the output relay R for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

Bi - Symmetrical cyclical operation pulse first.



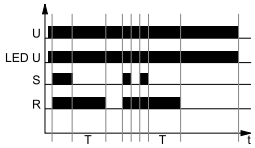
Applying the supply voltage U starts the cyclical operation from switching on the output relay R for the set interval T. After the interval T has lapsed, the output relay R switches off for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

PWM - Pulse width modulation.



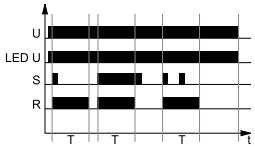
Set the relay to a single Tz cycle which is one of the time ranges available for a time relay. The cycle shall be set with the time selection knob. Then, set the interval T, i.e. the ON time of the output relay R with the time fine setting knob. The interval T may be set from 0.1 to 1.0 of the time range (Tz cycle). Applying the supply voltage U immediately switches on the output relay R for the set interval, and after the interval has lapsed, the output relay R switches off for the time left until the set time Tz. After the Tz time, consecutive cycles start and are continued until the supply voltage U is interrupted. In the course of the PWM function, the ON time of the output relay R may be changed, and such change does not affect the interval of the Tz cycle. The changed ON time of the output relay R shall be realized starting from the new Tz cycle following the change.

R - OFF delay with the control contact S.



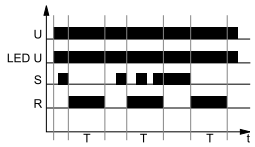
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches on the output relay R. Opening of the control contact S starts the set time of the delayed switching off of the output relay R. After the interval T has lapsed, the output relay R switches off. If the control contact S is closed during the interval T, the already measured time is reset, and the output relay R is switched on again. The OFF delay of the output relay R will start when the control contact S is opened again.

Ws - Single shot for the set interval triggered by closing of the control contact S.



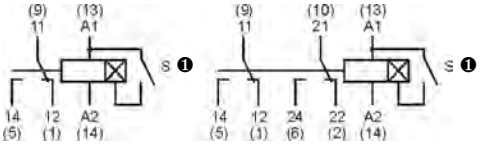
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. In the course of the interval T, any opening of the control contact S does not affect the function to be performed. The output relay R may be switched on again for the set interval, after the interval T has lapsed, by closing the control contact S again.

Wa - ON for the set interval triggered with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S does not start the interval T, and it does not change the position of the output relay R. Opening of the control contact S immediately switches on the output relay R for the set time. After the interval T has lapsed, the output relay R switches off. Opening and closing of the control contact S in the course of the interval T does not affect the function to be performed. The output relay R may be switched on again for the set interval with another closing and opening of the control contact S.

Connections diagrams



1 CO **2 CO**

❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **Tz** - value of the set interval; **T** - measured time; **t** - time axis

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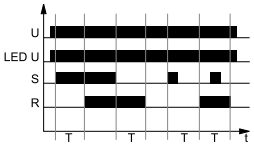
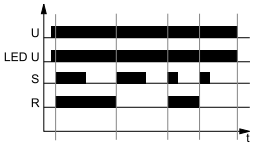
Time functions

Esa - ON and OFF delay with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T - on-delay of the output relay R. After the interval T has lapsed, the output relay R switches on. Opening of the control contact S begins further measurement of the interval T - off-delay of the output relay R, and after the interval has lapsed, the output relay switches off. In case the time for which the control contact S is closed in the course of measurement of the on-delay of the output relay R is shorter than the set interval T, the output relay R will switch on after the set interval T, and the output relay R will remain in on position for the interval T. When the output relay R is in on position, closing of the control contact S does not affect the function to be performed.

B - Cyclical operation controlled with closing of the control contact S.



The input of the time relay is supplied with U voltage continuously. Closing of the control contact S immediately switches on the output relay R. Each next closing of the control contact S results in a change of the status of the output relay R to an opposite one (the feature of a bistable relay).

Permanent switching ON and OFF.
The functions ON and OFF are selected with TIME potentiometer. In the ON function, the normally open contacts are closed all the time whereas in the OFF function they are open. The position of the FUNC potentiometer is of no significance in these functions as is the preset measurement time. The ON or OFF functions are used for the time relay operation control in electric systems.

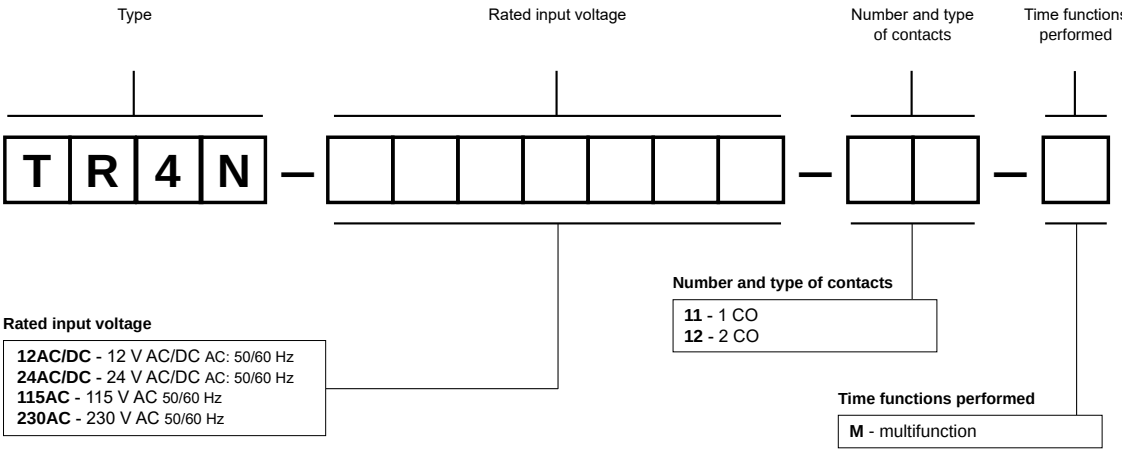
U - supply voltage; **R** - output state of the relay; **S** - control contact state; **Tz** - value of the set interval; **T** - measured time; **t** - time axis

Mounting

Relays **TR4N 1 CO, 2 CO** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

One tap:
easy assembly
on 35 mm rail,
firm tapping (bottom).

Ordering codes



Examples of ordering codes:

TR4N-230AC-11-M time relay **TR4N 1 CO**, multifunction (relay perform 10 functions), one changeover contact, contact material AgNi, rated input voltage 230 V AC 50/60 Hz

TR4N-24AC/DC-12-M time relay **TR4N 2 CO**, multifunction (relay perform 10 functions), two changeover contacts, contact material AgNi, rated input voltage 24 V AC/DC AC: 50/60 Hz

• 10-function electronic time relays in compact cover • Cadmium - free contacts • AC and AC/DC input voltages • Direct mounting on 35 mm rail mount acc. to PN-EN 60715 • The main advantages of application: simple selection of the performed function, possibility to control a few circuits (4 changeover contacts), esthetic design in the control cabinet • The switching capacity of contacts as in R4 electromagnetic relay • Compliance with standard PN-EN 61812-1
• Recognitions, certifications, directives: CE EAC

Output circuits - contact data

Number and type of contacts		4 CO
Contact material		**AgNi**
Max. switching voltage		250 V AC / 250 V DC
Rated load	AC1	6 A / 250 V AC
	DC1	6 A / 24 V DC; 0,15 A / 250 V DC
Rated current		6 A
Max. breaking capacity	AC1	1 500 VA
Min. breaking capacity		0,3 W 5 V, 5 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Input circuit

Rated voltage	50/60 Hz AC	115 ... 230 V
	AC: 50/60 Hz AC/DC	12 ... 24 V
Operating range of supply voltage		0,9...1,1 U_n 12 V AC/DC
		0,85...1,1 U_n 24 V AC/DC, 115 V AC, 230 V AC
Rated power consumption	AC	2,2 VA 115 V AC, 230 V AC
	AC/DC	1,0 VA / 1,0 W 12 V AC/DC, 24 V AC/DC
Range of supply frequency	AC	48...63 Hz
	AC/DC	48...100 Hz
Control contact S ❶		
• min. voltage ❷		0,6 U_n
• min. time of pulse duration ❷		AC: ≥ 25 ms DC: ≥ 15 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage		250 V AC
Insulation category		B250
Overvoltage category		II
Insulation pollution degree		2
Flammability class		V-1 UL94
Dielectric strength	• input - outputs	2 500 V AC type of insulation: basic
	• contact clearance	1 500 V AC type of clearance: micro-disconnection
Input - outputs distance		
• clearance		≥ 1,6 mm
• creepage		≥ 3,2 mm

General data

Electrical life		
• resistive AC1		> 10^5 6 A, 250 V AC
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		90 x 36 x 55 mm
Weight		115 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-20...+55 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		RTI PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		0,35 mm DA 10...55 Hz

The data in bold type relate to the standard versions of the relays.
❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.
❷ Where the control signal is recognizable.

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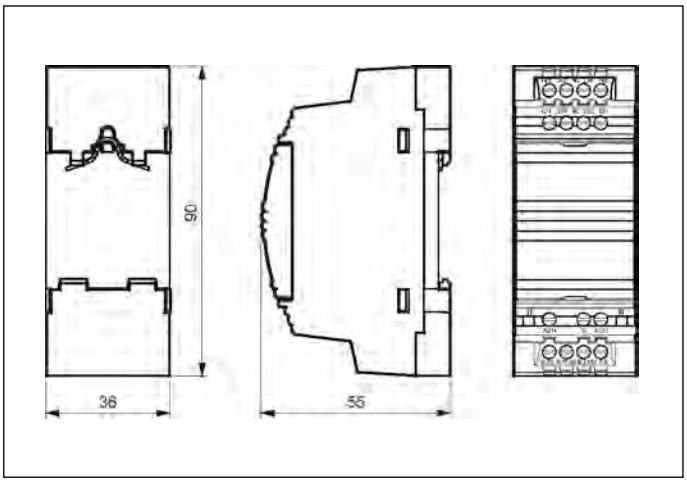
Time module data

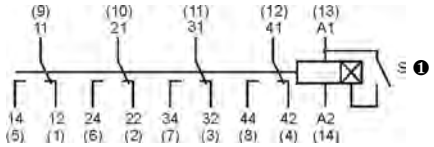
Functions	E, Wu, Bp, Bi, PWM, R, Ws, Wa, Esa, B permanent switching ON and OFF
Time ranges	1 s ❸; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment	smooth - (0,1...1) x time range
Setting accuracy	± 5% (calculated from the final range values) ❸
Repeatability	± 0,5% ❸
Temperature influence	± 0,01% / °C
Recovery time	90 ms
LED indicator	green LED - indication of supply voltage U yellow LED - indication of time period T and the status of outputs after the time T has been measured ❹

❸ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time). Recommend to set measuring time by experimental method. ❹ The yellow LED - T time measurement (pulsating); excited operational relay; time not measured (steady light); de-excited operational relay, time not measured (no light).

Dimensions



Connections diagram

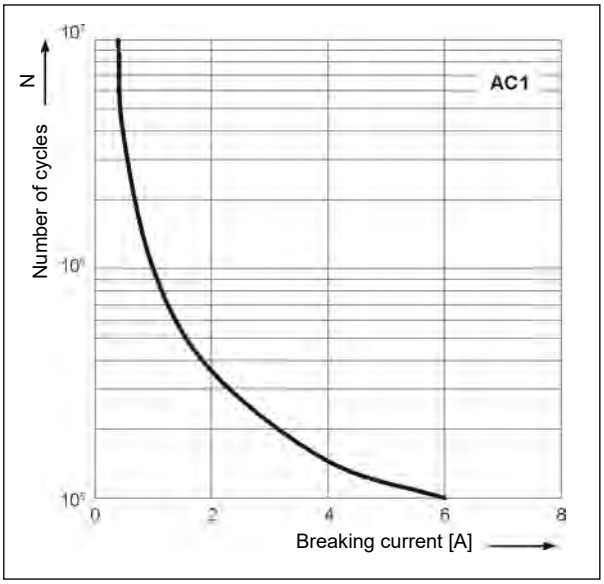


4 CO

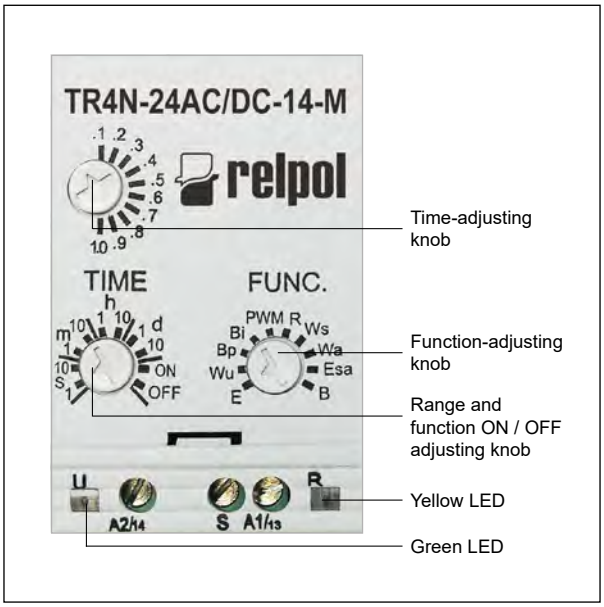
❶ The control terminal S is activated by connection to A1 terminal via the external control contact S.

Electrical life at AC resistive current. Switching frequency: 1 200 cycles/hour

Fig. 1

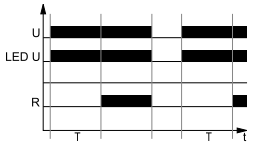


Front panel description



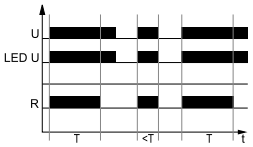
Time functions

E - ON delay.



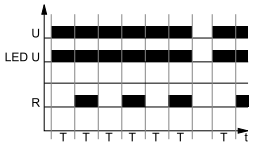
On applying the supply voltage U the set interval T begins - off-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains on until supply voltage U is interrupted.

Wu - ON for the set interval.



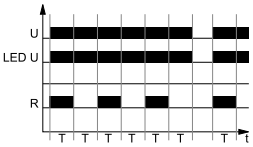
Applying the supply voltage U immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R switches off.

Bp - Symmetrical cyclical operation pause first.



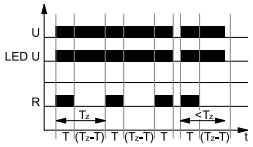
Applying the supply voltage U starts the cyclical operation from the T interval - switching the output relay R off followed by switching on the output relay R for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

Bi - Symmetrical cyclical operation pulse first.



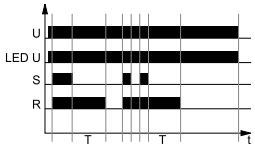
Applying the supply voltage U starts the cyclical operation from switching on the output relay R for the set interval T. After the interval T has lapsed, the output relay R switches off for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

PWM - Pulse width modulation.



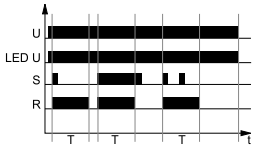
Set the relay to a single Tz cycle which is one of the time ranges available for a time relay. The cycle shall be set with the time selection knob. Then, set the interval T, i.e. the ON time of the output relay R with the time fine setting knob. The interval T may be set from 0.1 to 1.0 of the time range (Tz cycle). Applying the supply voltage U immediately switches on the output relay R for the set interval, and after the interval has lapsed, the output relay R switches off for the time left until the set time Tz. After the Tz time, consecutive cycles start and are continued until the supply voltage U is interrupted. In the course of the PWM function, the ON time of the output relay R may be changed, and such change does not affect the interval of the Tz cycle. The changed ON time of the output relay R shall be realized starting from the new Tz cycle following the change.

R - OFF delay with the control contact S.



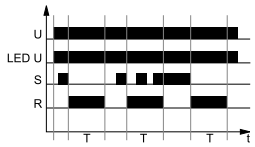
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches on the output relay R. Opening of the control contact S starts the set time of the delayed switching off of the output relay R. After the interval T has lapsed, the output relay R switches off. If the control contact S is closed during the interval T, the already measured time is reset, and the output relay R is switched on again. The OFF delay of the output relay R will start when the control contact S is opened again.

Ws - Single shot for the set interval triggered by closing of the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. In the course of the interval T, any opening of the control contact S does not affect the function to be performed. The output relay R may be switched on again for the set interval, after the interval T has lapsed, by closing the control contact S again.

Wa - ON for the set interval triggered with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S does not start the interval T, and it does not change the position of the output relay R. Opening of the control contact S immediately switches on the output relay R for the set time. After the interval T has lapsed, the output relay R switches off. Opening and closing of the control contact S in the course of the interval T does not affect the function to be performed. The output relay R may be switched on again for the set interval with another closing and opening of the control contact S.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **Tz** - value of the set interval; **T** - measured time; **t** - time axis

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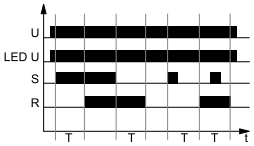
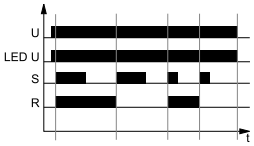
Time functions

Esa - ON and OFF delay with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T - on-delay of the output relay R. After the interval T has lapsed, the output relay R switches on. Opening of the control contact S begins further measurement of the interval T - off-delay of the output relay R, and after the interval has lapsed, the output relay switches off. In case the time for which the control contact S is closed in the course of measurement of the on-delay of the output relay R is shorter than the set interval T, the output relay R will switch on after the set interval T, and the output relay R will remain in on position for the interval T. When the output relay R is in on position, closing of the control contact S does not affect the function to be performed.

B - Cyclical operation controlled with closing of the control contact S.



The input of the time relay is supplied with U voltage continuously. Closing of the control contact S immediately switches on the output relay R. Each next closing of the control contact S results in a change of the status of the output relay R to an opposite one (the feature of a bistable relay).

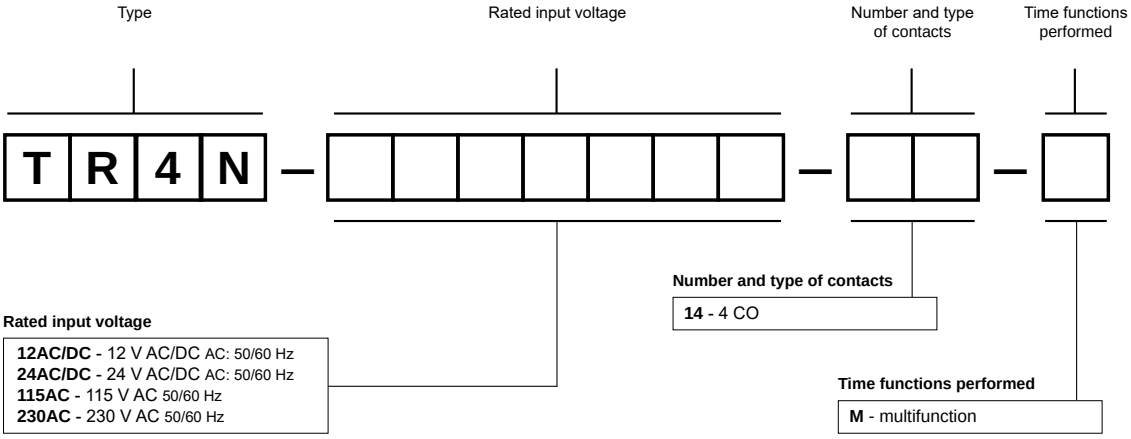
Permanent switching ON and OFF.
The functions ON and OFF are selected with TIME potentiometer. In the ON function, the normally open contacts are closed all the time whereas in the OFF function they are open. The position of the FUNC potentiometer is of no significance in these functions as is the preset measurement time. The ON or OFF functions are used for the time relay operation control in electric systems.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **Tz** - value of the set interval; **T** - measured time; **t** - time axis

Mounting

Relays **TR4N 4 CO** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm^2 / 2 x 1,5 mm^2 (1 x 14 / 2 x 16 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,6 Nm.

Ordering codes



Examples of ordering codes:

TR4N-230AC-14-M time relay **TR4N 4 CO**, multifunction (relay perform 10 functions), four changeover contacts, contact material AgNi, rated input voltage 230 V AC 50/60 Hz

TR4N-24AC/DC-14-M time relay **TR4N 4 CO**, multifunction (relay perform 10 functions), four changeover contacts, contact material AgNi, rated input voltage 24 V AC/DC AC: 50/60 Hz

• Single-function, single-voltage time relays offered in the following versions: **T-R4E** - relay with time function E, **T-R4Wu** - relay with time function Wu, **T-R4Bp** - relay with time function Bp, **T-R4Bi** - relay with time function Bi • Cadmium - free contacts • AC and DC input voltages • For plug-in sockets, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting • Applications: as time systems in electric circuits of machines, technological lines, in automation systems, etc.
• Recognitions, certifications, directives: recognitions R4N, CE

Output circuits - contact data

Number and type of contacts		4 CO
Contact material		**AgNi**
Max. switching voltage		250 V AC / 250 V DC
Rated load	AC1	6 A / 230 V AC
Max. inrush current		12 A
Rated current		6 A
Max. breaking capacity	AC1	1 500 VA
Min. breaking capacity		0,3 W 5 V, 5 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		18 000 cycles/hour

Input circuit

Rated voltage	50/60 Hz AC	24 ... 230 V
	DC	12 ... 24 V
Must release voltage		AC: ≥ 0,2 U_n DC: ≥ 0,1 U_n
Operating range of supply voltage		0,8...1,1 U_n see Tables 1, 2
Rated power consumption	AC	2,2 VA
	DC	1,2 W
Range of supply frequency		48...63 Hz

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Overvoltage category	III
Dielectric strength	
• input - outputs	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 000 V AC type of insulation: basic
Input - outputs distance	
• clearance	≥ 1,6 mm
• creepage	≥ 3,2 mm

General data

Operating / release time (typical values)		10 ms / 8 ms
Electrical life		
• resistive AC1		> 10^5 6 A, 250 V AC
• cosφ		see Fig. 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		T-R4 + GZM4: 75 x 27 x 91,5 mm T-R4 + GZT4: 76,3 x 27 x 90 mm T-R4 + GZMB4: 95 ❶ x 31 x 90 mm T-R4: 27,5 x 21,2 x 62,5 mm
Weight		T-R4 + GZM4: 123 g T-R4 + GZT4: 113 g T-R4 + GZMB4: 124 g T-R4: 49 g
Ambient temperature	• storage	-20...+85 °C
	• operating	-20...+55 °C
Cover protection category		IP 20 (with socket) PN-EN 60529
Environmental protection		T-R4: RTI GZM4: RT0 PN-EN 116000-3
Shock resistance	(NO/NC)	10 g / 5 g
Vibration resistance		5 g 10...150 Hz

The data in bold type relate to the standard versions of the relays.
❶ Length with 35 mm rail taps: 100 mm.

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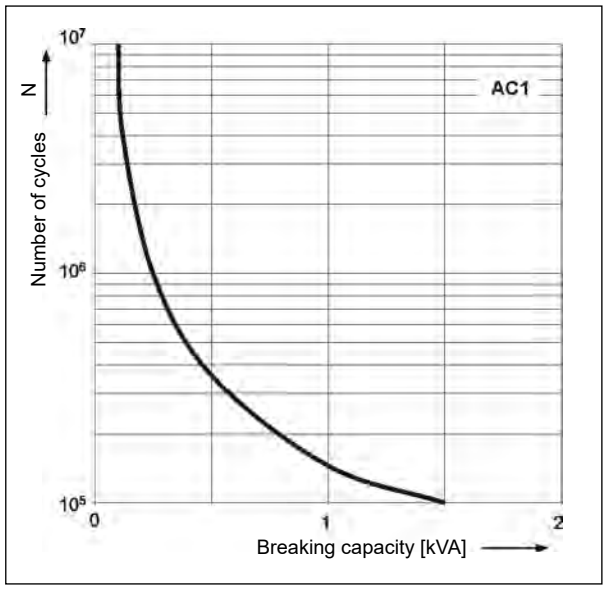
Time module data

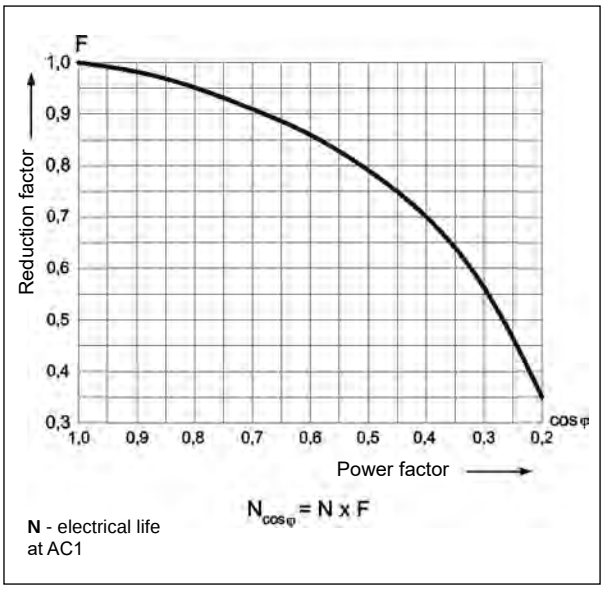
Functions	E, Wu, Bp, Bi
Time ranges	1 s ❶; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
Timing adjustment	range - with the range-adjusting knob / switch; within the range - with the time-adjusting knob / potentiometer
Setting accuracy	± 5% (calculated from the final range values) ❶
Repeatability	± 1% ❶
Temperature influence	± 0,01% / °C
Recovery time	100 ms
LED indicator	green LED - indication of supply voltage U yellow LED - indication of time period T and the status of outputs after the time T has been measured ❷

❶ For first range setpoint (1 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time). Recommend to set measuring time by experimental method. ❷ The yellow LED - T time measurement (pulsating); excited operational relay; time not measured (steady light); de-excited operational relay, time not measured (no light).

Electrical life at AC resistive load. Switching frequency: 1 200 cycles/hour Fig. 1

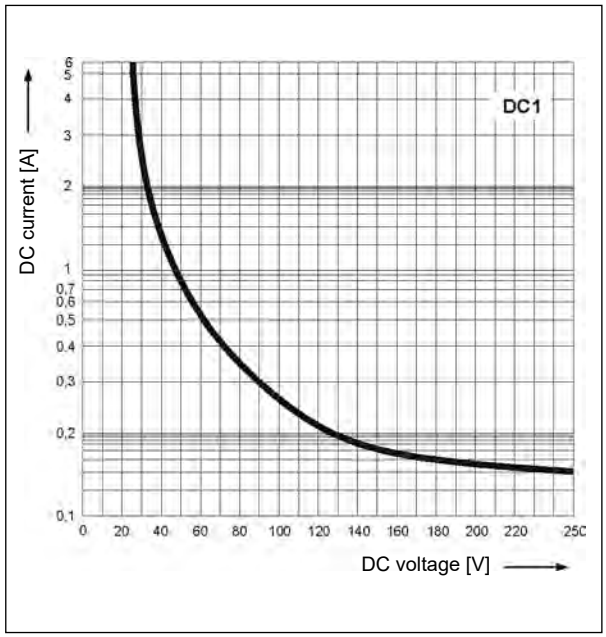


Electrical life reduction factor at AC inductive load Fig. 2

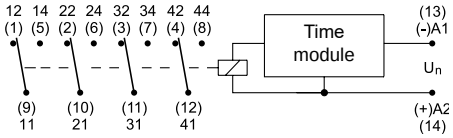


N - electrical life at AC1

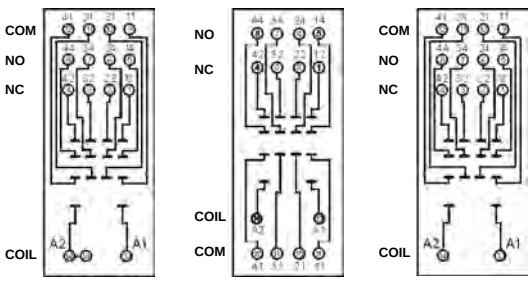
Max. DC resistive load breaking capacity Fig. 3



Connection diagrams



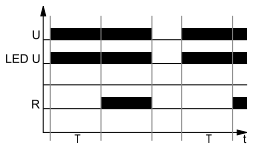
4 CO



GZM4 **GZT4** **GZMB4**

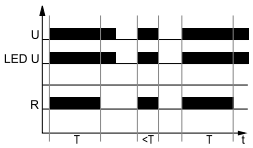
Time functions

E - ON delay.



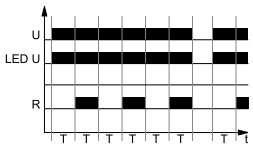
On applying the supply voltage U the set interval T begins - off-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains on until supply voltage U is interrupted.

Wu - ON for the set interval.



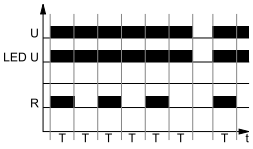
Applying the supply voltage U immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R switches off.

Bp - Symmetrical cyclical operation pause first.



Applying the supply voltage U starts the cyclical operation from the T interval - switching the output relay R off followed by switching on the output relay R for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

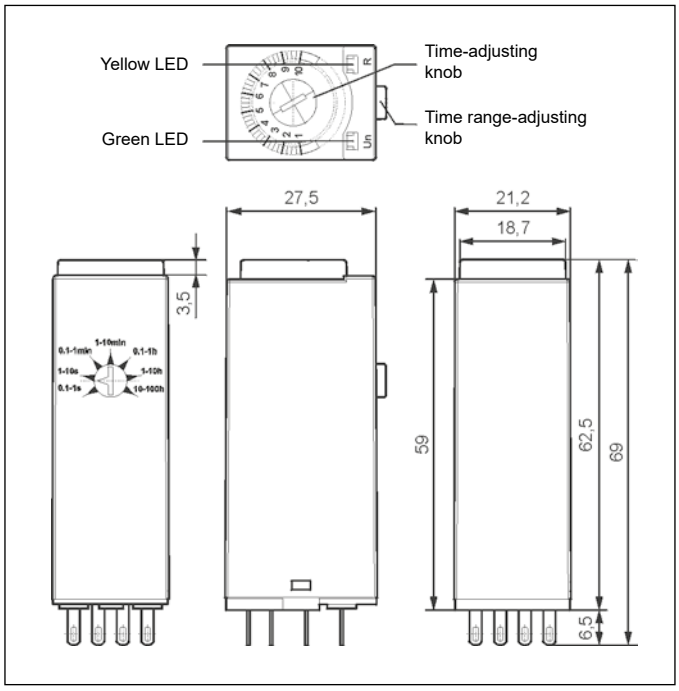
Bi - Symmetrical cyclical operation pulse first.



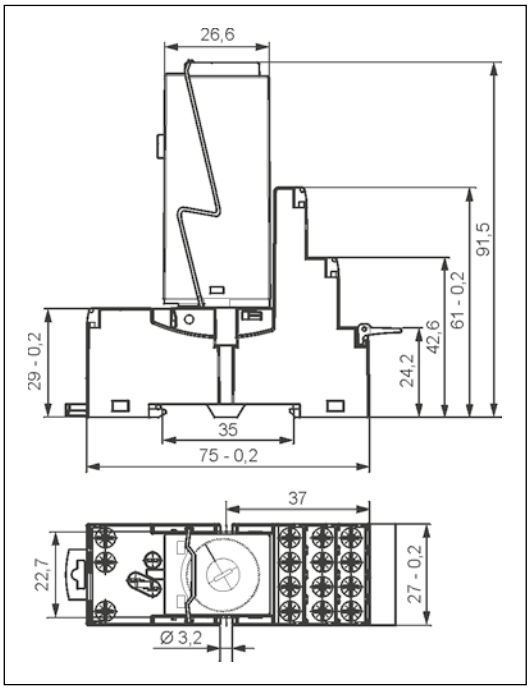
Applying the supply voltage U starts the cyclical operation from switching on the output relay R for the set interval T. After the interval T has lapsed, the output relay R switches off for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

U - supply voltage; **R** - output state of the relay; **T** - measured time; **t** - time axis

Dimensions - T-R4



Dimensions - T-R4 with socket GZM4



Time relay
T-R4

with plug-in socket
GZM4

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Mounting

Relays **T-R4E**, **T-R4Wu**, **T-R4Bp**, **T-R4Bi** are designed for screw terminals plug-in sockets **GZM4** ❶ ❷ and **GZT4** ❶ ❷, 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,7 Nm • spring terminals plug-in sockets **GZMB4** ❸ ❹, 35 mm rail mount acc. to PN-EN 60715. **Connections:** max. cross section of the cables: 1 x 0,2...1,5 mm^2 (1 x 24...16 AWG), length of the cable deinsulation: 9...11 mm.

❶ Plug-in sockets **GZT4**, **GZM4** may be linked with interconnection strip type **ZGGZ4** (see page 419). ❷ For sockets **GZT4**, **GZM4** are offered clips TR4-2000 and description plates GZT4-0035. ❸ For sockets **GZMB4** are offered clips TR4-2000 and description plates TR. ❹ For sockets **GZMB4** - see page 403 (wire connection).

Separate T-R4 control circuits from load circuits (T-R4 contacts)	GZM4: yes GZT4: no GZMB4: yes
Increased dielectric strength spacing between coil and contacs clamps	GZM4: min. 5 kV GZT4: min. 4 kV GZMB4: min. 4 kV
Double A2(14) terminal is introduced for easy wiring in electrical devices	GZM4: yes GZT4: no GZMB4: yes

Input data - DC voltage version

Table 1

Input voltage code	Rated input voltage U_n V DC	Input resistance at 20 °C Ω	Acceptable resistance	Input - voltage range V DC	
				min. (at 20 °C)	max. (at 55 °C)
1012	**12**	**160**	**± 10%**	**9,6**	**13,2**
1024	**24**	**640**	**± 10%**	**19,2**	**26,4**

The data in bold type relate to the standard versions of the relays.

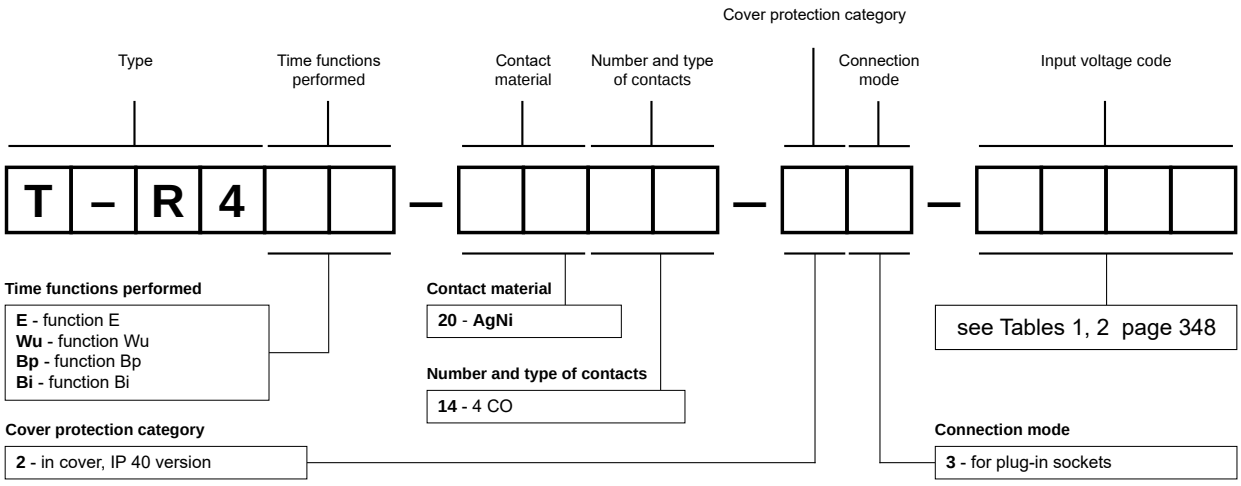
Input data - AC 50/60 Hz voltage version

Table 2

Input voltage code	Rated input voltage U_n V AC	Input resistance at 20 °C Ω	Acceptable resistance	Input - voltage range V AC	
				min. (at 20 °C)	max. (at 55 °C)
5024	**24**	**158**	**± 10%**	**19,2**	**26,4**
5115	115	3 610	± 10%	92,0	127,0
5230	**230**	**16 100**	**± 10%**	**184,0**	**253,0**

The data in bold type relate to the standard versions of the relays.

Ordering codes



Example of ordering code:

T-R4E-2014-23-1012 time relay **T-R4**, single-function (relay perform function **E** - ON delay), for plug-in sockets, four changeover contacts, contact material AgNi, rated input voltage 12 V DC, in cover IP 40

R15 - 3 CO
+ GZP11
+ COM3

R15 - 2 CO
+ GZP8
+ COM3

- Time relay **PIR15 - 3 CO (standard)** consists of: electromagnetic relay **R15 - 3 CO**, black plug-in socket **GZP11**, time module **COM3**, spring wire clip **GZP-0054**, white description plate **GZP-0035**
- Time relay **PIR15 - 2 CO** consists of: electromagnetic relay **R15 - 2 CO**, black plug-in socket **GZP8**, time module **COM3**, spring wire clip **GZP-0054**, white description plate **GZP-0035**
- 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws • Recognitions, certifications, directives: recognitions R15, RoHS, CE

Output circuits - contact data

Number and type of contacts		2 CO, **3 CO**
Contact material		**AgNi**
Max. switching voltage		440 V AC / 250 V DC
Rated load (capacity)	AC1	10 A / 250 V AC
	AC15	3 A / 120 V 1,5 A / 240 V (B300)
	AC3	370 W (single-phase motor; 0,5 HP / 240 V AC UL 508)
	DC1	10 A / 24 V DC (see Fig. 3)
	DC13	0,22 A / 120 V 0,1 A / 250 V (R300)
Max. inrush current		20 A
Rated current		10 A
Max. breaking capacity	AC1	2 500 VA
Min. breaking capacity		0,3 W 5 V, 5 mA
Contact resistance		≤ 100 mΩ
Max. operating frequency		
• at rated load	AC1	1 200 cycles/hour
• no load		12 000 cycles/hour

Input circuit

Rated voltage of output relay R15	50/60 Hz AC	24 ... 240 V
	DC	24 ... 220 V
Supply voltage of time module COM3		24...240 V AC/DC (universal module)
Operating range of supply voltage		0,85...1,1 U_n see Tables 1, 2
Rated power consumption	AC	3,0 VA
	DC	2,0 W
Range of supply frequency		48...63 Hz
Control contact S ❶		
• connections		not potential free, terminals A1-B1
• line length		max. 10 m (twisted pair)
• min. time of pulse duration ❷		100 ms

Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Overvoltage category	III
Dielectric strength	
• input - outputs	2 500 V AC type of insulation: basic
• contact clearance	1 500 V AC type of clearance: micro-disconnection
• pole - pole	2 000 V AC type of insulation: basic
Input - outputs distance	
• clearance	≥ 3 mm
• creepage	≥ 4,2 mm

General data

Operating / release time (typical values)		AC: 12 ms / 10 ms DC: 18 ms / 7 ms
Electrical life		
• resistive AC1		> 2 x 10^5 10 A, 250 V AC
• cosφ		patrz Wykres 2
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		73 x 38,2 x 85,4 mm
Weight		3 CO: 175 g 2 CO: 168 g
Ambient temperature	• storage	-40...+70 °C
	• operating	-40...+55 °C
Cover protection category		IP 20 PN-EN 60529
Environmental protection		R15: RTI GZP11, GZP8: RT0 PN-EN 116000-3
Shock resistance		10 g
Vibration resistance		5 g 10...500 Hz

The data in bold type relate to the standard versions of the relays.
❶ The control terminal B1 is activated by connection to A1 terminal via the external control contact S.
❷ Where the control signal is recognizable.

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Time module data

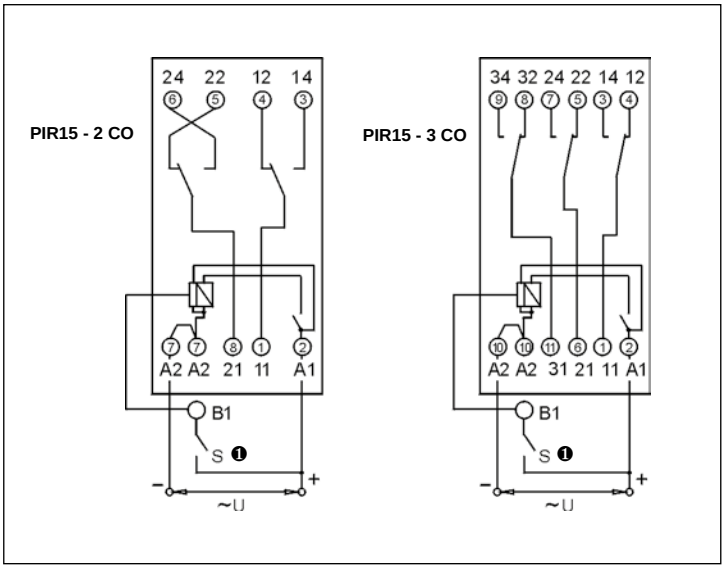
Functions	E, Wu, Bp, Bi, R, Ws, Wa, Es
Function adjustment ❸	selection with microswitches
Time ranges	1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment ❸	time range - with microswitches smooth - (0,05...1) x time range - with potentiometer
Base accuracy	± 1% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 0,5% or ± 5 ms
Temperature influence	± 0,01% / °C
Recovery time	150 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time

❸ Settings of switches - see below.

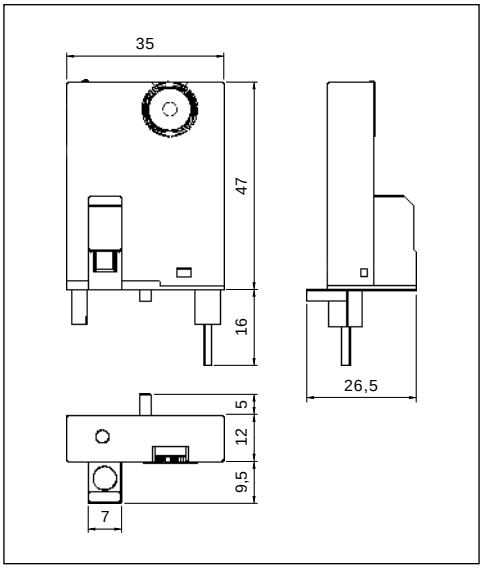
Settings of switches

Function adjustment microswitches 1, 2, 3	E	Wu	Bi	Bp	R	Ws	Wa	Es
Timing adjustment (max.) microswitches 4, 5, 6	1 s	10 s	1 min.	10 min.	1 h	10 h	1 d	10 d

Connection diagrams (screw terminals side view)



Dimensions - time module COM3



❶ The control terminal B1 is activated by connection to A1 terminal via the external control contact S.

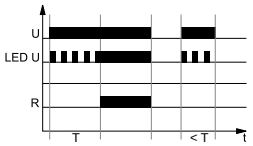
COM3

Universal
time module
- see page 354

Time functions

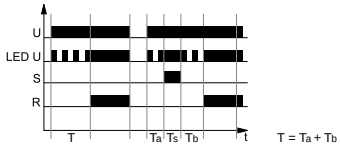
E - ON delay.

Diagram 1



When the supply voltage U is applied, the set interval T begins (green LED flashing). After the interval T has expired (green LED illuminated) the output relay R switches into on-position. This status remains until the supply voltage is interrupted - see Diagram 1.

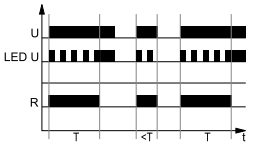
Diagram 2



Additional option (ON delay adding): if the control contact S is closed the running interval T is stopped (green LED illuminated) and the interval already expired is saved. When the control contact S is opened once again the interval T is continued (green LED flashing). After the interval T has expired, the control contact S can be operated as you like - see Diagram 2.

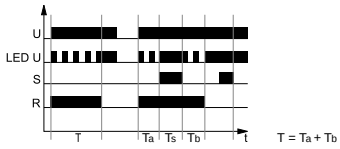
Wu - Single shot leading edge voltage controlled.

Diagram 1



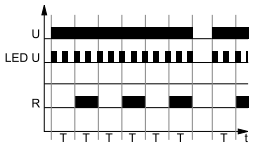
When the supply voltage U is applied, the output relay R switches into on-position and the set interval T begins (green LED flashing). After the interval T has expired (green LED illuminated) the output relay switches into off-position. This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the interval T has expired, the output relay switches into off-position. The interval already expired is erased and is restarted when the supply voltage is next applied - see Diagram 1.

Diagram 2



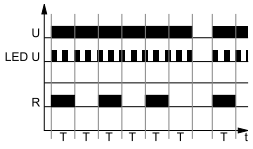
Additional option (Single shot leading edge adding): if the control contact S is closed the running interval T is stopped (green LED illuminated) and the interval already expired is saved. When the control contact S is opened once again the interval T is continued (green LED flashing). After the interval T has expired, the control contact S can be operated as you like - see Diagram 2.

Bp - Symmetrical cyclical operation pause first.



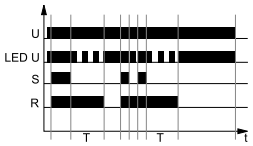
Applying the supply voltage U starts the cyclical operation from the T interval - switching the output relay R off followed by switching on the output relay R for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

Bi - Symmetrical cyclical operation pulse first.



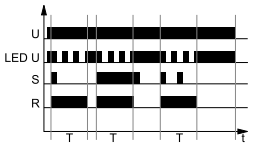
Applying the supply voltage U starts the cyclical operation from switching on the output relay R for the set interval T. After the interval T has lapsed, the output relay R switches off for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

R - OFF delay with the control contact S.



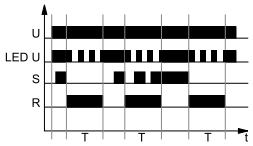
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches on the output relay R. Opening of the control contact S starts the set time of the delayed switching off of the output relay R. After the interval T has lapsed, the output relay R switches off. If the control contact S is closed during the interval T, the already measured time is reset, and the output relay R is switched on again. The OFF delay of the output relay R will start when the control contact S is opened again.

Ws - Single shot for the set interval triggered by closing of the control contact S.



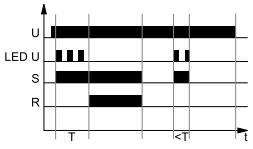
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. In the course of the interval T, any opening of the control contact S does not affect the function to be performed. The output relay R may be switched on again for the set interval, after the interval T has lapsed, by closing the control contact S again.

Wa - ON for the set interval triggered with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S does not start the interval T, and it does not change the position of the output relay R. Opening of the control contact S immediately switches on the output relay R for the set time. After the interval T has lapsed, the output relay R switches off. Opening and closing of the control contact S in the course of the interval T does not affect the function to be performed. The output relay R may be switched on again for the set interval with another closing and opening of the control contact S.

Es - ON delay with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T - on-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains in this position until the control contact S is opened. In case the control contact S is closed for time shorter than the set interval T, the output relay R will not activate.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T** - measured time; **Ta**, **Tb** - component intervals of T time; **Ts** - period of T time interrupt; **t** - time axis

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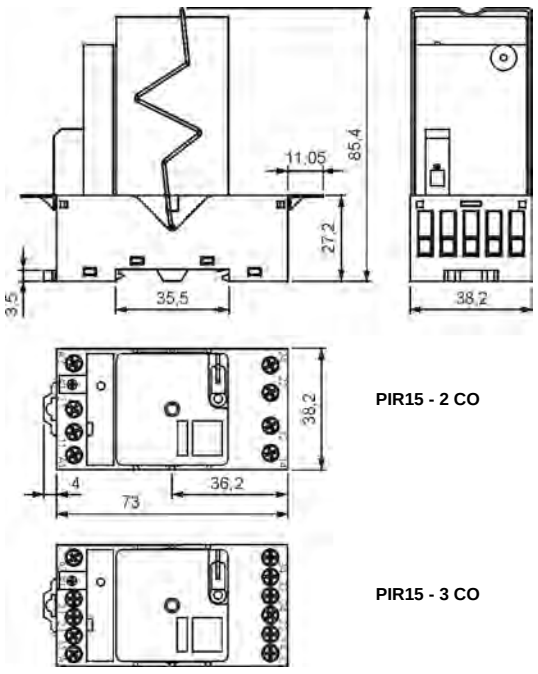
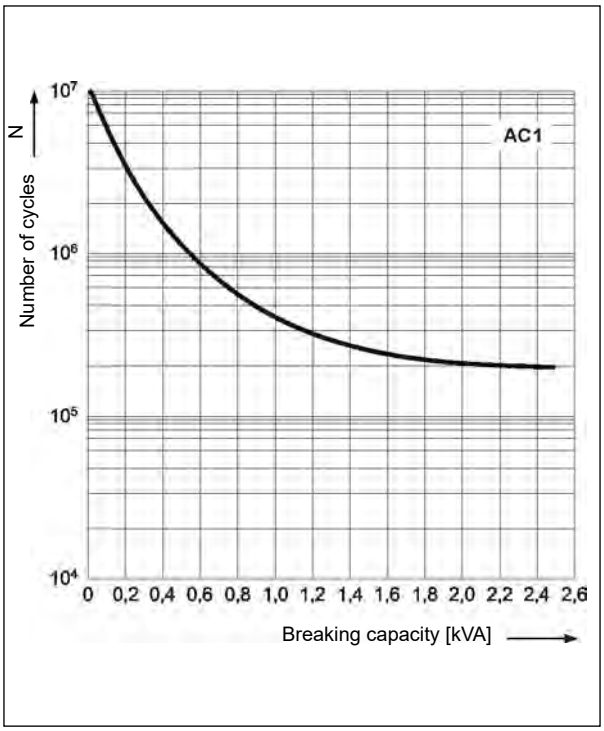
Dimensions



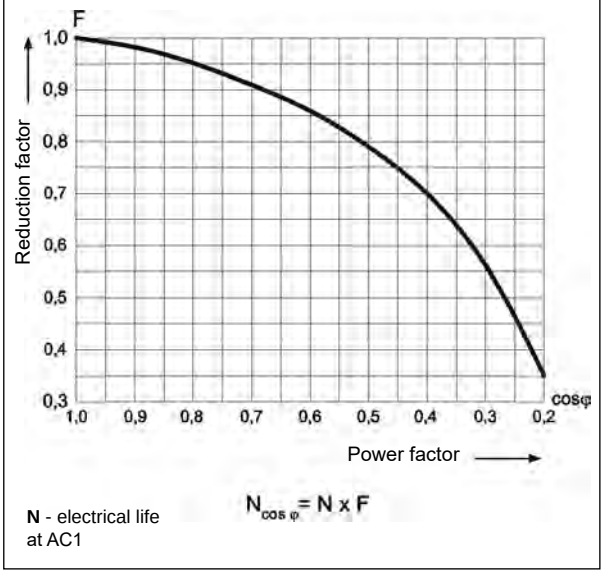
Electrical life at AC resistive load. Switching frequency: 1 200 cycles/hour

Fig. 1



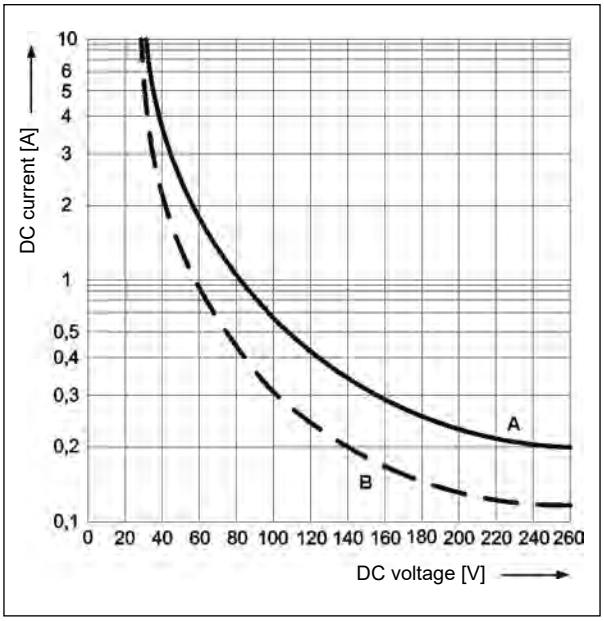
Electrical life reduction factor at AC inductive load

Fig. 2



Max. DC breaking capacity
A - resistive load DC1
B - inductive load L/R = 40 ms

Fig. 3



Mounting

Relays **PIR15...T** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting with two M3 screws. **Connections:** max. cross section of the cables (stranded): 2 x 2,5 mm^2 (2 x 14 AWG), length of the cable deinsulation: 6,5 mm, max. tightening moment for the terminal: 0,5 Nm.

Input data - DC voltage version Table 1

Input voltage code	Rated input voltage U_n V DC	Input resistance at 20 °C Ω	Acceptable resistance	Input - voltage range V DC	
				min. (at 20 °C)	max. (at 55 °C)
024DC	**24**	**430**	**± 10%**	**19,2**	**26,4**
048DC	48	1 750	± 10%	38,4	52,8
060DC	60	2 700	± 10%	48,0	66,0
110DC	110	9 200	± 10%	88,0	121,0
120DC	120	11 000	± 10%	96,0	132,0
220DC	**220**	**37 000**	**± 10%**	**176,0**	**242,0**

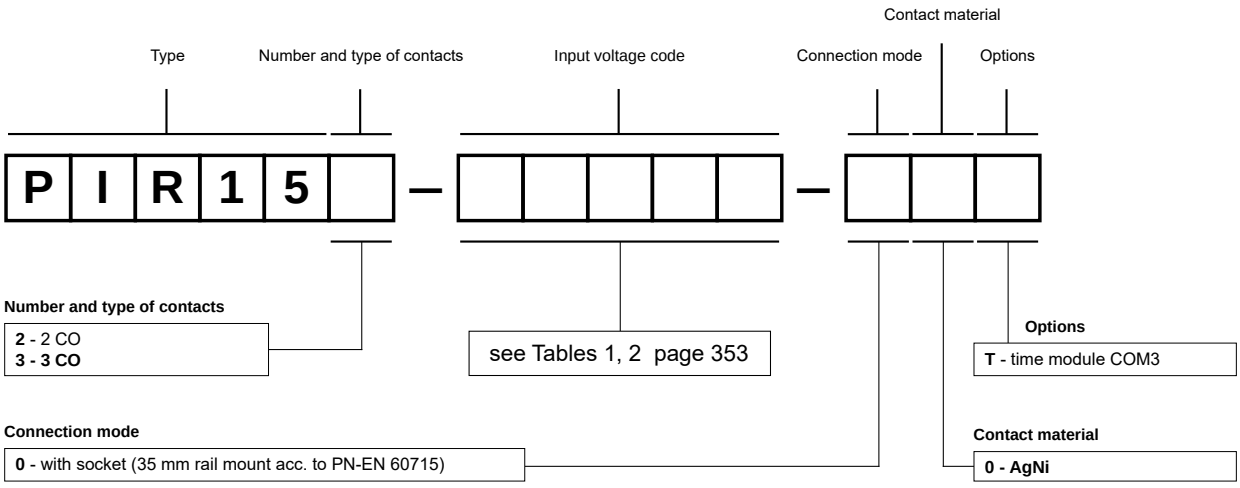
The data in bold type relate to the standard versions of the relays.

Input data - AC 50/60 Hz voltage version Table 2

Input voltage code	Rated input voltage U_n V AC	Input resistance at 20 °C Ω	Acceptable resistance	Input - voltage range V AC	
				min. (at 20 °C)	max. (at 55 °C)
024AC	**24**	**75**	**± 15%**	**19,2**	**26,4**
048AC	48	305	± 15%	38,4	52,8
060AC	60	475	± 15%	48,0	66,0
110AC	110	1 700	± 15%	88,0	121,0
120AC	120	1 910	± 15%	96,0	132,0
230AC	**230**	**7 080**	**± 15%**	**184,0**	**253,0**
240AC	240	7 760	± 15%	192,0	264,0

The data in bold type relate to the standard versions of the relays.

Ordering codes



Examples of ordering codes:

PIR153-230AC-00T time relay **PIR15 - 3 CO** consists of: relay **R15 - 3 CO** (three changeover contacts, contact material AgNi, input voltage 230 V AC 50/60 Hz), socket **GZP11** (black, screw terminals), time module **COM3**, spring wire clip **GZP-0054**, description plate **GZP-0035** (white)

PIR152-024DC-00T time relay **PIR15 - 2 CO** consists of: relay **R15 - 2 CO** (two changeover contacts, contact material AgNi, input voltage 24 V DC), socket **GZP8** (black, screw terminals), time module **COM3**, spring wire clip **GZP-0054**, description plate **GZP-0035** (white)

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- **Multifunction time modules (8 time functions; 8 time ranges)**
- AC/DC input voltages
- Mounting: combinable to relay R15 - 3 CO (2 CO) with plug-in socket GZP11 (GZP8)
- Recognitions, certifications, directives: CE

Output circuits - contact data

Number and type of contacts		according to relays R15 - 3 CO (2 CO)	
Input circuit			
Rated voltage	AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Must release voltage		> 10 V AC or 10 V DC	
Operating range of supply voltage		0,85...1,1 U_n	
Rated power consumption	AC	80 mVA (54 mW)	24 V AC
		940 mVA (520 mW)	230 V AC
	DC	60 mW	24 V DC
		765 mW	240 V AC
Range of supply frequency	AC	45...65 Hz	
Duty cycle		100%	
Residual ripple to DC		10%	
Control contact S ❶			
• connections		not potential free, terminals A1-B1	
• line length		max. 10 m (twisted pair)	
• min. time of pulse duration ❷		100 ms	
Insulation according to PN-EN 60664-1			
Insulation pollution degree		2	if built-in: 3
General data			
Dimensions (L x W x H)		26,5 x 35 x 47 mm	
Ambient temperature	• storage	-25...+70 °C	
	• operating	-25...+55 °C	
Cover protection category		IP 40	PN-EN 60529
Relative humidity		15...85%	
Time module data			
Functions		E, Wu, Bp, Bi, R, Ws, Wa, Es	
Function adjustment ❸		selection with microswitches	
Time ranges		1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d	
Timing adjustment ❸		time range - with microswitches smooth - (0,05...1) x time range - with potentiometer	
Base accuracy		± 1% (calculated from the final range values)	
Setting accuracy		± 5% (calculated from the final range values)	
Repeatability		± 0,5% or ± 5 ms	
Temperature influence		± 0,01% / °C	
Recovery time		150 ms	
LED indicator		green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time	

❶ The control terminal B1 is activated by connection to A1 terminal via the external control contact S.
❷ Where the control signal is recognizable.
❸ Settings of switches - see page 356.

Time relay PIR15...T

set: relay R15 - 3 CO (2 CO)
+ socket GZP11 (GZP8)
+ time module COM3
- see page 349

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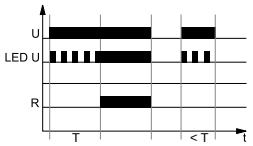
Time functions

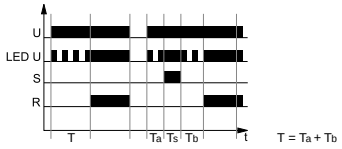
E - ON delay.

Diagram 1



When the supply voltage U is applied, the set interval T begins (green LED flashing). After the interval T has expired (green LED illuminated) the output relay R switches into on-position. This status remains until the supply voltage is interrupted - see Diagram 1.

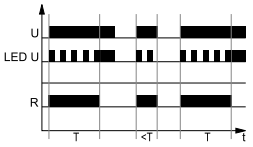
Diagram 2



Additional option (ON delay adding): if the control contact S is closed the running interval T is stopped (green LED illuminated) and the interval already expired is saved. When the control contact S is opened once again the interval T is continued (green LED flashing). After the interval T has expired, the control contact S can be operated as you like - see Diagram 2.

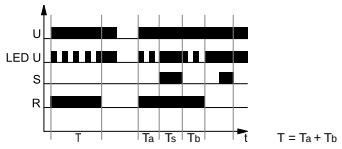
Wu - Single shot leading edge voltage controlled.

Diagram 1



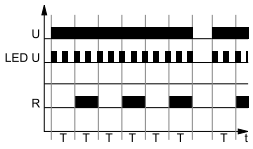
When the supply voltage U is applied, the output relay R switches into on-position and the set interval T begins (green LED flashing). After the interval T has expired (green LED illuminated) the output relay switches into off-position. This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the interval T has expired, the output relay switches into off-position. The interval already expired is erased and is restarted when the supply voltage is next applied - see Diagram 1.

Diagram 2



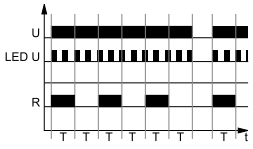
Additional option (Single shot leading edge adding): if the control contact S is closed the running interval T is stopped (green LED illuminated) and the interval already expired is saved. When the control contact S is opened once again the interval T is continued (green LED flashing). After the interval T has expired, the control contact S can be operated as you like - see Diagram 2.

Bp - Symmetrical cyclical operation pause first.



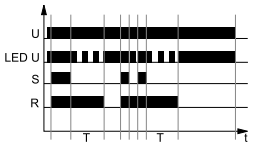
Applying the supply voltage U starts the cyclical operation from the T interval - switching the output relay R off followed by switching on the output relay R for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

Bi - Symmetrical cyclical operation pulse first.



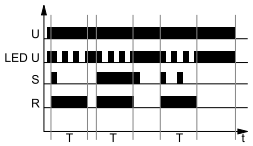
Applying the supply voltage U starts the cyclical operation from switching on the output relay R for the set interval T. After the interval T has lapsed, the output relay R switches off for the interval T. The cyclical operation lasts until the supply voltage U is interrupted.

R - OFF delay with the control contact S.



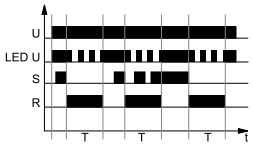
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches on the output relay R. Opening of the control contact S starts the set time of the delayed switching off of the output relay R. After the interval T has lapsed, the output relay R switches off. If the control contact S is closed during the interval T, the already measured time is reset, and the output relay R is switched on again. The OFF delay of the output relay R will start when the control contact S is opened again.

Ws - Single shot for the set interval triggered by closing of the control contact S.



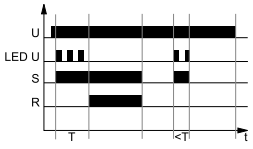
The input of the time relay is supplied with voltage U continuously. Closing of the control contact S immediately switches the output relay R on for the set interval T. After the interval T has lapsed, the output relay R is switched off. In the course of the interval T, any opening of the control contact S does not affect the function to be performed. The output relay R may be switched on again for the set interval, after the interval T has lapsed, by closing the control contact S again.

Wa - ON for the set interval triggered with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S does not start the interval T, and it does not change the position of the output relay R. Opening of the control contact S immediately switches on the output relay R for the set time. After the interval T has lapsed, the output relay R switches off. Opening and closing of the control contact S in the course of the interval T does not affect the function to be performed. The output relay R may be switched on again for the set interval with another closing and opening of the control contact S.

Es - ON delay with the control contact S.



The input of the time relay is supplied with voltage U continuously. Closing of the control contact S starts the interval T - on-delay of the output relay R. After the interval T has lapsed, the output relay R switches on and remains in this position until the control contact S is opened. In case the control contact S is closed for time shorter than the set interval T, the output relay R will not activate.

U - supply voltage; **R** - output state of the relay; **S** - control contact state; **T** - measured time; **Ta**, **Tb** - component intervals of T time; **Ts** - period of T time interrupt; **t** - time axis

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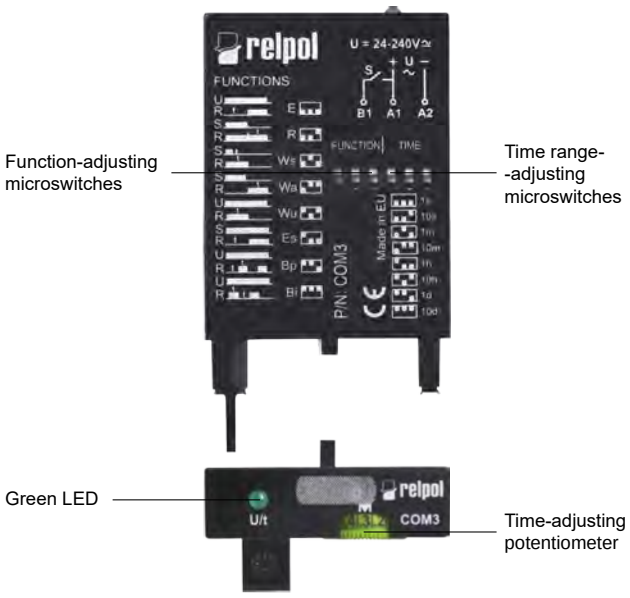
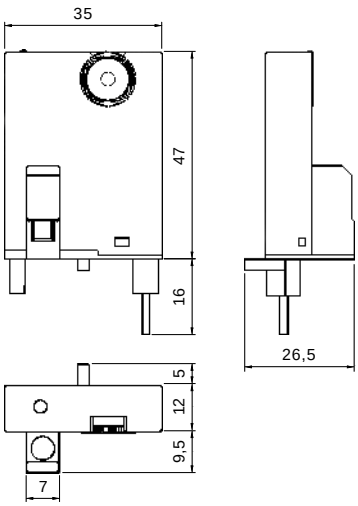
Settings of switches

Function adjustment microswitches 1, 2, 3	E	Wu	Bi	Bp	R	Ws	Wa	Es
Timing adjustment (max.) microswitches 4, 5, 6	1 s	10 s	1 min.	10 min.	1 h	10 h	1 d	10 d

Panels description



Dimensions - time module COM3



Mounting

Modules **COM3** are designed for mounting on plug-in sockets GZP11 or GZP8 (combinable to relays R15 - 3 CO or R15 - 2 CO). Operational position - any.

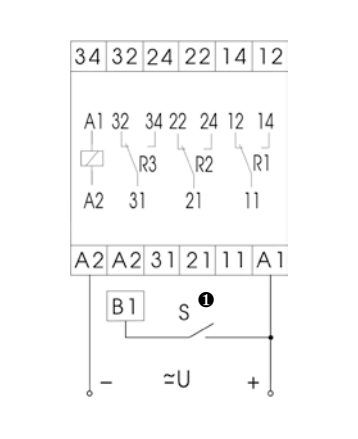
Ordering codes

Type

C	O	M	3

❶ The control terminal B1 is activated by connection to A1 terminal via the external control contact S.

Connection diagram (COM3 + GZP11 + R15 - 3 CO)



Relays monitoring

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Multifunctions monitoring relays for power-engineering and industrial automation systems.

Monitoring relays MR-E... series in modular covers and MR-G... series in industrial covers are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715.

They meet the requirements of RoHS Directive. The relays are recognized and certified by:

CE

modular covers

MR-EU1W1P 358
MR-EU31UW1P 361
MR-EU3M1P 364
MR-EI1W1P 367
MR-ET1P 370

industrial covers

MR-GU1M2P-TR2 373
MR-GU32P-TR2 376
MR-GU3M2P-TR2 379
MR-GU3M2P 382
MR-GI1M2P-TR2 385
MR-GI3M2P-TR2 388
MR-GT2P-TR2 391
TR2 394

- **Multifunctions monitoring relays (DC and AC voltage monitoring in 1-phase network, with adjustable thresholds)**
- Minimum value monitoring with the histeresis mode
- Supply voltage = monitoring voltage
- Output: 1 CO (1 changeover contact)
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		1 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	1 250 VA (5 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage		= monitoring voltage
Rated voltage	AC DC	230 V, 24 V 24 V
Must release voltage		determined by undervoltage detection (see measured circuit)
Operating range of supply voltage		0,75...1,2 U_n
Rated power consumption	AC DC	230 V AC: 10,0 VA / 0,6 W 24 V AC: 1,3 VA / 0,8 W 24 V DC: 0,6 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Measuring circuit • measuring variable • measuring inputs • overload capacity • swiching threshold • hysteresis H		DC or AC sinus, 48...63 Hz = supply voltage AC: 230 V terminals E-F3 AC: 24 V terminals E-F2 DC: 24 V terminals E-F1 ≥ 1,2 U_n MIN: 0,75...1,15 U_n MAX: 0,8...1,2 U_n see printing on the unit

Insulation according to PN-EN 60664-1

Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 17,5 x 65 mm
Weight		72 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions	UNDER, WIN minimum value monitoring with the histeresis mode
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Temperature influence	± 1% / °C
Recovery time	500 ms
LED indicator	green LED U ON - indication of supply voltage U red LEDs MIN and MAX ON/OFF - indication of failure ❶ yellow LED R ON/OFF - output relay status

❶ Indication of relay status - according to the set threshold.

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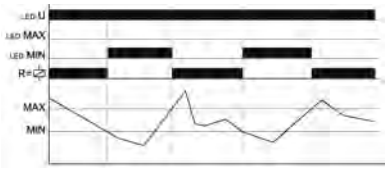
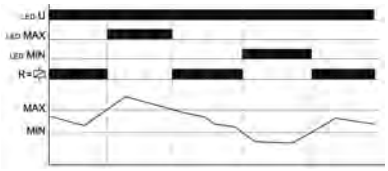
Functions

UNDER - Undervoltage monitoring.



When the supply voltage U is applied, the output relay R switches into on-position, if the measured voltage is beyond the MIN-value. When the measured voltage falls below the MIN-value, the output relay R switches into off-position. The output relay R switches into on-position again, if the voltage exceeds the MAX-value.

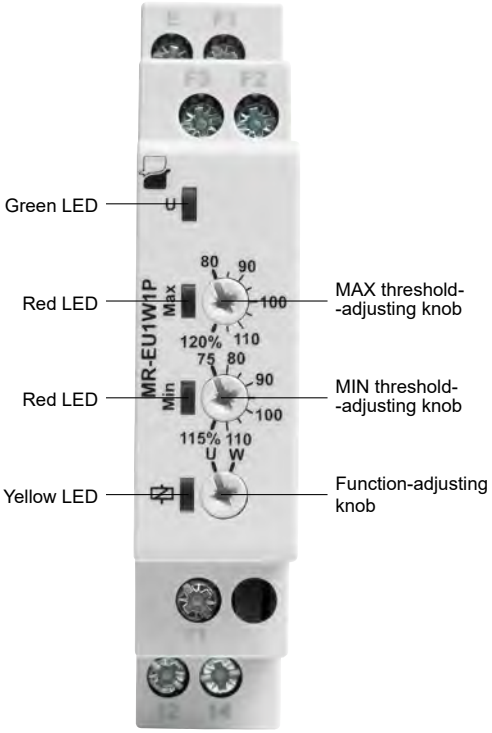
WIN - Voltage monitoring in windowfunction between MIN and MAX values.



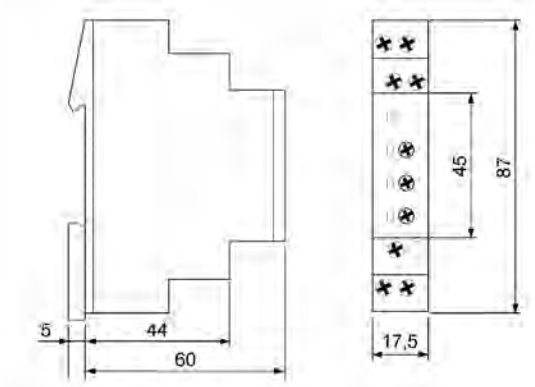
When the supply voltage U is applied, the output relay R switches into on-position, if the measured voltage is within the adjusted window. When the measured voltage left the window between MIN and MAX, the output relay R switches into off-position. The output relay R switches into on-position again, if the voltage re-enter the adjusted window.

U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status

Front panel description



Dimensions



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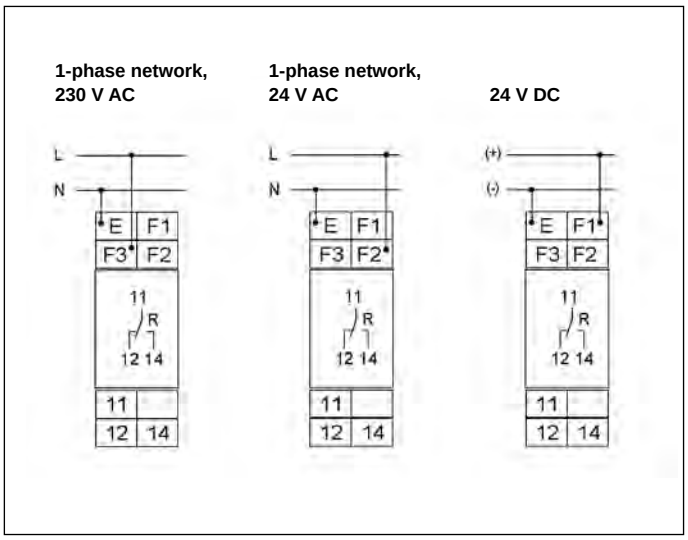
Connection diagrams



Mounting

Relays **MR-EU1W1P** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

Ordering codes

Type

M	R	–	E	U	1	W	1	P

Monitoring

U1 - DC and AC voltage in 1-phase network

Number and type of contacts

1P - 1 CO

Example of ordering code:

MR-EU1W1P monitoring relay **MR-EU1W1P**, multifunction (relay perform 2 functions), cover - modular, width 17,5 mm, one changeover contact, rated monitoring voltages: AC - 230 V, 24 V; DC - 24 V

- **Multifunctions monitoring relays (AC voltage monitoring in 1-phase network and 3-phase - 3(N)~ 400/230 V, with adjustable thresholds)**
- Monitoring of phase sequence ❶ and phase failure • Connection of neutral wire (optional) • Timing adjustment of tripping delay
- Supply voltage = monitoring voltage • Output: 1 CO (1 changeover contact)
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		1 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	1 250 VA (5 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage		= monitoring voltage
Rated voltage	AC	230 V, 3(N)~ 400/230 V
Operating range of supply voltage		0,7...1,3 U_n
Rated power consumption	AC	8,0 VA / 1,0 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Measuring circuit	• measuring variable	3(N)~, sinus, 48...63 Hz
	• measuring inputs	= supply voltage AC: 230 V, 3(N)~ 400/230 V terminals (N)-L1-L2-L3
	• overload capacity	determined by tolerance specified for supply voltage
	• swiching threshold	MIN: 0,7...1,2 U_n MAX: 0,8...1,3 U_n

Insulation according to PN-EN 60664-1

Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 17,5 x 65 mm
Weight		72 g
Ambient temperature	• storage	-25...+70 °C
	• operating	-25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions	UNDER, UNDER+SEQ, WIN, WIN+SEQ SEQ - monitoring of phase sequence ❶ and phase failure connection of neutral wire (optional)
Range of delay timing adjustment	tripping delay: 0...10 s
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Temperature influence	± 0,05% / °C
Recovery time	500 ms
LED indicator	red LEDs MIN and MAX ON/OFF - indication of failure ❷ red LEDs MIN and MAX flashing - indication of tripping delay ❷ red LED SEQ ON - indication of the change of phase sequence yellow LED R ON/OFF - output relay status

❶ Phase sequence monitoring - selectable.
❷ Indication of relay status - according to the set threshold.

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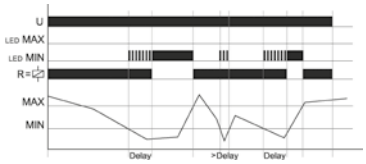
Functions

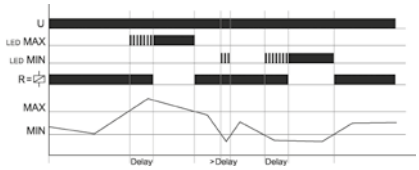
For all functions the LED's MIN and MAX are flashing alternating (the relay is fallen off), when the minimum value for the measured voltage was chosen to be greater than the maximum value. If a failure already exists, when the device is activated, the output relay R remains in off-position and the LED for the corresponding threshold is illuminated. The device includes seperately every phase voltage (L-N) and monitors it according to the selected function (UNDER or WINDOW).

UNDER, UNDER+SEQ - Undervoltage monitoring, undervoltage monitoring with monitoring of phase sequence.



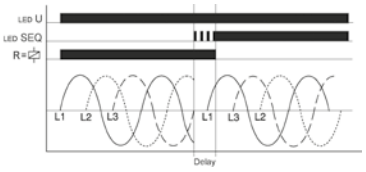
When the measured voltage (one of the phase voltages) falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R switches into on-position again (yellow LED illuminated), when the measured voltage (all phase voltages) exceeds the value adjusted at the MAX-regulator.

WIN, WIN+SEQ - Voltage monitoring in windowfunction between MIN and MAX values, voltage monitoring in windowfunction between MIN and MAX values with monitoring of phase sequence.



The output relay R switches into on-position (yellow LED illuminated), when the measured voltage (all phase voltages) exceeds the value adjusted at the MIN-regulator. When the measured voltage (one of the phase voltages) exceeds the value adjusted at the MAX-regulator, the set interval of tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated) the output relay R switches into off-position (yellow LED not illuminated). The output relay R switches into on-position again (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage (one of the phase voltage) falls below the value adjusted at the Min-regulator, the set interval of tripping delay (Delay) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-positon (yellow LED not illuminated).

SEQ - Phase sequence monitoring.

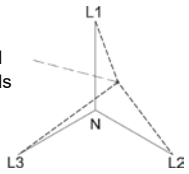


Phase sequence monitoring is selectable for all functions. In single phase circuit, the monitoring of phase sequence must be disconnected. If a change in phase sequence is detected (red LED SEQ illuminated), the output relay R switches into off-position after the set interval of tripping delay (Delay) has expired (yellow LED not illuminated).

U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status; **SEQ** - phase sequence

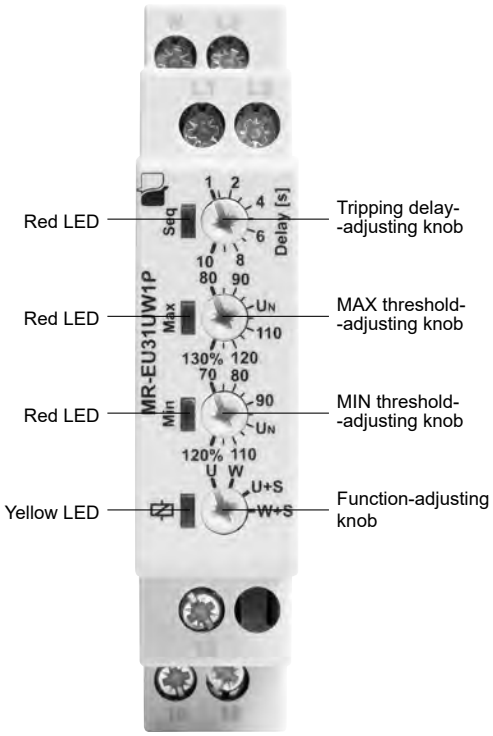
Loss of neutral wire by means of evaluation of asymmetry.

Shift of neutral point caused by asymmetrical phase loads and missing neutral wire

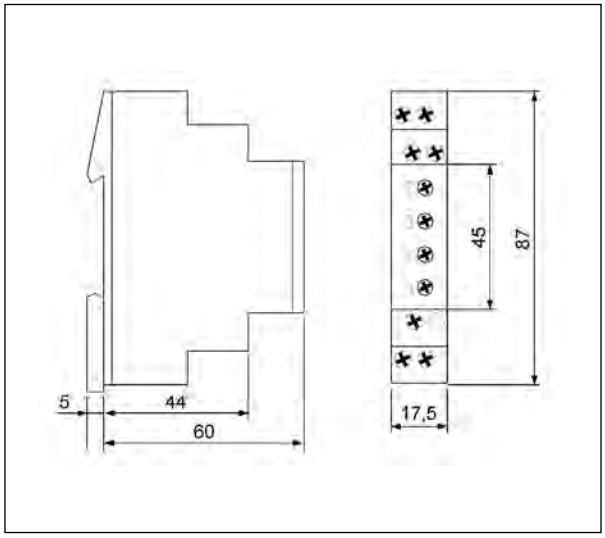


The device monitors every phase (L1, L2 and L3) against the neutral wire N. A shift of neutral point occurs by an asymmetrical phase load if the neutral wire breaks in the power line. If one of the phase voltages exceeds the value adjusted at the trip point, the set interval of tripping delay (Delay) begins (red LED MIN or MAX flashes). After the interval has expired (red LED MIN or MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated).

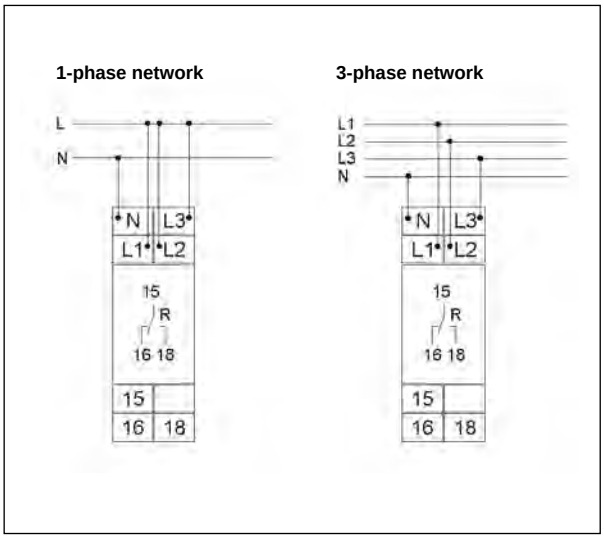
Front panel description



Dimensions



Connection diagrams



Mounting

Relays **MR-EU31UW1P** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

Ordering codes

Type

M	R	–	E	U	3	1	U	W	1	P

Monitoring

U31 - 3(N)~ 400/230 V voltage in 1-phase network and 3-phase

Number and type of contacts

1P - 1 CO

Example of ordering code:

MR-EU31UW1P monitoring relay **MR-EU31UW1P**, multifunction (relay perform 5 functions), cover - modular, width 17,5 mm, one changeover contact, rated monitoring voltages: AC - 230 V, 3(N)~ 400/230 V

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- **Multifunctions monitoring relays (AC voltage monitoring in 3-phase network - 3(N)~ 400/230 V)**
- Monitoring of phase sequence and phase failure • Asymmetry monitoring (adjustable) • Connection of neutral wire (optional)
- Supply voltage = monitoring voltage • Output: 1 CO (1 changeover contact)
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		1 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	1 250 VA (5 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage		= monitoring voltage
Rated voltage	AC	3(N)~ 400/230 V
Must release voltage		AC: ≥ 0,2 U_n
Operating range of supply voltage		0,7...1,3 U_n
Rated power consumption	AC	8,0 VA / 0,8 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Measuring circuit • measuring variable • measuring inputs • overload capacity • asymmetry		3(N)~, sinus, 48...63 Hz = supply voltage AC: 3(N)~ 400/230 V terminals (N)-L1-L2-L3 determined by tolerance specified for supply voltage adjustable: 5...25%

Insulation according to PN-EN 60664-1

Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3

General data

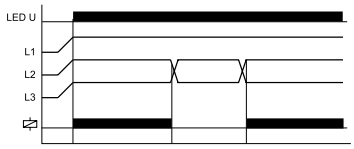
Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 17,5 x 65 mm
Weight		63 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions	SEQ - monitoring of phase sequence and phase failure ASYM - monitoring of asymmetry (adjustable) connection of neutral wire (optional)
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Temperature influence	± 0,05% / °C
Recovery time	500 ms
LED indicator	green LED U ON - indication of supply voltage U yellow LED R ON/OFF - output relay status

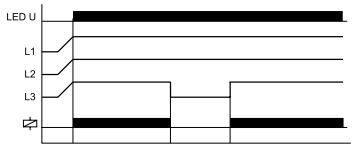
Functions

SEQ - Phase sequence monitoring.



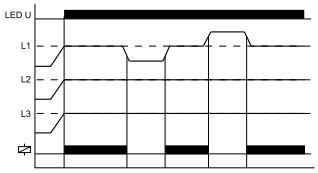
When all the phases are connected in the correct sequence and the measured asymmetry is less than the fixed value, the output relay R switches into on-position (yellow LED illuminated). When the phase sequence changes, the output relay R switches into off-position (yellow LED not illuminated).

SEQ - Phase failure monitoring.



The output relay R switches into off-position (yellow LED not illuminated), when one of the three phases fails.

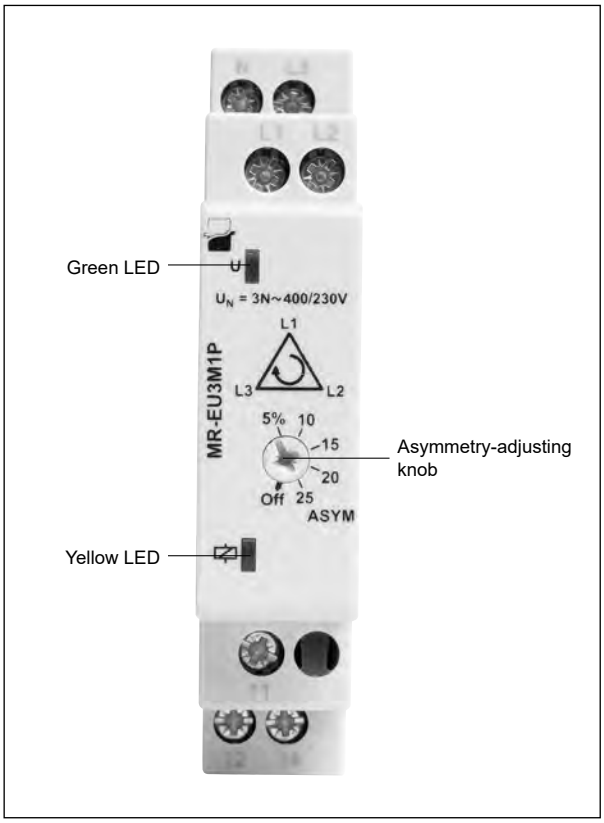
ASYM - Asymmetry monitoring.



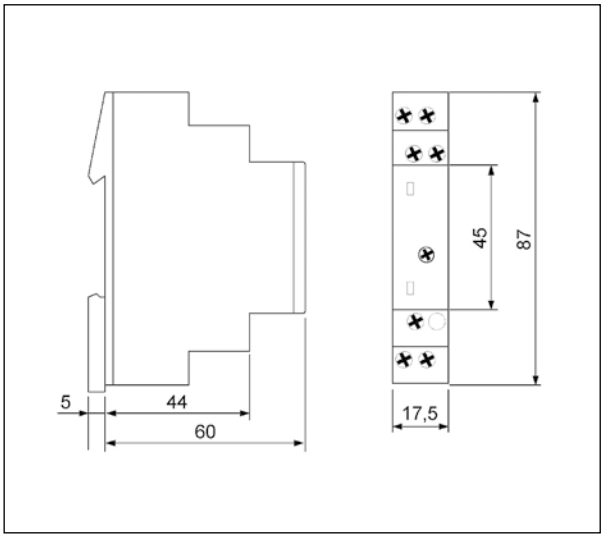
The output relay R switches into off-position (yellow LED not illuminated) when the asymmetrie exceeds the value set at the ASYM-regulator. An asymmetry caused by the reverse voltage of a consumer (e.g. a motor which continues to run on two phases only) does not effect the disconnection.

U - supply voltage; **R** - output state of the relay

Front panel description



Dimensions



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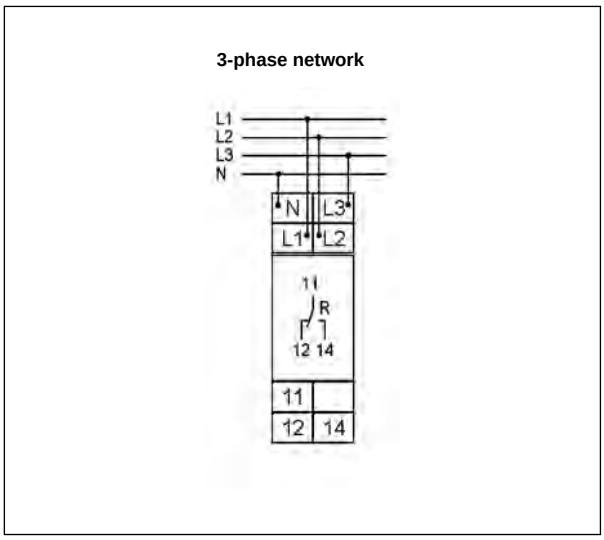
Connection diagram



Mounting

Relays **MR-EU3M1P** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

Ordering codes

Type

M	R	–	E	U	3	M	1	P

Monitoring

U3 - 3(N)~ 400/230 V voltage in 3-phase network

Number and type of contacts

1P - 1 CO

Example of ordering code:

MR-EU3M1P monitoring relay **MR-EU3M1P**, multifunction (relay perform 2 functions), cover - modular, width 17,5 mm, one changeover contact, rated monitoring voltages: AC - 3(N)~ 400/230 V

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- **Multifunctions monitoring relays (AC current monitoring in 1-phase network, with adjustable thresholds and adjustable hysteresis)**
- Monitoring windowfunction and histeresis • Timing adjustment of tripping delay • Supply voltage = monitored phase voltage
- Output: 1 CO (1 changeover contact)
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		1 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	1 250 VA (5 A / 250 V AC)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage	AC	230 V terminals (N)-Li
Rated voltage	AC	230 V
Must release voltage		AC: ≥ 0,2 U_n
Operating range of supply voltage		0,85...1,15 U_n
Rated power consumption	AC	5,0 VA / 0,8 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Measuring circuit • measuring variable		AC sinus, 48...63 Hz
• measuring inputs		AC: 10 A / 230 V AC terminals (N)-Li-Lk
• overload capacity		13 A
• starting current		1 s: 100 A 3 s: 50 A
• input resistance		3 mΩ
• swiching threshold		MIN: 0,05...0,95 I_n MAX: 0,1...1,0 I_n
• hysteresis H		adjustable setting

Insulation according to PN-EN 60664-1

Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	2 if built-in: 3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 17,5 x 65 mm
Weight		72 g
Ambient temperature	• storage	-25...+70 °C
	• operating	-25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH monitoring windowfunction and histeresis
Range of delay timing adjustment	tripping delay: 0,1...10 s
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Temperature influence	± 1% / °C
Recovery time	500 ms
LED indicator	green LED U ON - indication of supply voltage U red LEDs MIN and MAX ON/OFF - indication of failure ❶ red LEDs MIN and MAX flashing - indication of tripping delay ❶ yellow LED R ON/OFF - output relay status

❶ Indication of relay status - according to the set threshold.

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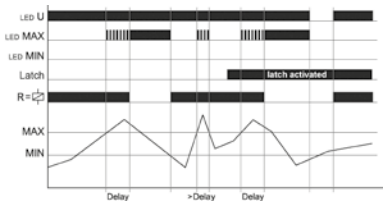
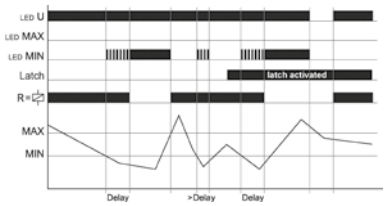
Functions

OVER, OVER+LATCH - Overcurrent monitoring, overcurrent monitoring with fault latch.



When the supply voltage U is applied, the output relay R switches into on-position, if the measured current is below the MAX-value. When the measured current exceeds the MAX-value, the output relay R switches into off-position after the interval of the tripping delay (Delay) has expired.
OVER: the output relay R switches into on-position again, if the current falls below the MIN-value.
OVER+LATCH: the output relay R switches only into on-position again by interrupting and re-applying of the supply voltage, provided that the measured current is below the MAX-value.

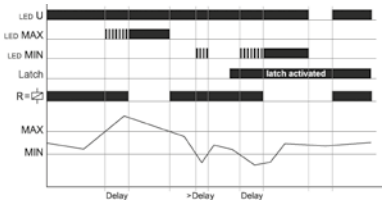
UNDER, UNDER+LATCH - Undercurrent monitoring, undercurrent monitoring with fault latch.



When the supply voltage U is applied, the output relay R switches into on-position, if the measured current is beyond the MIN-value. When the measured current falls below the MIN-value, the output relay R switches into off-position after the interval of the tripping delay (Delay) has expired.
UNDER: the output relay R switches into on-position again, if the current exceeds the MIN-value.
UNDER+LATCH: the output relay R switches only into on-position again by interrupting and re-applying of the supply voltage, provided that the measured current is beyond the MIN-value.

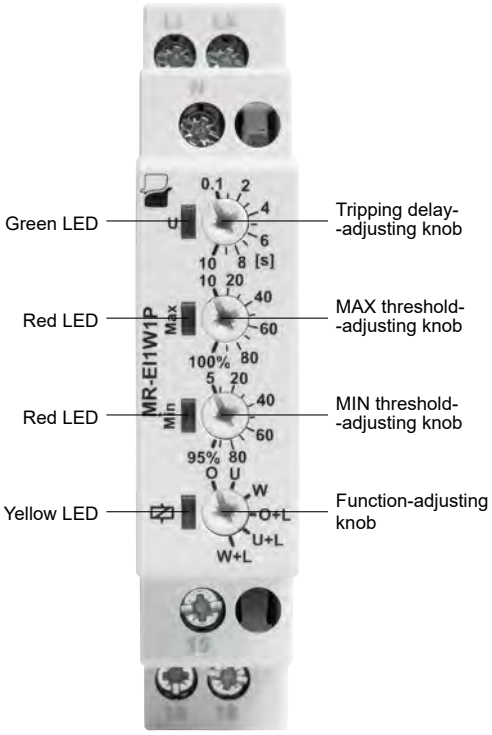
U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status; **SEQ** - phase sequence

WIN, WIN+LATCH - Current monitoring in windowfunction between MIN and MAX values, current monitoring in windowfunction between MIN and MAX values with fault latch.



When the supply voltage U is applied, the output relay R switches into on-position, if the measured current is within the adjusted window. When the measured current leaves the window between MIN and MAX, the output relay R switches into off-position after the interval of the tripping delay (Delay) has expired.
WIN: the output relay R switches into on-position again, if the current re-enter the adjusted window.
WIN+LATCH: the output relay R switches only into on-position again by interrupting and re-applying of the supply voltage, provided that the measured current is within the threshold values.

Front panel description



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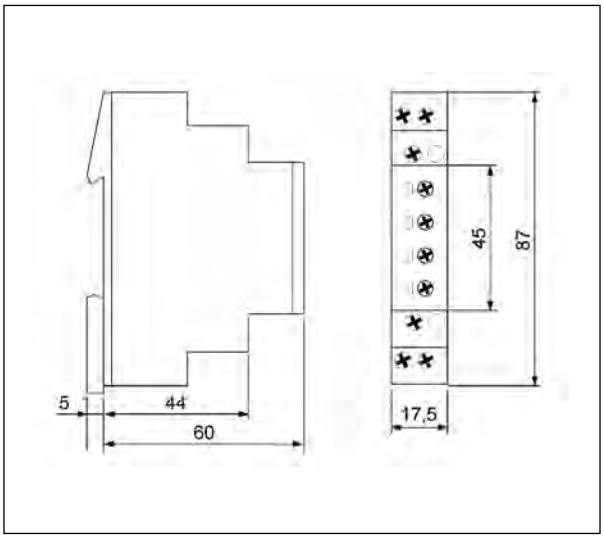
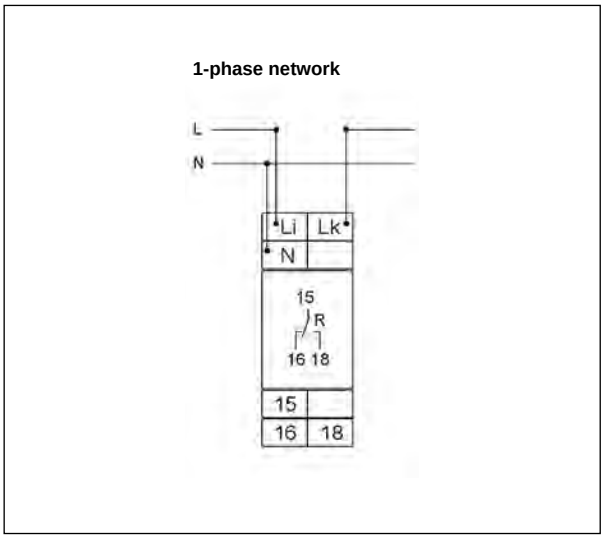
Dimensions



Connection diagram



Mounting

Relays **MR-EI1W1P** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

Ordering codes

Type

M	R	–	E	I	1	W	1	P

Monitoring

I1 - AC current in 1-phase network

Number and type of contacts

1P - 1 CO

Example of ordering code:

MR-EI1W1P monitoring relay **MR-EI1W1P**, multifunction (relay perform 6 functions), cover - modular, width 17,5 mm, one changeover contact, rated input voltage (supply): AC - 230 V; monitoring current: max. 10 A / 230 V AC

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- **Single-functions monitoring relays (motor temperature monitoring)** • Short circuit monitoring of the thermistor line or thermal contact monitoring ❶ • Test functions: integrated Test/Reset key, connection of the external Reset key (optional)
- Insulation rated voltage on the sensor circuit: 690 V • Output: 1 CO (1 changeover contact) • Cover - modular, width 35 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		1 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	1 250 VA (thermal constant current 5 A)
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage	AC	230 V terminals A1-A2
Rated voltage	AC	230 V
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		0,85...1,1 U_n
Rated power consumption	AC	1,3 VA / 1,0 W
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Measuring circuit • terminals		T1-T2 or T1-T3
• initial resistance		< 1,5 kΩ
• response value		relay in OFF-position: ≥ 3,6 kΩ
• release value		relay in ON-position: ≤ 1,65 kΩ
• disconnection ❷		T1-T2: yes T1-T3: no
• measuring voltage T1-T2		≤ 7,5 V at R ≤ 4 kΩ PN-EN 60947-8
Control contact • function		connection of an external Reset key
• loadable		no
• max. line length		R1-R2: 10 m (twisted pair)
• control pulse length		min. 50 ms
• Reset		contact 1 NO; terminals R1-R2 ❸

Insulation according to PN-EN 60664-1

Rated surge voltage		6 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		2 if built-in: 3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		87 x 35 x 65 mm
Weight		100 g
Ambient temperature	• storage	-25...+70 °C
	• operating	-25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%

Meassuring circuit data

Functions	temperature monitoring of the motor winding, with fault latch (max. 6 PTC - temperature sensors DIN 44081) short circuit monitoring of the thermistor line or thermal contact ❶ test functions: integrated Test/Reset key, connection of the external Reset key (optional)
Base accuracy	± 5% (calculated from the final range values)
Repeatability	± 1%
Temperature influence	± 0,15% / °C
Recovery time	250 ms
LED indicator	green LED U ON - indication of supply voltage U red LED ON/OFF - indication of failure

❶ Only one of this circuit versions (either short circuit monitoring of the thermistor line or thermal contact monitoring) can be executed.
❷ At short circuit.
❸ Terminals R2-T2 are internal affiliated with each other.

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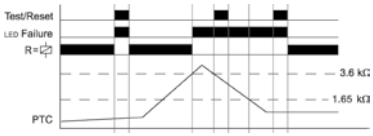
Functions

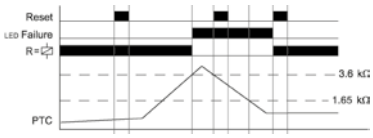
Motor temperature monitoring with fault latch.

If the supply voltage U is applied (green LED illuminated) and the cumulative resistance of the PTC-circuit is less than 3,6 kΩ (standard temperature of the motor), the output relay R switches into on-position. Pressing the Test/Reset key under this conditions forces the output relay R to switch into off-position. It remains in state as long as the Test/Reset key is pressed and thus the switching function can be checked in case of fault. The test function is not effective by using an external Reset key. When the comulative resistance of the PTC-circuit exceeds 3,6 kΩ (at least one of the PTCs has reached the cut-off temperature), the output relay R switches into off-position (red LED illuminated). The output relay R switches into on-position again (red LED not illuminated), if the cumulative resistance drops below 1,65 kΩ by cooling down of the PTC and either a Reset key (internal or external) was pressed or the supply voltage was disconnected and re-applied.

Application of internal **Test/Reset** key.

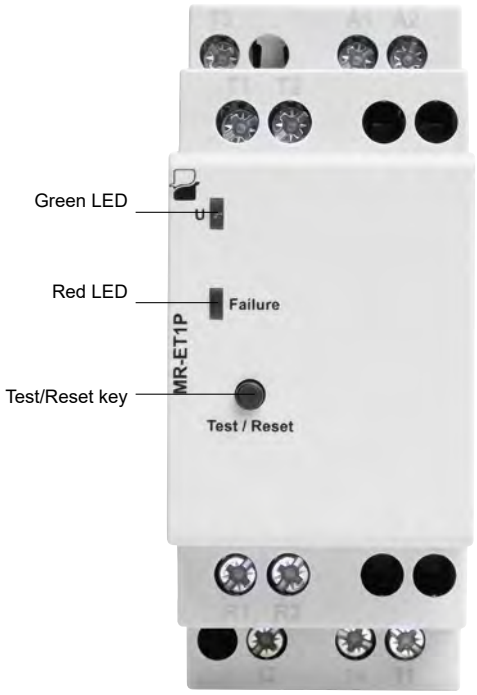


Application of an external **Reset** key.

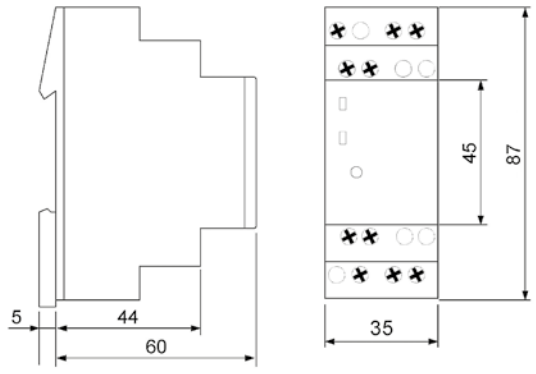


U - supply voltage; **R** - output state of the relay

Front panel description



Dimensions



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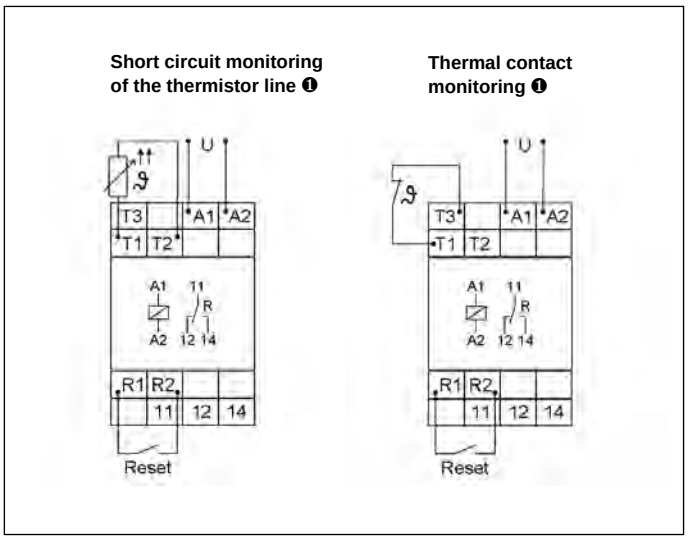
Connection diagrams



Mounting

Relays **MR-ET1P** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

❶ Only one of this circuit versions (either short circuit monitoring of the thermistor line or thermal contact monitoring) can be executed.

Ordering codes

Type

M	R	–	E	T	1	P

Monitoring

T - motor temperature

Number and type of contacts

1P - 1 CO

Example of ordering code:

MR-ET1P monitoring relay **MR-ET1P**, single-function (relay monitors the motor temperature), cover - modular, width 35 mm, one changeover contact, rated input voltage (supply): AC - 230 V

- **Multifunctions monitoring relays (DC and AC voltage monitoring in 1-phase network, with adjustable thresholds)**
- Fault latch mode • Timing adjustment of start-up suppression and tripping delay ❶ • Supply via TR2 supply transformer ❷ • Frequency of supply voltage: 16,6...400 Hz • Output: 2 CO (2 changeover contacts)
- Industrial cover, width 22,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		2 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	750 VA (3 A / 250 V AC) ❸ 1 250 VA (5 A / 250 V AC) ❹
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage	AC	12 ... 400 V ❷ terminals A1-A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		as per the specification of TR2 supply transformer ❷
Rated power consumption	AC	2,0 VA / 1,5 W
Range of supply frequency	AC	as per the specification of TR2 supply transformer ❷
Duty cycle		100%
Measuring circuit • measuring variable		DC or AC sinus, 16,6...400 Hz (frequency response: -10…+5%)
• measuring inputs		AC/DC: 30 V terminals E-F1(+) AC/DC: 60 V terminals E-F2(+) AC/DC: 300 V terminals E-F3(+)
• overload capacity		30 V AC/DC: 100 V_{eff} 60 V AC/DC: 150 V_{eff} 300 V AC/DC: 440 V_{eff}
• input resistance		30 V AC/DC: 47 kΩ 60 V AC/DC: 100 kΩ 300 V AC/DC: 470 kΩ
• swiching threshold		MIN: 0,05...0,95 U_n MAX: 0,1...1,0 U_n

Insulation according to PN-EN 60664-1

Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		90 x 22,5 x 108 mm
Weight		100 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH fault latch mode
Range of delay timing adjustment	start-up suppression: 0...10 s tripping delay: 0,1...10 s ❶
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Voltage influence	± 0,5%
Temperature influence	± 0,1% / °C
Recovery time	500 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U flashing - indication of start-up suppression time ❺ red LEDs MIN and MAX ON/OFF - indication of failure ❺ red LEDs MIN and MAX flashing - indication of tripping delay ❺ yellow LED R ON/OFF - output relay status

❶ Separately adjustable (two adjusting knobs). ❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394. ❸ If the distance between the mounting relays is less than 5 mm. ❹ If the distance between the mounting relays is greater than 5 mm. ❺ Indication of relay status - according to the set threshold.

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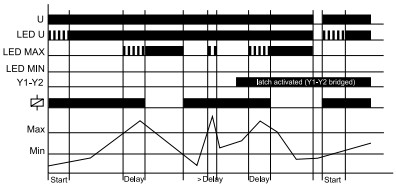
Functions

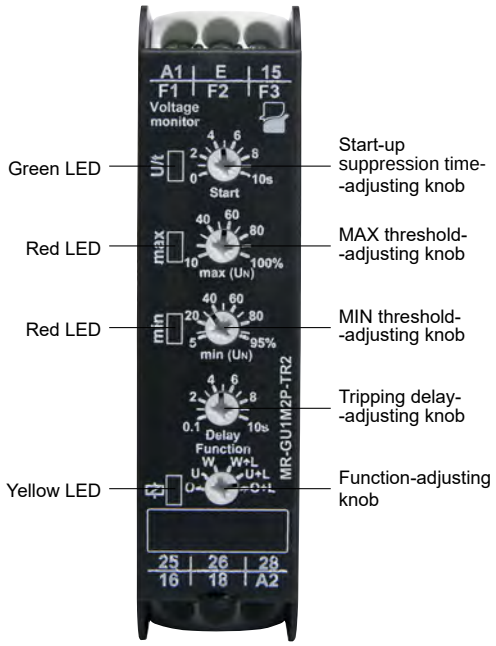
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval of the start-up suppression (Start) begins (green LED flashes). Changes of the measured voltage during this period do not affect the state of the output relay R. After the interval has expired the green LED is illuminated steadily. For all the functions the LEDs MIN and MAX are flashing alternating, when the minimum value for the measured voltage was chosen to be greater than the maximum value.

OVER, OVER+LATCH - Overvoltage monitoring, overvoltage monitoring with fault latch.

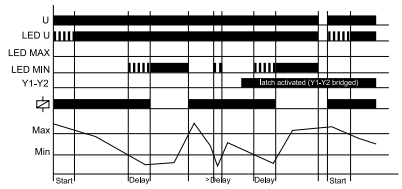


When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured voltage falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated).
If the **fault latch** is activated (OVER+LATCH) and the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R again switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

Front panel description

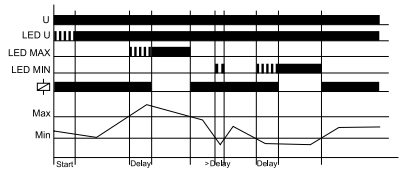


UNDER, UNDER+LATCH - Undervoltage monitoring, undervoltage monitoring with fault latch.

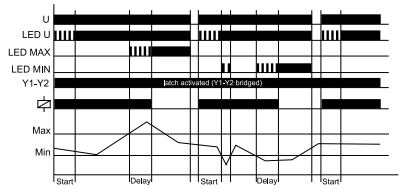


When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator. If the **fault latch** is activated (UNDER+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

WIN, WIN+LATCH - Voltage monitoring in windowfunction between MIN and MAX values, voltage monitoring in windowfunction between MIN and MAX values with fault latch.



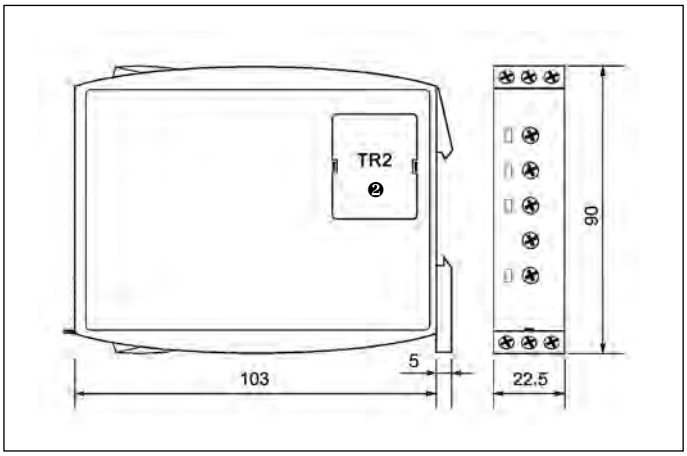
The output relay R switches into on-position (yellow LED illuminated) when the measured voltage exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX--regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated).



If the **fault latch** is activated (WIN+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage exceeds the value adjusted at the MIN-regulator. If the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status; **SEQ** - phase sequence

Dimensions



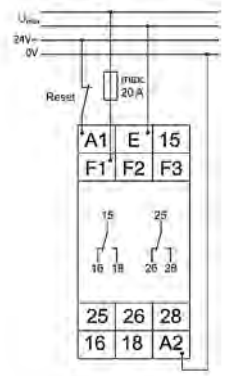
Mounting

Relays **MR-GU1M2P-TR2** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394.

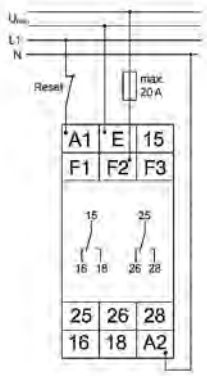
Connection diagrams

Measuring circuit 30 V AC/DC, with fault latch mode



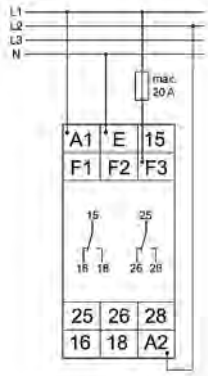
Supply: A1-A2 with TR2 24 V AC ❷

Measuring circuit 60 V AC/DC, with fault latch mode



Supply: A1-A2 with TR2 230 V AC ❷

Measuring circuit 300 V AC/DC, without fault latch mode



Supply: A1-A2 with TR2 400 V AC ❷

Ordering codes

Type

M	R	–	G	U	1	M	2	P	–	T	R

Supply

TR - supply transformer ❷

Monitoring

U1 - DC and AC voltage in 1-phase network

Number and type of contacts

2P - 2 CO

Example of ordering code:

MR-GU1M2P-TR2 monitoring relay **MR-GU1M2P-TR2**, multifunction (relay perform 6 functions), industrial cover, width 22,5 mm, two changeover contacts, rated input voltage (supply): AC - 12 ... 400 V AC ❷

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- **Multifunctions monitoring relays (AC voltages monitoring in phases - 230 V, 3-phase network 3(N)~ 400/230 V, with adjustable thresholds)** • Fault latch mode • Connection of neutral wire (required)
- Timing adjustment of tripping delay • Supply via TR2 supply transformer ❶ • Measurement inputs: 230 V AC • Output: 2 CO (2 changeover contacts) • Industrial cover, width 22,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		2 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	750 VA (3 A / 250 V AC) ❷ 1 250 VA (5 A / 250 V AC) ❸
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage	AC	12 ... 400 V ❶ terminals A1-A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		as per the specification of TR2 supply transformer ❶
Rated power consumption	AC	2,0 VA / 1,5 W
Range of supply frequency	AC	as per the specification of TR2 supply transformer ❶
Duty cycle		100%
Measuring circuit • measuring variable		AC sinus, 48...63 Hz
• measuring inputs		AC: 230 V terminals N-L1, N-L2, N-L3
• overload capacity		440 V AC
• input resistance		3(N)~ 400/230 V: 470 kΩ
• swiching threshold		MIN: 0,7...1,2 U_n MAX: 0,8...1,3 U_n

Insulation according to PN-EN 60664-1

Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		90 x 22,5 x 108 mm
Weight		100 g
Ambient temperature	• storage	-25...+70 °C
	• operating	-25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

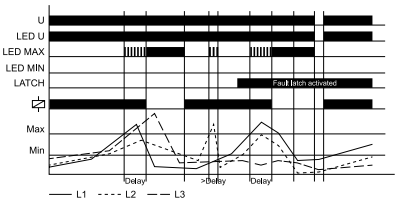
Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH fault latch mode, connection of neutral wire (required)
Range of delay timing adjustment	tripping delay: 0,1...10 s
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Voltage influence	± 0,5%
Temperature influence	± 0,1% / °C
Recovery time	500 ms
LED indicator	green LED U ON - indication of supply voltage U red LEDs MIN and MAX ON/OFF - indication of failure ❹ red LEDs MIN and MAX flashing - indication of tripping delay ❹ yellow LED R ON/OFF - output relay status

❶ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394. ❷ If the distance between the mounting relays is less than 5 mm. ❸ If the distance between the mounting relays is greater than 5 mm. ❹ Indication of relay status - according to the set threshold.

Functions

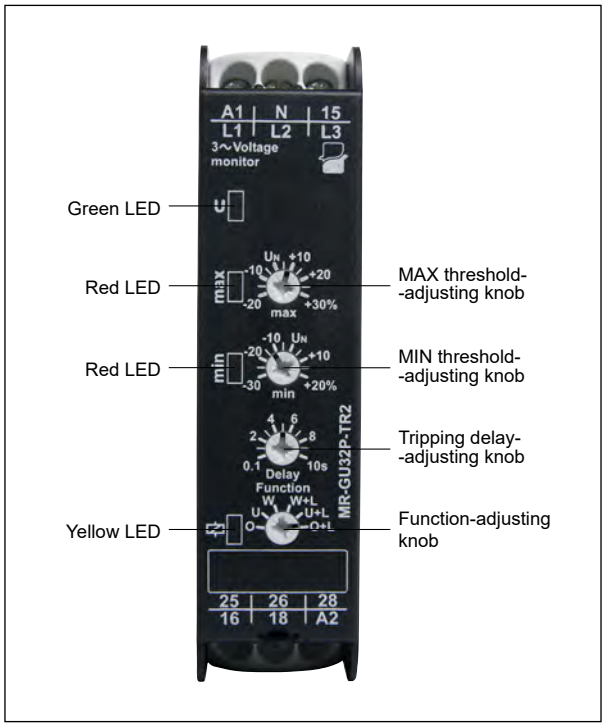
For all functions the LED's MIN and MAX are flashing alternating, when the minimum value for the measured voltage was chosen to be greater than the maximum value. If a failure already exists, when the device is activated, the output relay R remains in off-position and the LED for the corresponding threshold is illuminated.

OVER, OVER+LATCH - Overvoltage monitoring, overvoltage monitoring with fault latch.



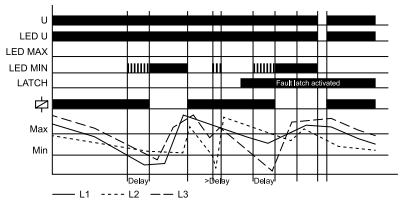
When the measured voltage of one of the phases exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured voltage of all the phases falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated). If the **fault latch** is activated (OVER+LATCH) and the measured voltage of one of the phases remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage of all the phases falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position.

Front panel description



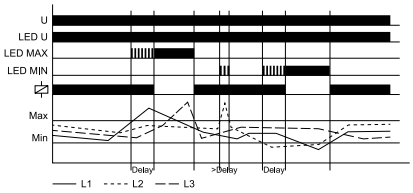
U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status; **SEQ** - phase sequence

UNDER, UNDER+LATCH - Undervoltage monitoring, undervoltage monitoring with fault latch.

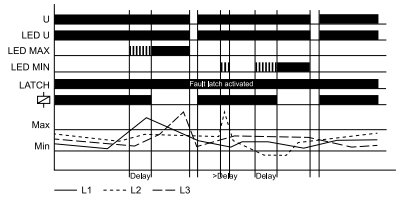


When the measured voltage of one of the phases falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured voltage of all the phases exceeds the value adjusted at the MAX-regulator.
If the **fault latch** is activated (UNDER+LATCH) and the measured voltage of one of the phases remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage of all the phases exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position.

WIN, WIN+LATCH - Voltage monitoring in windowfunction between MIN and MAX values, voltage monitoring in windowfunction between MIN and MAX values with fault latch.



The output relay R switches into on-position (yellow LED illuminated) when the measured voltage of all the phases exceeds the value adjusted at the MIN-regulator. When the measured voltage of one of the phases exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated) when the measured voltage of all the phases falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage of one of the phases falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated).



If the **fault latch** is activated (WIN+LATCH) and the measured voltage of one of the phases remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage of all the phases exceeds the value adjusted at the MIN-regulator. If the measured voltage of one of the phases remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured voltage of all the phases falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position.

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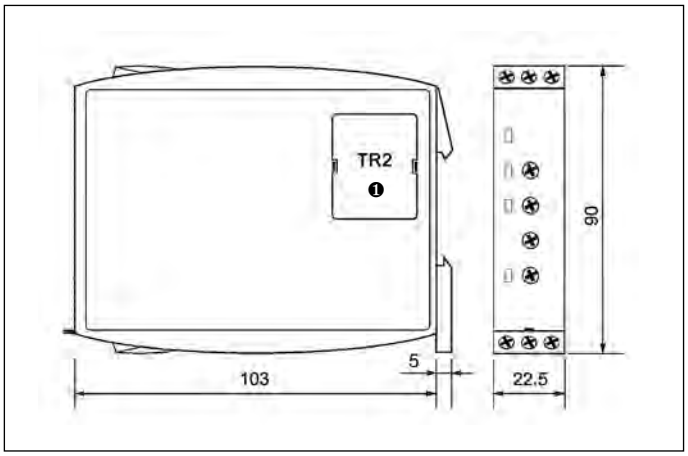
Dimensions



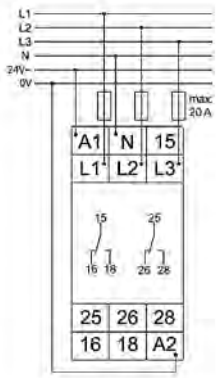
Mounting

Relays **MR-GU32P-TR2** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

❶ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394.

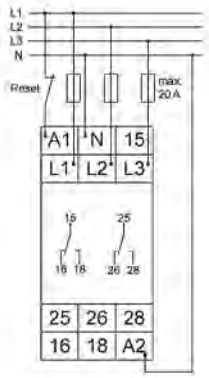
Connection diagrams

Measuring circuit 230 V AC, without fault latch mode



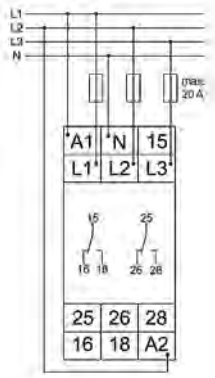
Supply: A1-A2 with TR2 24 V AC ❶

Measuring circuit 230 V AC, with fault latch mode



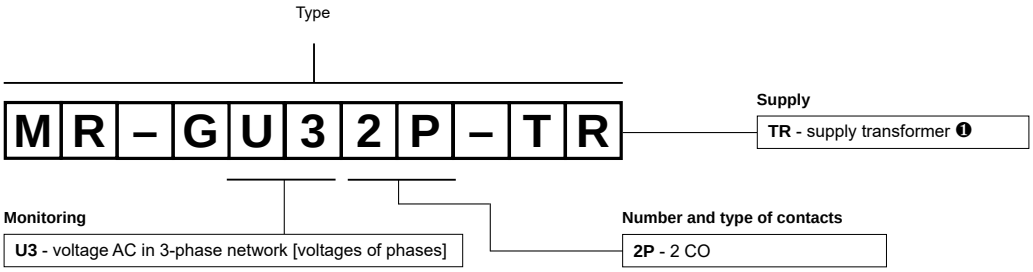
Supply: A1-A2 with TR2 230 V AC ❶

Measuring circuit 230 V AC, without fault latch mode



Supply: A1-A2 with TR2 400 V AC ❶

Ordering codes



Example of ordering code:

MR-GU32P-TR2 monitoring relay **MR-GU32P-TR2**, multifunction (relay perform 6 functions), industrial cover, width 22,5 mm, two changeover contacts, rated input voltage (supply): AC - 12 ... 400 V AC ❶

- **Multifunctions monitoring relays (AC voltage monitoring in 3-phase network, with adjustable thresholds)** • Monitoring of phase sequence and phase failure • Asymmetry monitoring (adjustable)
- Connection of neutral wire (optional) ❶ • Timing adjustment of tripping delay • Supply via TR2 supply transformer ❷ • Output: 2 CO (2 change-over contacts) • Industrial cover, width 22,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		2 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	750 VA (3 A / 250 V AC) ❸ 1 250 VA (5 A / 250 V AC) ❹
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage	AC	12 ... 400 V ❷ terminals A1-A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		as per the specification of TR2 supply transformer ❷
Rated power consumption	AC	2,0 VA / 1,5 W
Range of supply frequency	AC	as per the specification of TR2 supply transformer ❷
Duty cycle		100%
Measuring circuit • measuring variable • measuring inputs • overload capacity • input resistance • swiching threshold • asymmetry		AC sinus, 48...63 Hz AC: 3(N)~ 400/230 V terminals (N)-L1-L2-L3 3(N)~ 600/346 V 3(N)~ 400/230 V: 1 MΩ MIN: 0,7...1,2 U_n MAX: 0,8...1,3 U_n adjustable: 5...25%

Insulation according to PN-EN 60664-1

Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		90 x 22,5 x 108 mm
Weight		100 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions	UNDER, UNDER+SEQ, WIN, WIN+SEQ SEQ - monitoring of phase sequence and phase failure ASYM - monitoring of asymmetry (adjustable) connection of neutral wire (optional) ❶
Range of delay timing adjustment	tripping delay: 0,1...10 s
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Voltage influence	± 0,5%
Temperature influence	± 0,1% / °C
Recovery time	500 ms
LED indicator	red LED ASYM ON/OFF - indication of asymmetry ❺ red LEDs MIN and MAX ON/OFF - indication of failure ❺ red LEDs MIN and MAX flashing - indication of tripping delay ❺ red LED SEQ ON/OFF - indication of phase sequence ❺ yellow LED R ON/OFF - output relay status

❶ Detection of neutral wire loss. ❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394. ❸ If the distance between the mounting relays is less than 5 mm. ❹ If the distance between the mounting relays is greater than 5 mm. ❺ Indication of relay status - according to the set threshold.

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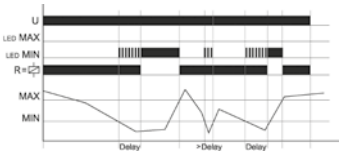
Functions

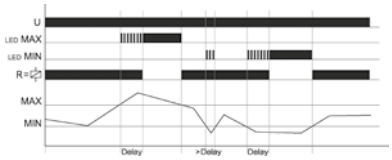
For all functions the LED's MIN and MAX are flashing alternating, when the minimum value for the measured voltage was chosen to be greater than the maximum value. If a failure already exists, when the device is activated, the output relay R remains in off-position and the LED for the corresponding threshold is illuminated.

UNDER, UNDER+SEQ - Undervoltage monitoring, undervoltage monitoring with monitoring of phase sequence.



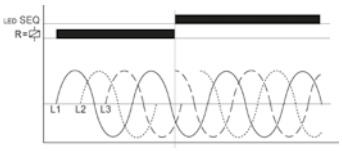
When the measured voltage (mean value of phase-to-phase voltages) falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator.

WIN, WIN+SEQ - Voltage monitoring in windowfunction between MIN and MAX values, voltage monitoring in windowfunction between MIN and MAX values with monitoring of phase sequence.



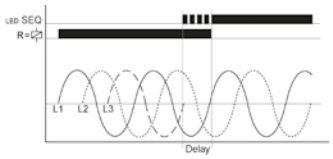
The output relay R switches into on-position (yellow LED illuminated) when the measured voltage (mean value of phase-to-phase voltages) exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated).

SEQ - Phase sequence monitoring.



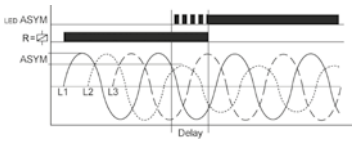
Phase sequence monitoring is selectable for all functions.If a change in phase sequence is detected (red LED SEQ illuminated), the output relay R switches into off-position immediately (yellow LED not illuminated).

SEQ - Phase failure monitoring.



If one of the phase voltages fails, the set interval of the tripping delay (Delay) begins (red LED SEQ flashes). After the interval has expired (red LED SEQ illuminated), the output relay R switches into off-position (yellow LED not illuminated). Reverse voltages of a consumer (e.g. a motor which continues to run on two phases only) do not effect the disconnection but can be monitored by using a proper value for the asymmetry.

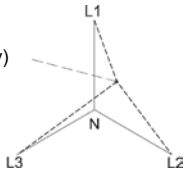
ASYM - Asymmetry monitoring.



If the asymmetry of the phase-to-phase voltages exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relay R switches into off-position (yellow LED not illuminated). If the neutral wire is connected to the device, the asymmetry of the phase voltages referred to the neutral wire (Y-voltage) is monitored also. In that case both values of the asymmetry are evaluated and if one of the values exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relay R switches into off-position (yellow LED not illuminated).

Loss of neutral wire by means of evaluation of asymmetry.

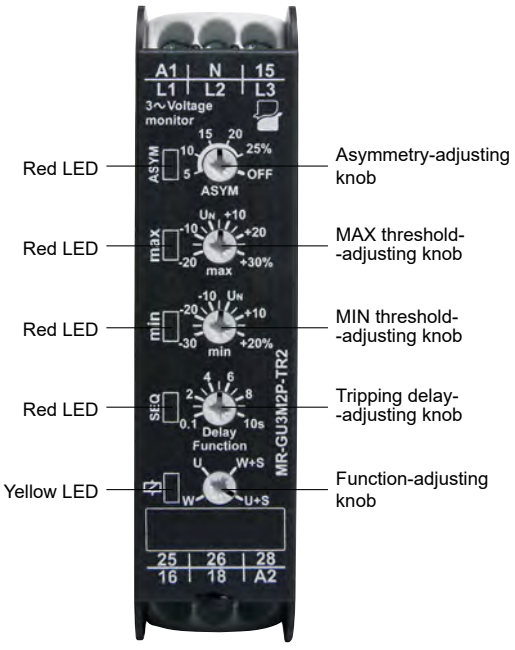
Shift of neutral point (asymmetry) caused by asymmetrical phase loads and missing neutral wire



A break of the neutral wire between power line and machinery is detected as soon as asymmetry between phase-to-phase voltage and neutral wire occurs. If the asymmetry exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (Delay) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relay R switches into off-position (yellow LED not illuminated). A break of the neutral wire between our device and the machinery can not be detected.

U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status; **SEQ** - phase sequence

Front panel description



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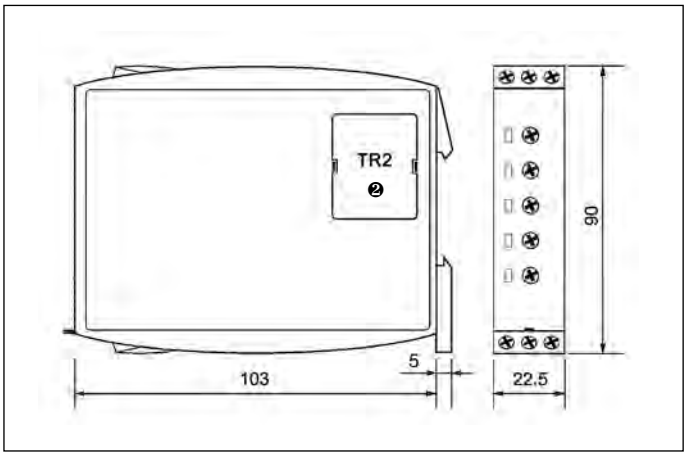
Dimensions



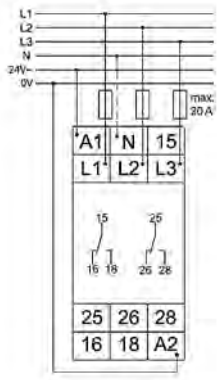
Mounting

Relays **MR-GU3M2P-TR2** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394.

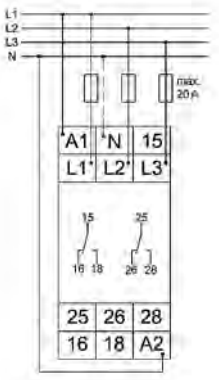
Connection diagrams

Measuring circuit 3(N)~ 400/230 V



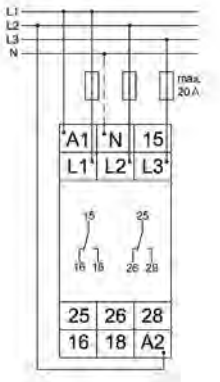
Supply: A1-A2 with TR2 24 V AC ❷

Measuring circuit 3(N)~ 400/230 V



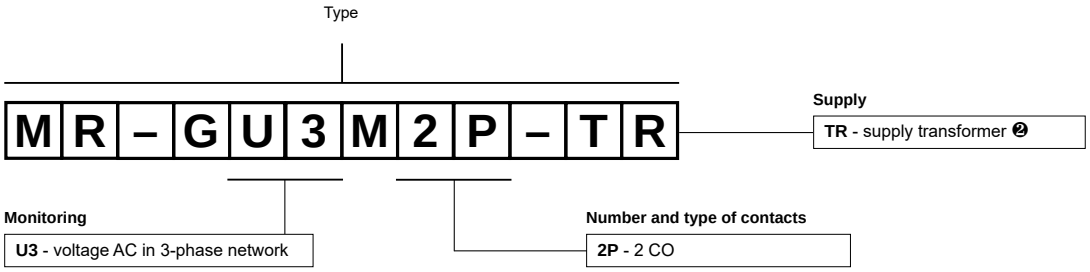
Supply: A1-A2 with TR2 230 V AC ❷

Measuring circuit 3(N)~ 400/230 V



Supply: A1-A2 with TR2 400 V AC ❷

Ordering codes



Example of ordering code:

MR-GU3M2P-TR2 monitoring relay **MR-GU3M2P-TR2**, multifunction (relay perform 6 functions), industrial cover, width 22,5 mm, two changeover contacts, rated input voltage (supply): AC - 12 ... 400 V AC ❷

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- **Multifunctions monitoring relays (AC voltage monitoring in 3-phase network)** • Monitoring of phase sequence and phase failure
- Detection of reverse voltage by means of asymmetry • Connection of neutral wire (optional)
- Supply voltage = monitoring voltage • Output: 2 CO (2 changeover contacts) • Industrial cover, width 22,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		2 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	750 VA (3 A / 250 V AC) ❶ 1 250 VA (5 A / 250 V AC) ❷
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage		= monitoring voltage terminals (N)-L1-L2-L3
Must release voltage		AC: ≥ 0,2 U_n
Operating range of supply voltage		3(N)~ 342...457 V
Rated power consumption	AC	9,0 VA
Range of supply frequency	AC	48...63 Hz
Duty cycle		100%
Measuring circuit • measuring variable • measuring inputs • overload capacity • input resistance • asymmetry		AC sinus, 48...63 Hz AC: 3(N)~ 400/230 V terminals (N)-L1-L2-L3 3(N)~ 457/264 V 3(N)~ 400/230 V: 15 kΩ fixed: typical value 30%

Insulation according to PN-EN 60664-1

Rated surge voltage		4 000 V 1,2 / 50 µs
Overvoltage category		III
Insulation pollution degree		3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		90 x 22,5 x 108 mm
Weight		100 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

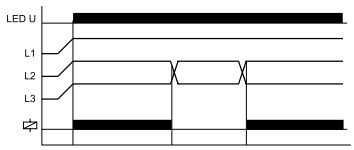
Meassuring circuit data

Functions	SEQ - monitoring of phase sequence and phase failure ASYM - detection of reverse voltage by means of asymmetry connection of neutral wire (optional)
Range of delay timing adjustment	start-up suppression: fixed, max. 0,5 s tripping delay: fixed, max. 0,35 s
Recovery time	100 ms
LED indicator	green LED U ON - indication of supply voltage U yellow LED R ON/OFF - output relay status

❶ If the distance between the mounting relays is less than 5 mm. ❷ If the distance between the mounting relays is greater than 5 mm.

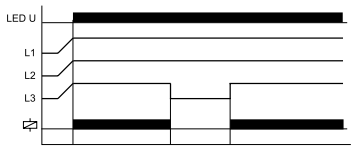
Functions

SEQ - Phase sequence monitoring.



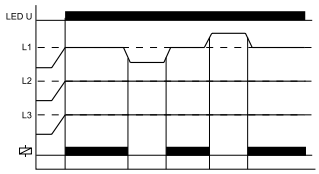
When all the phases are connected in the correct sequence and the measured asymmetry is less than the fixed value, the output relay R switches into on-position (yellow LED illuminated). When the phase sequence changes, the output relay R switches into off-position (yellow LED not illuminated).

SEQ - Phase failure monitoring.



The output relay R switches into off-position (yellow LED not illuminated), when one of the three phases fails.

ASYM - Detection of reverse voltage by means of asymmetry.

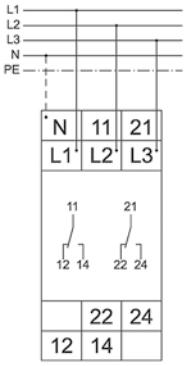


The output relay R switches into off-position (yellow LED not illuminated) when the asymmetry between the phase voltages exceeds the fixed value of the asymmetry. An asymmetry caused by the reverse voltage of a consumer (e.g. a motor which continues to run on two phases only) does not effect the disconnection.

U - supply voltage; **R** - output state of the relay

Front panel description

Connection diagram



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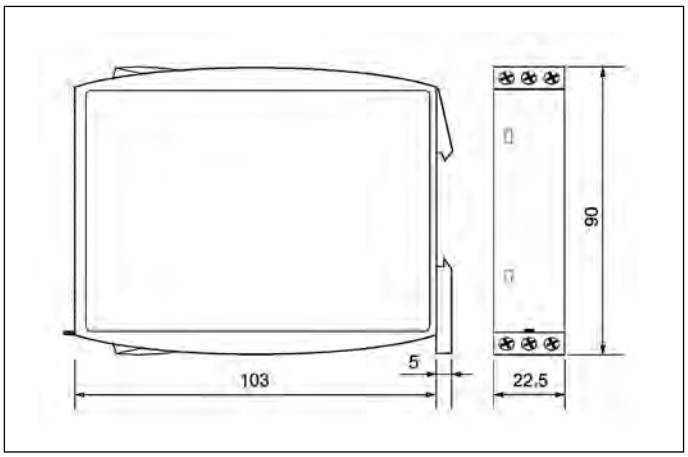
Dimensions



Mounting

Relays **MR-GU3M2P** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

Ordering codes

Type

M	R	–	G	U	3	M	2	P

Monitoring

U3 - voltage AC in 3-phase network

Number and type of contacts

2P - 2 CO

Example of ordering code:

MR-GU3M2P monitoring relay **MR-GU3M2P**, multifunction (relay perform 2 functions), industrial cover, width 22,5 mm, two changeover contacts, rated input voltage (supply): AC - 3(N)~ 400/230 V

- **Multifunctions monitoring relays (DC and AC current monitoring in 1-phase network, with adjustable thresholds)**
- Fault latch mode • Timing adjustment of start-up suppression and tripping delay ❶ • Supply via TR2 supply transformer ❷
- Frequency of supply voltage: 16,6...400 Hz • Output: 2 CO (2 changeover contacts) • Industrial cover, width 22,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		2 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	750 VA (3 A / 250 V AC) ❸ 1 250 VA (5 A / 250 V AC) ❹
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage	AC	12 ... 400 V ❷ terminals A1-A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		as per the specification of TR2 supply transformer ❷
Rated power consumption	AC	2,0 VA / 1,5 W
Range of supply frequency	AC	as per the specification of TR2 supply transformer ❷
Duty cycle		100%
Measuring circuit • measuring variable		DC or AC sinus, 16,6...400 Hz (frequency response: -10…+5%)
• measuring inputs		AC/DC: 0,1 A terminals K-I1 AC/DC: 1 A terminals K-I2 AC/DC: 10 A terminals K-I3
• overload capacity		0,1 A AC/DC: 0,8 A 1 A AC/DC: 3 A 10 A AC/DC: 12 A
• input resistance		0,1 A AC/DC: 470 mΩ 1 A AC/DC: 47 mΩ 10 A AC/DC: 5 mΩ
• swiching threshold		MIN: 0,05...0,95 I_n MAX: 0,1...1,0 I_n

Insulation according to PN-EN 60664-1

Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		90 x 22,5 x 108 mm
Weight		100 g
Ambient temperature	• storage • operating	-25...+70 °C -25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH fault latch mode
Range of delay timing adjustment	start-up suppression: 0...10 s tripping delay: 0,1...10 s ❶
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Voltage influence	± 0,5%
Temperature influence	± 0,1% / °C
Recovery time	500 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U flashing - indication of start-up suppression time ❺ red LEDs MIN and MAX ON/OFF - indication of failure ❺ red LEDs MIN and MAX flashing - indication of tripping delay ❺ yellow LED R ON/OFF - output relay status

❶ Separately adjustable (two adjusting knobs). ❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394. ❸ If the distance between the mounting relays is less than 5 mm. ❹ If the distance between the mounting relays is greater than 5 mm. ❺ Indication of relay status - according to the set threshold.

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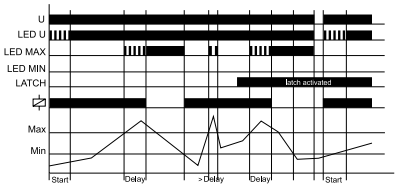
Functions

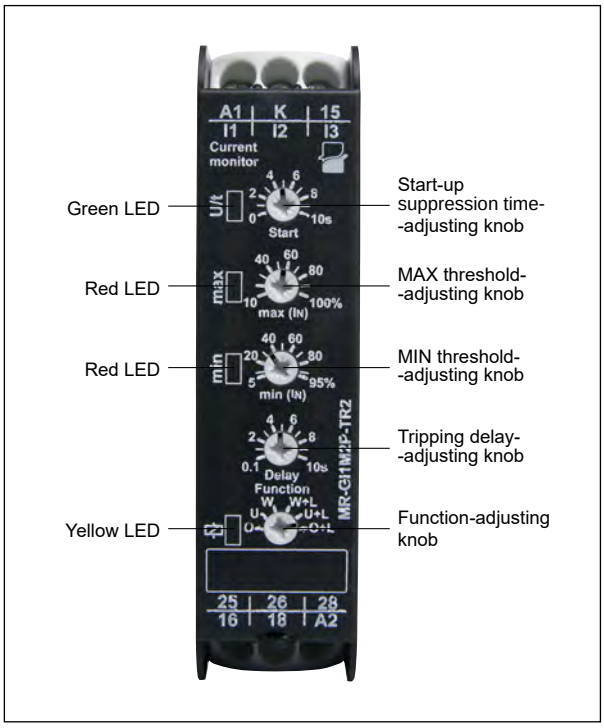
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval of the start-up suppression (Start) begins (green LED flashes). Changes of the measured current during this period do not affect the state of the output relay R. After the interval has expired the green LED is illuminated steadily. For all the functions the LEDs MIN and MAX are flashing alternating, when the minimum value for the measured current was chosen to be greater than the maximum value.

OVER, OVER+LATCH - Overcurrent monitoring, overcurrent monitoring with fault latch.

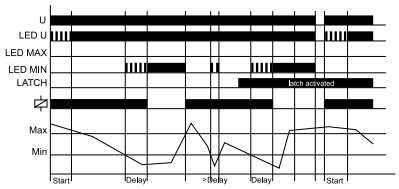


When the measured current exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured current falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated).
If the **fault latch** is activated (OVER+LATCH) and the measured current remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R again switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

Front panel description

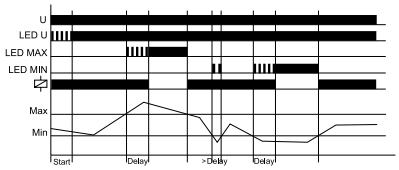


UNDER, UNDER+LATCH - Undercurrent monitoring, undercurrent monitoring with fault latch.

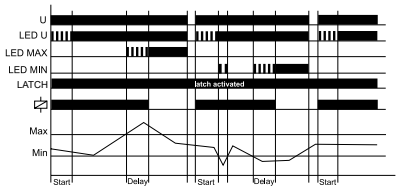


When the measured current falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured current exceeds the value adjusted at the MAX-regulator. If the **fault latch** is activated (UNDER+LATCH) and the measured current remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

WIN, WIN+LATCH - Current monitoring in windowfunction between MIN and MAX values, current monitoring in windowfunction between MIN and MAX values with fault latch.



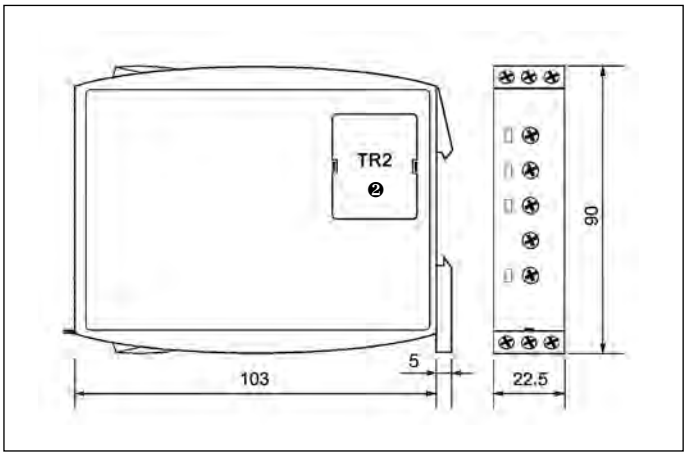
The output relay R switches into on-position (yellow LED illuminated) when the measured **current** exceeds the value adjusted at the MIN-regulator. When the measured current exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated) when the measured current falls below the value adjusted at the MAX--regulator (red LED MAX not illuminated). When the measured current falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated).



If the **fault latch** is activated (WIN+LATCH) and the measured current remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current exceeds the value adjusted at the MIN-regulator. If the measured current remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status; **SEQ** - phase sequence

Dimensions



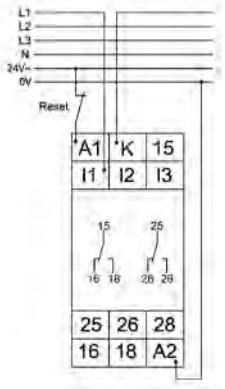
Mounting

Relays **MR-GI1M2P-TR2** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394.

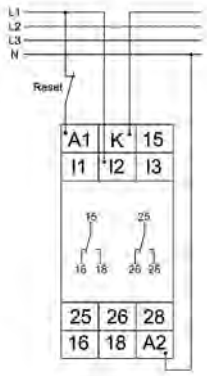
Connection diagrams

Measuring circuit 0,1 A AC/DC, with fault latch mode



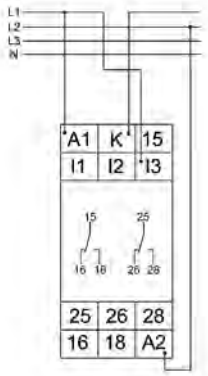
Supply: A1-A2 with TR2 24 V AC ❷

Measuring circuit 1 A AC/DC, with fault latch mode



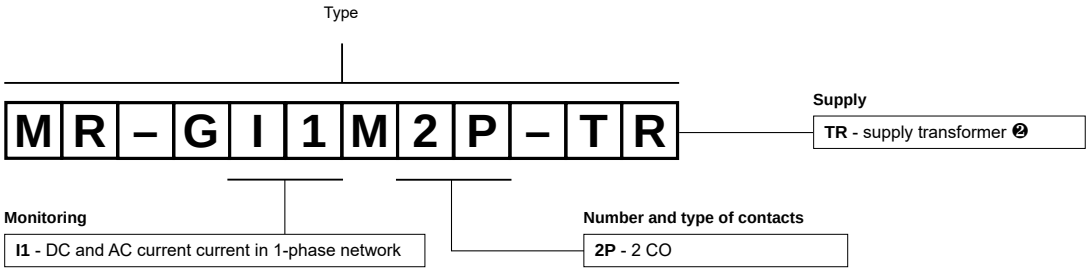
Supply: A1-A2 with TR2 230 V AC ❷

Measuring circuit 10 A AC/DC, without fault latch mode



Supply: A1-A2 with TR2 400 V AC ❷

Ordering codes



Example of ordering code:

MR-GI1M2P-TR2 monitoring relay **MR-GI1M2P-TR2**, multifunction (relay perform 6 functions), industrial cover, width 22,5 mm, two changeover contacts, rated input voltage (supply): AC - 12 ... 400 V AC ❷

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- **Multifunctions monitoring relays (AC current monitoring in 3-phase network, with adjustable thresholds)**
- Fault latch mode • Timing adjustment of start-up suppression and tripping delay ❶ • Supply via TR2 supply transformer ❷
- Output: 2 CO (2 changeover contacts)
- Industrial cover, width 22,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts		2 CO
Rated voltage		250 V AC
Max. breaking capacity	AC1	750 VA (3 A / 250 V AC) ❸ 1 250 VA (5 A / 250 V AC) ❹
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA		 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage	AC	12 ... 400 V ❷ terminals A1-A2
Must release voltage		AC: ≥ 0,3 U_n
Operating range of supply voltage		as per the specification of TR2 supply transformer ❷
Rated power consumption	AC	2,0 VA / 1,5 W
Range of supply frequency	AC	as per the specification of TR2 supply transformer ❷
Duty cycle		100%
Measuring circuit • measuring variable		AC sinus, 48...63 Hz (frequency response: -10…+5%)
• measuring inputs		AC: 5 A terminals K-I1 AC: 5 A terminals K-I2 AC: 5 A terminals K-I3
• overload capacity		6 A AC
• input resistance		10 mΩ
• swiching threshold		MIN: 0,05...0,95 I_n MAX: 0,1...1,0 I_n

Insulation according to PN-EN 60664-1

Rated surge voltage	4 000 V 1,2 / 50 µs
Overvoltage category	III
Insulation pollution degree	3

General data

Electrical life	• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)		> 2 x 10^7
Dimensions (L x W x H)		90 x 22,5 x 108 mm
Weight		100 g
Ambient temperature	• storage	-25...+70 °C
	• operating	-25...+55 °C
Cover protection category		IP 20 PN-EN 60529
Relative humidity		15...85%
Shock resistance		15 g 11 ms
Vibration resistance		0,35 mm DA 10...55 Hz

Meassuring circuit data

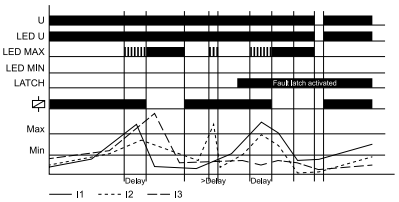
Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH fault latch mode
Range of delay timing adjustment	start-up suppression: 0...10 s tripping delay: 0,1...10 s ❶
Base accuracy	± 5% (calculated from the final range values)
Setting accuracy	± 5% (calculated from the final range values)
Repeatability	± 2%
Voltage influence	± 0,5%
Temperature influence	± 0,1% / °C
Recovery time	500 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U flashing - indication of start-up suppression time ❺ red LEDs MIN and MAX ON/OFF - indication of failure ❺ red LEDs MIN and MAX flashing - indication of tripping delay ❺ yellow LED R ON/OFF - output relay status

❶ Separately adjustable (two adjusting knobs). ❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394. ❸ If the distance between the mounting relays is less than 5 mm. ❹ If the distance between the mounting relays is greater than 5 mm. ❺ Indication of relay status - according to the set threshold.

Functions

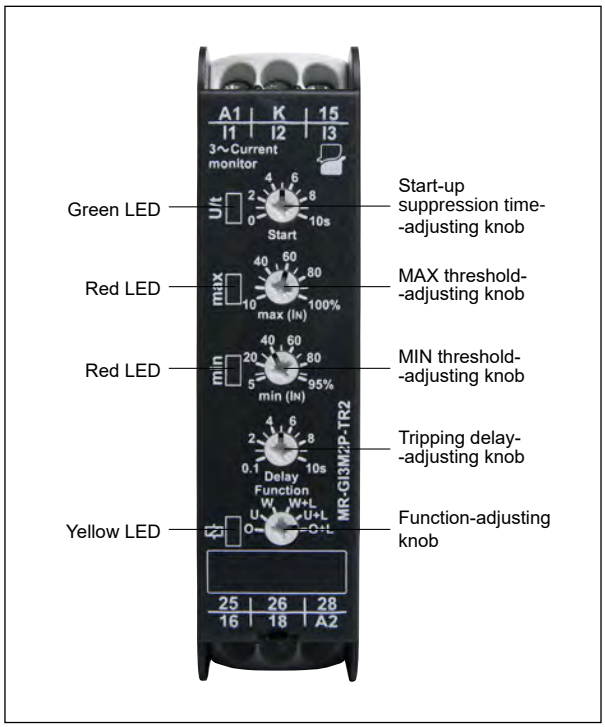
For all functions the LED's MIN and MAX are flashing alternating, when the minimum value for the measured current was chosen to be greater than the maximum value. If a failure already exists, when the device is activated, the output relay R remains in off-position and the LED for the corresponding threshold is illuminated.

OVER, OVER+LATCH - Overcurrent monitoring, overcurrent monitoring with fault latch.



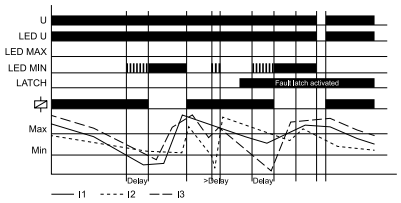
When the measured current of one of the phases exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured current of all the phases falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated). If the **fault latch** is activated (OVER+LATCH) and the measured current of one of the phases remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current of all the phases falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

Front panel description



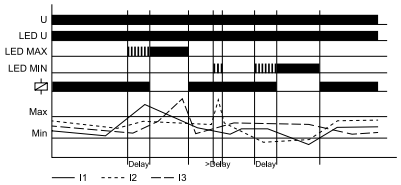
U - supply voltage; **R** - output state of the relay; **MIN, MAX** - relay status; **SEQ** - phase sequence

UNDER, UNDER+LATCH - Undercurrent monitoring, undercurrent monitoring with fault latch.

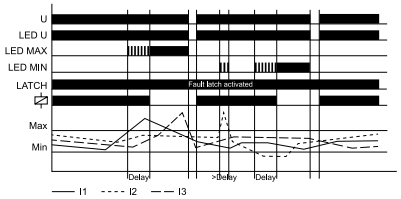


When the measured current of one of the phases falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated), when the measured current of all the phases exceeds the value adjusted at the MAX-regulator.
If the **fault latch** is activated (UNDER+LATCH) and the measured current of one of the phases remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current of all the phases exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

WIN, WIN+LATCH - Current monitoring in windowfunction between MIN and MAX values, current monitoring in windowfunction between MIN and MAX values with fault latch.



The output relay R switches into on-position (yellow LED illuminated) when the measured current of all the phases exceeds the value adjusted at the MIN-regulator. When the measured current of one of the phases exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated) when the measured current of all the phases falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured current of one of the phases falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (Delay) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relay R switches into off-position (yellow LED not illuminated).



If the **fault latch** is activated (WIN+LATCH) and the measured current of one of the phases remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current of all the phases exceeds the value adjusted at the MIN-regulator. If the measured current of one of the phases remains above the MAX-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current of all the phases falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relay R switches into on-position and a new measuring cycle begins with the set interval of the start-up suppression (Start).

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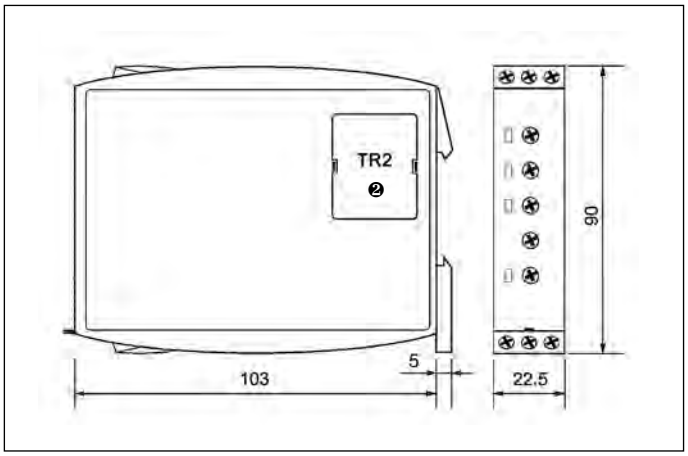
Dimensions



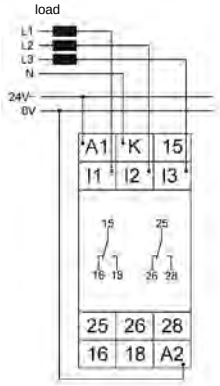
Mounting

Relays **MR-GI3M2P-TR2** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm² with/without multicore cable end, 1 x 4 mm² without multicore cable end, 2 x 0,5 ... 1,5 mm² with/without multicore cable end, 2 x 2,5 mm² flexible without multicore cable end.

❷ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394.

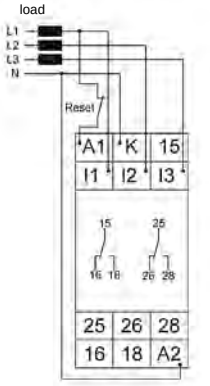
Connection diagrams

Measuring circuit 5 A AC/DC, with fault latch mode



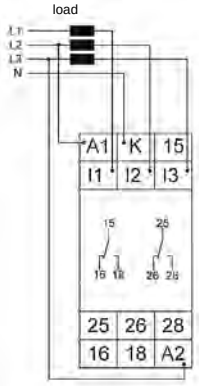
Supply: A1-A2 with TR2 24 V AC ❷

Measuring circuit 5 A AC/DC, with fault latch mode



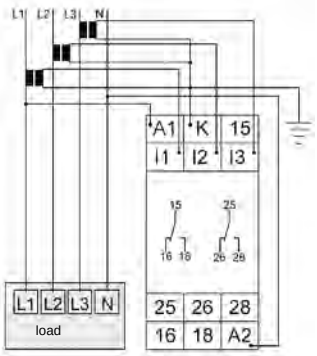
Supply: A1-A2 with TR2 230 V AC ❷

Measuring circuit 5 A AC/DC, without fault latch mode



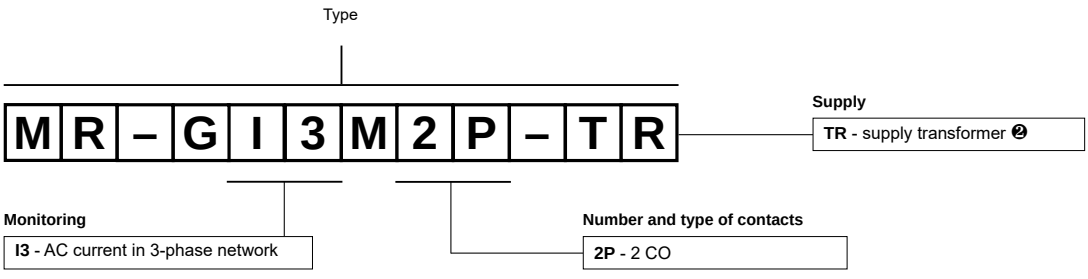
Supply: A1-A2 with TR2 400 V AC ❷

Measuring circuit 5 A AC/DC, with current transformer



Supply: A1-A2 with TR2 230 V AC ❷

Ordering codes



Example of ordering code:

MR-GI3M2P-TR2 monitoring relay **MR-GI3M2P-TR2**, multifunction (relay perform 6 functions), industrial cover, width 22,5 mm, two changeover contacts, rated input voltage (supply): AC - 12 ... 400 V AC ❷

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- **Single-functions monitoring relays (motor temperature monitoring)** • Test functions: integrated Test/Reset key, connection of the external Reset key (optional)
- Supply via TR2 supply transformer ❶
- Output: 2 CO (2 changeover contacts)
- Industrial cover, width 22,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Recognitions, certifications, directives: CE

Output circuit - contact data

Number and type of contacts			2 CO
Rated voltage			250 V AC
Max. breaking capacity		AC1	750 VA (3 A / 250 V AC) ❷ 1 250 VA (5 A / 250 V AC) ❸
Max. operating frequency • at resistive load 100 VA • at resistive load 1 000 VA			 3 600 cycles/hour 360 cycles/hour

Input circuit

Supply voltage		AC	12 ... 400 V ❶ terminals A1-A2
Must release voltage			AC: ≥ 0,3 U_n
Operating range of supply voltage			as per the specification of TR2 supply transformer ❶
Rated power consumption		AC	2,0 VA / 1,5 W
Range of supply frequency		AC	as per the specification of TR2 supply transformer ❶
Duty cycle			100%
Measuring circuit	• terminals		T1-T2
	• initial resistance		< 1,5 kΩ
	• response value		relay in OFF-position: ≥ 3,6 kΩ
	• release value		relay in ON-position: ≤ 1,8 kΩ
	• disconnection ❹		no
	• measuring voltage T1-T2		≤ 2,5 V at R ≤ 4 kΩ PN-EN 60947-8
Control contact	• function		connection of an external Reset key
	• loadable		no
	• max. line length		R-T2: 10 m (twisted pair)
	• control pulse length		min. 50 ms
	• Reset		contact 1 NO; terminals R-T2

Insulation according to PN-EN 60664-1

Rated surge voltage			4 000 V 1,2 / 50 µs
Overvoltage category			III
Insulation pollution degree			3

General data

Electrical life		• resistive AC1	> 2 x 10^5 1 000 VA
Mechanical life (cycles)			> 2 x 10^7
Dimensions (L x W x H)			90 x 22,5 x 108 mm
Weight			100 g
Ambient temperature	• storage		-25...+70 °C
	• operating		-25...+55 °C
Cover protection category			IP 20 PN-EN 60529
Relative humidity			15...85%
Shock resistance			15 g 11 ms
Vibration resistance			0,35 mm DA 10...55 Hz

Meassuring circuit data

Functions			temperature monitoring of the motor winding, with fault latch (max. 6 PTC - temperature sensors DIN 44081) test functions: integrated Test/Reset key, connection of the external Reset key (optional)
Base accuracy			± 10% (calculated from the final range values)
Repeatability			± 1%
Voltage influence			± 2,2%
Temperature influence			± 0,1% / °C
Recovery time			500 ms
LED indicator			green LED U ON - indication of supply voltage U red LED ON/OFF - indication of failure

❶ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394. ❷ If the distance between the mounting relays is less than 5 mm. ❸ If the distance between the mounting relays is greater than 5 mm. ❹ At short circuit.

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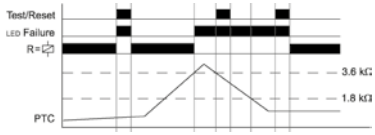
Functions

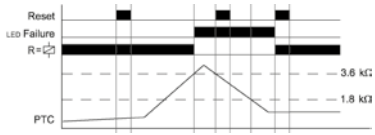
Motor temperature monitoring with fault latch.

If the supply voltage U is applied (green LED illuminated) and the cumulative resistance of the PTC-circuit is less than 3,6 kΩ (standard temperature of the motor), the output relay R switches into on-position. Pressing the Test/Reset key under this conditions forces the output relay R to switch into off-position. It remains in state as long as the Test/Reset key is pressed and thus the switching function can be checked in case of fault. The test function is not effective by using an external Reset key. When the comulative resistance of the PTC-circuit exceeds 3,6 kΩ (at least one of the PTCs has reached the cut-off temperature), the output relay R switches into off-position (red LED illuminated). The output relay R switches into on-position again (red LED not illuminated), if the cumulative resistance drops below 1,8 kΩ by cooling down of the PTC and either a Reset key (internal or external) was pressed or the supply voltage was disconnected and re-applied.

Application of internal **Test/Reset** key.

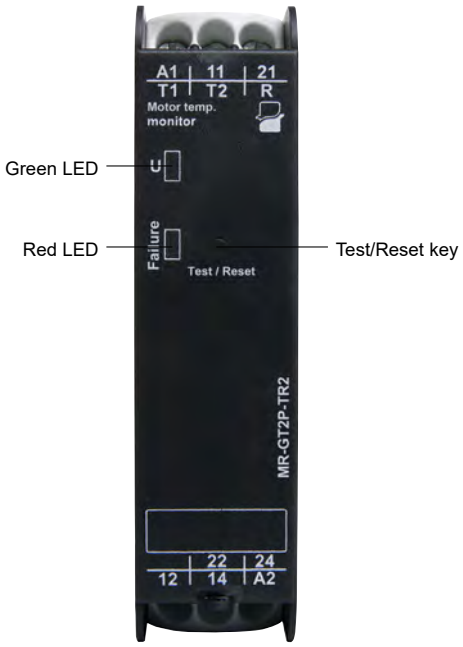


Application of an external **Reset** key.

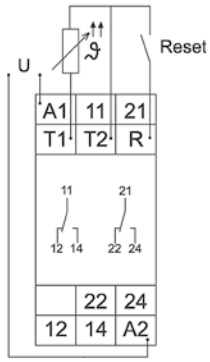


U - supply voltage; **R** - output state of the relay

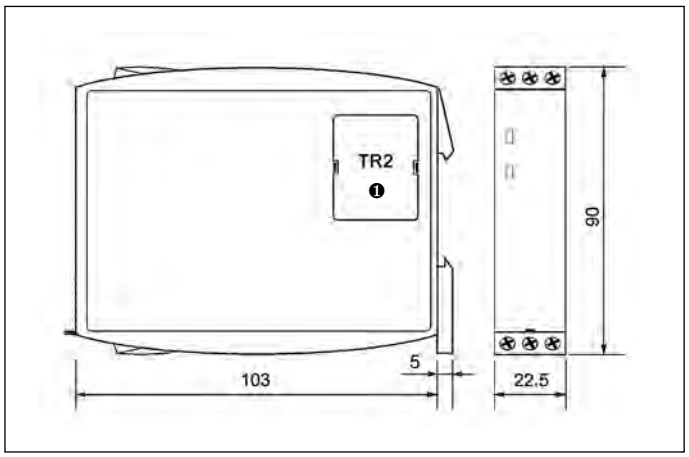
Front panel description



Connection diagram



Dimensions

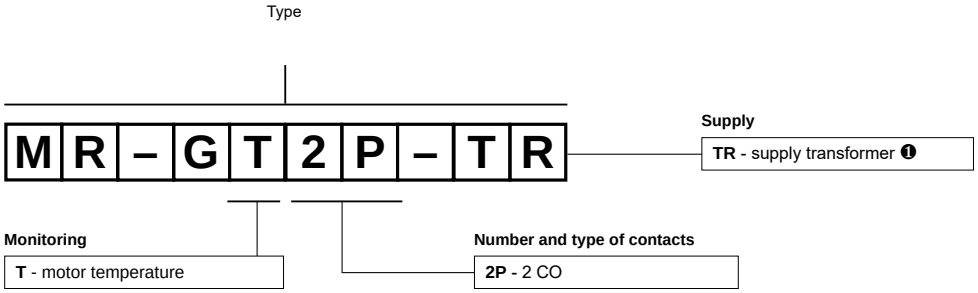


Mounting

Relays **MR-GT2P-TR2** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. **Terminals - cross section of the connection cables:** 1 x 0,5 ... 2,5 mm^2 with/without multicore cable end, 1 x 4 mm^2 without multicore cable end, 2 x 0,5 ... 1,5 mm^2 with/without multicore cable end, 2 x 2,5 mm^2 flexible without multicore cable end.

❶ Supply voltage depending on the TR2 transformer which shall be ordered as a separate product - see page 394.

Ordering codes



Example of ordering code:

MR-GT2P-TR2 monitoring relay **MR-GT2P-TR2**, single-function (relay monitors the motor temperature), industrial cover, width 22,5 mm, two changeover contacts, rated input voltage (supply): AC - 12 ... 400 V AC ❶

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- Separating TR2... supply transformers for the monitoring relays of MR-G... series to reduce the input voltage applied to the terminals A1 and A2 of monitoring relays to the level required by the internal system
- TR2 transformers shall be ordered as a separate product.

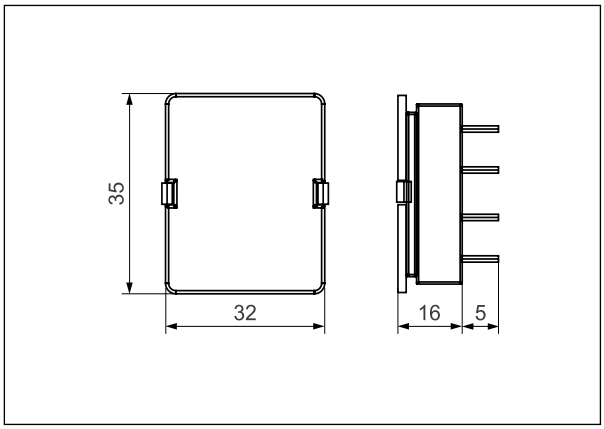
Input circuit

Supply voltage	50/60 Hz AC	12 ... 400 V
Operating range of supply voltage		0,85...1,1 U_n
Rated power consumption	AC	0,5...2,0 VA
Rated frequency	AC	50/60 Hz
Duty cycle		100%

General data

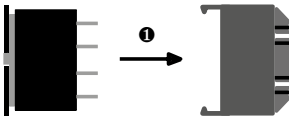
Dimensions (L x W x H)		32 x 35 x 16 mm
Weight		40 g
Ambient temperature	• storage	-25...+70 °C
	• operating	-25...+55 °C
Cover protection category		IP 20
Relative humidity		15...85%

Dimensions

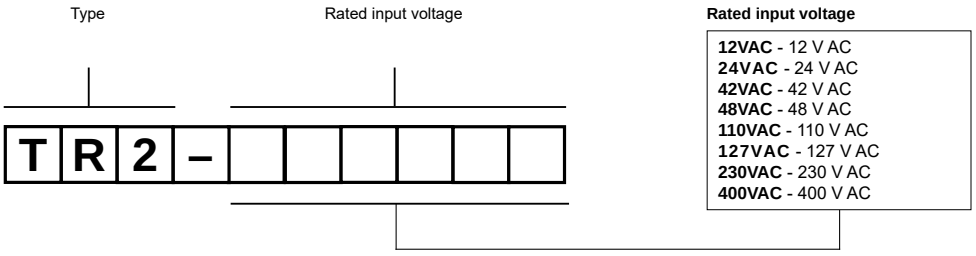


Mounting, mechanical design

TR2 supply transformers are designed for mounting in MR-G... monitoring relays and they are inseparable for their operation. MR-G... relays will not operate without the TR2... transformers. In order to mount the TR2... transformer in the monitoring relay, it is necessary to remove the protective cap ❶ from the relay, which protects the terminals of TR2... Then, TR2... shall be placed in the assembly opening of the MR-G... relay. The cover of TR2... is made of self-extinguishing plastic. When mounted, the tightness of TR2... is IP 20.



Ordering codes



Rated input voltage

12VAC - 12 V AC
24VAC - 24 V AC
42VAC - 42 V AC
48VAC - 48 V AC
110VAC - 110 V AC
127VAC - 127 V AC
230VAC - 230 V AC
400VAC - 400 V AC

Example of ordering code:

TR2-230VAC supply transformer **TR2**, rated input voltage 230 V AC 50/60 Hz

Plug-in sockets and accessories

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Plug-in sockets are designed for miniature and industrial relays. They provide for mounting of the relays in printed circuits, on 35 mm rail mount acc. to PN-EN 60715, and on panel mounting.

GZT..., GZM..., GZS..., GZF..., GZ..., GZU... series are the sockets with screw terminals for mounting on 35 mm rail mount acc. to PN-EN 60715, and on panel mounting. GZMB... serie are the sockets with spring terminals for mounting on 35 mm rail mount acc. to PN-EN 60715.

The sockets have the following features: current circuits load: up to 12 A, available plug-in sockets with separation of input (coil) from output (contacts), i.e. coil terminals on one side of the socket, and contact terminals on another side, adapted for mounting signalling / protecting modules type M... - sockets of GZT..., GZM..., GZS..., GZMB..., ES 32 series.

The screw terminals plug-in sockets are recognized and certified by:

CE EAC

GZT8O, GZM8O, GZS8O 396
GZF8O, GZMB8O 397
EC 5O, PW8O, GD5O, GZT92 398
GZM92, GZS92, EC 35, GD35 399
ES 32, EC 32, GZT2, GZM2 400
GZMB2, SU4/2D, SU4/2L 401
G4/2, GZT3, GZM3, GZT4 402
GZM4, GZMB4, GZ4 403
GS4, SU4D, SU4L, G4 404
GZY2G, GZ2, S2M, G2M 405
PZ8, GZU8, GZ8, GZP8 406
GOP8, PS11, PZ11, GZU11 407
GZ11, GZP11, GOP11, GZ14U 408
GZ14, GZ14Z, GOP14 409
GUC11, GUC11S, PI6W-1P 410

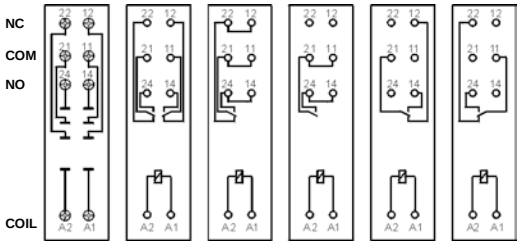
Mounting and sub-assemblies of the relay and accessories in the socket 411
Plug-in sockets and accessories availability index 412
Plug-in sockets technical data 414
Interconnection strips ZGGZ8O 418
Interconnection strips ZGGZ4 419
Additional features for industrial relays 420
Test buttons (no latching) and plugs ... 421
Signalling / protecting modules type M... 422

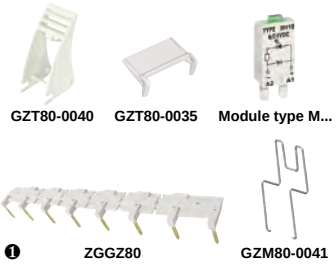
GZT80

For RM84, RM85,
RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
80 x 15,6 x 61(67) mm ❷
Two poles, 5 mm pinout
12 A, 300 V AC

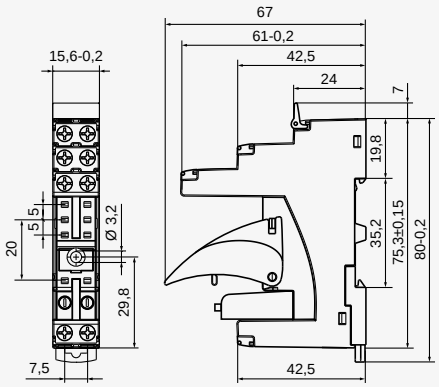
Connection diagrams ❸





Accessories ❶

Dimensions

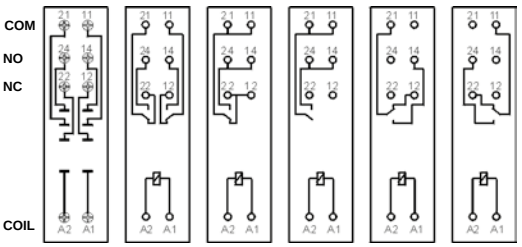


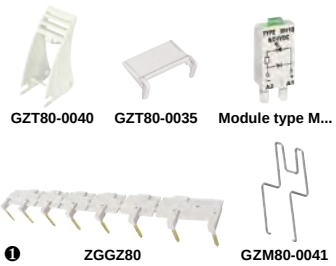
GZM80

For RM84, RM85,
RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
81,6 x 15,9 x 61(67) mm ❷
Two poles, 5 mm pinout
12 A, 300 V AC

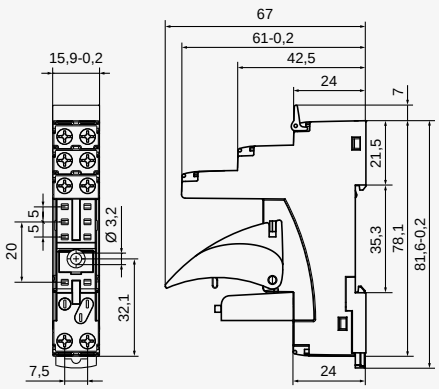
Connection diagrams ❸





Accessories ❶

Dimensions

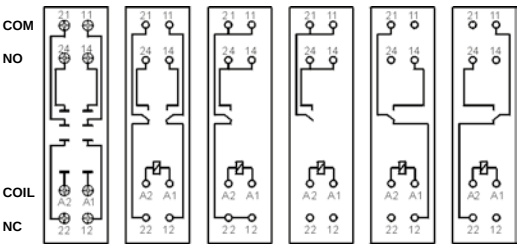


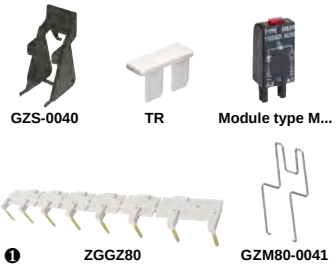
GZS80

For RM84, RM85,
RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive

Screw terminals
Max. tightening moment
for the terminal: 0,5 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
76,8 x 15,8 x 42,5(57,1) mm ❷
Two poles, 5 mm pinout
10 A, 300 V AC

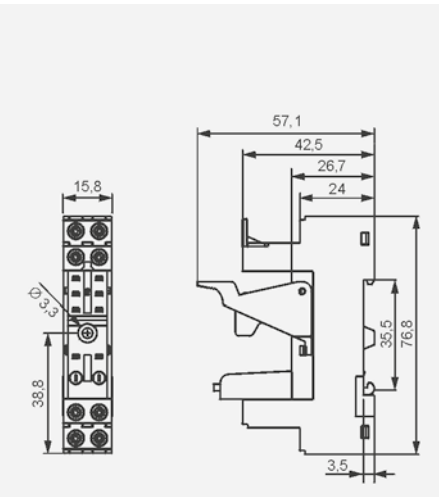
Connection diagrams ❸





Accessories ❶

Dimensions



❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422. ❷ In the bracket the height of socket with retainer / retractor clip is shown. ❸ For RM85..., RMP85: loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24 - see pages 92, 100, 104, 137.

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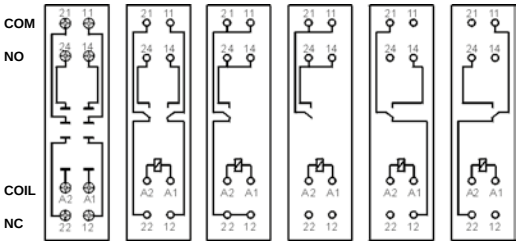
GZF80

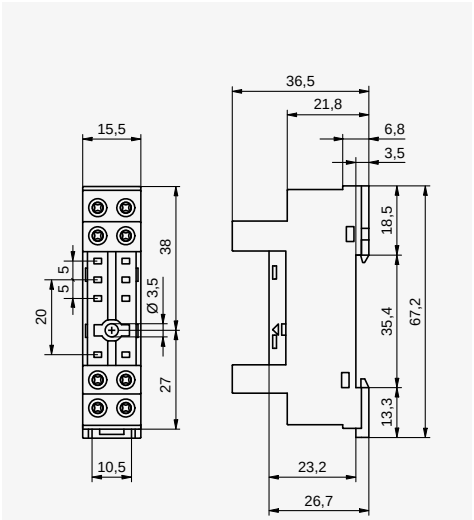
For RM84, RM85,
RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive,
RMP84, RMP85

Screw terminals
Max. tightening moment
for the terminal: 0,5 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
67,2 x 15,5 x 36,5 mm
Two poles, 5 mm pinout
10 A, 250 V AC

Connection diagrams ❸



Dimensions



Accessories ❶

GZM80-0041 GZM80-0025

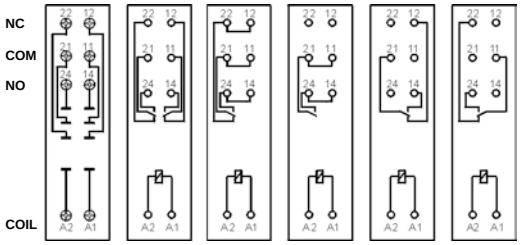
GZMB80

For RM84, RM85,
RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive,
RMP84, RMP85

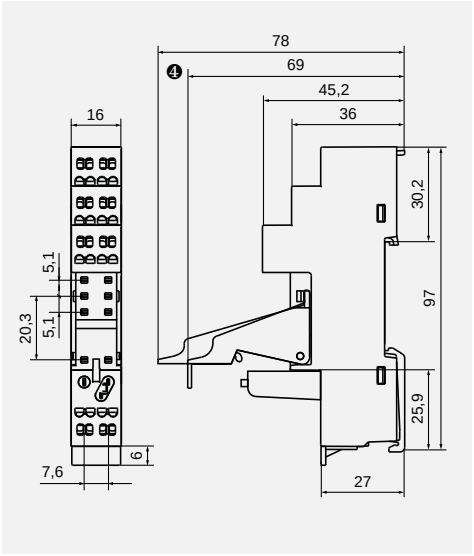
Spring terminals
Max. cross section
of the cables:
1 x 0,2...1,5 mm²
(1 x 24...16 AWG)
Length of the cable
deinsulation: 9...11 mm

35 mm rail mount
acc. to PN-EN 60715
97 x 16 x 45,2(69/78 ❹) mm ❷
Two poles, 5 mm pinout
10 A, 300 V AC

Connection diagrams ❸

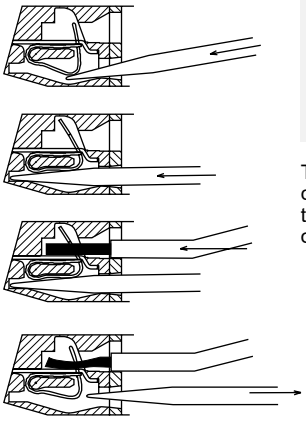


Dimensions



TR

Module type M...



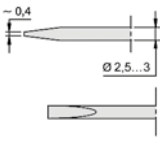
The drawings present the sequence of operations in course of inserting wires to the spring terminal, and the recommended screwdriver to be used for opening of case springs, comply with the DIN 5264 FORM „A".

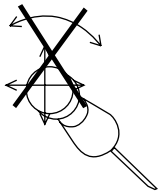
GZMB80-0040

GZMB80-0025

GZM80-0041

GZM80-0025





Accessories ❶ ❹

Wire connection

❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422. ❷ In the bracket the height of socket with retainer / retractor clip is shown. ❸ For RM85..., RMP85: loads above 12 A (GZT80, GZM80) or 10 A (GZS80, GZF80, GZMB80) require bridging pairs of terminals: 11 with 21, 12 with 22, 14 with 24 - see pages 92, 100, 104, 137. ❹ Height of set: 69 mm (GZMB80-0040) or 78 mm (GZMB80-0025).

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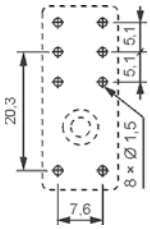
EC 50

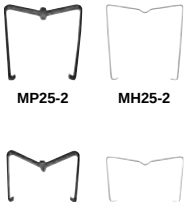
For RM84, RM85, RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive,
RM83, RMP84, RMP85

For PCB
31,3 x 12,7 x 9 mm
Two poles, 5 mm pinout
8 A, 300 V AC

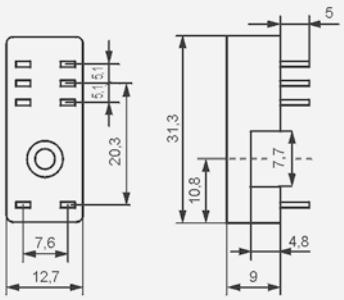
Pinout



Accessories



Dimensions

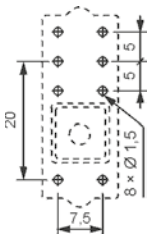


PW80

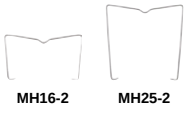
For RM84, RM85, RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive,
RM83

For PCB
34,6 x 12,9 x 6,6 mm
Two poles, 5 mm pinout
8 A, 250 V AC

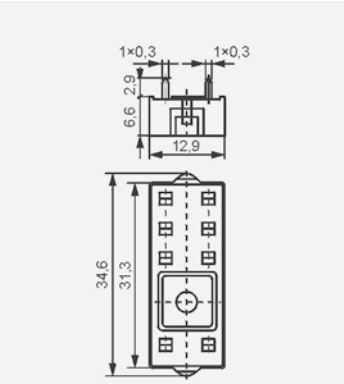
Pinout



Accessories



Dimensions

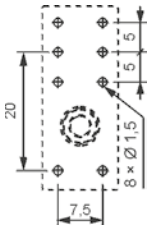


GD50

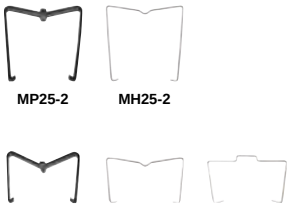
For RM84, RM85, RM85 inrush,
RM85 105 °C sensitive,
RM87L, RM87L sensitive,
RM87P, RM87P sensitive,
RM83, RMP84, RMP85

For PCB
31,5 x 13 x 9 mm
Two poles, 5 mm pinout
8 A, 300 V AC

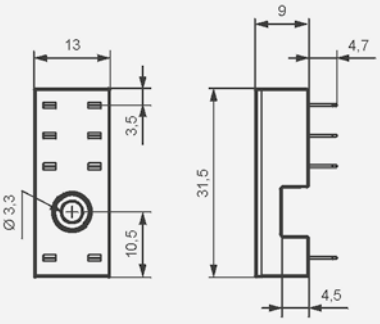
Pinout



Accessories



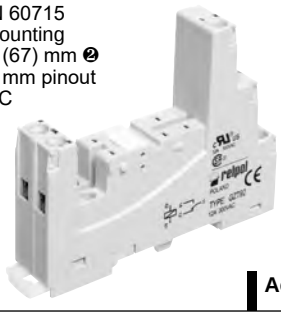
Dimensions



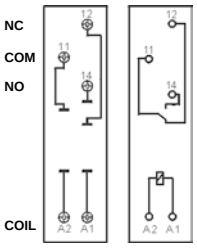
GZT92

For RM87N, RM87N sensitive

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
80 x 15,6 x 61(67) mm ❷
One pole, 3,5 mm pinout
12 A, 300 V AC

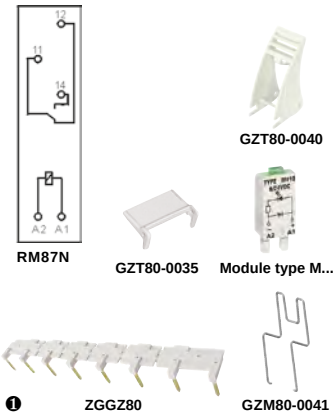


Connection diagrams

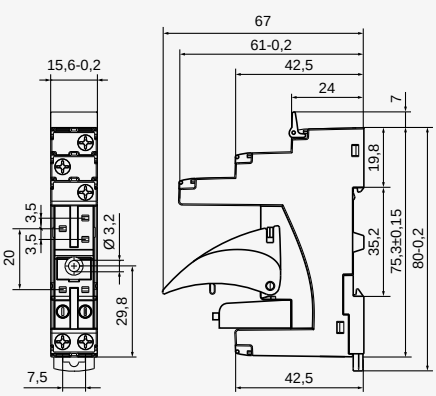


RM87N

Accessories ❶



Dimensions

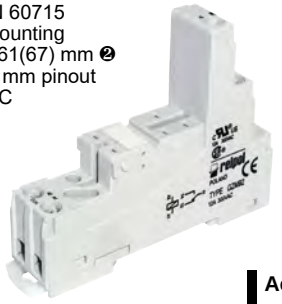


❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422.
❷ In the bracket the height of socket with retainer / retractor clip is shown.

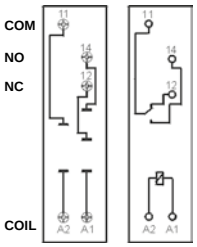
GZM92

For RM87N, RM87N sensitive

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
81,6 x 15,9 x 61(67) mm ❷
One pole, 3,5 mm pinout
12 A, 300 V AC



Connection diagrams



GZT80-0040

GZT80-0035

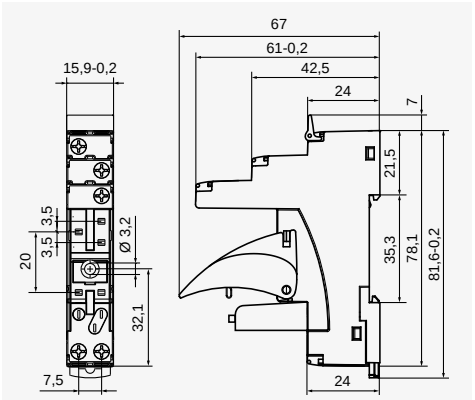
Module type M...

Accessories ❶

ZGGZ80

GZM80-0041

Dimensions

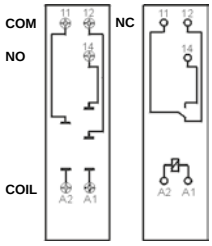


GZS92

For RM87N, RM87N sensitive

Screw terminals
Max. tightening moment
for the terminal: 0,5 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
76,8 x 15,8 x 42,5(57,1) mm ❷
One pole, 3,5 mm pinout
12 A, 300 V AC

Connection diagrams



GZS-0040

TR

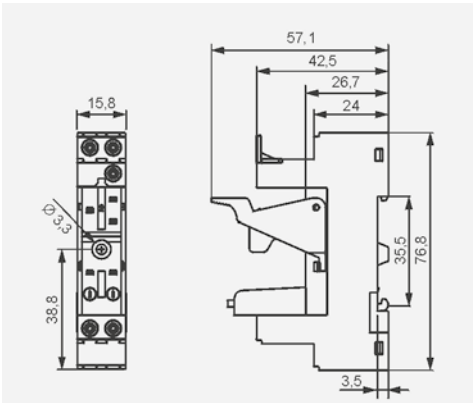
Module type M...

Accessories ❶

ZGGZ80

GZM80-0041

Dimensions

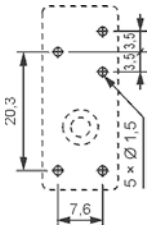


EC 35

For RM87N, RM87N sensitive

For PCB
31,3 x 12,7 x 9 mm
One pole, 3,5 mm pinout
12 A, 300 V AC

Pinout

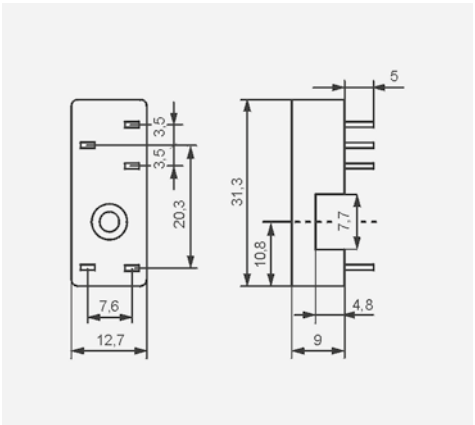


Accessories

MP16-2

MH16-2

Dimensions

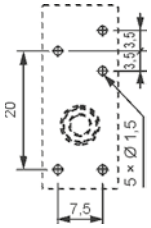


GD35

For RM87N, RM87N sensitive

For PCB
31,5 x 13 x 9 mm
One pole, 3,5 mm pinout
12 A, 300 V AC

Pinout



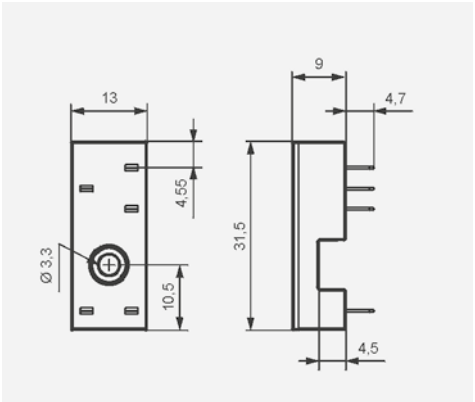
Accessories

MP16-2

MH16-2

GD-0016

Dimensions



❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422.
❷ In the bracket the height of socket with retainer / retractor clip is shown.

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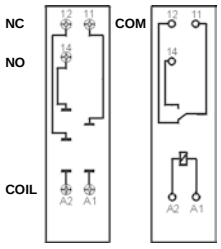
ES 32

For RM96 1 CO

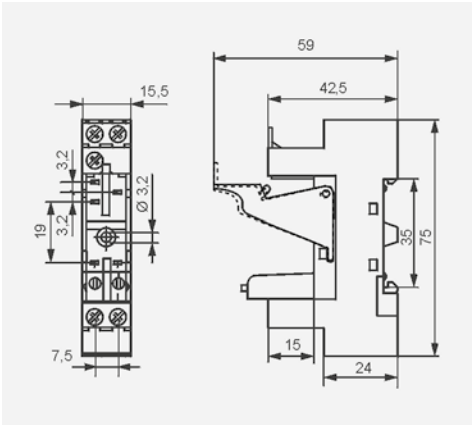
Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
75 x 15,5 x 42,5(59) mm ❷
One pole, 3,2 mm pinout
12 A, 300 V AC

Connection diagrams



Accessories ❶

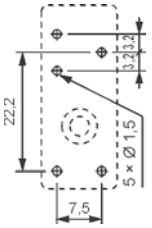
Dimensions



EC 32

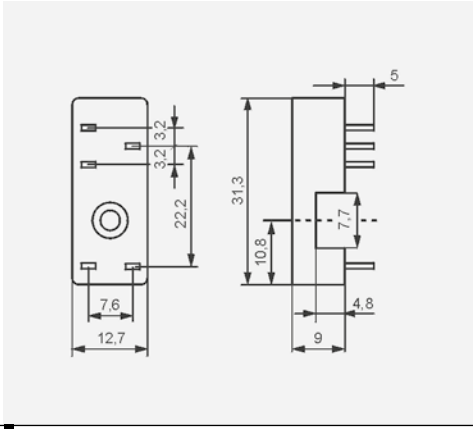
For PCB
31 x 12,7 x 9 mm
One pole, 3,2 mm pinout
12 A, 300 V AC

Pinout



Accessories

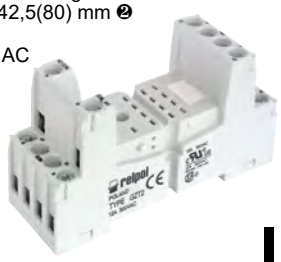
Dimensions



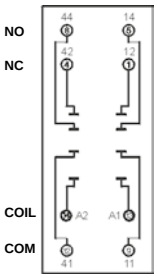
GZT2

For R2N

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
76,3 x 27 x 42,5(80) mm ❷
Two poles
12 A, 300 V AC

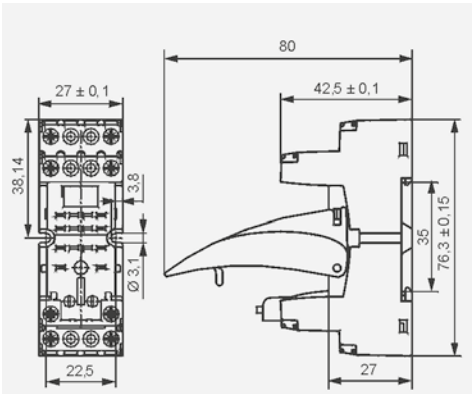


Connection diagram



Accessories ❶

Dimensions

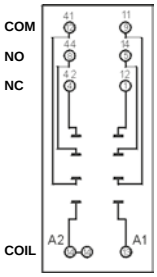


GZM2

For R2N

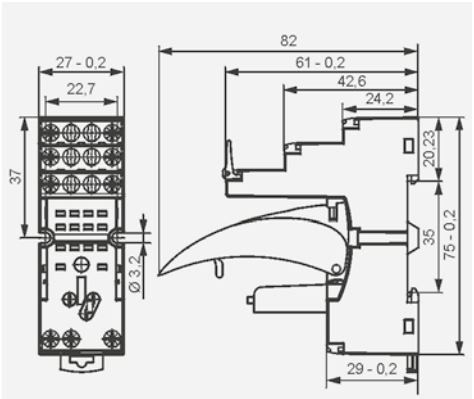
Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
75 x 27 x 61(82) mm ❷
Two poles
12 A, 300 V AC

Connection diagram



Accessories ❶

Dimensions



❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422.
❷ In the bracket the height of socket with retainer / retractor clip is shown.

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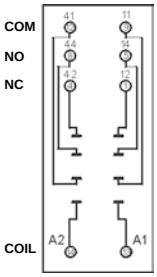
GZMB2

For R2N

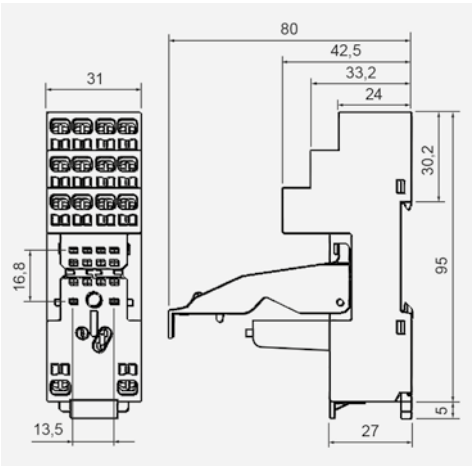
Spring terminals
Max. cross section
of the cables:
1 x 0,2...1,5 mm²
(1 x 24...16 AWG)
Length of the cable
deinsulation: 9...11 mm

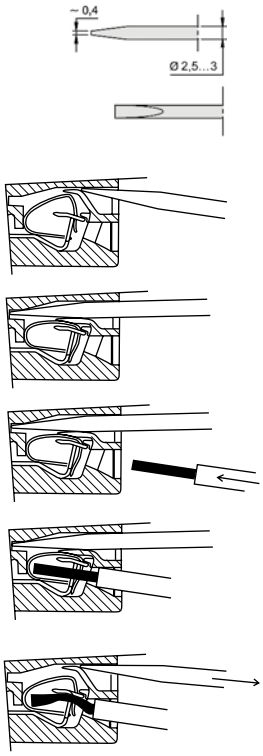
35 mm rail mount
acc. to PN-EN 60715
95 x 31 x 42,5(80) mm ❷
Two poles
10 A, 300 V AC

Connection diagram

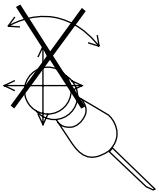


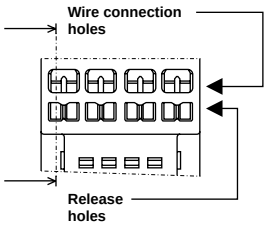
Dimensions





The drawings present the sequence of operations in course of inserting wires to the spring terminal, and the recommended screwdriver to be used for opening of case springs, comply with the DIN 5264 FORM „A".





GZMB4-0040

TR

Module type M...

G4 1052

Accessories ❶

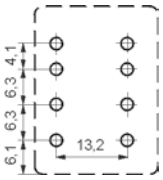
Wire connection

SU4/2D

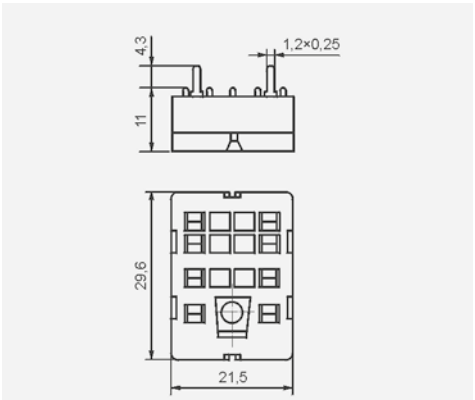
For R2N

For PCB
29,6 x 21,5 x 11 mm
Two poles
12 A, 250 V AC

Pinout



Dimensions



G4 1053

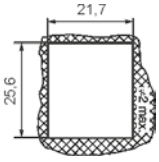
Accessories

SU4/2L

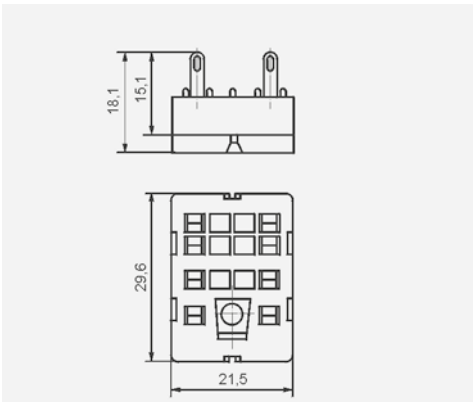
For R2N

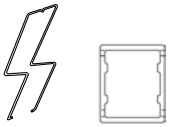
Solder terminals
29,6 x 21,5 x 18,1 mm
Two poles
12 A, 250 V AC

Dimensions of opening on panel mounting



Dimensions




G4 1053 G4 1040

Accessories

❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422.
❷ In the bracket the height of socket with retainer / retractor clip is shown.

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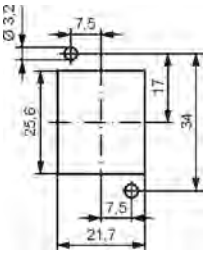
G4/2

For R2N

Solder terminals
40,5 x 21,5 x 18,1 mm
Two poles
12 A, 250 V AC

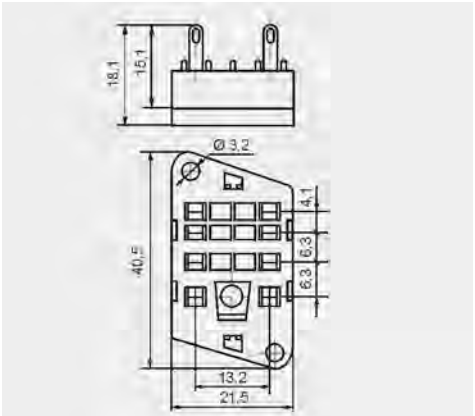
Pinout of openings on panel mounting



Accessories

G4 1053

Dimensions

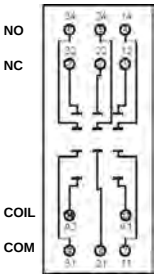


GZT3

For R3N

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
76,3 x 27 x 42,5(80) mm ❷
Three poles
10 A, 300 V AC

Connection diagram



Accessories ❶

ZGGZ4

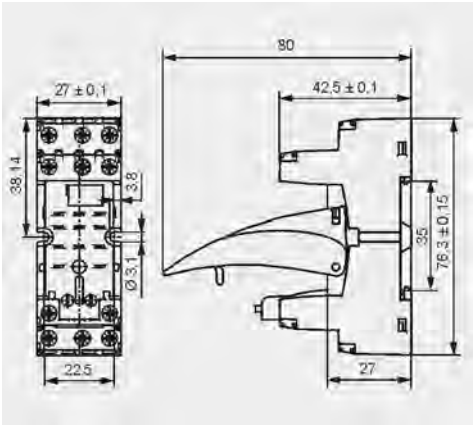
GZT4-0040

G4 1052

GZT4-0035

Module type M...

Dimensions

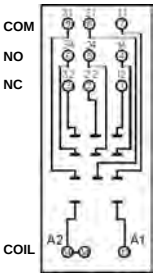


GZM3

For R3N

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
75 x 27 x 61(82) mm ❷
Three poles
10 A, 300 V AC

Connection diagram



Accessories ❶

ZGGZ4

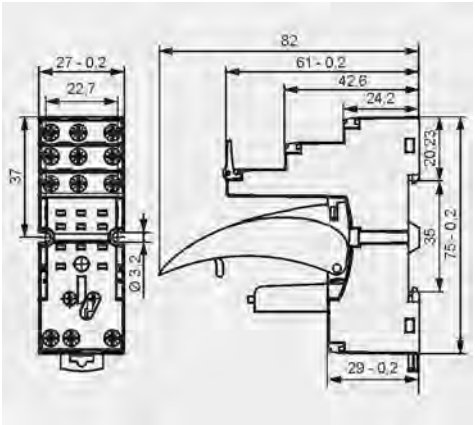
GZT4-0040

G4 1052

GZT4-0035

Module type M...

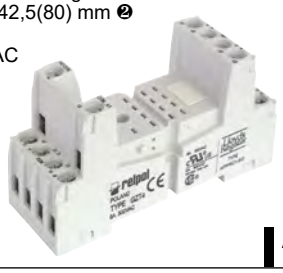
Dimensions



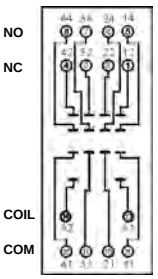
GZT4 ❺

For R4N, T-R4

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
76,3 x 27 x 42,5(80) mm ❷
Four poles
6 A, 300 V AC



Connection diagram



Accessories ❶ ❻

ZGGZ4

TR4-2000

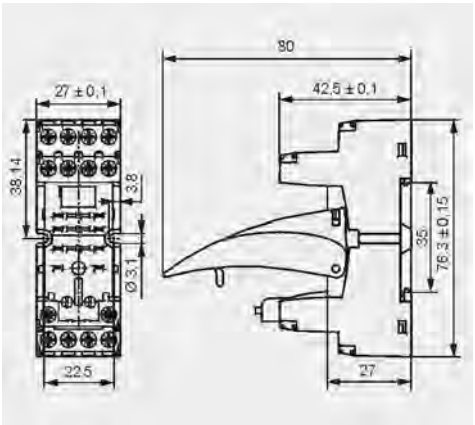
GZT4-0040

G4 1052

GZT4-0035

Module type M...

Dimensions



❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422. ❷ In the bracket the height of socket with retainer / retractor clip is shown. ❺ Have obtained LR Type Approval Certificate (Lloyd's Register). ❻ For R4N relays: G4 1052, GZT4-0040, GZMB-0040, GZT4-0035, TR, module type M...; for T-R4 relays: TR4-2000, GZT4-0035, TR.

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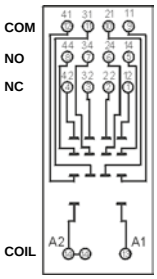
GZM4

For R4N, T-R4

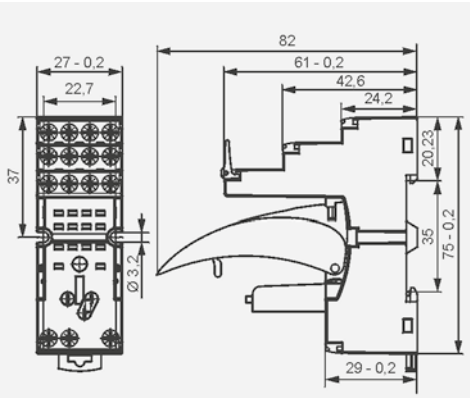
Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
75 x 27 x 61(82) mm ❷
Four poles
6 A, 300 V AC

Connection diagram



Accessories ❶ ❻

Dimensions



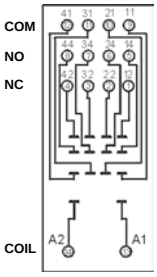
GZMB4

For R4N, T-R4

Spring terminals
Max. cross section
of the cables:
1 x 0,2...1,5 mm²
(1 x 24...16 AWG)
Length of the cable
deinsulation: 9...11 mm

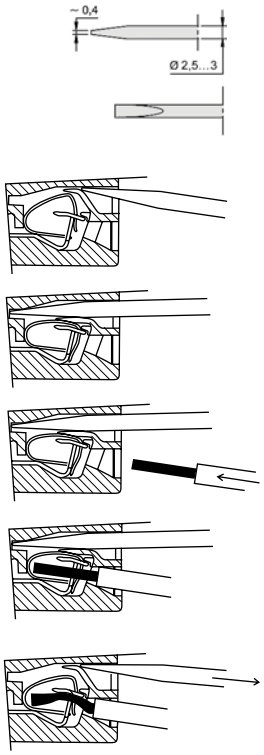
35 mm rail mount
acc. to PN-EN 60715
95 x 31 x 42,5(80) mm ❷
Four poles
10 A, 300 V AC

Connection diagram

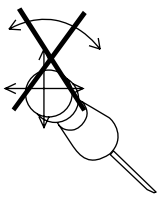


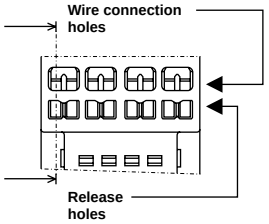
Accessories ❶ ❻

Wire connection

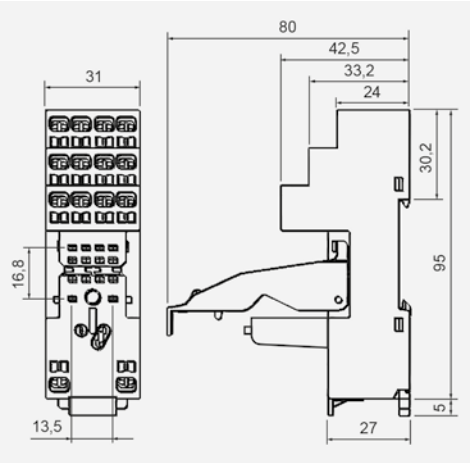


The drawings present the sequence of operations in course of inserting wires to the spring terminal, and the recommended screwdriver to be used for opening of case springs, comply with the DIN 5264 FORM „A".





Dimensions

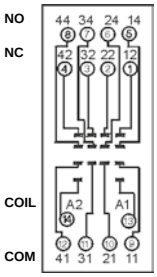


GZ4

For R4N

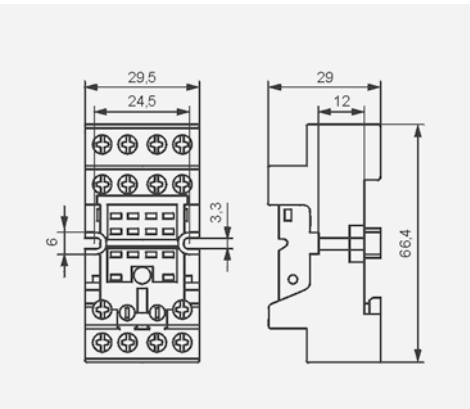
Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
66,4 x 29,5 x 29 mm
Four poles
10 A, 300 V AC

Connection diagram



Accessories

Dimensions



❶ Mounting and sub-assemblies of accessories in the socket - see page 411. Signalling / protecting modules type M... - see page 422. ❷ In the bracket the height of socket with retainer / retractor clip is shown. ❻ For R4N relays: G4 1052, GZT4-0040, GZMB-0040, GZT4-0035, TR, module type M...; for T-R4 relays: TR4-2000, GZT4-0035, TR.

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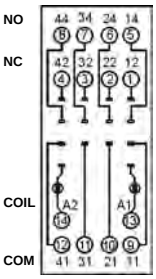
GS4

For R4N

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
67 x 30,8 x 30(~63,7) mm ❼
Four poles
6 A, 300 V AC

Connection diagram

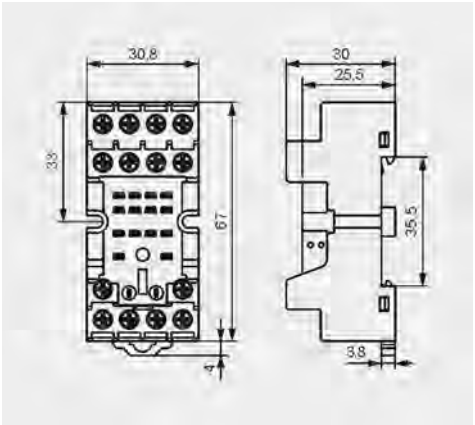


Accessories

GS4-0036

GS4-0035

Dimensions

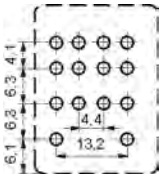


SU4D

For R4N

For PCB
29,6 x 21,5 x 11 mm
Four poles
6 A, 250 V AC

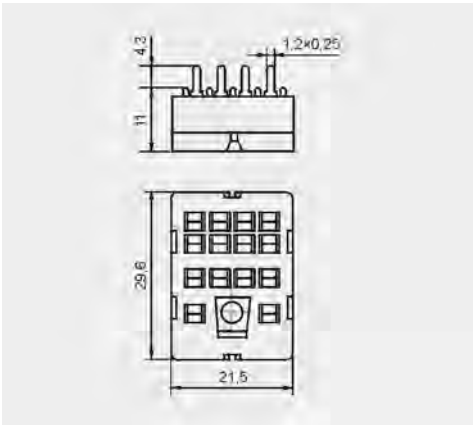
Pinout



Accessories

G4 1053

Dimensions

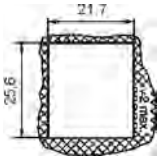


SU4L

For R4N

Solder terminals
29,6 x 21,5 x 18,1 mm
Four poles
6 A, 250 V AC

Dimensions of opening on panel mounting

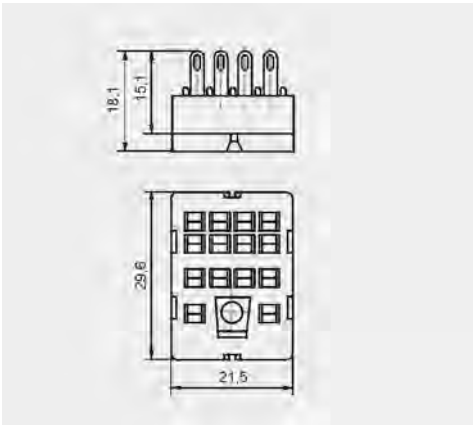


Accessories

G4 1053

G4 1040

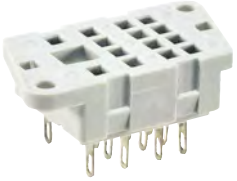
Dimensions



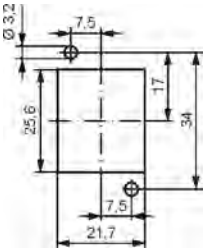
G4

For R4N

Solder terminals
40,5 x 21,5 x 18,1 mm
Four poles
6 A, 250 V AC



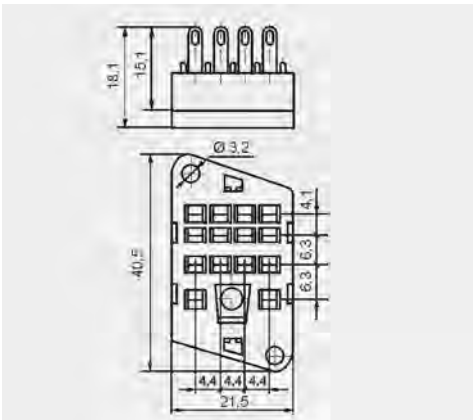
Pinout of openings on panel mounting



Accessories

G4 1053

Dimensions



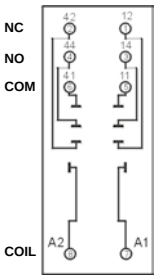
❼ In the bracket the height of socket with spring wire clip is shown.

GZY2G

For RY2

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
78,7 x 28 x 32,4 mm
Two poles
12 A, 250 V AC

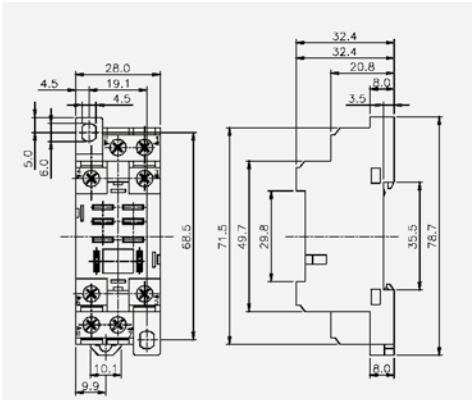
Connection diagram



Accessories

GZY2G-0041

Dimensions

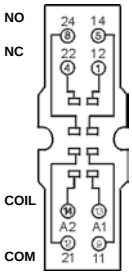


GZ2

For R2M

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
65,2 x 20 x 25 mm
Two poles
7 A, 250 V AC

Connection diagram

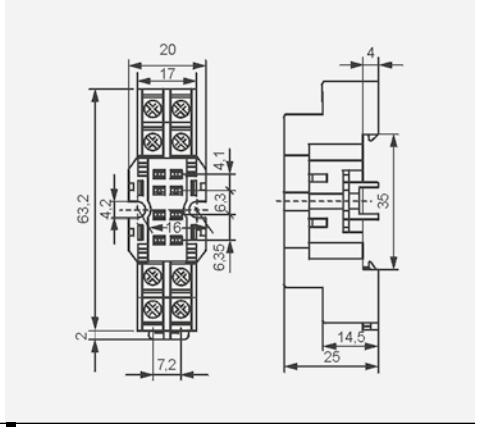


Accessories

GZ2 1060

GZ2 1111

Dimensions

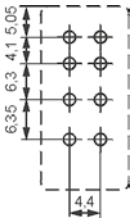


S2M

For R2M

For PCB
29,6 x 14 x 10,5 mm
Two poles
5 A, 250 V AC

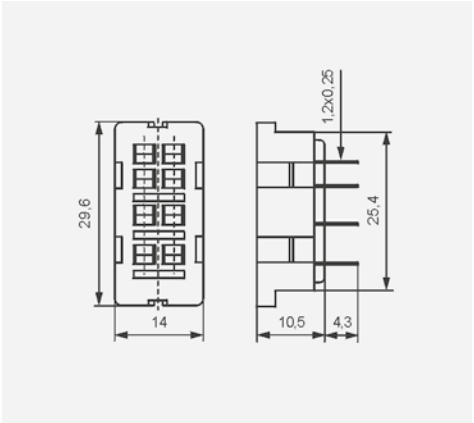
Pinout



Accessories

G4 1050

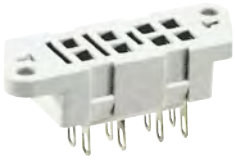
Dimensions



G2M

For R2M

Solder terminals
40,5 x 14 x 10,5 mm
Two poles
5 A, 250 V AC

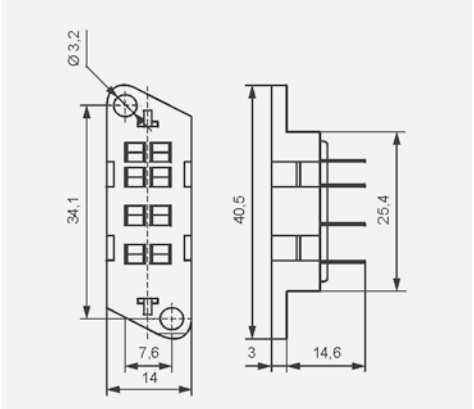


Accessories

G4 1050

G2M 1020

Dimensions



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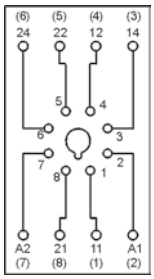
PZ8 ❺

For R15 - 2 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
68,2 x 38 x 24,2 mm
Two poles
10 A, 250 V AC

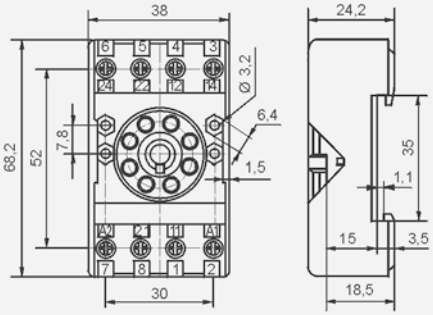
Connection diagram



Accessories

PZ11 0031

Dimensions

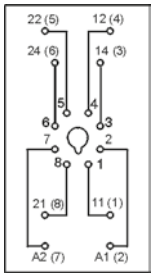


GZU8

For R15 - 2 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
82 x 35,5 x 25,7 mm
Two poles
10 A, 300 V AC

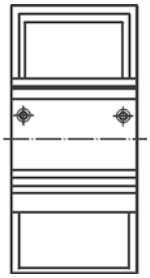
Connection diagram



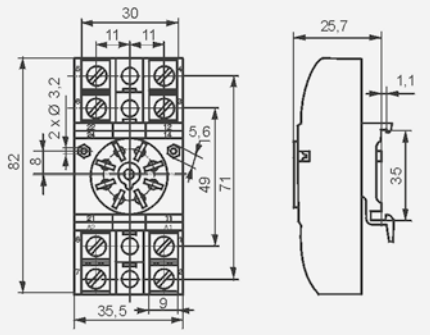
Accessories

GZU 1052

Adaptor



Dimensions

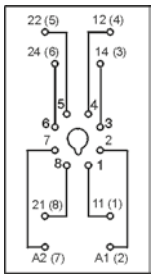


GZ8

For R15 - 2 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
On panel mounting
82,8 x 35,5 x 22,5 mm
Two poles
10 A, 300 V AC

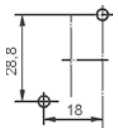
Connection diagram



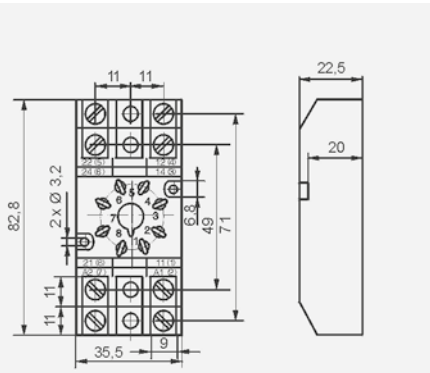
Accessories

GZ 1050

Mounting dimensions



Dimensions

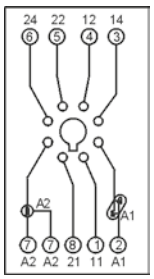


GZP8

For R15 - 2 CO

Screw terminals
Max. tightening moment
for the terminal: 0,5 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
73 x 38,2 x 27,2 mm
Two poles
12 A, 300 V AC

Connection diagram



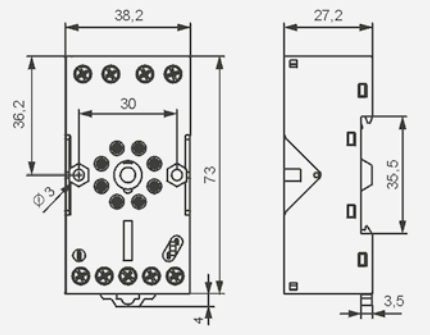
Accessories

GZP-0054

Time module COM3

GZP-0035

Dimensions



❺ Have obtained LR Type Approval Certificate (Lloyd's Register).

GOP8

For R15 - 2 CO

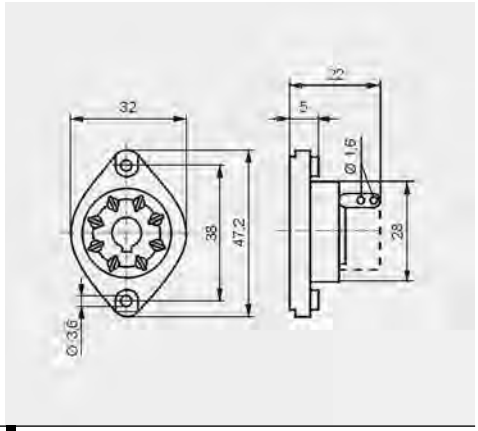
Solder terminals
47,2 x 32 x 22 mm
Two poles
10 A, 250 V AC

Accessories

R159 1051

R15 5922

Dimensions

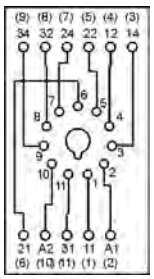


PS11 ❺

For R15 - 3 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
68,2 x 38 x 24,2 mm
Three poles
10 A, 250 V AC

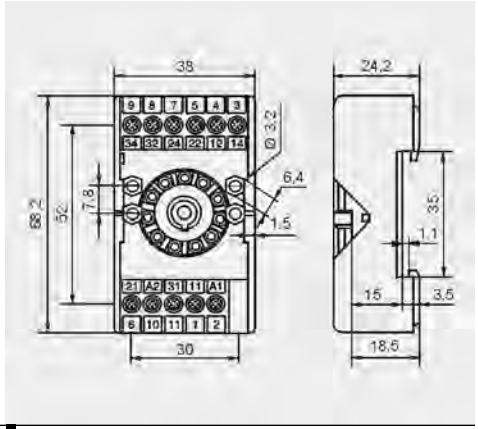
Connection diagram



Accessories

PZ11 0031

Dimensions

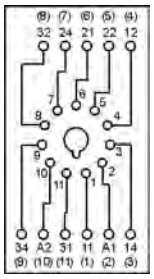


PZ11 ❺

For R15 - 3 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
68,2 x 38 x 24,2 mm
Three poles
10 A, 250 V AC

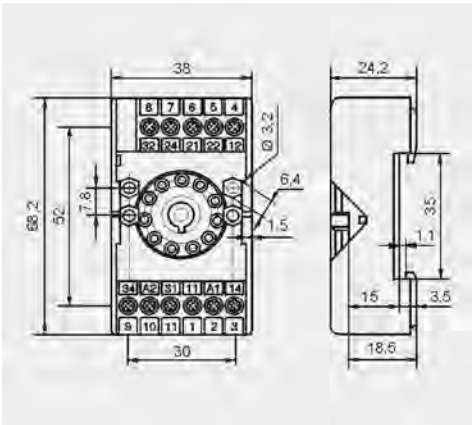
Connection diagram



Accessories

PZ11 0031

Dimensions

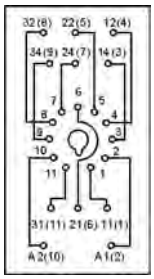


GZU11

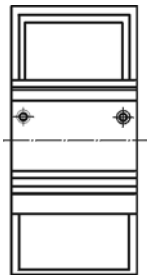
For R15 - 3 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
82 x 35,5 x 25,7 mm
Three poles
10 A, 250 V AC

Connection diagram



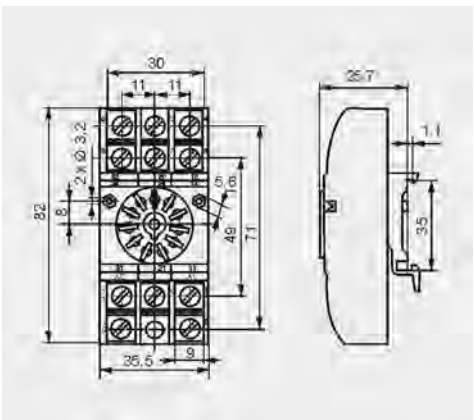
Adaptor



Accessories

GZU 1052

Dimensions



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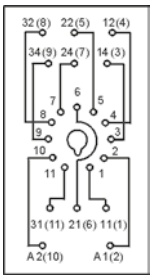
GZ11

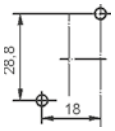
For R15 - 3 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
On panel mounting
82,8 x 35,5 x 22,5 mm
Three poles
10 A, 250 V AC

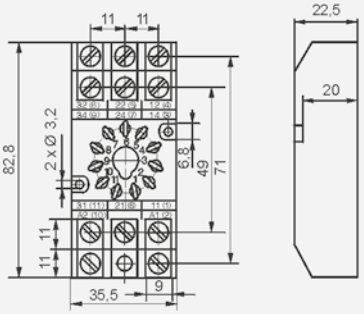
Connection diagram



Mounting dimensions



Dimensions



Accessories

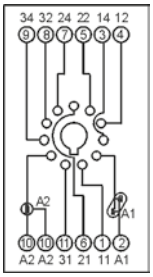
GZ 1050

GZP11

For R15 - 3 CO

Screw terminals
Max. tightening moment
for the terminal: 0,5 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
73 x 38,2 x 27,2 mm
Three poles
12 A, 300 V AC

Connection diagram



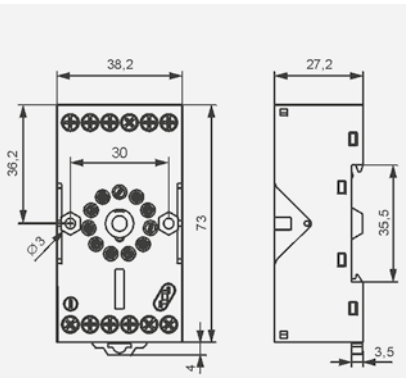
Time module COM3

GZP-0054

GZP-0035

Accessories

Dimensions



GOP11

For R15 - 3 CO

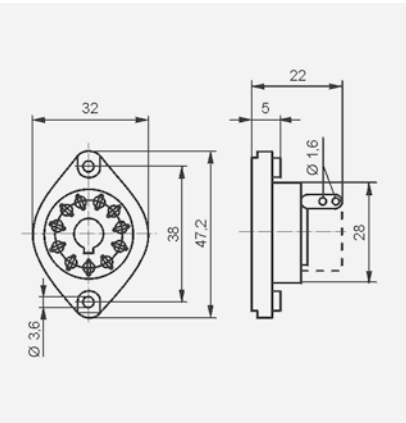
Solder terminals
47,2 x 32 x 22 mm
Three poles
10 A, 250 V AC

R159 1051

R15 5922

Accessories

Dimensions

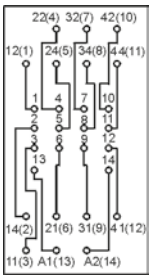


GZ14U

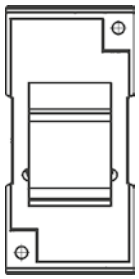
For R15 - 4 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
96,8 x 46,4 x 33,3 mm
Four poles
10 A, 250 V AC

Connection diagram



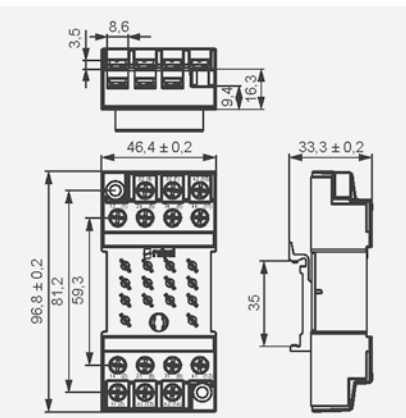
Adaptor



GZ14 0737

Accessories

Dimensions

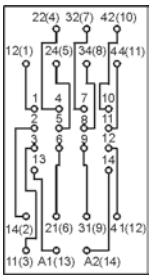


GZ14

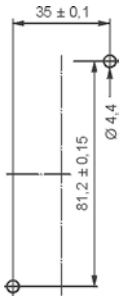
For R15 - 4 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
On panel mounting
96,8 x 46,4 x 24,5 mm
Four poles
10 A, 250 V AC

Connection diagram



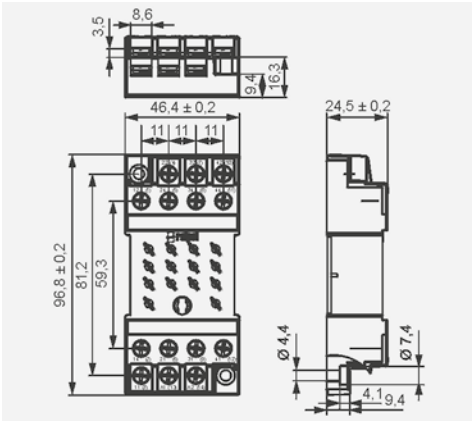
Mounting dimensions



Accessories

GZ14 0737

Dimensions

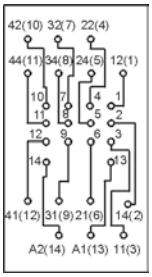


GZ14Z

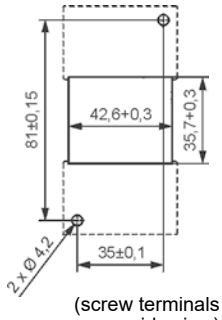
For R15 - 4 CO

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
On panel mounting, behind
92,2 x 46 x 23 mm
Four poles
10 A, 250 V AC

Connection diagram



Mounting dimensions

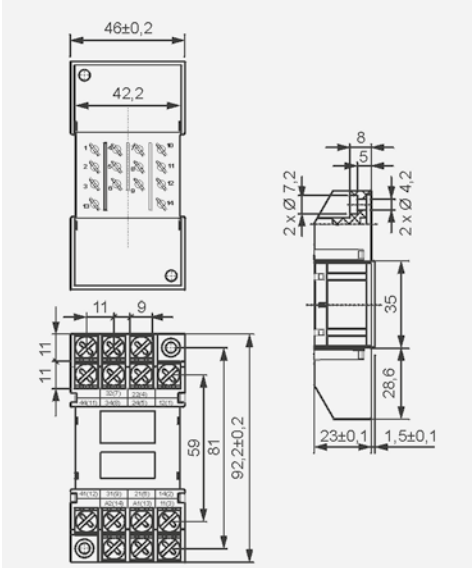


(screw terminals side view)

Accessories

GZ14 0737

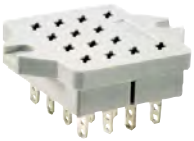
Dimensions



GOP14

For R15 - 4 CO

Solder terminals
50 x 42 x 23 mm
Four poles
10 A, 250 V AC

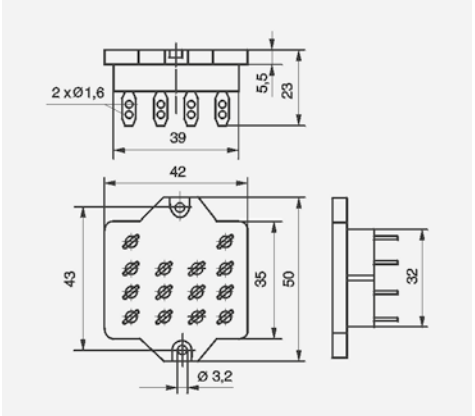


Accessories

R15 0736

R15 5922

Dimensions



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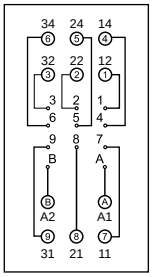
GUC11 ❽

For RUC faston 4,8x0,5, RUC-M

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
or on panel mounting
81,5 x 42,2 x 26,5 mm
Three poles
16 A, 250 V AC

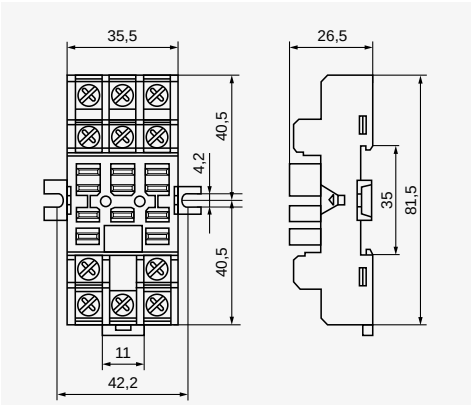
Connection diagram



Accessories

MBA

Dimensions

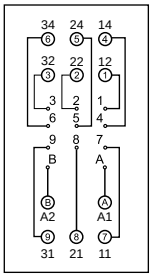


GUC11S ❽

For RUC faston 4,8x0,5, RUC-M

Screw terminals
Max. tightening moment
for the terminal: 0,7 Nm
35 mm rail mount
acc. to PN-EN 60715
81,5 x 35,5 x 26,5 mm
Three poles
16 A, 250 V AC

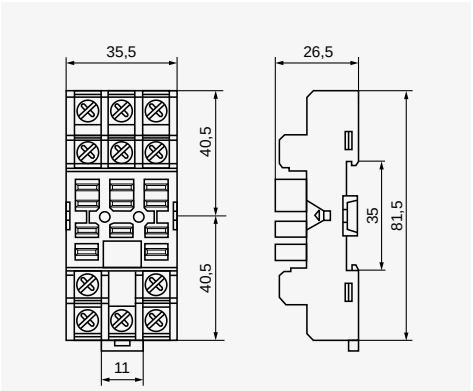
Connection diagram



Accessories

MBA

Dimensions

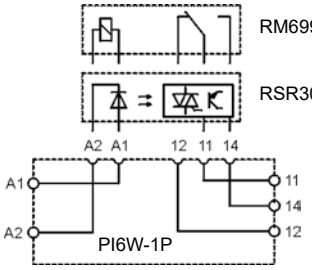


PI6W-1P

For RM699BV, RSR30 ❾

Screw terminals
Max. tightening moment
for the terminal: 0,3 Nm
35 mm rail mount
acc. to PN-EN 60715
98,5 x 6,2 x 85,5 mm
One pole
6 A, 250 V AC

Connection diagram

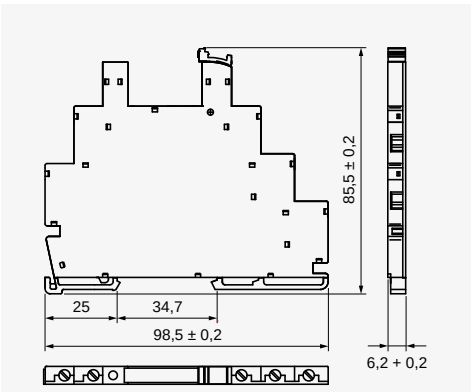


Accessories

ZG20

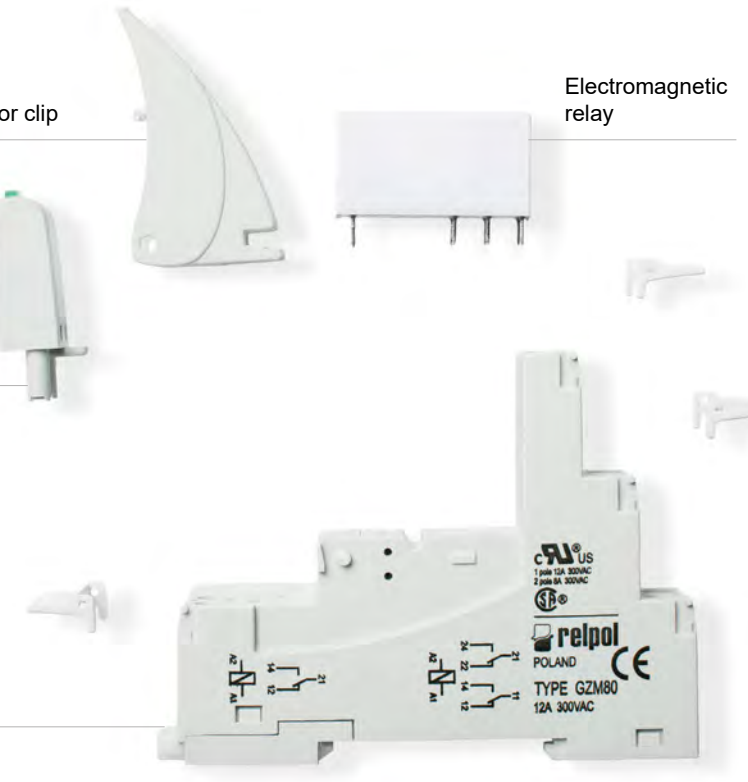
PI6W-1246

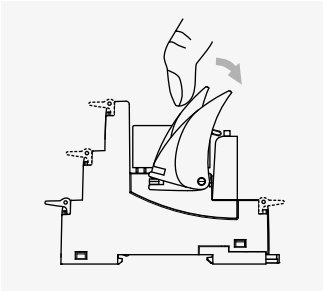
Dimensions



❽ For RUC faston 4,8 x 0,5 and RUC-M, with GUC11 or GUC11S socket, max. switching voltages and coil voltages of relays are limited to 250 V AC / DC.
❾ Solid state relays type **RSR30** - see www.relpol.com.pl

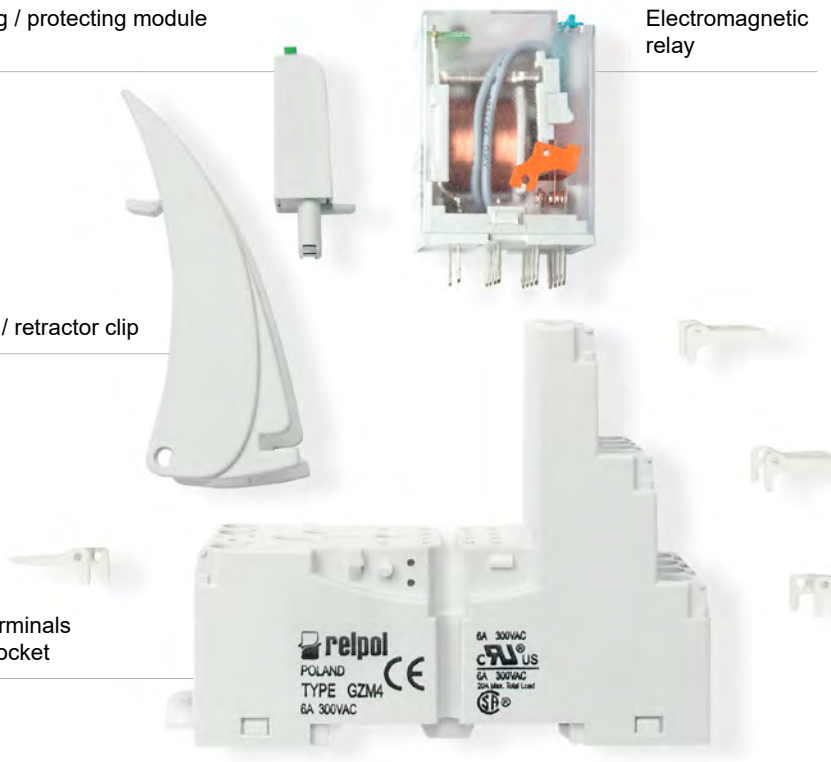
Miniature relays

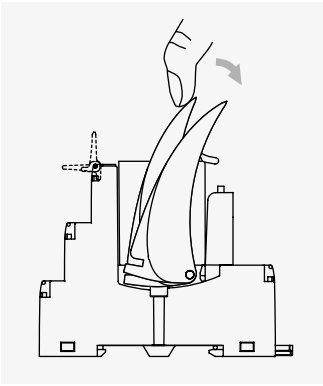




Removing the relay from the socket with a retrainer / retractor clip

Miniature industrial relays





Removing the relay from the socket with a retrainer / retractor clip

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The relays not specified in the table are designed for other manners of mounting.

Type of relay	Plug-in sockets			
	Screw terminals			
	on panel mounting	35 mm rail mount acc. to PN-EN 60715	**Spring terminals**	For PCB
Miniature relays				
RM699BV, RSR30 ❶	–	PI6W-1P	–	–
RM84, RM85, RM85 inrush, RM85 105 °C sensitive, RM87L, RM87L sensitive, RM87P, RM87P sensitive	(GZT80, GZM80 ❷), (GZS80, GZF80 ❸)	(GZT80, GZM80 ❷), (GZS80, GZF80 ❸)	GZMB80 ❹	(EC 50, PW80, GD50 ❺)
RM87N, RM87N sensitive	(GZT92, GZM92 ❷), GZS92 ❸	(GZT92, GZM92 ❷), GZS92 ❸	–	(EC 35, GD35 ❺)
RM96 1 CO	ES 32	ES 32	–	–
RM83	–	–	–	(EC 50, PW80, GD50 ❺)
RMP84, RMP85	GZF80 ❸	GZF80 ❸	GZMB80 ❹	(EC 50, GD50 ❺)
Miniature industrial relays				
R2N	(GZT2, GZM2 ❻)	(GZT2, GZM2 ❻)	GZMB2 ❾	SU4/2D ❿
R3N	GZT3, GZM3	GZT3, GZM3	–	–
R4N	(GZT4, GZM4 ❻) GZ4 ❼, GS4 ❽	(GZT4, GZM4 ❻) GZ4 ❼, GS4 ❽	GZMB4 ❾	SU4D ❿
RY2	GZY2G	GZY2G	–	–
R2M	GZ2 ❶	GZ2 ❶	–	S2M ❷
Industrial relays of small dimensions				
R15 - 2 CO	PZ8 ❸, GZ8 ❹, GZP8 ❺	PZ8 ❸, GZU8 ❹, GZP8 ❺	–	–
R15 - 3 CO	(PS11, PZ11 ❸), GZ11 ❹, GZP11 ❺	(PS11, PZ11 ❸), GZU11 ❹, GZP11 ❺	–	–
R15 - 4 CO	GZ14, GZ14Z	GZ14U	–	–
RUC faston 4,8x0,5, RUC-M	GUC11	GUC11, GUC11S	–	–
Time relays				
T-R4	GZT4, GZM4 ❼	GZT4, GZM4 ❼	GZMB4 ❼	–

❶ Solid state relays type **RSR30** - see www.relpol.com.pl ❷ For sockets GZT80, GZT92, GZM80, GZM92 apply retainer / retractor clips GZT80-0040 or spring wire clips GZM80-0041 and description plates GZT80-0035 ❸ For sockets GZS80, GZS92 apply retainer / retractor clips GZS-0040 or spring wire clips GZM80-0041 and description plates TR. For sockets GZF80 apply spring wire clips GZM80-0041, GZM80-0025. For sockets GZF80 not applicable modules type M... and interconnection strips ZGGZ80 ❹ For sockets GZMB80 apply retainer / retractor clips GZMB80-0040, GZMB80-0025 or spring wire clips GZM80-0041, GZM80-0025 and description plates TR. For sockets GZMB80 not applicable interconnection strips ZGGZ80 ❺ For sockets EC 35, EC 50, GD35, GD50 apply: plastic clips MP16-2, MP25-2; spring wire clips MH16-2, MH25-2. For sockets GD35, GD50 apply also spring wire clips GD-0016. For sockets PW80 apply spring wire clips MH16-2, MH25-2 ❻ For sockets GZT2, GZT4, GZM2, GZM4 apply retainer / retractor clips GZT4-0040 or spring wire clips G4 1052 and description plates GZT4-0035 ❼ For sockets GZ4 apply spring wire clips G4 1052 ❽ For sockets GS4 apply spring wire clips GS4-0036 and description plates GS4-0035 ❾ For sockets GZMB2, GZMB4 apply retainer / retractor clips GZMB4-0040 or spring wire clips G4 1052 and description plates TR. For sockets GZMB2, GZMB4 not applicable interconnection strips ZGGZ4 ❿ For sockets SU4/2D, SU4D, SU4/2L, SU4L, G4/2, G4 apply spring wire clips G4 1053. For sockets SU4/2L, SU4L apply also spring clamps G4 1040

Relays mounting options are specified in the table - see pages 20-23

Sockets	Accessories			
Solder terminals	Retainer / retractor clips	Spring wire clips	Description plates	Additional features
–	–	–	PI6W-1246	ZG20
–	GZT80-0040 ❷, GZS-0040 ❸, GZMB80-0040 ❹	GZM80-0041 ❷ ❸ ❹, (MP16-2, MH16-2, GD-0016 ❺)	GZT80-0035 ❷, TR ❸ ❹	M... ❸, ZGGZ80 ❸ ❹
–	GZT80-0040 ❷, GZS-0040 ❸	GZM80-0041 ❷ ❸, (MP16-2, MH16-2, GD-0016 ❺)	GZT80-0035 ❷, TR ❸	M..., ZGGZ80
–	MS 16, GZMB80-0040	GZM80-0041	TR	M..., ZGGZ80
–	–	(MP25-2, MH25-2 ❺)	–	–
–	GZMB80-0025 ❹	GZM80-0025 ❸ ❹, MH25-2 ❺	TR ❹	M... ❸
SU4/2L, G4/2 ❿	GZT4-0040 ❻, GZMB4-0040 ❾	G4 1052 ❻ ❼ ❾, G4 1053 ❿	GZT4-0035 ❻, TR ❾	M..., ZGGZ4 ❾, R4P-0001, R4W-0003
–	GZT4-0040	G4 1052	GZT4-0035	M..., ZGGZ4, R4P-0001, R4W-0003
SU4L, G4 ❿	GZT4-0040 ❻, GZMB4-0040 ❾	G4 1052 ❻ ❼ ❾, GS4-0036 ❽, G4 1053 ❿	GZT4-0035 ❻, GS4-0035 ❽, TR ❾	M... ❼, ZGGZ4 ❾, R4P-0001, R4W-0003
–	–	–	–	–
G2M ❷	–	GZ2 1060 ❶, G4 1050 ❷	–	–
GOP8 ❻	–	PZ11 0031 ❸, (GZ 1050, GZU 1052 ❹), GZP-0054 ❺, R159 1051 ❻	GZP-0035 ❺	R15-M404, R15-M203, COM3 ❺
GOP11 ❻	–	PZ11 0031 ❸, (GZ 1050, GZU 1052 ❹), GZP-0054 ❺, R159 1051 ❻	GZP-0035 ❺	R15-M404, R15-M203, COM3 ❺
GOP14 ❻	–	GZ14 0737 , R15 0736 ❻	–	–
–	–	MBA	–	–
–	–	TR4-2000	GZT4-0035, TR ❼	ZGGZ4 ❼

❶ For sockets GZ2 apply spring wire clips GZ2 1060 and spring clamps GZ2 1111 ❷ For sockets S2M, G2M apply spring wire clips G4 1050. For sockets G2M apply also spring clamps G2M 1020 ❸ For sockets PZ8, PS11, PZ11 apply spring wire clips PZ11 0031 ❹ For sockets GZ8, GZ11 apply spring wire clips GZ 1050. For sockets GZU8, GZU11 apply spring wire clips GZU 1052 ❺ For sockets GZP8, GZP11 apply spring wire clips GZP-0054, description plates GZP-0035 and time modules COM3 ❻ For sockets GOP8, GOP11 apply spring wire clips R159 1051 and spring clamps R15 5922. For sockets GOP14 apply spring wire clips R15 0736 and spring clamps R15 5922 ❼ For sockets GZT4, GZM4 apply description plates GZT4-0035. For sockets GZMB4 apply description plates TR. For sockets GZMB4 not applicable interconnection strips ZGGZ4

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Type	Terminals	Signs credits	Insulation (PN-EN 60664-1)		
				Dielectric strength 50/60 Hz, 1 min.	
			Rated load	between coil and contacts	pole - pole
For RM699BV, RSR30 ❶					
PI6W-1P	screw terminals	cЯUus, VDE, CE, EAC	6 A / 300 V AC	4 000 V AC	–
For RM84, RM85..., RM87L..., RM87P...					
GZT80	screw terminals	ЯUus, CSA, CE, EAC	12 A / 300 V AC	5 000 V AC	3 000 V AC
GZM80	screw terminals	cЯUus, CSA, CE, EAC	12 A / 300 V AC	5 000 V AC	3 000 V AC
GZS80	screw terminals	cЯUus, CE, EAC	10 A / 300 V AC	4 000 V AC	2 500 V AC
For RM84, RM85..., RM87L..., RM87P..., RM83, RMP84, RMP85					
GZF80	screw terminals	CE, EAC	10 A / 250 V AC	2 000 V AC	3 000 V AC
GZMB80	spring terminals	cЯUus, CE, EAC	10 A / 300 V AC	4 000 V AC	4 000 V AC
EC 50	for PCB	EAC	8 A / 300 V AC	2 500 V AC	2 500 V AC
PW80	for PCB	EAC	8 A / 250 V AC	2 000 V AC	2 000 V AC
GD50	for PCB	ЯU, EAC	8 A / 300 V AC	2 000 V AC	2 000 V AC
For RM87N...					
GZT92	screw terminals	cЯUus, CSA, CE, EAC	12 A / 300 V AC	5 000 V AC	–
GZM92	screw terminals	cЯUus, CSA, CE, EAC	12 A / 300 V AC	5 000 V AC	–
GZS92	screw terminals	cЯUus, CE, EAC	12 A / 300 V AC	4 000 V AC	–
EC 35	for PCB	EAC	12 A / 300 V AC	2 500 V AC	–
GD35	for PCB	ЯU, EAC	12 A / 300 V AC	2 000 V AC	–
For RM96 1 CO					
ES 32	screw terminals	CE, EAC	12 A / 300 V AC	2 500 V AC	–
For miniature relays					
EC 32	for PCB	EAC	12 A / 300 V AC	2 500 V AC	–
For R2N					
GZT2	screw terminals	cЯUus, CSA, CE, EAC	12 A / 300 V AC	3 000 V AC	3 000 V AC
GZM2	screw terminals	cЯUus, CSA, CE, EAC	12 A / 300 V AC	4 000 V AC	3 000 V AC
GZMB2	spring terminals	ЯU, CSA, CE, EAC	10 A / 300 V AC	4 000 V AC	4 000 V AC
SU4/2D	for PCB	cЯUus, CSA, EAC	12 A / 250 V AC	2 500 V AC	2 500 V AC
SU4/2L	solder terminals	cЯUus, CSA, CE, EAC	12 A / 250 V AC	2 500 V AC	2 500 V AC
G4/2	solder terminals	cЯUus, CSA, CE, EAC	12 A / 250 V AC	2 500 V AC	2 500 V AC
For R3N					
GZT3	screw terminals	cЯUus, CSA, CE, EAC	10 A / 300 V AC	3 000 V AC	3 000 V AC
GZM3	screw terminals	cЯUus, CSA, CE, EAC	10 A / 300 V AC	4 000 V AC	3 000 V AC

❶ Solid state relays type **RSR30** - see www.relpol.com.pl

General data			Connections (mounting)			
Number of poles	Weight	Ambient temperature (operating)	Protection category (PN-EN 60529)	Max. cross section of the cables (stranded)	Length of the cable deinsulation	Max. tightening moment for the terminal
1	40 g	-40...+55 °C	IP 20	1 x 2,5 / 2 x 1,5 mm^2	9 mm	0,3 Nm
2	45 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
2	44 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
2	37 g	-40...+85 °C	IP 20	2 x 2,5 mm^2	6,5 mm	–
2	30 g	-40...+70 °C	IP 20	1 x 4 / 2 x 2,5 mm^2	7 mm	0,5 Nm
2	41,8 g	-25...+85 °C	IP 20	1 x 0,2...1,5 mm^2	9...11 mm	0,5 Nm
2	4 g	-40...+85 °C	–	–	–	–
2	4 g	-40...+85 °C	–	–	–	–
2	4 g	-40...+85 °C	–	–	–	–
1	38 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
1	40 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
1	33 g	-40...+85 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,5 Nm
1	4 g	-40...+85 °C	–	–	–	–
1	4 g	-40...+85 °C	–	–	–	–
1	37 g	-40...+85 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,5 Nm
1	4 g	-40...+85 °C	–	–	–	–
2	52 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
2	68 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
2	65 g	-25...+85 °C	IP 20	1 x 0,2...1,5 mm^2	9...11 mm	–
2	6 g	-40...+70 °C	–	–	–	–
2	6 g	-40...+70 °C	–	2 x 0,75 mm^2	–	–
2	6 g	-40...+70 °C	–	2 x 0,75 mm^2	–	–
3	60 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
3	68 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm

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Type	Terminals	Signs credits	Insulation (PN-EN 60664-1)		
				Dielectric strength 50/60 Hz, 1 min.	
			Rated load	between coil and contacts	pole - pole
For R4N, T-R4					
GZT4	screw terminals	cЯUus, CSA, CE, EAC, LR	6 A / 300 V AC	3 000 V AC	3 000 V AC
GZM4	screw terminals	cЯUus, CSA, CE, EAC	6 A / 250 V AC	4 000 V AC	3 000 V AC
GZMB4	spring terminals	ЯU, CSA, CE, EAC	10 A / 300 V AC	4 000 V AC	4 000 V AC
For R4N					
GZ4	screw terminals	CE, EAC	10 A / 300 V AC	2 500 V AC	2 000 V AC
GS4	screw terminals	cЯUus, CE, EAC	6 A / 250 V AC	2 500 V AC	2 000 V AC
SU4D	for PCB	cЯUus, CSA, EAC	6 A / 250 V AC	2 500 V AC	2 000 V AC
SU4L	solder terminals	cЯUus, CSA, CE, EAC	6 A / 250 V AC	2 500 V AC	2 000 V AC
G4	solder terminals	cЯUus, CSA, CE, EAC	6 A / 250 V AC	2 500 V AC	2 000 V AC
For RY2					
GZY2G	screw terminals	CE, EAC	12 A / 250 V AC	2 000 V AC	2 000 V AC
For R2M					
GZ2	screw terminals	CE, EAC	7 A / 250 V AC	2 000 V AC	2 000 V AC
S2M	for PCB	cЯUus, EAC	5 A / 250 V AC	2 000 V AC	2 000 V AC
G2M	solder terminals	cЯUus, CE, EAC	5 A / 250 V AC	2 000 V AC	2 000 V AC
For R15 - 2 CO					
PZ8	screw terminals	ЯU, CSA, CE, EAC, LR	10 A / 250 V AC	2 500 V AC	2 500 V AC
GZU8	screw terminals	ЯU, CSA, CE, EAC	10 A / 300 V AC	2 500 V AC	2 500 V AC
GZ8	screw terminals	CSA, CE, EAC	10 A / 300 V AC	2 500V AC	2 500 V AC
GZP8	screw terminals	cЯUus, CE, EAC	12 A / 300 V AC	4 000 V AC	2 500 V AC
GOP8	solder terminals	CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
For R15 - 3 CO					
PS11	screw terminals	ЯU, CSA, CE, EAC, LR	10 A / 250 V AC	2 000 V AC	2 000 V AC
PZ11	screw terminals	ЯU, CSA, CE, EAC, LR	10 A / 250 V AC	2 000 V AC	2 000 V AC
GZU11	screw terminals	ЯU, CSA, CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
GZ11	screw terminals	CSA, CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
GZP11	screw terminals	cЯUus, CE, EAC	12 A / 300 V AC	2 500 V AC	2 000 V AC
GOP11	solder terminals	CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
For R15 - 4 CO					
GZ14U	screw terminals	CSA, CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
GZ14	screw terminals	CSA, CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
GOP14	solder terminals	CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
GZ14Z	screw terminals	CE, EAC	10 A / 250 V AC	2 000 V AC	2 000 V AC
For RUC faston 4,8 x 0,5, RUC-M					
GUC11	screw terminals	CE, EAC	16 A / 250 V AC	2 000 V AC	2 000 V AC
GUC11S	screw terminals	CE, EAC	16 A / 250 V AC	2 000 V AC	2 000 V AC

General data			Connections (mounting)			
Number of poles	Weight	Ambient temperature (operating)	Protection category (PN-EN 60529)	Max. cross section of the cables (stranded)	Length of the cable deinsulation	Max. tightening moment for the terminal
4	64 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
4	74 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,7 Nm
4	75 g	-25...+85 °C	IP 20	1 x 0,2...1,5 mm^2	9...11 mm	–
4	40 g	-40...+70 °C	IP 20	2 x 1,5 mm^2	7 mm	0,7 Nm
4	40 g	-40...+70 °C	IP 20	2 x 1,5 mm^2	7 mm	0,7 Nm
4	7 g	-40...+70 °C	–	–	–	–
4	7 g	-40...+70 °C	–	–	–	–
4	8 g	-40...+70 °C	–	2 x 0,75 mm^2	–	–
2	54 g	-25...+55 °C	IP 20	2 x 2,5 mm^2	7 mm	0,7 Nm
2	35 g	-40...+70 °C	IP 00	2 x 2,5 mm^2	7 mm	0,7 Nm
2	8 g	-40...+70 °C	–	–	–	–
2	8 g	-40...+70 °C	–	–	–	–
2	55 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	7 mm	0,7 Nm
2	70 g	-40...+70 °C	IP 00	2 x 2,5 mm^2	9,5 mm	0,7 Nm
2	80 g	-40...+70 °C	IP 00	2 x 2,5 mm^2	9,5 mm	0,7 Nm
2	50 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,5 Nm
2	25 g	-40...+70 °C	–	–	–	–
3	55 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	7 mm	0,7 Nm
3	55 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	7 mm	0,7 Nm
3	70 g	-40...+70 °C	IP 00	2 x 2,5 mm^2	9,5 mm	0,7 Nm
3	80 g	-40...+70 °C	IP 00	2 x 2,5 mm^2	9,5 mm	0,7 Nm
3	55 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	6,5 mm	0,5 Nm
3	27 g	-40...+70 °C	–	–	–	–
4	120 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	9,5 mm	0,7 Nm
4	120 g	-40...+70 °C	IP 20	2 x 2,5 mm^2	9,5 mm	0,7 Nm
4	35 g	-40...+70 °C	–	–	–	–
4	120 g	-40...+55 °C	IP 00	2 x 2,5 mm^2	9,5 mm	0,7 Nm
3	75 g	-40...+70 °C	IP 00	2 x 2,5 mm^2	9 mm	0,7 Nm
3	72 g	-40...+70 °C	IP 00	2 x 2,5 mm^2	9 mm	0,7 Nm

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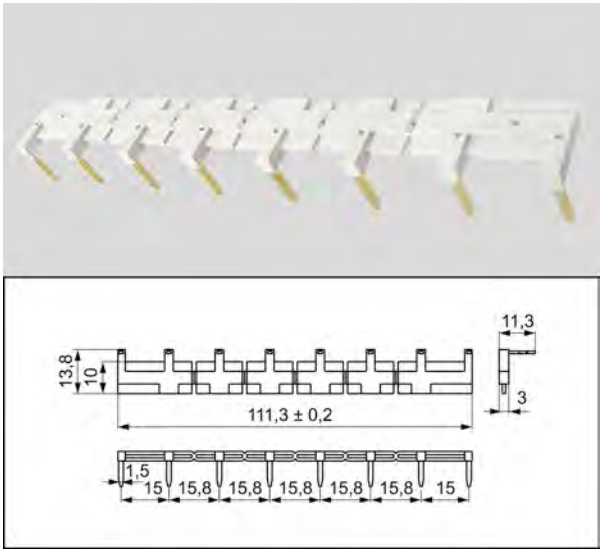
ZGGZ80 for:

Plug-in sockets	Relays for plug-in sockets	Interface relays ❸
GZT80	RM84, RM85, RM85 inrush, RM85 105 °C sensitive, RM87L ❹, RM87P ❹, RM87N ❹	PI84-...-TS-... (RM84 + GZT80)
GZM80		PI84-...-MS-... (RM84 + GZM80)
GZS80		PI85-...-TS-... (RM85 + GZT80)
GZT92		(RM85 inrush + GZT80)
GZM92		PI85-...-MS-... (RM85 + GZM80)
GZS92		
ES 32	RM96 1 CO	

❸ Interface relay **PI84** (**PI85**) is offered as a **set**: plug-in socket **GZT80** or **GZM80** + miniature relay **RM84** (**RM85**) + signalling / protecting module **type M...** + retainer / retractor clip **GZT80-0040** + description plate **GZT80-0035**. ❹ Also versions RM87. sensitive

Interconnection strip ZGGZ80

- designed for the co-operation with plug-in sockets of miniature relays and with interface relays PI84 and PI85, which are equipped with screw terminals; sockets and relays are mounted on 35 mm rail mount acc. to PN-EN 60715,
- bridges common input signals (coil terminals A1 or A2) or output signals - see photo at the top,
- maximum permissible current is 10 A / 250 V AC,
- possibility of connection of 8 sockets or relays,
- colours of strips: **ZGGZ80-1** grey, **ZGGZ80-2** black.



PIR2-...-00L.
(R2N + GZM2)

ZGGZ4

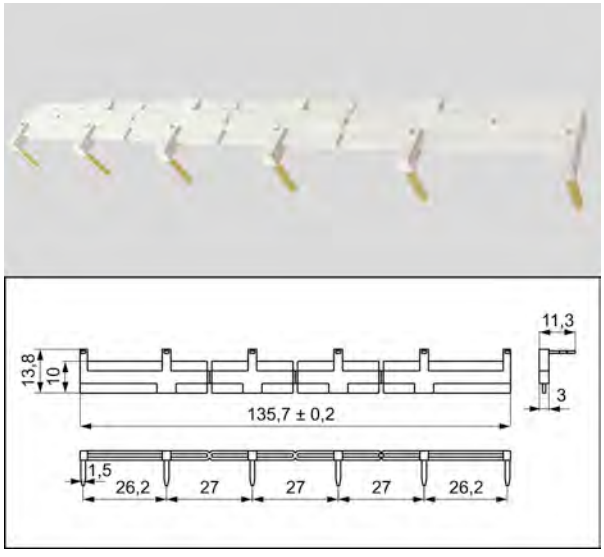
ZGGZ4 for:

Plug-in sockets	Relays for plug-in sockets	Interface relays ❺
GZT2	R2N	PIR2-...-00L. (R2N + GZM2)
GZM2		PIR3-...-00L. (R3N + GZM3)
GZT3	R3N	PIR4-...-00L. (R4N + GZM4)
GZM3		
GZT4	R4N	
GZM4		

❺ Interface relay **PIR2** (**PIR3**, **PIR4**) is offered as a **set**: plug-in socket **GZM2** (**GZM3**, **GZM4**) + miniature industrial relay **R2N** (**R3N**, **R4N**) + signalling / protecting module **type M...** + retainer / retractor clip **GZT4-0040** + description plate **GZT4-0035**.

Interconnection strip ZGGZ4

- designed for the co-operation with plug-in sockets of miniature industrial relays and with interface relays PIR2, PIR3 and PIR4, which are equipped with screw terminals; sockets and relays are mounted on 35 mm rail mount acc. to PN-EN 60715,
- bridges common input signals (coil terminals A1 or A2) or output signals - see photo at the top,
- maximum permissible current is 10 A / 250 V AC,
- possibility of connection of 6 sockets or relays,
- colours of strips: **ZGGZ4-1** grey, **ZGGZ4-2** black.



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Industrial relays for plug-in sockets: R2N, R3N, R4N, R15 - 2 CO ❼, R15 - 3 CO ❼ **with WT features as standard** (**W** - mechanical indicator + **T** - lockable front test button). **Detailed information** on additional features of individual relays can be found in the data sheets on the side of "Ordering codes".

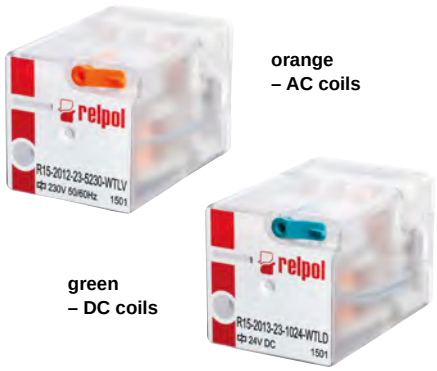
Note:
While the relay operates, the test button of the **T** type becomes heated. In order to push the test button manually, you should first turn the supply voltage off, and wait some time until the button becomes colder (or push the button immediately using a protective glove or an insulated tool). The button shall be pushed smoothly and quickly. The normally open contacts are closed with the button for the time during which the button is pushed. Releasing the button opens the normally open contacts. Normally open contacts may be closed with the blocking function of the button (it shall be turned by 90°). When the button is turned back, the normally open contacts are opened.

Type ❻	Description	For industrial relays
W	mechanical indicator	R2N, R3N, R4N, (R15 - 2 CO, 3 CO ❼)
T	lockable front test button, orange colour - AC coils, green colour - DC coils	R2N, R3N, R4N, (R15 - 2 CO, 3 CO ❼)
L	light indicator (LED diode), located inside the relay	R2N, R3N, R4N, RY2, (R15 - 2 CO, 3 CO, 4 CO ❼) RUC, RUC-M
D	surge suppression element (diode) - only for DC coils	R2N, R3N, R4N, RY2, (R15 - 2 CO, 3 CO, 4 CO ❼)
V	surge suppression element (varistor) - only for AC coils	(R15 - 2 CO, 3 CO ❼)
K	test button without block function	(R15 - 4 CO ❼), RUC

❻ Available combinations:
WT, WTL, WTD, WTLD - in relays R2N, R3N, R4N for plug-in sockets
L, D, LD - in relays RY2 for plug-in sockets
WT, WTL, WTD, WTLD, WTV, WTLV - in relays R15 - 2 CO, 3 CO for plug-in sockets
K, L, D, KL, KD, LD, KLD - in relays R15 - 4 CO for plug-in sockets
K, L, KL - in relays RUC
L - in relays RUC-M
❼ Voltage versions, in covers

Test buttons type T R2N, R3N, R4N

Test buttons type T R15 - 2 CO, 3 CO



Test buttons (no latching) are recommended for R2N...WT, R3N...WT, R4N...WT, R15...WT 2 CO, R15...WT 3 CO relays - **for applications that do not allow permanent contact latching**. By manual operation (pressing the button) relay contacts can get switched for as long time as long the button is pressed. Contacts return to initial position as soon as pressure is released from the button. Those operations can be done while the coil is deenergized [8].

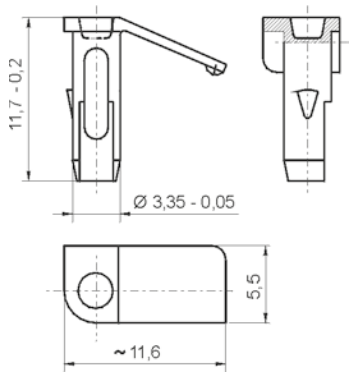
Button **R4P-0001** or **R15-M404** can be easily inserted by the Customer after removal of button type **T** (see Fig. 2). Button type **T** can be removed with screwdriver as shown on Fig. 1.

[8] While the relay operates, the test button becomes heated. In order to push the test button manually, you should first turn the supply voltage off, and wait some time until the button becomes colder (or push the button immediately using a protective glove or an insulated tool). The button shall be pushed smoothly and quickly.

Fig. 1

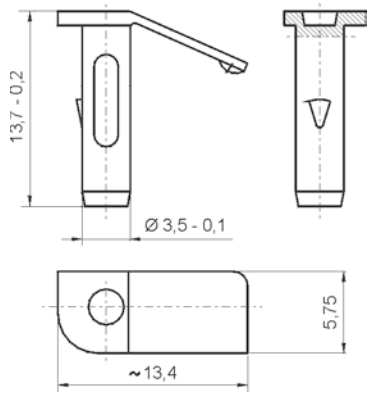
Fig. 2

Dimensions - test button **R4P-0001**
for **R2N...WT, R3N...WT, R4N...WT**



Types of buttons:
R4P-0001-A - orange colour (AC coils)
R4P-0001-D - green colour (DC coils)

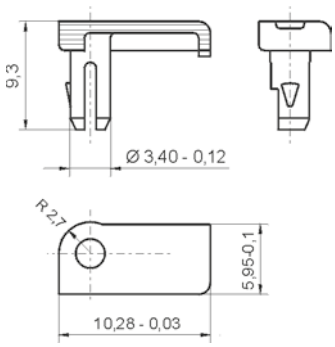
Dimensions - test button **R15-M404**
for **R15...WT 2 CO, R15...WT 3 CO**



Types of buttons:
R15-M404-A - orange colour (AC coils)
R15-M404-D - green colour (DC coils)

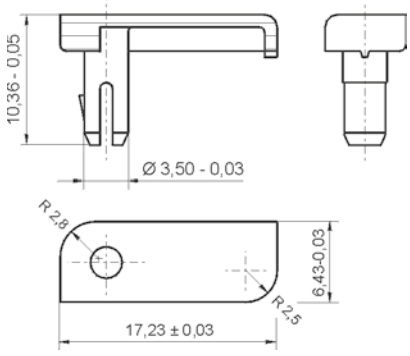
Plugs R4W-0003 or **R15-M203** can substitute button type **T if manual operation (latching and testing) is not allowed**. Changing button type **T** for plug can be done by Customer themselves in the same way as changing button type **T** for button (no latching).

Dimensions - plug **R4W-0003**
for **R2N...WT, R3N...WT, R4N...WT**



Types of plugs:
R4W-0003-A - orange colour (AC coils)
R4W-0003-D - green colour (DC coils)

Dimensions - plug **R15-M203**
for **R15...WT 2 CO, R15...WT 3 CO**



Types of plugs:
R15-M203-A - orange colour (AC coils)
R15-M203-D - green colour (DC coils)

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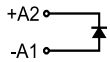
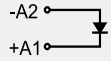
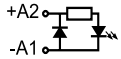
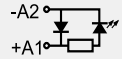
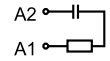
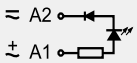
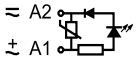
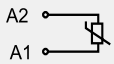
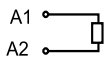
For sockets type:
GZT80, GZM80, GZS80, GZMB80, GZT92, GZM92, GZS92, ES 32, GZT2, GZM2, GZMB2, GZT3, GZM3, GZT4, GZM4, GZMB4

Modules type M... are parallely connected with relay coil.
Polarity P: -A1/+A2. Polarity N: +A1/-A2.

Modules type M...	Layout	Voltage	Type of module ❶ ❷
Module D (polarization P) It limits overvoltage on DC coils.		6/230 V DC	M21P
Module D (polarization N) It limits overvoltage on DC coils.		6/230 V DC	M21N
Module LD (polarization P) It limits overvoltage on DC coils. Coil energizing indication.		6/24 V DC 24/60 V DC 110/230 V DC	M31R, M31G M32R, M32G M33R, M33G
Module LD (polarization N) It limits overvoltage on DC coils. Coil energizing indication.		6/24 V DC 24/60 V DC 110/230 V DC	M41R, M41G M42R, M42G M43R, M43G
Module RC It protects against EMC disturbance. It limits overvoltage.		6/24 V AC/DC 24/60 V AC/DC 110/240 V AC/DC	M51 M52 M53
Module L Coil energizing indication.		6/24 V AC/DC 24/60 V AC/DC 110/240 V AC/DC	M61R, M61G M62R, M62G M63R, M63G
Module LV It limits overvoltage on AC and DC coils. Coil energizing indication.		6/24 V AC/DC 24/60 V AC/DC 110/240 V AC/DC	M91R, M91G M92R, M92G M93R, M93G
Module V It limits overvoltage on AC coils. No indication.		6/24 V AC 110/130 V AC 220/240 V AC	M71 M72 M73
Module R It limits harmful voltage on AC coils induced in long lines which causes unwanted making of the relay.		110/240 V AC	M103

❶ **M...R** - LED red, **M...G** - LED green
❷ When ordering modules indicate their color: gray or black.

MODULE type M...

LED red – M...R

LED green – M...G

Relays
basic information

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According to USASI (United States of America Standards Institute) a relay may be defined as an electrically controlled device which opens and closes an electrical circuit in order to affect the operation of other devices in the same or another circuit. Relays are a significant element in the contemporary industrial processes.

Dozens of milliards of relays operate nowadays in the world as an interface between control circuits and electrical load. The technological development has brought miniaturization of mono- and bi-stable relays which need a low or even no supply voltage to carry a high power through the contacts.

Relpol S.A. - almost 55 years of activities and more than 45 years of experience in production of highest-quality relays.

Function of the relay

The relay performs two crucial tasks:
1. Galvanic separation (isolation) of the control section and switching section.
2. Switching of high-power loads with high voltage and/or current of high intensity at low energy consumption (low voltage / low current intensity) even at low electrical signals.

There are numerous applications of relays. Whenever satisfactory operation is needed in electronic and electromechanical conditions, a relay is necessary, e.g. for control equipment, time relays, temperature control, etc.

Main parts of the relay

The electromechanical relay consists of an electromagnetic switch and an electric one.

The former is the control section, and the latter is the switching section which is directly connected to the electrical load.

The electromagnet transforms the electrical current into a magnetic stream that generates the force which moves the switching part.

Electromagnet

Fig. 1. Classic electromagnet unit

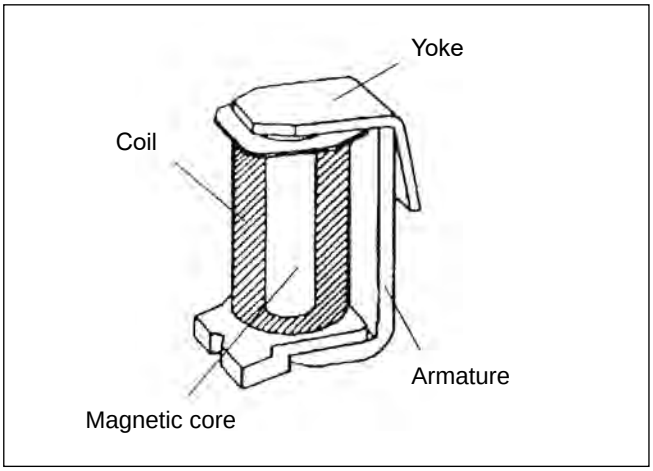
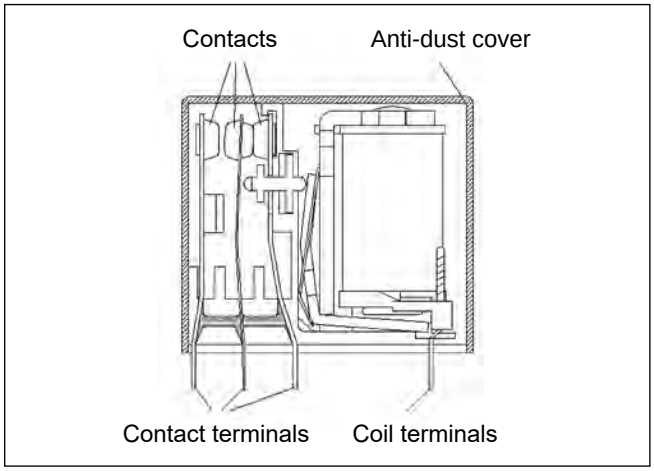


Fig. 1 shows a classic electromagnet unit which consists of four basic parts:
The coil which consists of one or more windings of a copper wire that is usually wound around a spool made of insulating material.
Ferromagnetic core.
Ferromagnetic yoke.
Movable ferromagnetic armature.

Fig. 2. Classic design of a relay



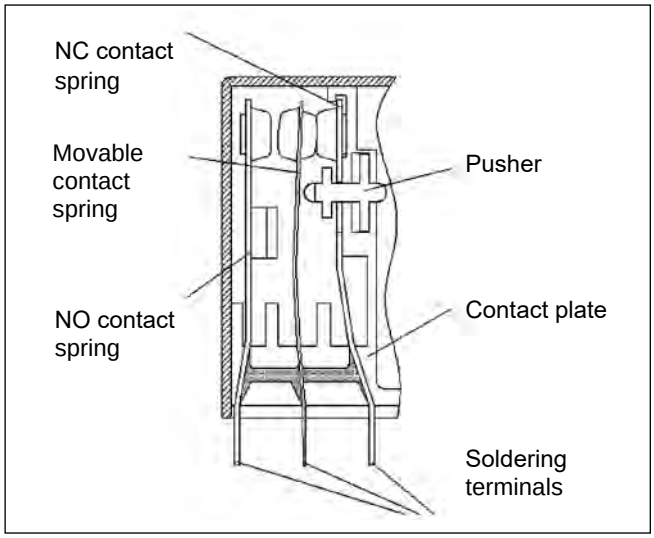
Additional parts:
- Fixed and movable contact springs.
- Contacts.
- Pusher.
- Mounting terminals and coil terminals.
- Contact plate.
- Anti-dust cover.

Switching section

A classic arrangement of the switching section refers to a diagram of one changeover contact. It has been used in the explanation below as it is a basic diagram referred to by all other diagrams.

Fig. 3 shows the switching section of a relay with one changeover contact.
The figure presents the following parts:
- fixed normally closed (NC) contact unit,
- movable contact unit,
- fixed normally open (NO) contact unit,
- pusher,
- contact plate,
- soldering terminals.

Fig. 3. Switching section of a relay

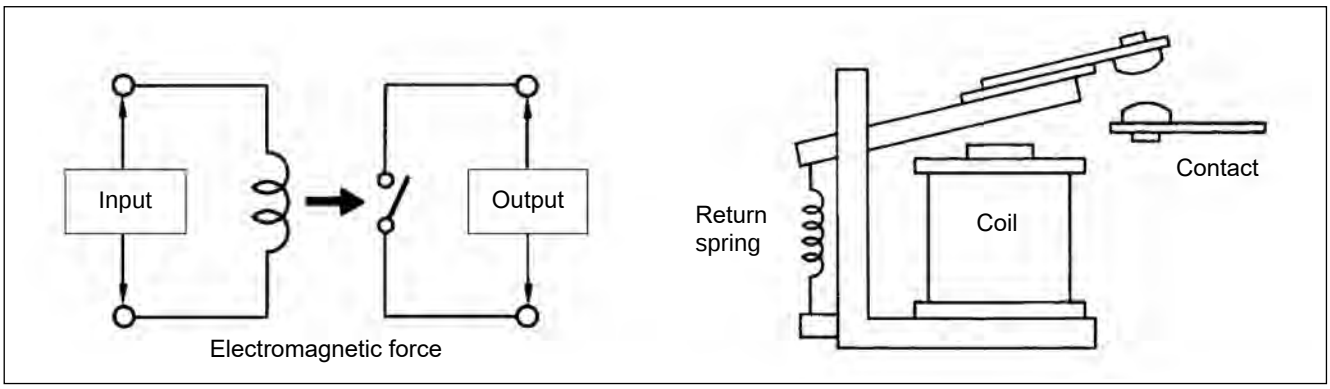


Types of relays

There are two kinds of the device, i.e. electromechanical relay and solid-state relay (SSR).

Electromagnetic and solid-state (SSR) relays

Operation of solid-state relays is very similar to that of electromagnetic relays - it consists in switching the load circuit, which is controlled with a low voltage signal of an insulated input circuit. In an **electromagnetic relay**, the electromagnetic force which moves the yoke and causes switching of the contacts is generated when input voltage is applied to the coil. When the supply voltage is interrupted, the return spring pushes the contacts away from each other, i.e. opens the contacts and disconnetcts the power circuit.



Solid-state relays use an opto-isolator to disconnect the input and output circuits. The opto-isolator changes electrical signal to optic ones and transfers them through the distance which is a galvanic insulation between the input and output sections. SSR's are electronic devices which do not have any movable parts, and the switching elements are thyristors, triacs or transistors.

The input current flows through a light-emitting diode which is usually made of gallium arsenide and it emits radiation in infrared. The diode illuminates the photovoltaic cell which generates voltage to control the output element.

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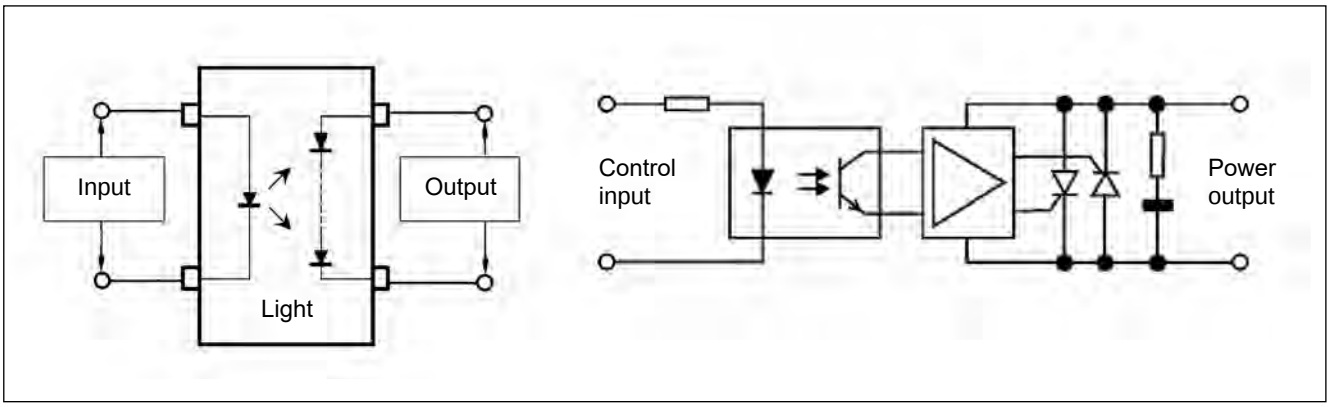
In the opto-isolator, a photodiode, photo-transistor or a photo--thyristor may be be the photodetector.

The opto-isolator carries both direct-current signals and alternating-current ones (analog and digital signals).



Advantages of solid-state relays:

1. Absence of movable parts due to which their operation is completely noiseless, which is of high importance in dwelling rooms, offices, etc.
2. There is no electric arc in the course of switching operation which takes place inside the semiconductor material, the function of making high starting currents, long life and reliable operation.
3. High resistance to shock, vibrations and environmental pollution.
4. No electromagnetic interference owing to completely electronic control.
5. High operation speed and high operation frequency.
6. Low power necessary to control the relay.

Disadvantages:

1. High resistance in switching on state, which causes generation of heat and necessity to use radiators.
2. Considerable voltage drop on the interface (1 - 1,6 V).
3. Sensitivity to overvoltage, necessity to use a varistor or RC circuit.

As compared to solid-state relays, **electromagnetic relays** bear the stamp of negligible small voltage drop (the contact resistance in switching state is on the average about 10 mΩ), and zero leakage current, they are also highly resistant to overvoltage. Due to the mechanical system of contacts and their wear and tear, their life is definitely shorter, and the response time is long and prevents the use of higher operation frequency. The capability of switching surge currents is also considerably smaller.

SSR's provide the possibility of switching at "zero" for resistive load and, then the voltage on the load increases gradually, which, in some cases, e.g. an electric bulb, affects significantly the period of life. This limits surge currents too.
For inductive loads, relays which switch at maximum voltage are useful - conduction occurs at supply voltage peak value, then the surge current is minimized.

Among the basic types of electromechanical relays, monostable and bistable relays should be considered separately.

Mono- and bistable relays

Monostable relays

A monostable relay is an electrical relay which changes its status due to a supply value of the appropriate parameters and returns to the previous status when the parameter ceases or changes.

Bistable relays

A bistable relay changes its status as affected by the appropriate supply value of the appropriate parameters and remains in the changed state even after the value has ceased. Another application of the appropriate supply value is necessary for the relay to change its status again and return to the previous state.

Further classification of relays may be based upon the functions they perform, e.g. all-or-nothing relays, step relays, latching relays, polarized relays, reed relays.

All-or-nothing and step relays

All-or-nothing relays
The term identifies the relays designed for operation at the value that is:
- higher than the make value, or
- lower than the return value.

This type of relays must be supplied by a particular range of voltage (or current). They may be energized by supply or disconnection of voltage (or current) within a given range.

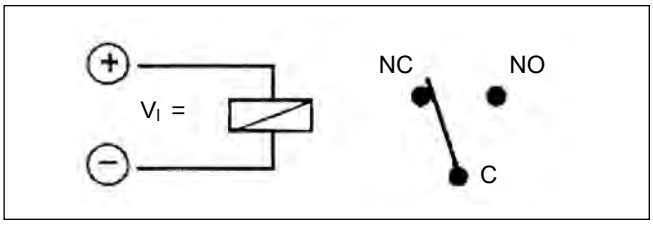
Step relays
The relays have two or more rotational positions, and they move from one step to another in consecutive operations with the use of energizing pulse. They usually move the contacts with the use of cams.

Latching relays

The latching relay is a non-polarized bistable relay. It changes its state at the supply value and remains in the position after the value has ceased. In order to change the state of the relay again, another actuation is necessary. The crucial part of the latching relay is the core made of special magnetic iron which remains magnetized ever after a voltage pulse has been applied. The core consists of a nickel base with aluminum, titanium or niobium added (55-85% Co, 10-12% Ni).

Function
Energizing condition: OFF state
As the wiring is supplied with a voltage pulse of direct current V1 (selected from the recommended supply voltage range) for the duration of ti, the electromagnetic field grows immediately, the core becomes magnetized and the relay is energized (the normally open contact closes). When the pulse declines, the relay remains in the ON state owing to the permanently magnetized core (Fig. 4).

Fig. 4. Latching relay, electrical circuit

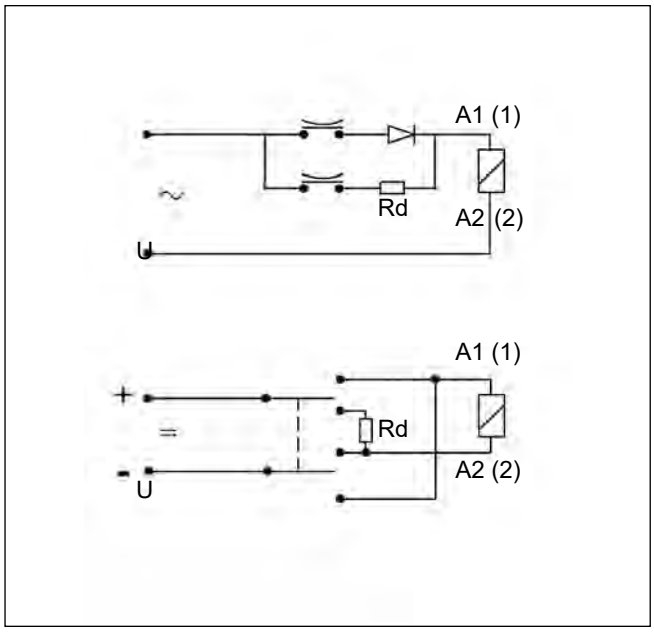


Thus, the magnetic polarization of the relay depends on the polarity of the supply voltage. The relay switches to the OFF state on supply of the voltage of the opposite polarity which changes the magnetic polarization of the core. The sole change of the supply polarity will not cause the release of the relay. This requires a change of the polarity, and the value of the energy supply must be within the range of the actuation (energizing) values.

The circuit applied
There are two different types of the latching relays:

- **single winding** latching relays with the external release resistance to limit the current intensity (Fig. 5).

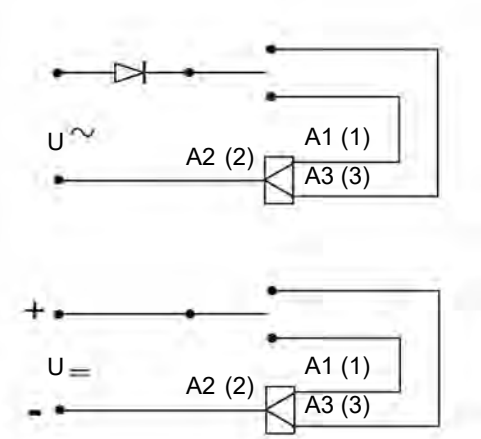
Fig. 5. Circuits with single winding latching relays



- latching relays with **two windings** and two different voltage ranges for ON / OFF operation (Fig. 6).

It is important to bear in mind that for the appropriate operation the relays require a **minimum pulse** of 10 ms. In order to avoid overheating, the maximum time of supply is usually limited, too. The aforementioned relays may also be supplied with alternating voltage owing to the external diode which rectifies the alternating current to the pulses of minimum duration of 10 ms (half of the period). The applications of latching relays are the same as the applications of the normal version relays.

Fig. 6. Circuits with two winding latching relay



Polarized relays

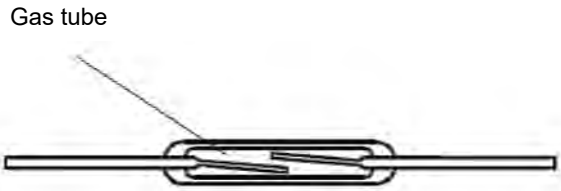
Polarized relay is a relay with permanent magnet which provides additional magnetic force that reduces the energy consumption. The magnetic field required for pulling the armature is partly generated by the coil and partly by the magnet.

The magnetic streams overlap. The supply value must be of the appropriate polarity, i.e. the same as the polarity of the magnet. There are mono- and bistable versions of these relays.

Reed relays

The remarkable advantage of the reed relays is that they are hermetically sealed and, thus, resistant to atmospheric corrosion. They are very fast (10 to 20 times faster than electromechanical relays) and at the range of the rated contact load they offer highly reliable switching operations, and extremely long life. The fundamental part of a reed relay is a hermetic glass tube, commonly called the magnetic (reed) contact.
The magnetic (reed) contact consists of two flat, ferromagnetic lap contacts of the reed relay separated by a small air-clearance, hermetically closed in a glass tube. The contacts of the reed relay are fixed to the ends of the glass tube and, thus, they serve as supports. If the free ends of the reed contacts are exposed to the magnetic field, the stream in the clearance between the reed contacts will make them cooperate.
When the magnetic field ceases, the reed contacts will part from each other as a result of the stress of the spring placed in the contacts. This way, the contacts provide an operating magnetic clearance, and they close and open the electrical circuit.

Fig. 7. Hermetic contact



Terminology

Actuation condition - in case of a monostable relay: specific status of a relay while it is supplied with a given supply value which has been energized; in case of a bistable relay: a status opposite to rest condition indicated by the manufacturer.

Actuation - change from rest condition to actuation condition

Return - in case of a monostable relay: change from actuation condition to rest condition

Reset - in case of a bistable relay: change from actuation condition to rest condition

Constant operation - operation during which a relay remains actuated for the time long enough to reach heat balance.

Cycle operation - operation during which a relay performs several make cycles, where intervals of actuation and absence of actuation are defined; actuation time of the relay is such that heat balance of the relay is impossible to be achieved.

Coil thermal resistance - the ratio of increment of the coil temperature and the input power, measured after the time sufficient for achieving heat balance.

Make voltage - the coil voltage value at which the relay is actuated

Return voltage - the coil voltage value at which a monostable relay returns to the previous condition.

Reset voltage - the coil voltage value at which a bistable relay is reset.

Normally open contact - a contact which is closed when the relay is actuated, and open when the relay does not operate.

Normally closed contact - a contact which open when the relay operates, and closed when the relay does not operate.

Changeover contact - a set of two contact circuit made of three members of which one is common for two contact circuits; when one of the circuits is open, the other is closed.

Contact gap - a gap between contacts at open contact circuit

Making capacity - the highest value of electric current which may be connected by a contact when specific conditions are met, e.g. making voltage, number of operations, power factor, time constant.

Maximum continuous current - the maximum value of the current which may flow through a closed contact continuously in specific conditions.

Isolating air gap - the minimum distance in the air between two conductive parts or between a conductive part and exposed surface of the relay

Isolating surface gap - the minimum distance on the surface of the isolating material between two conductive parts

PTI - indicator of resistance to creeping current - numerical value of proof voltage expressed in Volts, which may be resisted to by the isolating material without formation of conductive tracks, defined in specific conditions of experiments.

CTI - a comparative indicator of resistance to creeping current - numerical value equal to maximum voltage expressed in Volts, which may be resisted to by the isolating material without formation of conductive tracks, defined in specific conditions of experiments.

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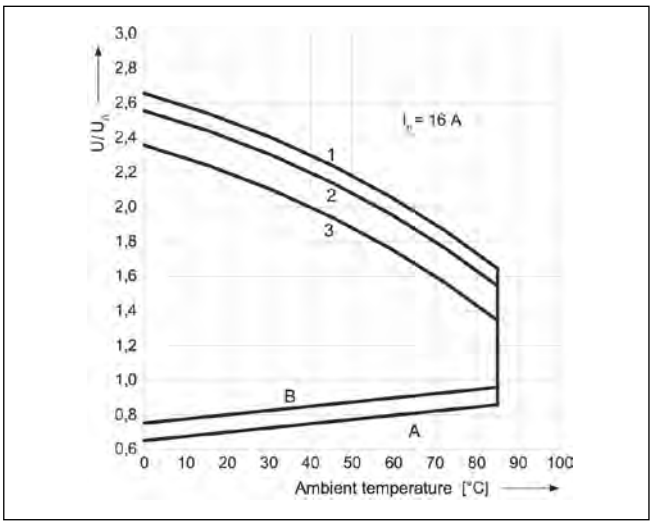
Coil operating voltage range

The admissible operating voltage range for the coil as the function of the ambient temperature is shown in the chart for RM85 relay.

The maximum operating voltage of the coil is limited by the increase of the coil temperature caused by the heating of the winding. The increase shall not exceed the admissible temperature defined for insulation materials.

The switching voltage is the minimum operating voltage of the coil. The switching voltage grows along with the increase of the winding temperature. Since the resistance of the copper wire changes by 0,4% per Centigrade, the growth of the coil temperature caused by a higher ambient temperature or by contact load results in the drop of the coil current and, thus, the increase of the voltage required for the relay electromagnet to operate.

Fig. 8. Coil operating range - DC



A - relations between make voltage and ambient temperature at no load on contacts. Coil temperature and ambient temperature are equal before coil energizing. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
B - relations between make voltage and ambient temperature after initial coil heating up with 1,1 U_n, at continues load of I_n on contacts. Make voltage is not higher than the value read on Y axis (multiplication of rated voltage).
1, 2, 3 - values on Y axis represent allowed overvoltage on coil at certain ambient temperature and contact load:
1 - no load.
2 - 50% of rated load.
3 - rated load.

Coils - overvoltage protection

While using electromagnetic relays in electric circuits, it should be borne in mind that coils are the source of significant overvoltage which may disturb the operation of the equipment in which electromagnetic relays are applied. Furthermore, due to overvoltage the equipment in which electromagnetic relays are used may not meet the requirements of electromagnetic compatibility.

Relay coils have high inductance during operation, which causes a rapid increase of the coil voltage on switching off. Such a situation occurs in both DC and AC voltage coils. If, for example, the coil is switched off by a transistor, the latter may be damaged. Moreover, such pulse disturbances my affect negatively the nearby electronic systems.

Fig. 9. DC coil voltage during switching off

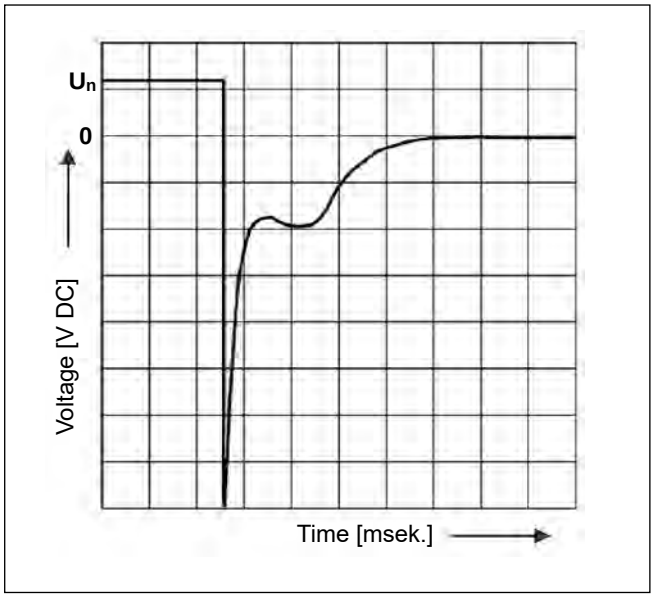
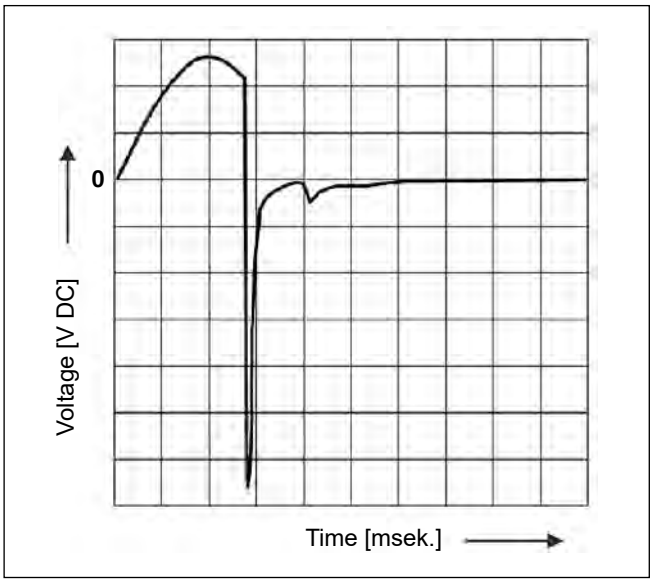


Fig. 10. AC coil voltage during switching off



For coils supplied with DC voltage, the best and simplest solution of the problem is a parallel connection of a standard rectifying diode to the coil terminals. During the current flow, the diode has a reversed bias due to the voltage drop on the coil. On switching off the coil voltage, the diode starts conducting which results in the coil voltage increase merely by the voltage drop on the conducting diode. Designers of electronic systems with electromagnetic relays practically always use suppressing diodes connected in parallel to the relay coil. The 1N4007 diode is a perfect solution in most of such cases. Diodes remove overvoltage extremely efficiently, they are a cost-effective and reliable way of suppressing coil self-induction voltage, which does not involve complicated calculations The only weak point of the diode system is a remarkable (threefold) increase of the relay release time. The release time may be reduced by connecting an additional resistor in serial to the diode in which case, however, the overvoltage value grows while the coil is being switched off.

The **diode protection** cannot obviously be used with AC coil relays. In such cases, two types of protection are commonly used, i.e.:
- varistor protection, and
- R-C two-terminal network protection.

Metal-oxide **varistors** have similar current-voltage characteristics to that of a bidirectional Zener diode. When the voltage between the varistor terminals exceeds a given limit value, it starts conducting, and, thus, it shunts the inductive load (the relay coil) with its differential resistance. The maximum overvoltage value on switching off depends on the limit voltage of the varistor.

Furthermore, when the varistor is supplied from the mains, the varistor protects also the relay coil from being damaged by the voltage pulses that occur in the mains. The varistor protection may be also applied in DC coil relays. However, the overvoltage values on switching off are much higher than in the case of protection with the use of a suppressing diode.

Another way to limit the overvoltage values during coil switching off is a parallel connection of an **R-C two-terminal network** to the coil. The network limits the overvoltage well, it is inexpensive, and it only slightly increases the relay release time.

No ceramic **capacitors** should be used whereas it is recommended to use foil capacitors. On selection of a **resistor**, it should be taken into consideration that quite a large amount of power dissipates on it during the transition process and, thus, the resistor's power shall not be less than 0,5 W.

Relpol S.A. offers both relays with integrated **overvoltage protection elements** (diodes or varistors) and ready-to-use **overvoltage protection modules** to be mounted in plug-in sockets.

R2N, R3N and R4N relays with DC coils are also in the version with suppressing diode mounted inside the relay. However, varistors are not mounted inside these relays. Ready-to-use overvoltage protection modules of M series may be used with the relays and then the modules are mounted in GZT., GZM. and GZMB. series plug-in sockets. Modules with a diode (DC coils) or with a varistor (DC or AC/DC coils) are available.

R15 relays are manufactured solely with the overvoltage protection element integrated, i.e. with the suppressing diodes for DC coils (two-, three-, and four-pole versions) and with varistors for AC coils (two-, and three-pole versions). In the case of a suppressing diode as the overvoltage protection element, the coil supply polarity must be as follows: A1 terminal "+", A2 terminal "-". note: the specified polarity does not refer to the relays R15 4 CO – four-pole for which the coil supply polarity must be as follows: A1 terminal "-", A2 terminal "+".

Ordering codes of the overvoltage protection elements integrated in the relays (as add-on equipment) are as follows:
D - suppressing diode;
V - varistor.

While using an overvoltage protection element, the user may be assured that the overvoltage that occurs on switching the coil off will not affect negatively the coil control circuits or any other electric and electronic circuits.

Switching section: main diagrams and mechanical solutions

There are various contact configuration diagrams related with different application requirements, i.e. normally open contacts (NO), normally closed contacts (NC) and changeover contacts. These are the basic configurations used for designing all the contact diagrams of relays. With the use of the basic contacts, many relay circuits may be built in order to apply relays successfully. The only theoretical limitations are the dimensions of relays, electromagnetic energy, switching energy and the complexity of drawings. The contact configurations available in a relay are determined by the number of poles, type of the contacts (changeover or normally open/closed), and normal position of the contacts (normally open or normally closed). In table next are listed **symbols depicting exact type of contacts**.

Other manufacturers of relays apply also different ways of defining the configuration of contacts. They may be found in catalogs and catalog cards published by the companies.

Contact type	Marking		
	Relpol S.A.	**Zettler**	**USA**
CO	1	C	SPDT
NO	2	A	SPST-NO
NC	3	B	SPST-NC

SP = single pole
ST = single contact (normally open or normally closed)
NO = normally open contact
NC = normally closed contact
DP = two contacts
DT = changeover contact

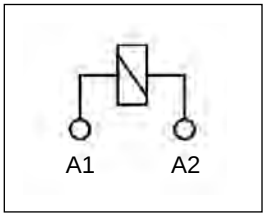
Terminals marking

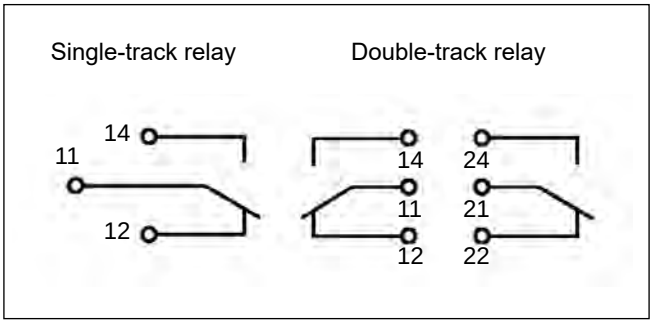
Terminals marking under Polish Standard PN-EN 50005.

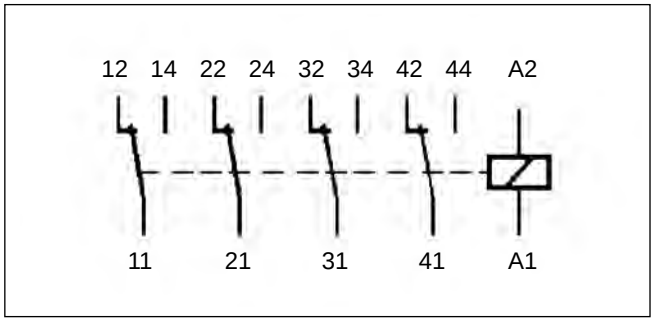
Contacts terminals are always marked numerically with two digits, where:
- the unit digit is the number of functions,
- the decimal digit is the number of sequences.

Coil terminals are always literal--numerical.

The scheme of marking of terminals of contacts and coil for a four-track relay (see below).







Contacts and shapes of contacts

Contact pressure

When two contacts come together to close the electrical circuit, they touch each other within the area that depends on the shape of the contacts. The force (N) with which the contacts push against each other as measured on the contact axis, divided by the area of the contact (mm^2) equals the contact pressure (N/mm^2). It is practically impossible to determine the real contact area as it depends also on the roughness of the contact surface. The contact pressure is determined by the contact force. In order to obtain a large contact area, the contact force must be increased so that the contact area roughness may be deformed. A low force means a few effective contact points and a small area of the contact (i.e. a high contact resistance). On the other hand, a stronger force increases the number of contact points and the total contact area (lower contact resistance). The contact force may be increased only to the limit defined by the mechanical strength of the parts and as much as it is allowed by the supply voltage sensitivity.

Manufacturers of relays use **different shapes** of contacts according to the relay designs and applications.

Fig. 11. Effect of the contact force

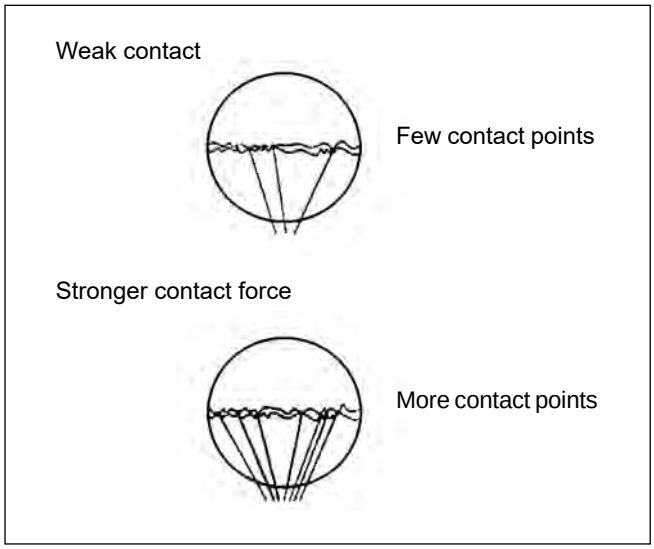
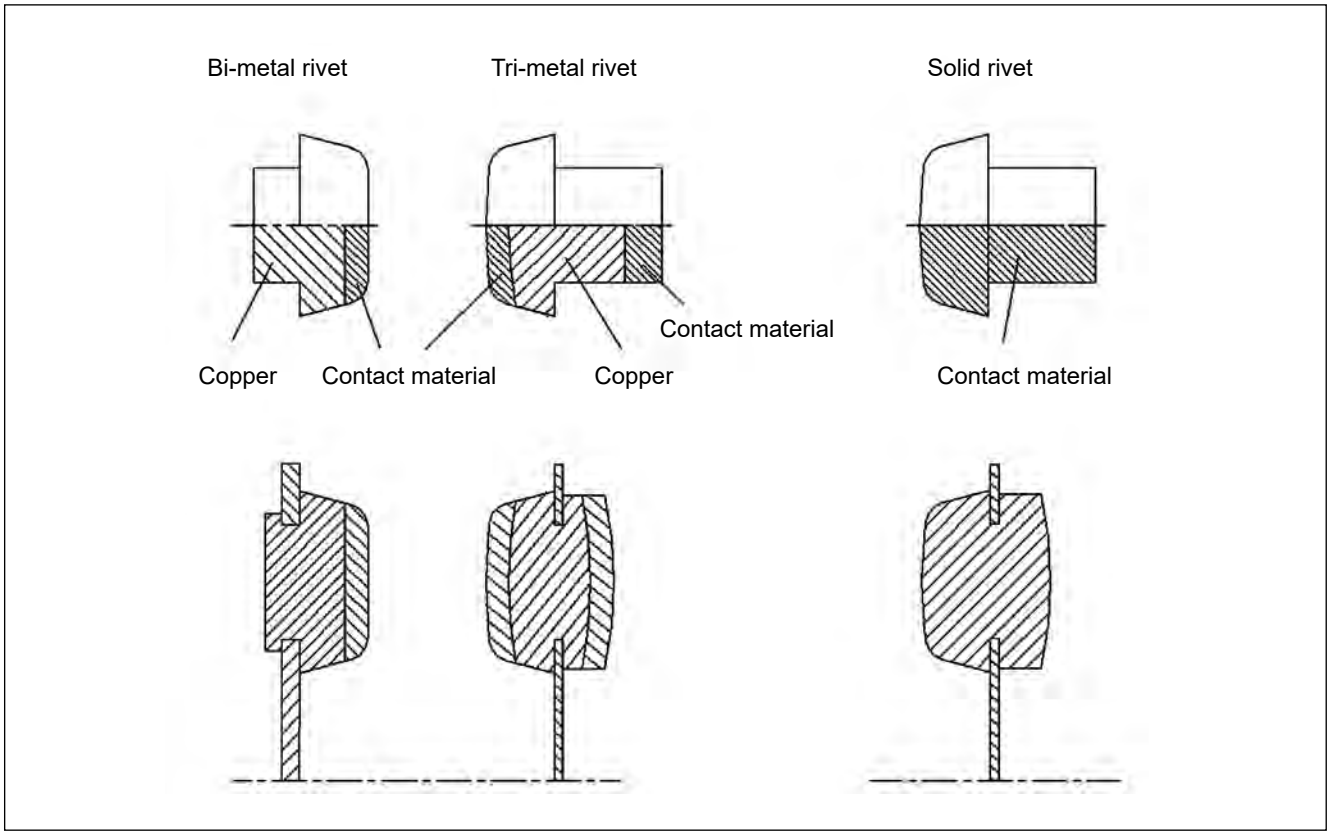


Fig. 12. Shapes of contact rivets



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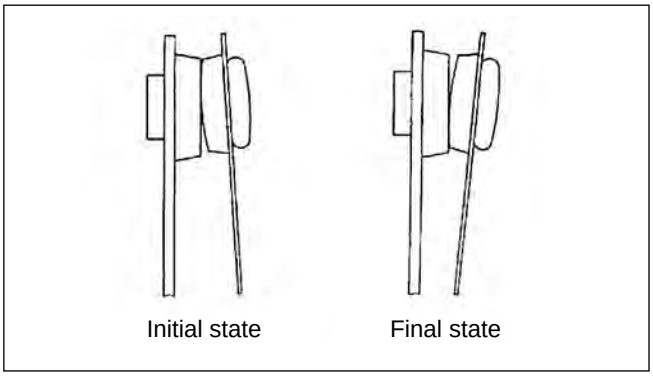
Cylindrical contact rivets

Cylindrical contact rivets are usually used in their bimetallic, solid or other versions, similarly to the contact parts of miniature relays owing to their optimal switching capabilities and easy assembly. Normally, the contacts are connected between the flat surface of the fixed contact and the spherical surface of the movable contact (the common contact). Principally, the common contact is a solid one whereas the fixed contacts (NC and NO, when in switching operation) are bimetallic ones (Fig. 12). The head of the central solid contact is ready to use on one side, and it is shaped during assembly on the other side. The flat-spherical connection between the contact surfaces is necessary for the reduction of the area of connection with the simultaneous increase of the contact pressure. Moreover, relative surface movement (roll) occurs then, which is useful in terms of enhanced contact performance (Fig. 13).

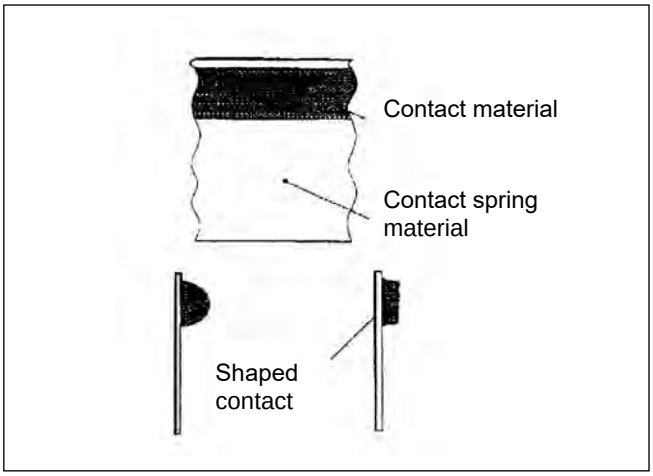
Fig. 13. Contact movement



Small-profile contact

A pressed strip of metal or contact alloy is automatically welded to the spring material prior to the cutting process. During the cutting process, the spring strip is cut together with the contacts, and the contact is formed to the required shape (Fig. 14). This solution is useful as it provides avoiding a dangerous voltage drop on the spring-contact connection. This allows the appropriate selection of the contact shape.

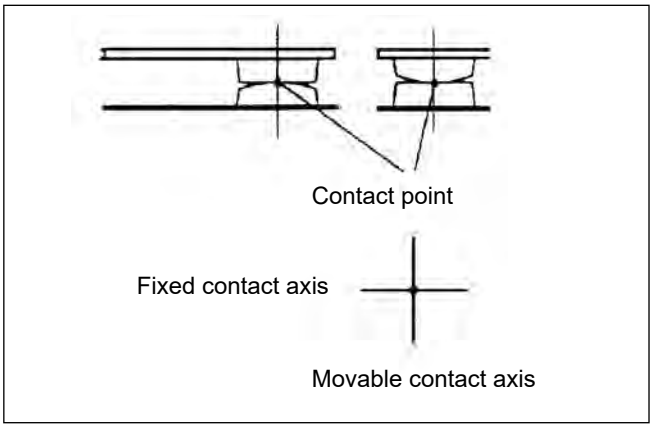
Fig. 14. Small-profile contact



Cross contacts

While using small-profile contacts it is possible to design a contact coupling with cylindrical surfaces and perpendicular axes. This way, a limited contact area and high contact pressure may be obtained. Moreover, during switching, two contacts operate like ”two knives”, thus maintaining a very clean contact surface.

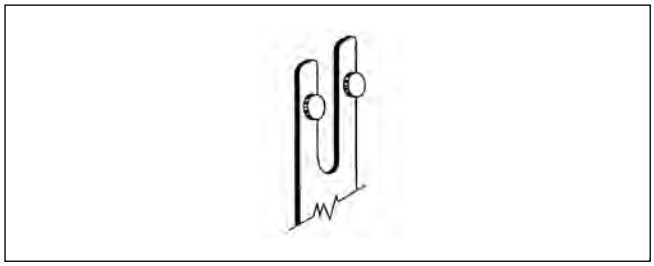
Fig. 15. Cross contact



Twin contacts

For some applications (e.g. low-level signals - safety systems), in order to enhance the contact reliability, twin contacts are used. Small-profile rivets or contacts are placed one next to another on the same forked spring (springs of fixed and movable contacts). Thus, duplication of the contact points may reduce the probability of error occurrence by half.

Fig. 16. Twin contact



Contact materials

In the issues related with switching, contact materials and special alloys play an important role, and each application requires the appropriate assessment of the electric load, ambient conditions and other information in order to make the proper choice.

Surface finishing

Precious contact materials are widely used due to their high conductivity. However, it is silver and its alloys that are exposed to the effects of the surface corrosion caused by sulfur contaminations in the atmosphere (SO_2 - sulfur dioxide). Layers of sulfur deposit on the contact surfaces, which is highly harmful to the contact resistance. The aforementioned materials may be plated with gold or another noble metal (metals that are more resistant to corrosion and/or oxidation, i.e. platinum, palladium, etc.).

Cleaning

Cleanliness is very important for the process of relay assembly due to the necessity to keep the internal parts of relays free of dust and other particles which may affect the area between the contacts and disturb the proper course of switching operations. That is why contacts, working parts and (in some applications) the whole relay without a dust cover are cleaned immediately prior to their enclosing.

Plastic contaminants

Due to temperature, internal parts of the relay made of plastic may produce gases and vapors. If they are not removed from the relay, they may deposit on the contact surface, which will increase the contact resistance. This is often the case in tight relays where it may appear extremely dangerous if the plastic has not been previously treated in a special manner. The treatment consists in high-temperature degassing process in which, at low atmospheric pressure, plastics emit gases and vapors. The process ends with stabilization of the ambient pressure which allows avoiding reactions inside the relay that might occur in the presence of humidity and oxygen.

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Contact resistance and influencing factors

The main function of electric contacts is to close an electric circuit to provide flow of current (I) at voltage (U). This "simple" operation requires certain special characteristics of contacts, which depend on materials, shapes, mechanical parameters, etc. When current (I) flows through an electric circuit, the circuit resistance (R) reacts against the current flow according to the following rule: **U = R x I**

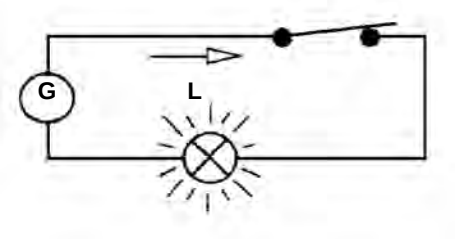
The value of R consists of two different resistances: **circuit resistance R_c and contact resistance R_r**.
Thus:

$$R = R_c + R_r \text{ oraz } U = I \times (R_c + R_r)$$

The dissipated power **P_w in the entire circuit** equals:

$$P_w = P_c + P_r = (R_c + R_r) \times I^2$$

Fig. 17. Basic circuit



G = Generator **L** = Load

The value of the circuit resistance R_c usually spreads evenly along the length of the circuit (cables, wires, printed circuits, etc.), and P_c dissipates in the same manner (low increase of temperature); on the other hand, however, R_r is entirely concentrated inside the relay (problems related with the temperature rise). This proves the extremely important role of maintaining the relay contact resistance on as low a level as possible. This is important in applications of both high and low power. In the first instance, there is the problem of temperature rise inside the relay whereas in the second case high contact resistance may disturb the proper operation of the device.

Question:
Find the values of power (W) dissipation in the relay contact circuit under the following circumstances:
- electric load: I = 5 A, U = 250 V AC,
- relay contact resistance (mΩ):

a) 10 mΩ
b) 50 mΩ
c) 300 mΩ
Solution:
a) $R_c \times I^2 = 10\ m\Omega \times (5\ A)^2 = 0{,}25\ W$
b) $R_c \times I^2 = 50\ m\Omega \times (5\ A)^2 = 1{,}25\ W$
c) $R_c \times I^2 = 300\ m\Omega \times (5\ A)^2 = 7{,}50\ W$

Based on the above, it may be stated that the power dissipation inside the relay reaches undesirable levels at high contact resistance.

Question:
Find the value of the voltage drop caused by the relay contact resistance in the next circuit under the following circumstances:
- electric load: I = 1 mA, U = 5 mV,
- relay contact resistance (mΩ):

d) 10 mΩ
e) 100 mΩ
f) 400 mΩ
Solution:
The voltage drop on the contact equals:
d) $R_c \times I = 0{,}01 \times 0{,}001 = 0{,}01\ mV$
e) $R_c \times I = 0{,}10 \times 0{,}001 = 0{,}10\ mV$
f) $R_c \times I = 0{,}40 \times 0{,}001 = 0{,}40\ mV$

High values of resistance cause a significant percentage of voltage drop which may be dangerous in some devices. This is important because high contact resistance usually means instability of the contact resistance. In applications of low-level signals (measurements, etc.) the capability of reaction to the contact resistance is a fundamental requirement. The following factors affect the contact resistance:
- contact pressure,
- materials,
- surface finishing,
- cleaning,
- internal contaminations of the plastic relay parts.

Each individual influence must be taken into account.

Alloys and contact materials

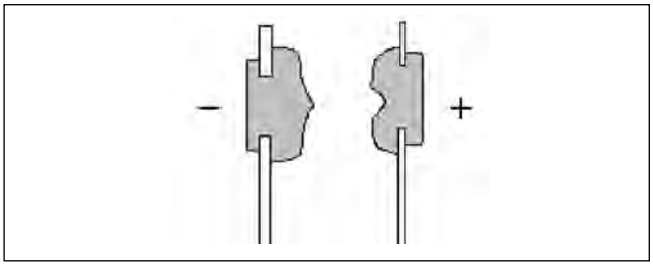
The choice of the contact material depends on the application. The following are the most commonly used materials:

Silver Ag
Pure silver (99% Ag) is of the highest electrical and thermal conductivity as compared to any other known metal, and it proves good resistance to oxidation but it is affected by the presence of sulfur in the atmosphere. The sulfur forms silver sulfide which increases the contact resistance. In order to avoid the problem, the contact surface is plated with gold (5 µm) as the latter remains free of silver sulfide (no chemical reaction). This is a good version of the contact widely used for switching low-level loads from µV to 24 V DC and AC, and from µA to 0,2 A, and in any case with no electric arc as it might damage the layer of gold and expose silver to the harmful presence of sulfur.

Silver - cadmium oxide AgCdO
This compound (90% Ag - 10% CdO) has a wide range off applications in power loads owing to its good resistance to welding and the effect of electric arc suppression. The compound may be used from 12 to 380 V AC and from 100 mA to 30 A. It is used particularly for resistive and inductive applications such as motor loads, heating resistors, lamp loads, solenoids, etc. The material is a standard one to meet most of the requirements of the customers. The problems related to sulfur do affect it but the presence of electric arc and relatively high voltage and intensity of current make the problem imperceptible (the electric arc and voltage pierce the sulfide layers).

Silver - nickel AgNi
The alloy (90% Ag - 10% Ni) is the most suitable one for switching DC loads and avoiding material transfer that appears at DC and at medium voltage and intensity of current (1-10 A; 6-60 V DC). This is a physical phenomenon of moving the material from one contact to the other (from cathode (-) to anode (+)). This results in quick wear of contacts and dangerous reduction of the contact clearance.

Fig. 18. Transfer of contact material



Tungsten
This is the hardest material, highly resistant to sticking. It has, however, a relatively high contact resistance. Because of these characteristics it is usually used in electric circuits where short current peaks appear, and where the material prevents the contacts from welding to each other: leading loads, motor loads, lamp loads (especially fluorescent lamps), etc. The range of applications starts from 60 V and 1 A.

Silver + tin oxide (tin dioxide) - $AgSnO_2$
The $AgSnO_2$ material is of similar properties to those of AgCdO. However, the former has a higher thermal stability and better resistance to transfer of material from one contact to the other, which provides longer life in DC applications. The $AgSnO_2$ contacts wear evenly and they are recommended for applications at the loads that create inrush current and at inductive loads.
The contact ratings depend to a great extent on the level of the oxide in the compound, the manufacture method and the presence of admixtures which are used by contact materials manufacturers mainly to reduce the contact resistance and to enhance the resistance to material transfer.
The $AgSnO_2$ material offered by Relpol S.A. in miniature relays contains a low admixture of indium oxide (In_2O_3) which is a universal material. Apart from good results achieved at lamp loads, the material performs perfectly at resistive loads and switching currents up to 16 A.

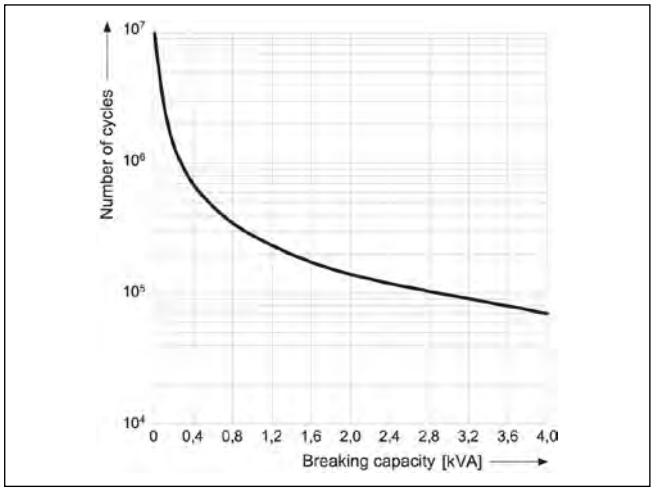
Gilding - Au
Contact gilding with 0,2-0,5 µm gold layer is usually applied in order to protect the basic material from oxidation during product storage. The protective gilding is not resistant to mechanical wear and it is quickly destroyed in course of the relay switching. Contact gilding with 3-5 µm layer of gold is used as protection from corrosion and to enhance signal circuits switching. Thick gilding provides the lack of microscopic pores, perfect resistance to corrosion and to formation of non-conductive layers.
However, gold is very soft, easily becomes mechanically worn, and its low melting point may limit the electric life of the contacts which switch high currents.

Electric life of relays

The electric life or switching capacity is expressed as the minimum number of cycles which the relay may perform at a given load and under certain circumstances. The ”cycle” means a full switching operation from OFF state to ON state and to OFF state again. The electric life ends when the contacts are no longer capable of switching electric load within the range of the contact resistance (or contact voltage drops) which stops the switching operations after it has reached a higher value (the limits depend on the application). The specifications of relays indicate the electric life as the number of cycles at rated current and voltage, and at constant frequency and ambient temperature.

For example, the electric life of the RM85 relay is:
Number of cycles: 7 x 10^4 at 16 A and 250 V AC - 50 Hz, resistive load, 600 cycles/hour - ambient temperature 85 °C.
In practice, customers require electric life also at lower values of current intensity. Thus, on the basis of tests, the curve of electric life is defined and the curve shows the dependence of electric life (number of cycles) on switching capacity (Fig. 19).

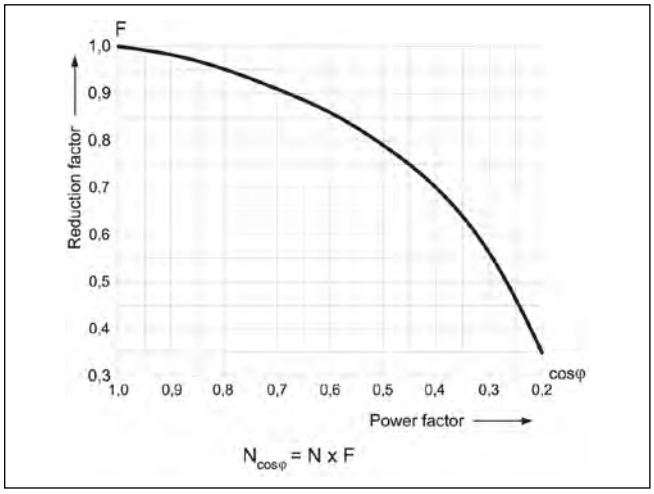
Fig. 19. Chart of electric life of a relay



Inductive loads cause high contact wear which reduces the relay life. The reduction has been defined on the basis of tests, and it is expressed as the correction factor for resistive electric life (depending on the load power factor) which should be used to define the projected life.

Question:
What is electric life of the RM85 type relay for the following electric load: 8 A / cosφ = 0,4 / 250 V AC; 600 cycles/hour. The chart in Figure 19 shows that the projected life is approximately 150 000 cycles at resistive load (cosine = 1).
The chart presented in Fig. 20 proves that at the cosine power factor which equals 0,4 the correction factor is 0,7. Thus, the projected electric life under the aforementioned conditions is 150 000 x 0,7 = 105 000 cycles.

Fig. 20. Ratio of correction coefficient to power coefficient



Reliability

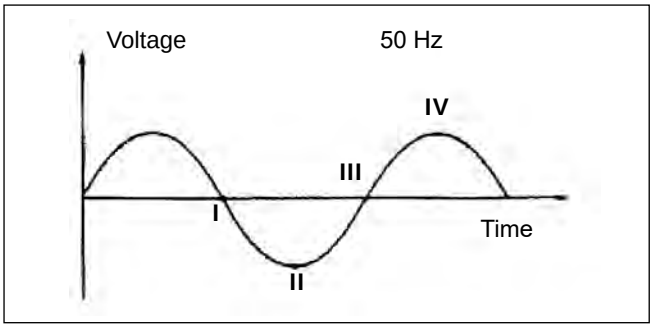
Charts of electric life of a relay in the function of load power are useful in estimating the reliability parameters. The value found in such charts may be used for defining the statistical parameter of B10 life, i.e. the number of cycles following which 10% of the relays population will fail. Electromagnetic relays are unreparable elements and, thus, any damage to them in a device means the necessity of replacement. Given the frequency of operations of a relay in a device and the number of cycles defining its life, the mean time to failure (MTTF) may be estimated, which may then be used for calculation of MTBF for the device.

Switching at alternating and direct current

Various problems occur at switching AC and DC loads of high power, and various aspects shall be taken into account in order to understand the nature of the phenomenon. In AC current circuits (of the frequency approx. 50 - 60 Hz), the relay contacts may open in two possible states of the operating voltage due to the course of the voltage and the phenomenon of the electric arc (see Fig. 21).

Switching at point I:
Voltage value is close to zero.
No electric arc occurs.

Fig. 21. Switching states (I, II) at the frequency of 50 Hz of alternating current



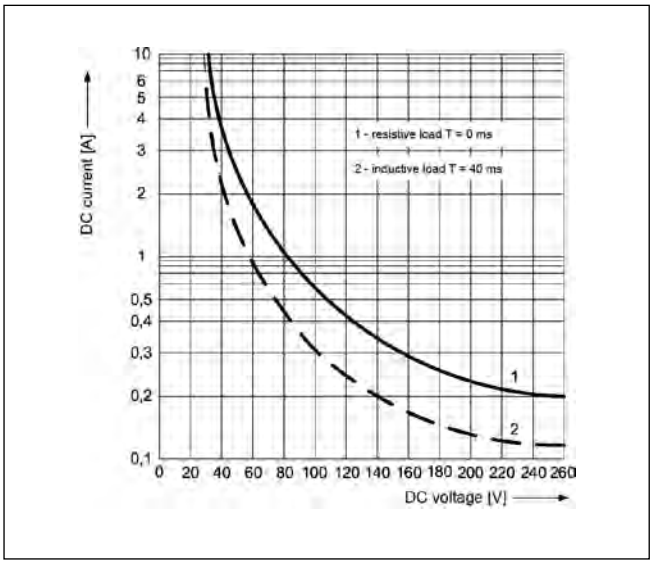
Switching between points I and II:
There may be two situations in which the voltage grows or drops. In both cases, arc discharge occurs but it is suppressed due to the transfer of the voltage via the zero value. The electric arc discharge depends on the voltage value, contact clearance, current intensity, shape of contacts and on materials. Due to these reasons, in miniature relays there are physical limits related to the above parameters, which reduce the maximum AC switching voltage to approximately 380 V. The inductive loads of AC are worse as compared to the resistive loads due to contacts wear since the load inductance grows and, thus, a constant arc appears together with its harmful effects.

Arc breaking

In DC devices, the arc breaking is a crucial problem because the voltage does not transfer via the zero value as it does at alternating current. Thus, when the electric arc appears, only the contact clearance and the properties of the contact materials contribute to the arc suppression. Relays usually have a physical limit that depends on the above parameters which make the relays incapable of switching the load at current intensity and voltage higher than the specified values. The values are expressed in the form of a curve which defines the maximum switching energy (U x I) at the constant time value L/R of resistive and inductive loads while L (inductance) is expressed in henries and R (resistance) in ohms.
L/R is principally expressed as a value that equals 40 ms (miliseconds) for inductive loads, i.e. a mean value for devices.

Example (Fig. 22):
The maximum admissible switching intensity of direct current for the R3N relay at 230 V DC at resistive and impedance loads are 210 mA and 120 mA respectively. The values assure the arc suppression. Suppressing circuits are also useful for alternating current devices.

Fig. 22. Maximum switching capacity at direct current



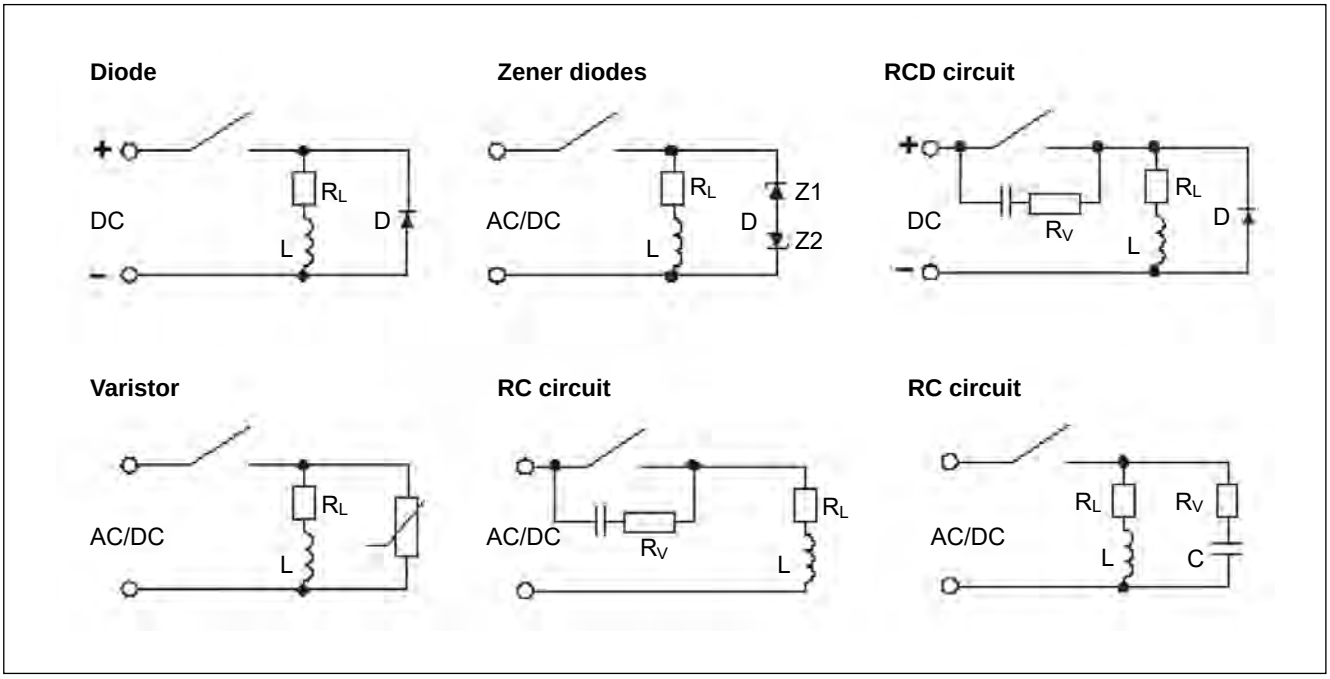
Suppressing circuits

In order to protect contacts against their damage by electric arc, protection circuits are used which are fitted in parallel to contacts of the relay or to the load. Appropriate suppressing elements may also be connected both to the contacts and the load.

The most common method of arc suppression in DC circuits is using a **diode** in parallel to the load. This is an efficient and cost-saving solution applicable at various values of the load. The inverse voltage of the diode should be at least 10 times higher than the rated voltage of the circuit, and the conduction current should be equal to or higher than the load current. It must be emphasized that diodes prolong the time of switching off the relay considerably, which delays opening of the contacts and this is conducive to their burnout.

In order to decrease the effect of the arc suppressing circuit, on switching off the load, **two Zener diodes** may be used instead of the diode parallel to the load. In such a circuit, the inverse voltage is limited by Zener diode do the regulated voltage. The breakdown voltage of the Zener diode must be higher than the supply voltage of the circuit. The disadvantage of this solution is its lower effectiveness and higher cost.

Fig. 23. Protection circuits

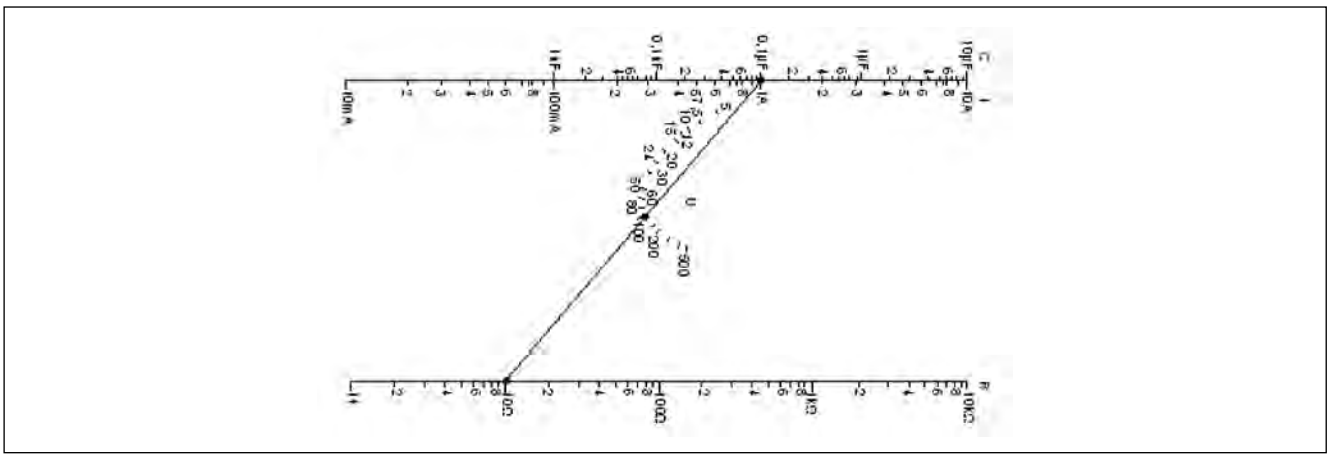


A **varistor** is another protection element of current-voltage ccharacteristics similar to Zener diode. For low voltages it shows high resistance and, then, it is practically disconnected from the circuit whereas when the voltage exceeds certain voltage, characteristic for the given varistor, its resistance decreases quickly and, then, it shunts the inductive load with its internal resistance.

Unlike diode and varistor circuits, **RC circuits** may be connected in parallel both to the load and to the contacts of the relay. When the contact opens, the capacitor connected in parallel starts charging itself and its voltage grows at the time constant of R and C values. This helps to maintain low voltage on the relay contacts and, thus, diminish the effect of the electric arc. Ehen the contact closes, the capacitor connected in parallel to the capacitor consists limitation of current. Thus, the RC circuit optimizes all the intermittent processes in the course of opening and closing of the contacts. At AC voltages the load impedance must be lower than the RC circuit impedance.

In order to enhance the effectiveness of arc suppression in direct current circuits of high inductiveness of the load, **RCD circuits** may be used, where the RC element is connected in parallel to the relay contact and the diode - in parallel to the load.

Fig. 24. Nomogram for defining optimal values of R and C



Special loads

Bulb load

Closing of the contact with bulb loads (a lamp with tungsten fiber) causes problems due to high current peaks related with the low resistance of the fiber when it is cold. For example, a 60 W - 220 V AC bulb has the ”cold” resistance of approximately 60 Ω which corresponds with a current intensity of 3,66 A (for a few milliseconds). On the other hand, the current intensity of a hot bulb is 0,273 A (the ratio is then 1:15). This illustrates the high load that occurs on the contacts during the bulb switching (a hazard of contact welding or sticking).

The following must be taken into account for bulb load switching:
- maximum load of the bulb,
- contact material.

For example, for the RM96 relay with AgCdO contacts the maximum admissible bulb load is some 1,000 W which corresponds with the current intensity of 4,5 A and the alternating current voltage of 220 V. In other relays of higher loads the contacts are made of $AgSnO_2$.

Motor loads

The motor loads are inductive loads which operate in a particular manner while switching on. A current peak occurs as a result of the motor inertia which is related to the mechanical load used in the motor, and which in the starting phase is 5-10 times higher than the current in the steady state. Furthermore, when the motor is being switched off, harmful action related with impedance loads occurs. Thus, the correct choice of contact material is related with the aforementioned load characteristics, especially when the capacitor is connected to the motor. In such particular cases, the contacts are made of tungsten and $AgSnO_2$. The motor load is usually expressed in HP (horsepower) where 1 HP equals approximately 745 W.
Example: R15 relay - the rated motor power of the contact is 1/2 HP.

Capacitance loads

This is the worst contact load as for switching on due to a sudden increase of the current intensity peak which occurs when the capacitor is discharged (a phenomenon similar to a short circuit). The current intensity at the peak to be switched on may reach the values of hundreds of Amperes in a very short time (microseconds).

The problem of contact welding may be avoided in two ways:
- via using the $AgSnO_2$ contacts,
- via reduction of the current intensity peak by introduction of a resistor to limit the current.

The same problem occurs at contacts closing with a charged capacitor, i.e. a rapid discharge occurs.

Switching time and contact bounce

On the relay coil supply during opening and/or closing, the operation lasts in time depending on the electric and mechanical inertia of the parts. The delay between the coil supply impulse and the preset closing and/or opening of the contacts is the sum of the effect of the electromagnetic system and the switching section.

Electromagnetic system

The current flows through the coil with the delay caused by the coil inductance which resists to the current stream. Furthermore, the movable parts such as the armature and the pusher react to the movement due to the action of the magnetic stream.

Switching section

The elastic forces stored in the contacts and springs, and their elastic strain, react to the movement of the relay parts. The phenomenon is also affected by the inertia of the contacts mass. The delay times of the miniature relays usually reach the value of a few milliseconds (5-15 ms) during the switching phase. During the release phase the operating time is shorter due to the absence of the magnetic circuit delay. It is really so that on removing the supply voltage from the terminal, the current that flows through the coil wire stops suddenly and the relay is released with the elastic energy stored in the contacts.

Fig. 25. Switching time

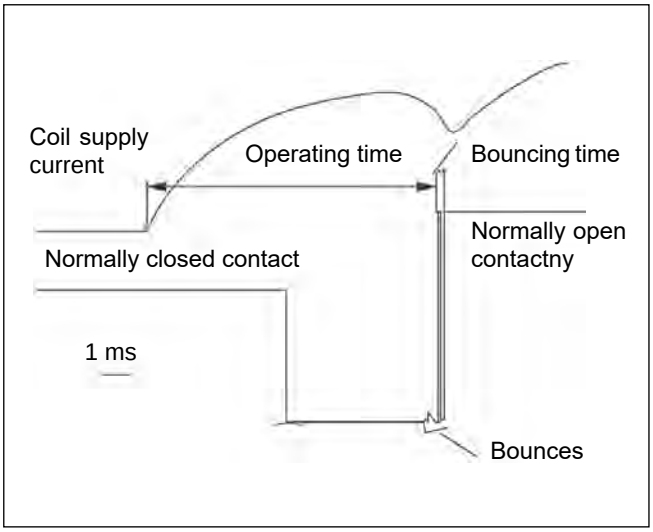
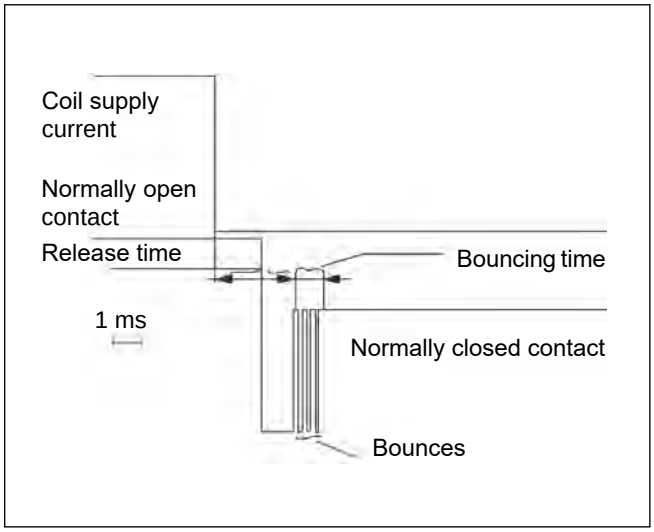


Fig. 26. Release time



The **operating time** of an inactive relay is the time interval from the moment of the supply of the voltage to the relay coil to the time of the first closing (or opening) of the contact.
If the relay has more than one contact, the time of closing (or opening) of the last of the contacts is taken into account.
The operating time includes the time of opening the normally closed contact and the time of closing the normally open contact.

The **release time** of the active relay is the time interval from the absence of the supply voltage to the first opening (or closing) of the contact.
If the relay has more than one contact, the time of opening (or closing) of the last of the contacts is taken into account.
The release time includes the time of opening of the normally open contact and the time of closing the normally closed contact.

Bouncing

In the phases of switching and release, when the contacts close, they never perform the operation at the same time but the clash between two contacts makes the contacts bounce. The ”contact bouncing” cause constant closing and opening of the contacts. This particularly affects the contact ratings such as electric life and signal switching.

Sinusoidal vibrations

The electromechanical relay is strongly affected by dynamic phenomena which may change its projected characteristics constantly or temporarily. The devices in which vibrations occur must be thoroughly tested so that we might find out the quality and essence of the stress. Machine tools, automotive devices, assembly machines, and principally every instrument in which the electronics of the drive is affected by the presence of movable parts (motors, vibrators, valves, etc.), may be exposed to the consequences of the problem. Relpol S.A. usually tests the relays via exposing them to sinusoidal vibrations at the constant acceleration (G) within a particular range of frequency. Moreover, the relays are tested along the main axes (x, y, z) and in two basic directions for each axis. As a rule, the relays are tested with the printed circuit board mounted (sockets, materials, etc.).
The tests are made in two stages, i.e. resonant test and fatigue test. The relays are tested at the states where the coil voltage is on or off. The contact continuity is monitored with an oscilloscope at a low-level load on the contacts. The test allows defining of the frequency range [Hz] and maximum value of the acceleration, at which the relay may operate with no loss of contact continuity (interval of 10 μs) or without any durable damage. The standard values (which meet the requirements of a wide line of devices) for miniature relays reach 10 G at the frequency range from 25 to 100 Hz. The values refer to the worst case which usually occurs in the most critical test conditions (the relay with no supply in a given axis of vibrations). For tests at a low frequency range (a few hertz), instead of the constant acceleration, a constant movement is simulated which corresponds with a given value of acceleration (e.g. from 10 to 25 Hz for the amplitude of 2,5 mm). The tested frequency at which the constant movement changes into the constant acceleration is called the ”transition frequency”, e.g. at 55 Hz 10 G it corresponds with 1,5 mm.

Current surges

The maximum value for miniature relays is 10 G for maximum peak acceleration and 11 ms of the impulse duration. As for the sinusoidal vibrations, the sample shall be subject to an ohm test for surge both at the ON and OFF states within the arrangement of the three main axes (x, y, z), in two basic directions for each axis. Three surges shall be applied to each state. The tested relay shall not open the contacts (10 μs interval), and it must operate perfectly at the end of the test.

Hermetic relays - soldering and cleaning

The necessity to use tightly closed and hermetic parts in devices arises from two different reasons, i.e. protection of the internal parts (contacts, mechanisms, wires) from penetration of the stream in the process of soldering and cleaning, and protection of the internal parts from atmospheric contamination.

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Soldering process

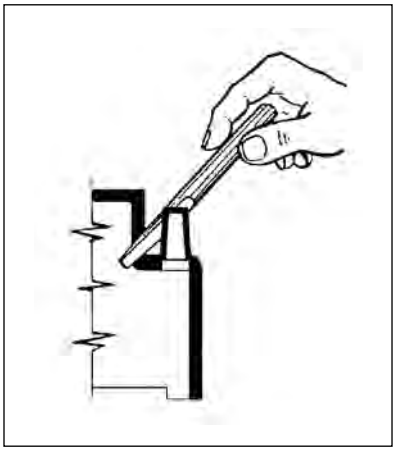
The contemporary electronic technology widely uses automatic soldering processes for mounting elements on printed circuit boards. This allows soldering of the whole circuit at one stage. The melted tin in a special machine forms a wave that "touches" the bottom side of the circuit to solder the terminals (pins) of the elements with the copper paths of the circuit. Prior to this operation, the circuit is sprinkled with a liquid (stream) which supports soldering via prevention from copper oxidation. There are many various types of such liquids composed of organic and non-organic acids, but all of them are more or less harmful to the internal parts of the relay and for other elements.

Thus, it is important that the circuit should be cleaned following the soldering process. Commonly used methods of cleaning are washing with hot water or washing with fluorocarbons with or without the use of ultrasounds.
It is obvious that the materials used for the construction of relays (anti-dust cover, sealing resin, print paints) must be physically and chemically resistant to the cleaning chemicals which they contact. With each individual application, it is important to know the processes and sometimes the reactions between the relay and the chemicals must be examined.

Environmental contamination

The environment of the relay may adversely affect its operation. Humidity, industrial air, dust and particles that penetrate the inside of the relay may affect the contacts, internal parts and isolation. The environmental conditions in which the relay and the device will be used shall be analyzed in order to avoid such problems as resistance growth and corrosion of the metallic parts.
If the ambient conditions are not arduous and/or the electric load of the contacts is not critical (cleaning presence of the arc), it is better to open the relay following the soldering and cleaning processes to allow the useful exchange of the air with the external atmosphere.
What is important for the thermal exchange (high switching power) is the gas emission caused by the electric arc and the residual contaminations with plastics. As explained before, the process of sealing the relay includes degassing of plastics, filling the relay with inert gas (nitrogen), and the process of label closing or other methods.

Fig. 27. Opening of the relay

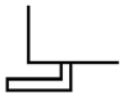
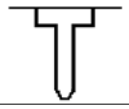
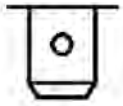


Leadless soldering

Eliminating of the lead used in the solders required both changing of the material and the production process which had to be adapted to different properties of the leadless materials.
The differences between the physical properties of lead alloys and their leadless equivalents available on the market are significant and, thus, the applicable features of soldering alloys shall be thoroughly considered, and the flux must be precisely selected in order to provide optimal conditions for the process. Generally, leadless alloys have slightly higher melting point, higher surface tension and lower moistening than SnPb. This may cause production problem, i.e. damages to components due to thermal impacts, deforming of the PCB's, flux splashes, extending of the operation time to good joining, deforming of plastics, etc.

Sn97Cu3 and Sn99Cu1 are good materials for soldering internal elements and for covering the terminals. They are modern alloys widely applied in electronics owing to their good physical properties. They are also a good and popular alternative for Sn60Pb40 and Sn63Pb37.
In order to provide good tin-plating and soldering of the terminals, it is important to select appropriate flux. Higher melting point of leadless alloys results in higher oxidation and lower moistening and, thus, appropriate flux must be selected and its quantity shall be adapted to the temperature profile of the process. Too much heat delivered may cause evaporation of flux before it moistens the solder, and use of stronger, aggressive fluxes in higher quantities may require introduction of the operation of washing away the residues of the soldering process.

Types of relay terminals

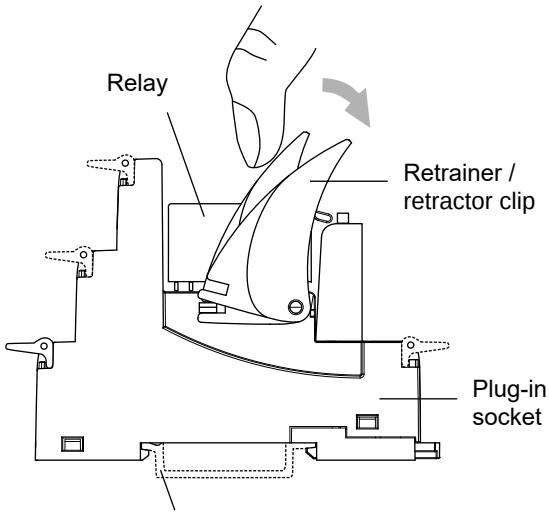
Surface mounted terminals (SMT)	
PCB mounted terminals	
Terminals to solder wires and for sockets	
Terminals for flat slide-in (faston) connections	

In miniature relays of high power to be mounted on printed boards universal terminals are made so to provide fitting the relays also in sockets mounted **on 35 mm rail mount**. Then, relay terminals are connected to wires with screw terminals of the socket. This allows mounting miniature relays on a mounting board and enhances technical service of the device. Sockets are fitted with retrainer / retractor clips which facilitate dismounting of the relay and, when it is mounted in the socket, the lever serves as a reliable latch which secures the relay on the mounting board.

Electrical connections to voltage and current sources are made with appropriate joints and wires of cross-sections specified in the table aside.

While mounting relays **on printed boards**, the openings on the board must match the raster of the relay terminals and have appropriate diameter, which shall enable its easy connection. Otherwise, terminals may be bent, contacts deformed or the cover tightness may be disturbed. Printed paths from the relay contacts should be as wide as possible, which results in lower losses in the course of current flow and good removal of heat from the contacts. For the purpose of providing good insulation strength, it is necessary to arrange the circuits appropriately on the board and to apply protection mask.

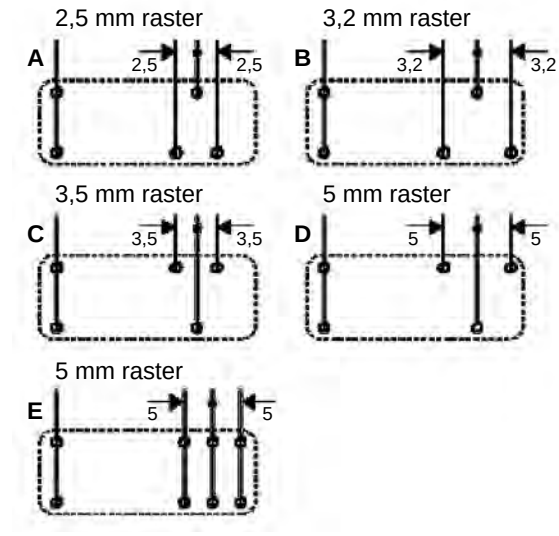
Fig. 28. In course of mounting of the relay in the socket, the clip functions also as a relay protective latch.



35 mm rail mount acc. to PN-EN 60715

Current flowing via terminal [A]		Wire and stranded conductors
above	including up to	cross-section [mm^2]
–	3	0,5
3	6	0,75
6	10	1
10	16	1,5
16	25	2,5
25	32	4
32	40	6
40	63	10

Fig. 29. Typical rasters of terminals of miniature relays



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relpol® S.A.

The table shows various **limiting currents** of printed circuits of different thickness of the copper layer and with various conducting paths.

Load current [A]	Width of the copper printed path [mm]			
	Copper thickness 70 µm		Copper thickness 35 µm	
	Single-side path	Double-side path	Single-side path	Double-side path
16	8	5	inadmissible	inadmissible
14	6,5	4	inadmissible	inadmissible
12	5	3	7,5	5
10	3,5	2	6	4
8	2,5	1	4	2,5
6	1,5	is not applied	2,5	1,5
4	1	is not applied	1,5	1
2	0,7	is not applied	1	is not applied

International standards

Relays manufactured by Relpol S.A. are designed and tested in compliance with the requirements of the following international standards:

PN-EN 61810-1 Electromechanical non-specified time all-or-nothing relays. Part 1: General requirements.

PN-EN 61810-5 Electromechanical non-specified time all-or-nothing relays. Part 5: Insulation coordination

PN-EN 60664-1 Insulation coordination for equipment within low-voltage systems. Part 1: Principles, requirements and tests.

PN-EN 116000-3 Generic Specification: Electromechanical all--or-nothing relays. Part 3: Test and measurement procedures.

PN-EN 61812-1 Adjustable time relays for industrial purposes - Requirements and tests

PN-EN 61131-2 Programmable controllers. Part 2: Requirements and equipment tests

Plug-in sockets manufactured by Relpol S.A. are designed and tested in compliance with the requirements of the following international standard:

PN-EN 61984 Connectors - Safety requirements and tests.

Insulation

The classification of insulation groups to define the properties of insulation of the device in compliance with the insulation coordination was previously done according to the VDE 0110 Standard.
Electric devices were classified in insulation categories A, B, C or D due to their application and possible reduction of the insulation properties caused by the impact of the environment, i.e. dust, humidity, aggressive gases, insulation clearance and creepance.
The insulation category was indicated together with the reference voltage which was the basis for defining of the requirements related to the insulation distances for rated voltage up to the reference voltage value.

At present, while dimensioning the insulation distances in accordance with the PN-EN 60664-1 Standard, the overvoltage category and the ambient pollution degree must be defined. The latter indicates the expected pollution of the microenvironment. The transient overvoltage values are the basis for defining the rated surge voltage which determines the minimum contact clearance related with the insulation coordination.

The following **overvoltage categories** are defined:
IV - devices at the front of the installation,
III - devices in fixed installation in cases where reliability and availability of the device is subject to special requirements,
II - receiving devices supplied from the fixed installation,
I - devices connected to circuits where measures have been taken (either in fixed installation or in the equipment) to limit transient overvoltage to the appropriately low level.

Four **pollution degrees** have been defined to estimate the contact creepance and clearance:

1 - no pollution or only dry and non-conducting pollution; the pollution has no effect,

2 - only non-conducting pollution occurs; the vapor condensation, however, may be expected to cause temporary conductivity of the pollution from time to time,

3 - conductive pollution or dry and non-conductive pollution occurs which may become conductive due to condensation,

4 - the pollution proves constant conductivity caused by the conductive dust, rain or snow.

The **rated surge voltage** is defined on the basis of the overvoltage category and the rated voltage of the device.

The rated voltage of the supply system according to PN-IEC 60038		Phase voltage defined on the basis of AC or DC nominal voltages up to the value of	Rated surge voltage			
			Overvoltage category			
Three-phase	Single-phase		I	II	III	IV
	120-240	150	800	1500	2500	4000
230/400		300	1500	2500	4000	6000

The **insulation creepance** are dimensioned on the basis of the following factors:

- root-mean-square value of rated voltage,
- pollution degree,
- group of insulation materials.

Insulation materials are divided into four groups with reference to the value of the indicator of resistance to creeping current:

Group I 600 ≤ CTI
Group II 400 ≤ CTI ≤ 600
Group IIIa 175 ≤ CTI ≤ 400
Group IIIb 100 ≤ CTI ≤ 175

Insulation materials testing

1. Glow wire test

The test simulates exposure to heat originating from such heat sources as glowing parts or overloaded subassemblies in order to assess fire hazard.

The consistency with the requirements for resistance to heat and fire is checked in glow wire test at the temperature of 650 °C.

Some applications of the relay extort more strict requirements. The PN-EN 60335-1 Standard: "Household and similar electrical appliances", provides that the insulation parts supporting elements which conduct current higher than 0,2 A must meet the following requirements as for resistance to fire:

a) GWFI (Glow Wire Flammability Index) with a value 850 °C according to the PN-EN 60695-2-12 Standard.
b) GWIT (Glow Wire Ignition Temperature) with a value 775 °C according to the PN-EN 60695-2-13 Standard.

2. Ball pressure test

The purpose of the test is to assess the resistance of the material to mechanical pressure at higher temperature with no significant deformations.

The test is performed in a heating chamber at higher temperature, where a steel ball of 5 mm diameter is pressed to the surface of the sample with the force of 20 N. The diameter of the indentation shall not exceed 2 mm. The test is made under PN-EN 60695-10-2 Standard.

3. Resistance to proof tracking

The test shows relative resistance of solid insulation materials to proof tracking for voltages up to 600 V when the surface of the insulation, at electrical tension, is exposed to contaminated water.

Proof tracking is probable between parts of different potential and between live parts and earthed metal parts.

Compliance with the requirements is checked under the PN-EN 60112 Standard for PTI index.

In case the type of the relay application requires more strict requirements, PTI 250V, PTI 400V or PTI 600V proof tracking resistance indices shall be assumed.

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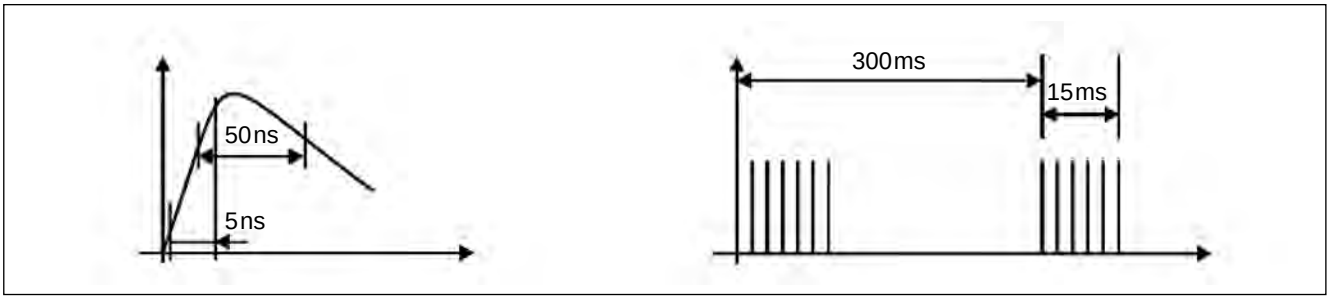
Electromagnetic compatibility

Electromagnetic compatibility is the ability of an electric or electronic appliance to operate correctly in a given electromagnetic environment and not to emit disturbances not tolerated by other appliances which operate in the same environment. The relay is insensitive to high frequency disturbances but presence of high power electromagnetic fields in the proximity of the relay coil may affect making and releasing voltages of the relay. On installation of a relay in the proximity of transformers, electromagnets and electric motors, it is recommended to check making and releasing of the relay.

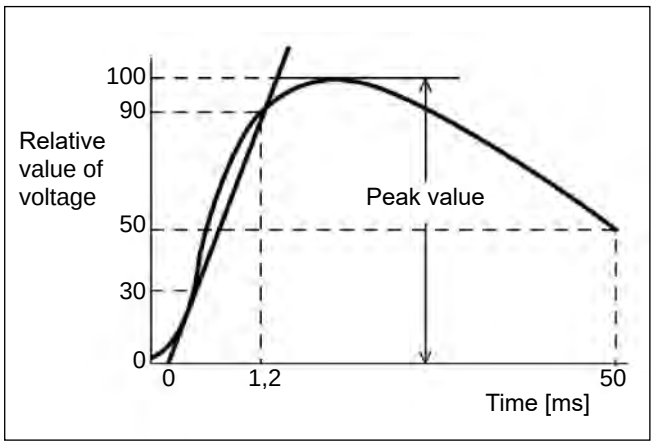
An electromagnetic relay may initiate disturbances, particularly when operating with inductive load of contacts. An electric arc occurring while switching, and overvoltage cause emission of disturbances which may affect the operation of a sensitive electronic appliance in the proximity of the relay. In such cases, circuits of protection of contacts shall be applied, which will allow decreasing the level of disturbances to a safe level. Relays, as components, are not covered with the **EMC** Directive. However, each electric appliance which includes relays is covered with the Directive and subject to its requirements.

EMC test	Standard
Resistance to electrostatic discharges	PN-EN 61000-4-2
Resistance to electromagnetic field of radio frequency	PN-EN 61000-4-3
Resistance to quick pulse beams	PN-EN 61000-4-4
Resistance to surges	PN-EN 61000-4-5
Resistance to conductive disturbances induced by fields of radio frequency	PN-EN 61000-4-6
Resistance to voltage dips, short breaks and changes	PN-EN 61000-4-11
Measurements of radiated and conducted emissions	PN-EN 55011

The most frequent disturbances in installations are quick, repeatable transient states - beams of electric disturbances called **BURST**. These are transient disturbances occurring in supply, signal and control connections. They origin from transient switching states and occur on switching by the contact of inductive loads - electromagnets, motors, etc. They have the form of a beam of high voltage and low power pulses, as the pulse increment time is merely 5 ns and its duration is 50 ns. In tests the duration of a pulse beam is defined as 15 ms, and the period - 300 ms.



Another type of disturbances occurring frequently, due to atmospheric discharges, in low voltage installations are surges (**SURGE**) in supply lines. Similar disturbances may be also caused by connection processes of high power, e.g. switching of leading loads, etc.
Surge pulses are of definitely higher power than burst pulses due to much longer duration - 50 µs.



Protection against ambient effect

As for the protection from **ambient effect**, the PN-EN 116000-3 Standard distinguishes the following types of relays:

RT0 - open relay - a relay without protective cover.

RTI - dustproof relay - a relay with cover to protect its mechanism from dust.

RTII - relay resistant to soldering alloy - a relay adapted to automatic soldering process which prevents soldering alloy from spreading beyond indicated areas.

RTIII - liquid-proof relay - a relay soldered automatically and then subject to washing process for the purpose of removal of the residue of the liquid soldering alloy where the relay cover is prevented from being penetrated by the solder or the washing liquid.

RTIV - tight relay - a relay equipped with a cover with no ventilation openings; all the gaps are filled with a sealing compound to prevent penetration of liquids in course of production, flow soldering or washing. The tightness of relays is tested with a submersion test according to PN-EN 60068-2-17 Standard. During the test, the relays are submerged in distilled water of 85 °C for 1 minute while no air bubbles shall be released from the relay.

RTV - hermetic relay - a tight relay of enhanced tightness level, in a metal cover, terminals sealed with glass, gas-filled.

Cover protection degrees according to PN-EN 60529 Standard. The first digit refers to the protection from foreign solids penetration. The second digit refers to the protection from water penetration.

Examples of indications:

IP20 - protection against solids of the diameter of 12,5 mm and larger, with no protection against water penetration.

IP40 - protection against penetration of solids of 1 mm diameter and larger, with no protection from water penetration.

IP50 - protection against dust; dust penetration is not excluded entirely but dust shall not penetrate in quantities which might disturb correct operation of the appliance or reduce safety.

IP64 - dustproof protection, protection against water splashes - water splashed onto the cover from any direction does not cause harmful effects.

IP67 - dustproof protection, protection against the effects of momentary submersion in water.

Electric load

Electromagnetic auxiliary relays manufactured by Relpol S.A. are designed for a wide range of applications and for switching several loads of diversified characteristics.
Electric loads are classified according to their nature (resistive, capacitive or inductive loads), type of supply (DC or AC), load value and the current curve course shape (lamp, motor, electromagnetic, etc. loads).

Contact application categories according to PN-EN 116000-3 Standard

Application category	Voltage [V]	Current [A]
0 (CA 0)	< 0,03	< 0,01
1 (CA 1)	0,03 < U < 60	0,01 < I < 0,1
2 (CA 2)	5 < U < 250	0,1 < I <1
3 (CA 3)	5 < U < 600	0,1 < I < 100

Application categories according to PN-EN 60947-4-1 and PN-EN 60947-5-1 Standards

Application category	Typical application
AC-1	Resistive or slightly inductive loads, resistance furnaces
AC-2	Slip-ring motors: start-up, switching off
AC-3	Squirrel-cage motors: start-up, switching off motors during running time
AC-4	Squirrel-cage motors: start-up, reversing (countercurrent braking), pulsing
AC-5a	Discharge lamps
AC-5b	Electric bulbs
AC-6a	Transfomers
AC-6b	Capacitor banks

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Application categories according to PN-EN 60947-4-1 and PN-EN 60947-5-1 Standards

Application category	Typical application
AC-7a	Slightly inductive loads in household appliances and similar applications
AC-7b	Motors in household appliances
AC-8a	Hermetic refrigerant compressor motors with manual overload resetting
AC-8b	Hermetic refrigerant compressor motor control with automatic overload resetting
AC-12	Control of resistive loads and solid state loads with opto-isolators
AC-13	Control of solid state loads with transformer isolation
AC-14	Control of small electromagnetic loads (≤ 72 VA)
AC-15	Control of AC electromagnetic loads (> 72 VA)
DC-1	Resistive or slightly inductive loads
DC-3	Shunt-motors: start-up, breaking
DC-5	Series-motors: start-up, countercurrent braking, pulsing. Dynamic switching-off of DC motors
DC-6	Bulbs
DC-12	Control of resistive loads and solid state loads with opto-isolators
DC-13	Control of DC electromagnets
DC-14	Control of DC resistive loads having economy resistors in the circuit

Certifications

Compliance with national and international standards provides for safe use of the product, and proves high quality and durability of the product. In some countries (e.g. USA, Canada, Russia), the product certification to prove its compliance with the requirements of appropriate national standards is obligatory, and the product must undergo the procedure of compliance assessment at certifying agencies in order to be approved for sale. In other countries it is the manufacturer's responsibility to provide the compliance of the design and production with the requirements of appropriate standards (e.g. the countries of the European Union).
Certification agencies carry out the testing procedure in accordance to applicable standards, and then they regularly audit the production process in order to confirm that the requirements are observed in current production of the certified product. The European Union applies European Standards (EN) as set forth by the European Committee for Electrotechnical Standardization (CENELEC), and international standards set forth by the International Electrotechnical Commission (IEC).
The products manufactured and offered by Relpol S.A. have numerous certifications issued by renowned research institutions such as VDE, UL, CSA International, GOST or BBJ-SEP. The electromagnetic relays have been certified to comply with the following standards: EN 60255-1 and EN 61810-1 - VDE, BBJ-SEP, UL508 - Underwriters Laboratories, C22.2 - CSA International, GB14048.5 - China Quality Certification Centre. Apart from the certifications which prove the safety and high durability of the products, some of Relpol's products have certifications required for applications of relays in special conditions, e.g. Lloyd's Register certification which acknowledges compliance with the requirements for electrotechnical products to be used on vessels and in devices which operate in adverse climatic conditions, or certificates of AUCOTEAM GmbH, Berlin or Railway Institute to confirm meeting of railway requirements.

PRECAUTIONS:
1. Ensure that the parameters of the product described in its specification provide a safety margin for the appropriate operation of the device or system and never use the product in circumstances which exceed the parameters of the product. **2.** Never touch any live parts of the device. **3.** Ensure that the product has been connected correctly. An incorrect connection may cause malfunction, excessive heating or risk of fire. **4.** In case of any risk of any serious material loss or death or injuries of humans or animals, the devices or systems shall be designed so to equip them with double safety system to guarantee their reliable operation.

You have not found the relay you wanted? The catalog does not show the information about the switching capacity for the type of load you are looking for? Detailed contact data is presented on the last page of the catalog and at **www.relpol.com.pl**

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subminiature
and miniature relays

industrial and
installation relays

interface relays

NEED – programmable
relays

time relays

monitoring relays

solid state relays

plug-in sockets
for relays

RIK – installation
contactors

softstarts

power supplies

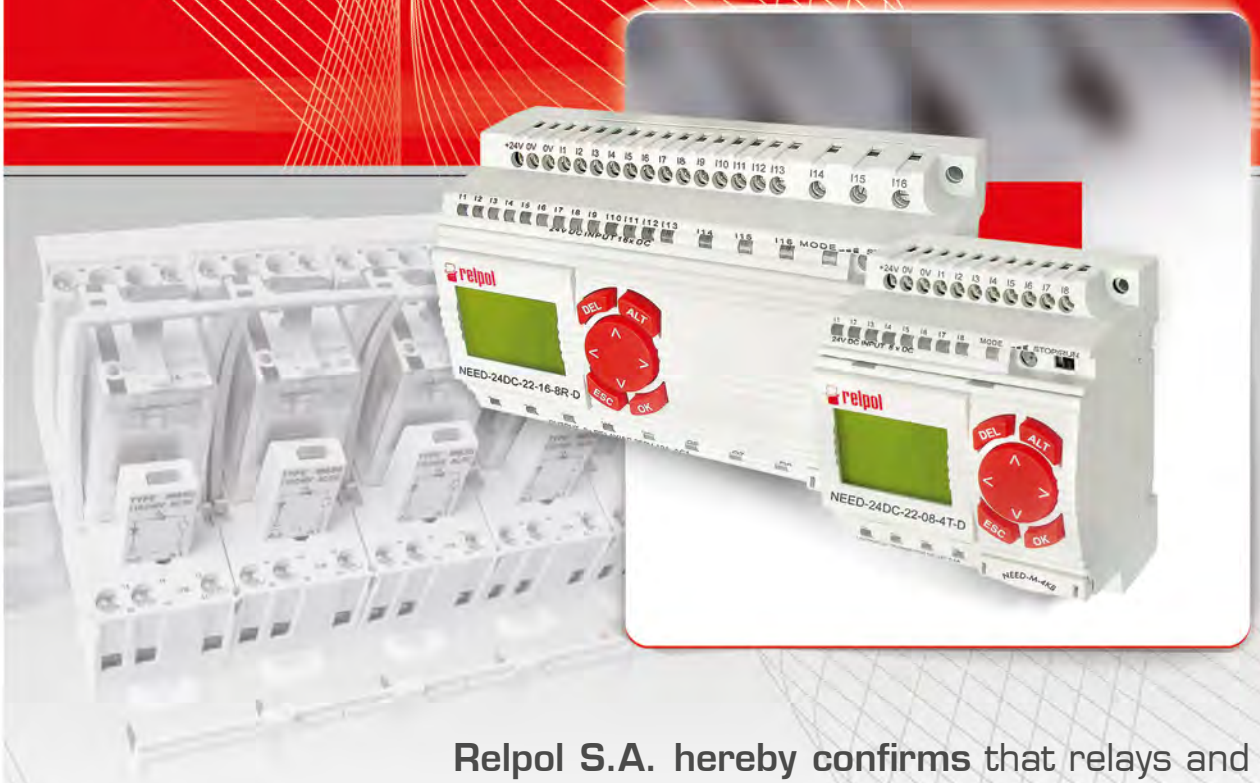
overvoltage arresters

SMP – radiation
portal monitors

CZIP®-PRO – protection
relays

Declaration of conformity

RoHS



Relpol S.A. hereby confirms that relays and plug-in sockets for relays supplied by our company meet the requirements of the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment – **RoHS 2011/65/UE**.

01.10.2014

Date

Quality and Environmental Management Department Director
Sylwia Sochoń-Miezio

relpol® S.A.

RoHS conform

The offer of Relpol S.A. includes the following products:

subminiature signal relays
rated switching capacity: from 0,5 A to 3 A, coil voltage range: from 3 V to 48 V DC

miniature relays
rated switching capacity: from 5 A to 20 A

industrial relays
rated switching capacity: from 5 A to 48 A, mounting: to plug-in sockets on 35 mm rail mount acc. to PN-EN 60715 or on panel mounting, for PCB

interface relays
rated switching capacity: from 0,05 A to 16 A, number of contacts: from 1 to 4

programmable relays NEED
versions: 8 inputs / 4 outputs, 16 inputs / 8 outputs, with LCD display, without display, supply voltages: 12 V DC, 24 V DC, 220 V DC, 230 V AC, programming: LAD, STL, LED indicators of the relay and input / output status

time relays
single- and multifunction time relays, wide range of time adjustments

monitoring relays
monitoring of current, voltage, temperature

solid state relays
rated load currents: from 1 A to 100 A, switching at zero or at any time

plug-in sockets for relays
for PCB, for 35 mm rail mount acc. to PN-EN 60715 or on panel mounting

installation contactors RIK
rated switching power: from 2,2 kW to 15 kW /at 400 V AC3/

power supplies
for automation systems, output circuit: 12 V DC, 24 V DC, rated currents: from 0,42 A to 20 A

overvoltage arresters
classes I, II and III, available with changeover signal contact

systems SMP
radiation portal monitors

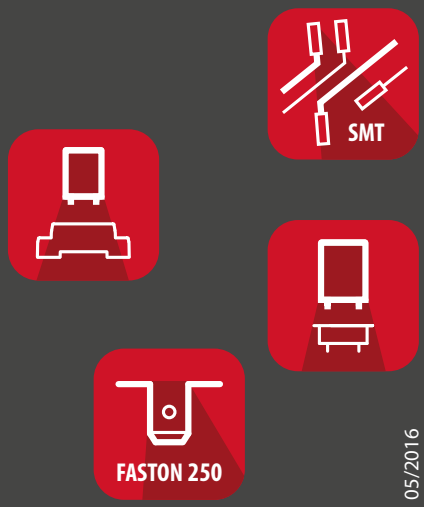
protection relays CZIP®-PRO
digital protection, automation, measurement, control and communication system for MV switchgears

LISTED ON GPW WARSAW STOCK EXCHANGE

Due to the permanent development policy, Relpol S.A. reserves the right to introduce changes of data and characteristics of the products. The devices shall be operated by skilled personnel in accordance with the regulations in force pertaining to electrical systems. The technical data are of informational nature. Thus, Relpol S.A. does not accept any liability for inappropriate use of the presented products.

PRECAUTIONS

1. Ensure that the parameters of the product described in its specification provide a safety margin for the appropriate operation of the device or system and never use the product in circumstances which exceed the parameters of the product.
2. Never touch any live parts of the device.
3. Ensure that the product has been connected correctly. An incorrect connection may cause malfunction, excessive heating or risk of fire.
4. In case of any risk of any serious material loss or death or injuries of humans or animals, the devices or systems shall be designed so to equip them with double safety system to guarantee their reliable operation.



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05/2016

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