

**NEW TIME**



# Automation is our passion



**For dozens of years now, Relpol S.A.**

has been a worldwide known supplier of components

used in industrial and power automation, power electronics,  
industrial and applied electronics, telecommunication, etc.



Apart from complete delivery of components, Relpol S.A. provides its partners with technical consultancy based upon **extensive knowledge of the application of the components.**

Taking into account **the significant role of the products of Relpol S.A.,** we have made their quality improvement our priority strategic goal.

**You are welcome to review** our catalogs which present a very wide line of products for industrial automation.

**Due to the wide line of products,** orders of non-standard products should be consulted with the manufacturer or distributor.





## The leading position

of the manufacturer of electromagnetic relays in Europe

provides for Relpol's presence  
in markets worldwide.

### Commercial Partnerships of Relpol S.A.

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**RELPOL BG** Varna / Bulgaria

**RELPOL HUNGARY** Budapest / Hungary

**RELPOL BALTIJA** Vilnius / Lithuania

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**RELPOL FRANCE** Paris / France

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## The standards quality guaranteed

Taking into account the high requirements of the market and our customers' full satisfaction, Relpol S.A. constantly strives for improvement of the quality of the products and services we offer. Our own technological, designing and research facilities remarkably help us to achieve our goals.

The modern production profile and high quality of the products that comply with the requirements of the European Union are confirmed by the ISO 9001 : 2001, ISO 14001 : 2005 CERTIFICATES.

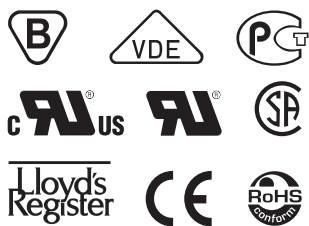
ISO 9001 : 2001

ISO 14001 : 2005

The Gold Statuette of the Business Centre Club 1995 / EUROPRODUCT 2002 / EUROPRODUCT 2003 / the Statuette of the Minister of Economic Affairs, Labor and Social Policy 2003 / GOLD EUROPRODUCT 2003 / ELECTROPRODUCT 2003 / GOLD MEDAL Automaticon 2004 / the Statuette for the Pillar of the Polish Economy 2004 / Product of the Year 2005

## The innovative features of our technological solutions

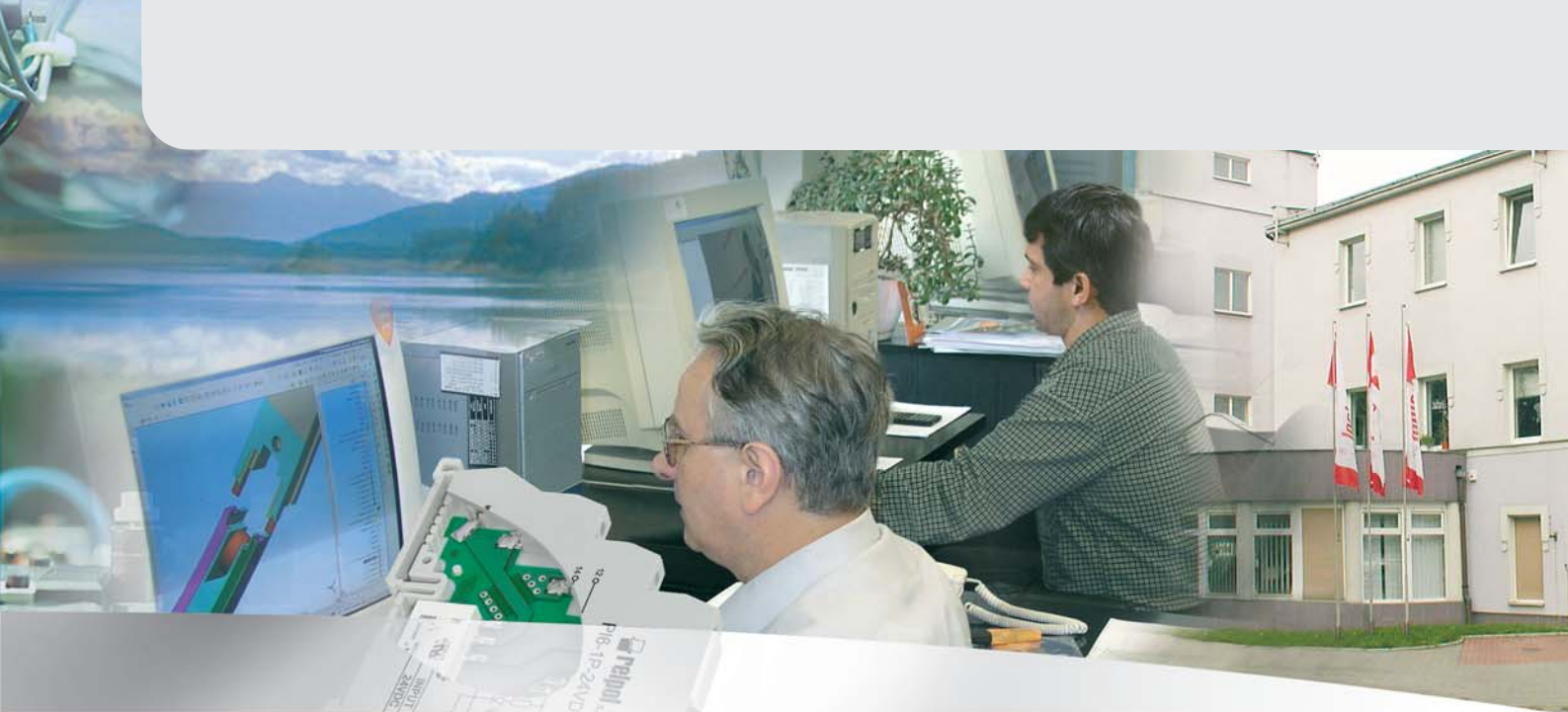
and the reliability of our products



are confirmed by numerous recognitions and certifications BBJ, VDE, UL, CSA, GOST, LR, RoHS and by prizes and awards.







## Relations and trust

Our co-operation with numerous renowned suppliers of materials and components necessary for the production process allows us to realize even complex deliveries quickly and smoothly. We build long-term partnership relations with our customers.

Owing to regular consultations and steady contribution of our Partners to our activities, we gain the knowledge necessary for reliable and professional services.

Relpol S.A. runs its own Research and Development Department which designs new products to follow the worldwide trends and solutions in the electrotechnical industry.

The permanent development of our staff along with human resources stabilization provide our customers with professional service.

Relpol S.A. Technical Support Department advises the Client and helps to solve the problems of electrical applications and, thus, enhances their satisfaction at cooperation with ourselves.

The long years of experience, the knowledge of the electrotechnical industry and the market activities of Relpol S.A. have been proved by co-operation with the largest corporations worldwide.

## Environment protection

With the development of technology we shall not forget

**about the issues of the environment protection.**

Reduction of the natural environment pollution with regard to the production process and the products of Relpol S.A. is a constant process aimed at minimizing of the environmental impact.

**Our products meet the requirements of the RoHS Directive.**



## Time relays



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- 10-functions electronic time relays in compact cover
- Cadmium - free contacts
- AC and AC/DC input voltages
- Direct mounting on 35 mm DIN rail mount, EN 50022 (wiring: 1 x 2,5 mm<sup>2</sup>, 2 x 1,5 mm<sup>2</sup>)
- 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:

Type of relay

**TR4N 4 C/O**

## Output circuits - contact data

Number and type of contacts		4 C/O - changeover
Contact material		<b>AgNi</b>
Max. switching voltage	AC/DC	250 V / 250 V
Min. switching voltage		5 V
Rated load	AC1 DC1	6 A / 250 V AC 6 A / 24 V DC
Min. switching current		5 mA
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

## Input control circuit

Rated voltage	50/60 Hz AC AC: 50/60 Hz AC/DC	<b>115-230 V</b> <b>12-24 V</b>
Operating range of supply voltage		0,9 < U <sub>n</sub> < 1,1 12 V AC/DC 0,85 < U <sub>n</sub> < 1,1 24 V AC/DC, 115 V AC, 230 V AC
Rated power consumption		1,0 VA / 1,0 W 12 V AC/DC, 24 V AC/DC 2,2 VA 115 V AC, 230 V AC
Range of supply frequency		AC: 48...63 Hz AC/DC: 48...100 Hz

## Insulation

Insulation category	B250
Overvoltage category	II PN-EN 60664-1
Insulation pollution degree	2
Flammability degree	V-1 UL94
Dielectric strength	
• input - outputs	2 500 V AC
Input - outputs distance	
• clearance	≥ 1,6 mm
• creepage	≥ 3,2 mm

## General data

Electrical life	
• resistive AC1	≥ 10 <sup>5</sup> 6 A, 250 V AC
Mechanical life (cycles)	≥ 2 x 10 <sup>7</sup>
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
Environmental protection	RTI PN-EN 116000-3
Shock resistance	(NO/NC) 10 g / 5 g
Vibration resistance	0,35 mm DA 10...55 Hz

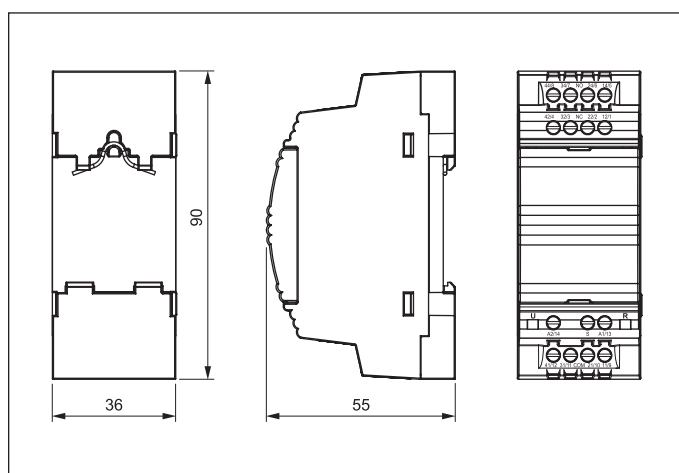
The data in bold type pertain to the standard versions of the relays.

## Time module data

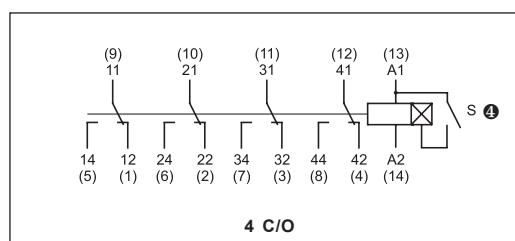
Functions ❶	E, Wu, Bp, Bi, PWM, R, Ws, Wa, Esa, B permanent switching ON and OFF
Time intervals	1 s ❷; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment	smooth - (0,1...1) x time interval
Setting accuracy	± 5% (calculate from final range value) ❷
Repeatability	± 0,5% ❷
Temperature influence	± 0,01% / °C
Recovery time	90 ms
Min. pulse of the control contact	AC: 25 ms DC: 15 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 ❸

❶ Descriptions of time functions - see pages 22-21. 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). Recommend to set measuring time by experimental method. ❸ The yellow LED - T time measurement (flashing); excited operational relay, time not measured (steady light); de-excited operational relay, time not measured (no light).

## Dimensions



## Connections diagram

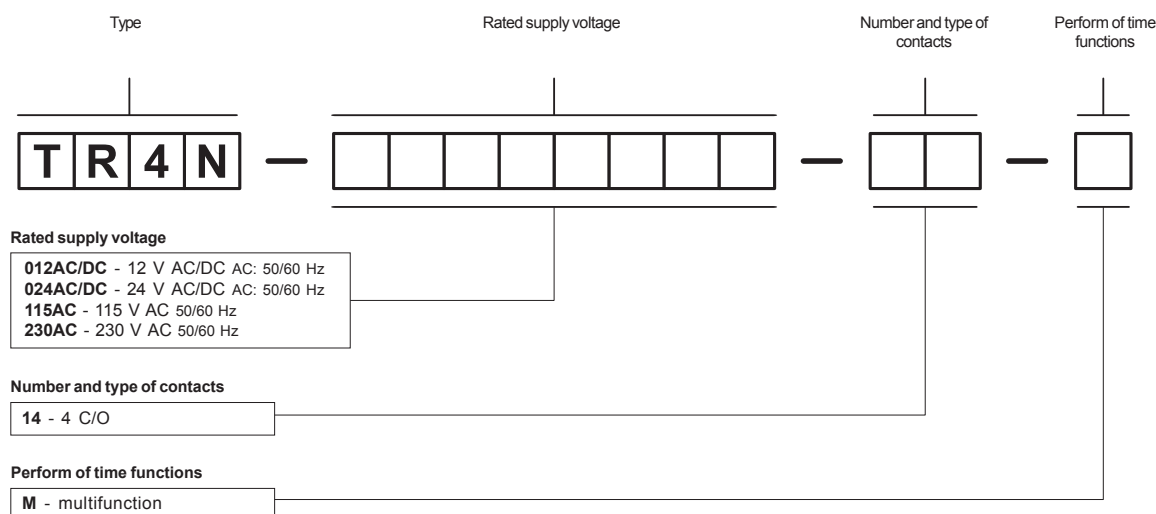


❹ Control contact S is activated by connecting it to A1 terminal.

## Mounting

Relays **TR4N 4 C/O** are designed for direct mounting on 35 mm DIN rail mount, EN 50022.

## Ordering codes



Example of ordering code:

**TR4N-230AC-14-M**

time relay **TR4N 4 C/O**, rated input voltage 230 V AC 50/60 Hz, with four changeover contacts, multifunction (relay perform 10 functions), contact material AgNi





• 10-functions electronic time relays in compact cover • Cadmium - free contacts • AC and AC/DC input voltages • Direct mounting on 35 mm DIN rail mount, EN 50022 (wiring: 1 x 2,5 mm<sup>2</sup>, 2 x 1,5 mm<sup>2</sup>) • 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 C/O) or RM84 (2 C/O) electromagnetic relay • Compliance with standard PN-EN 61812-1 • Recognitions, certifications, directives:

Type of relay	TR4N 1 C/O		TR4N 2 C/O	
Output circuits - contact data				
Number and type of contacts		1 C/O - changeover		2 C/O - changeover
Contact material		AgNi		AgNi
Max. switching voltage		AC/DC	250 V / 250 V	
Min. switching voltage			5 V	
Rated load		AC1	16 A / 250 V AC	
		DC1	16 A / 24 V DC	
Min. switching current			5 mA	
Rated current			16 A	
Max. breaking capacity		AC1	4 000 VA	
Min. breaking capacity			0,3 W	
Contact resistance			≤ 100 mΩ	
Max. operating frequency			1 200 cycles/hour	
• at rated load		AC1	18 000 cycles/hour	
• no load				
Input control 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 < U <sub>n</sub> < 1,2 12 V AC/DC	
			0,85 < U <sub>n</sub> < 1,2 24 V AC/DC, 115 V AC, 230 V AC	
Rated power consumption			0,5 VA / 0,5 W 12 V AC/DC 0,7 VA / 0,7 W 24 V AC/DC	
			1,3 VA 115 V AC 1,7 VA 230 V AC	
Range of supply frequency			AC: 48...63 Hz	
			AC/DC: 48...100 Hz	
Insulation				
Insulation category			B250	
Overvoltage category			III PN-EN 60664-1	
Insulation pollution degree			2	
Flammability degree			V-1 UL94	
Dielectric strength			2 500 V AC	
• input - outputs				
Input - outputs distance			≥ 10 mm	
• clearance			≥ 10 mm	
• creepage				
General data				
Electrical life				
• resistive AC1			≥ 0,7 x 10 <sup>5</sup> 16 A, 250 V AC	≥ 10 <sup>5</sup> 8 A, 250 V AC
Mechanical life (cycles)			≥ 3 x 10 <sup>7</sup>	
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	
Environmental protection			RTI PN-EN 116000-3	
Shock resistance			15 g	
Vibration resistance			0,35 mm DA 10...55 Hz	

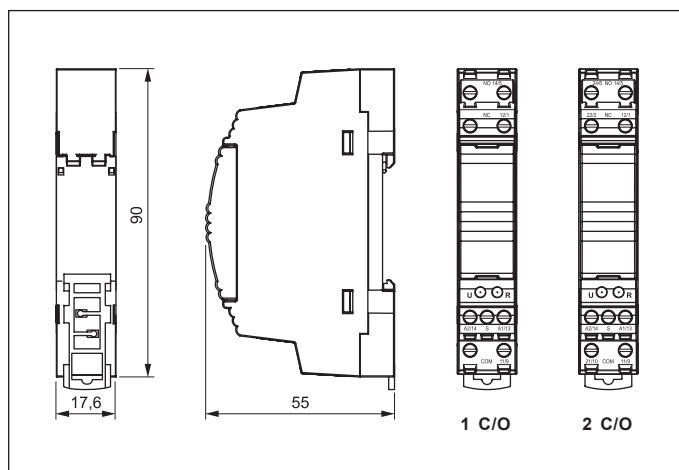
The data in bold type pertain to the standard versions of the relays.

## Time module data

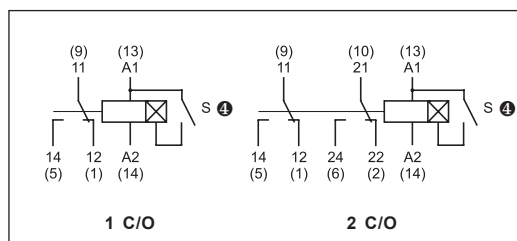
Functions ❶	E, Wu, Bp, Bi, PWM, R, Ws, Wa, Esa, B permanent switching ON and OFF
Time intervals	1 s ❷; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment	smooth - (0,1...1) x time interval
Setting accuracy	± 5% (calculate from final range value) ❷
Repeatability	± 0,5% ❷
Temperature influence	± 0,01% / °C
Recovery time	80 ms
Min. pulse of the control contact	AC: 25 ms DC: 15 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 ❸

❶ Descriptions of time functions - see pages 20-21. 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). Recommend to set measuring time by experimental method. ❸ The yellow LED - T time measurement (flashing); excited operational relay, time not measured (steady light); de-excited operational relay, time not measured (no light).

## Dimensions



## Connections diagrams

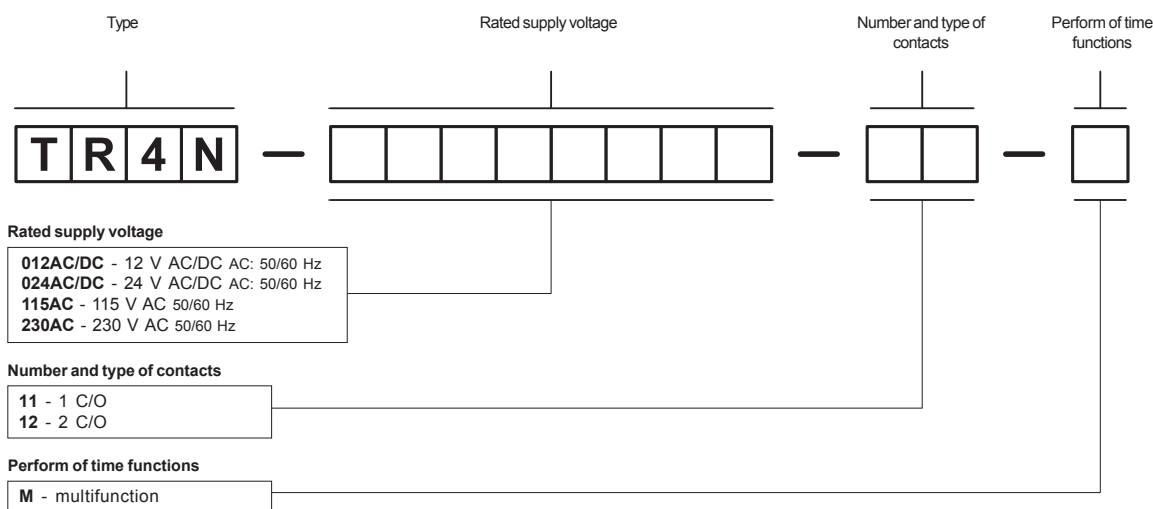


❹ Control contact S is activated by connecting it to A1 terminal.

## Mounting

Relays **TR4N 1 C/O, 2 C/O** are designed for direct mounting on 35 mm DIN rail mount, EN 50022.

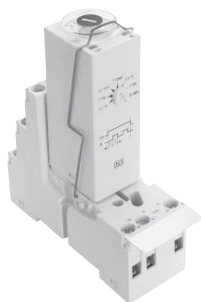
## Ordering codes



Examples of ordering codes:

**TR4N-230AC-11-M** time relay **TR4N 1 C/O**, rated input voltage 230 V AC 50/60 Hz, with one changeover contact, multifunction (relay perform 10 functions), contact material AgNi

**TR4N-024AC/DC-12-M** time relay **TR4N 2 C/O**, rated input voltage 24 V AC/DC 50/60 Hz, with two changeover contacts, multifunction (relay perform 10 functions), contact material AgNi



- 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 DIN rail mount, EN 50022 or on panel mounting • Applications: as time systems in electric circuits of machines, technological lines, in automation systems, etc.
- Recognitions, certifications, directives: recognitions R4,

Type of relay

**T-R4**

## Output circuits - contact data

Number and type of contacts		4 C/O - changeover
Contact material		<b>AgNi</b>
Max. switching voltage	AC/DC	250 V / 250 V
Min. switching voltage		5 V
Rated load	AC1	6 A / 230 V AC
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		1 200 cycles/hour
• at rated load	AC1	18 000 cycles/hour
• no load		

## Input control circuit

Rated voltage	50/60 Hz AC DC	<b>24-115-230 V</b> <b>12-24 V</b>
Must release voltage		AC: ≥ 0,2 U <sub>n</sub> DC: ≥ 0,1 U <sub>n</sub>
Operating range of supply voltage		0,8 < U <sub>n</sub> < 1,1 see Tables 1, 2
Rated power consumption	AC DC	2,2 VA 1,2 W
Range of supply frequency		48...63 Hz

## Insulation

Insulation category		B250
Insulation rated voltage		250 V AC
Overvoltage category		III PN-EN 60664-1
Dielectric strength		
• input - outputs		2 500 V AC
• contact clearance		1 500 V AC
• pole - pole		2 000 V AC
Input - outputs distance		
• clearance		≥ 1,6 mm
• creepage		≥ 3,2 mm

## General data

Operating time (typical value)		10 ms
Release time (typical value)		8 ms
Electrical life		
• resistive AC1		≥ 10 <sup>5</sup> 6 A, 250 V AC
• cos φ		see Fig. 2
Mechanical life (cycles)		≥ 2 x 10 <sup>7</sup>
Dimensions (L x W x H)		21,2 x 29,5 x 62,5 mm
Weight		49 g
Ambient temperature		
• storage		-20...+85 °C
• operating		-20...+55 °C
Cover protection category		IP 20 (with socket)
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 pertain to the standard versions of the relays.



## Time module data

Functions ❶	E, Wu, Bp, Bi
Time intervals	0,1 s ❷; 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% (calculate from final range value) ❷
Repeatability	± 1% ❷
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 ❸

❶ Descriptions of time functions - see pages 20-21. 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). Recommend to set measuring time by experimental method. ❸ The yellow LED - T time measurement (flashing); excited operational relay, time not measured (steady light); de-excited operational relay, time not measured (no light).

## Input data - DC voltage version

Table 1

Input voltage code	Rated input voltage $U_n$ V DC	Input resistance ± 10% at 20°C $\Omega$	Input - voltage range V DC	
			min. (at 20°C)	max. (at 55°C)
<b>1012</b>	<b>12</b>	<b>160</b>	<b>9,6</b>	<b>13,2</b>
<b>1024</b>	<b>24</b>	<b>640</b>	<b>19,2</b>	<b>26,4</b>

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

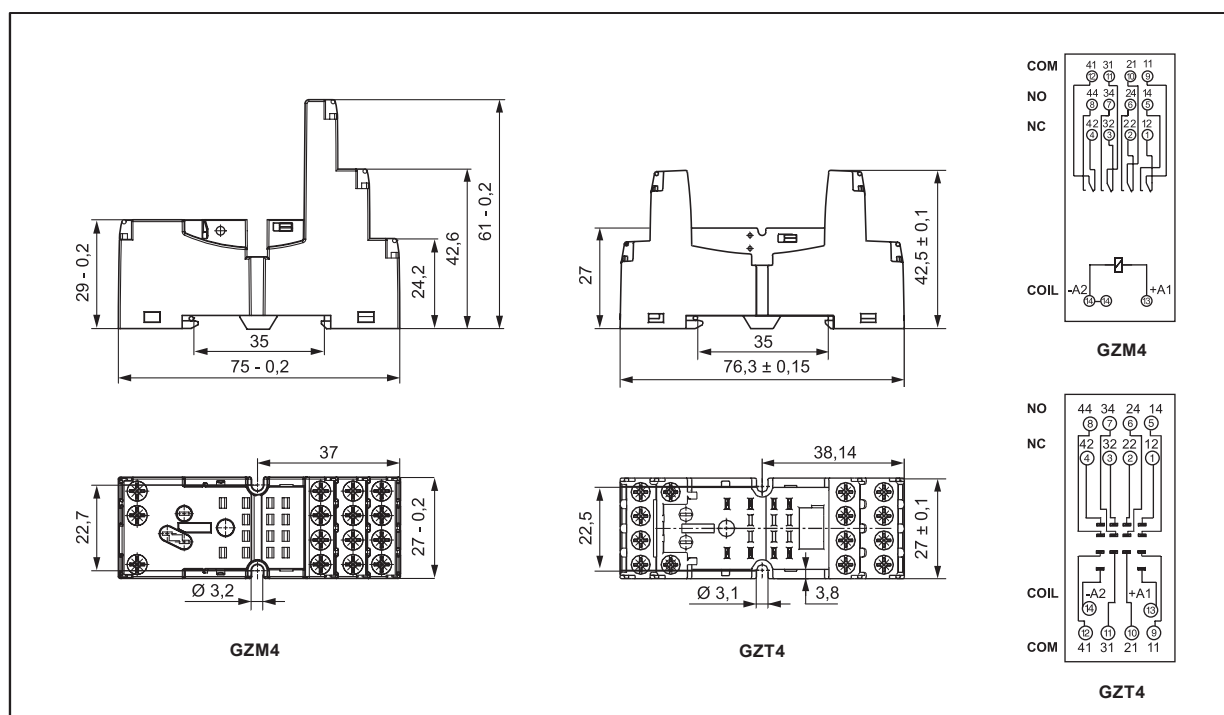
## Input data - AC 50/60 Hz voltage version

Table 2

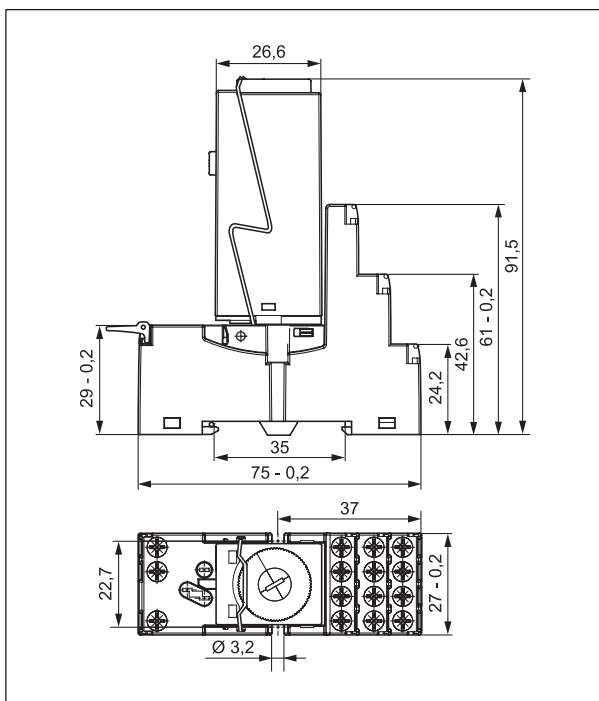
Input voltage code	Rated input voltage $U_n$ V AC	Input resistance ± 10% at 20°C $\Omega$	Input - voltage range V AC	
			min. (at 20°C)	max. (at 55°C)
<b>5024</b>	<b>24</b>	<b>158</b>	<b>19,2</b>	<b>26,4</b>
5115	115	3 610	92,0	127,0
<b>5230</b>	<b>230</b>	<b>16 100</b>	<b>184,0</b>	<b>253,0</b>

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

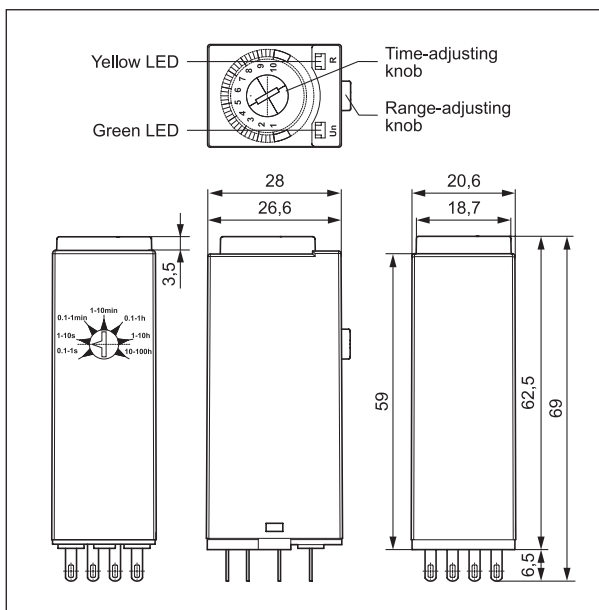
## Dimensions, connections diagrams - sockets with screw terminals for T-R4 relays



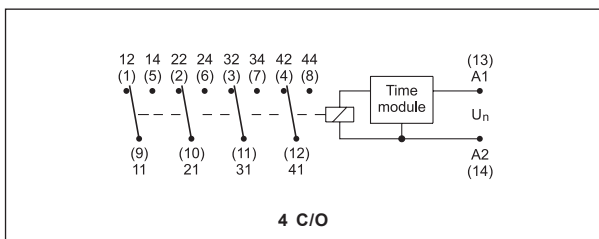
## Dimensions - T-R4 relays with GZM4 sockets



## Dimensions - T-R4 relays

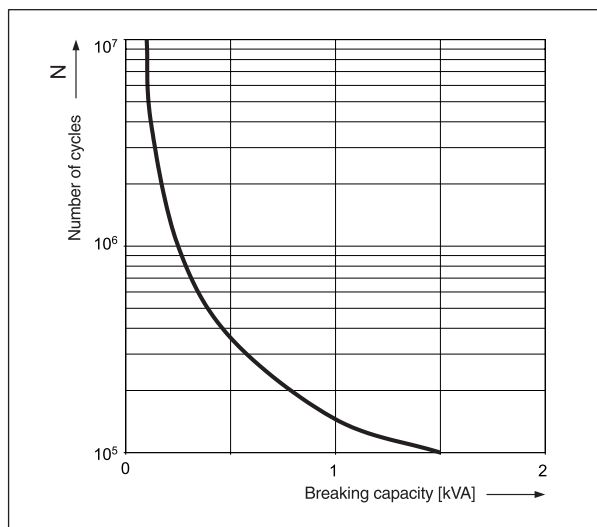


## Connections diagram



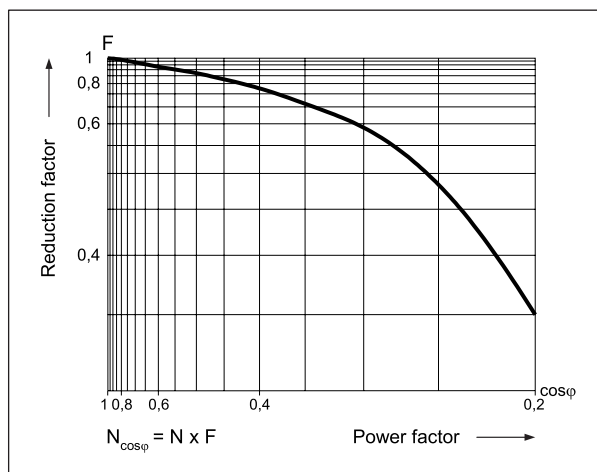
## Electrical life at AC resistive load

Fig. 1



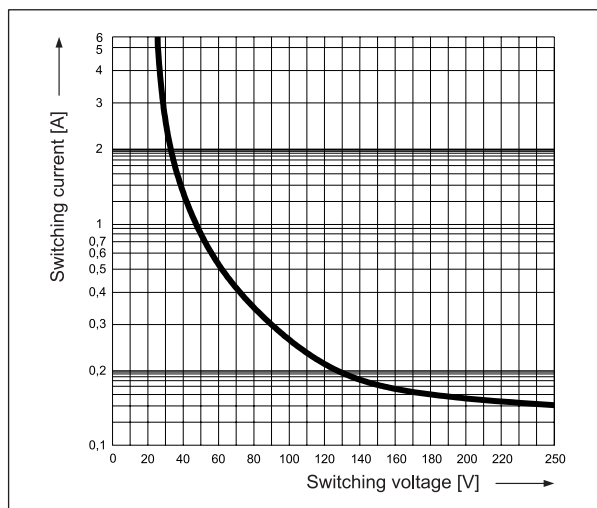
## Electrical life reduction factor at AC inductive load

Fig. 2



## Max. DC resistive load breaking capacity

Fig. 3



## Mounting

Relays **T-R4E**, **T-R4Wu**, **T-R4Bp**, **T-R4Bi** are designed for screw terminals plug-in sockets **GZM4** or **GZT4**, 35 mm DIN rail mount, EN 50022 or on panel mounting with two M3 screws. For sockets are offered description plates **GZT4-0035** and clips **TR4-2000**.

Separate T-R4 control circuits from load circuits (T-R4 contacts)	GZM4: yes GZT4: no
Increased dielectric strength spacing between coil and contacts clamps	GZM...: min. 5 kV GZT...: min. 4 kV
Double A2(14) terminal is introduced for easy wiring in electrical devices	GZM2/3/4: yes GZT2/3/4: no



T-R4



GZM4



GZM4



GZT4



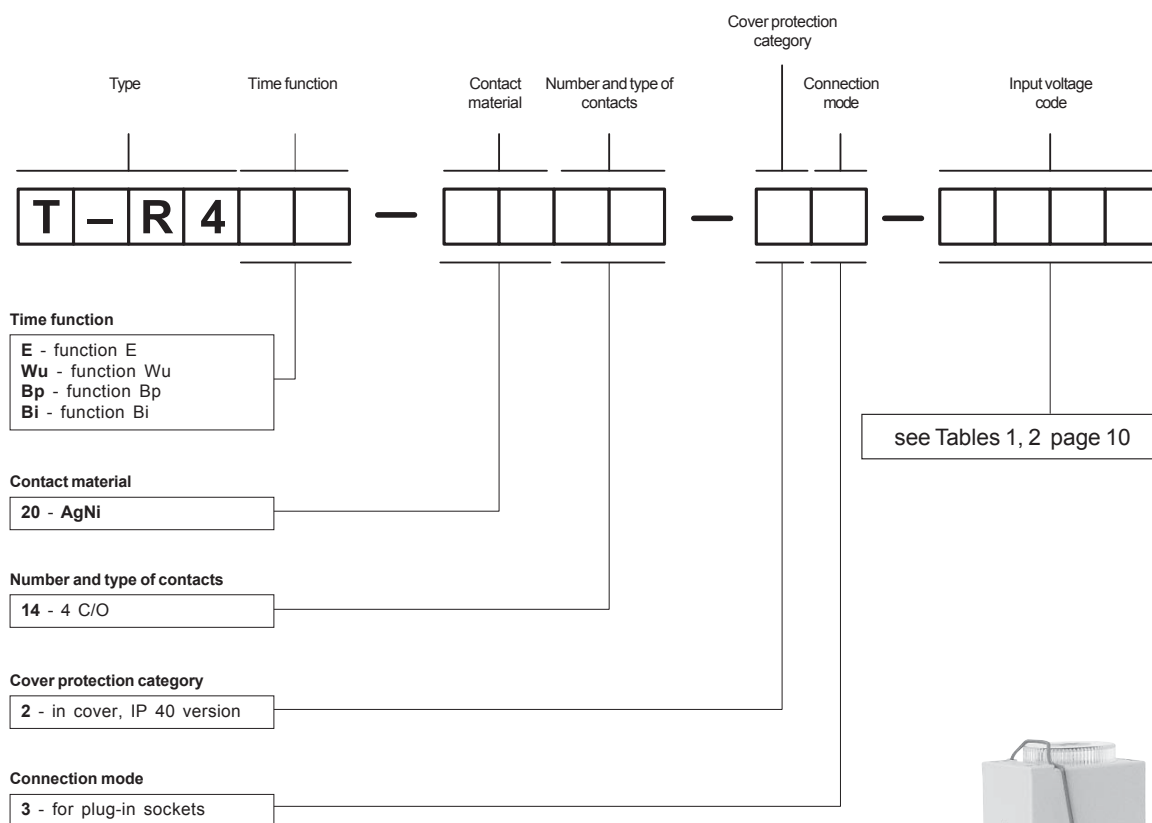
TR4-2000



GZT4-0035

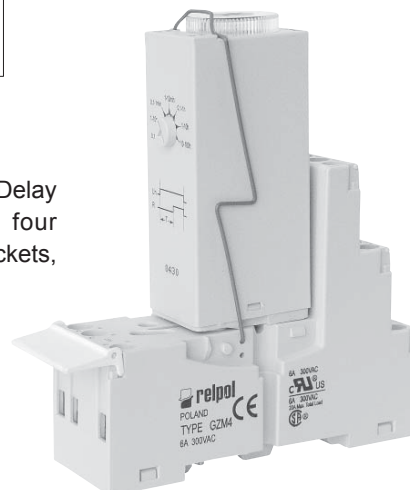
**Note:** sockets **GZM4** are available in black and gray colours.

## Ordering codes



Example of ordering code:

**T-R4E-2014-23-1012** time relay **T-R4**, performing the time function **E** - ON Delay Voltage Controlled, contact material AgNi, with four changeover contacts, in cover IP 40, for plug-in sockets, rated input voltage 12 V DC







- 35 mm DIN rail mount, EN 50022 or on panel mounting with two M3 screws.
- Interface relay **PIR15 2 C/O** consists of:
  - electromagnetic relay **R15 2 C/O**, plug-in socket **ES 9** black,
  - time module **T(COM3)**, spring wire clip **PZ11 0031**.
- Interface relay **PIR15 3 C/O (standard)** consists of:
  - electromagnetic relay **R15 3 C/O**, plug-in socket **ES 12** black,
  - time module **T(COM3)**, spring wire clip **PZ11 0031**.
- Recognitions, certifications, directives: recognitions R15, RoHS,

Type of relay	PIR15 2 C/O		PIR15 32 C/O	
Output circuits - contact data				
Number and type of contacts		2 C/O - changeover		3 C/O - changeover
Contact material		AgNi		
Max. switching voltage		AC/DC 250 V / 300 V		
Min. switching voltage		5 V		
Rated load		AC1 10 A / 250 V AC		
		DC1 10 A / 24 V DC		
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		12 000 cycles/hour		
Input control circuit				
Rated voltage of output relay R15		50/60 Hz AC 24-48-60-110-120-230-240 V		
		DC 24-48-60-110-120-220 V		
Supply voltage of time module T(COM3)		24...240 V AC/DC (uniwersal module)		
Operating range of supply voltage		0,85 < U <sub>n</sub> < 1,1 see Tables 1, 2		
Must operate voltage		≥ 0,85 U <sub>n</sub>		
Rated power consumption		AC 3,0 VA		
		DC 2,0 W		
Range of supply frequency		48...63 Hz		
Insulation				
Insulation category		C250		
Insulation rated voltage		250 V AC		
Overvoltage category		III PN-EN 60664-1		
Dielectric strength				
• input - outputs		2 500 V AC		
• contact clearance		1 500 V AC		
• pole - pole		2 000 V AC		
Input - outputs distance				
• clearance		≥ 3 mm		
• creepage		≥ 4,2 mm		
General data				
Operating time (typical value)		AC: 12 ms DC: 18 ms		
Release time (typical value)		AC: 10 ms DC: 7 ms		
Electrical life				
• resistive AC1		≥ 2 x 10 <sup>5</sup> 10 A, 250 V AC		
• cos ϕ		see Fig. 2		
Mechanical life (cycles)		> 2 x 10 <sup>7</sup>		
Dimensions (L x W x H)		75 x 38 x 83,1 mm		
Weight		168 g		
Ambient temperature				
• storage		-40...+70 °C		
• operating		-40...+55 °C		
Cover protection category		IP20		
Environmental protection		R15: RTI ES 9, ES 12: RT0 PN-EN 116000-3		
Shock resistance		10 g		
Vibration resistance		5 g 10...500 Hz		

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

### Time module data

Functions ❶	E, E(S), Wu, Wu(S), Bi, Bi(S), Bp, Bp(S), R, Ws, Wa, Es
Function adjustment ❷	selection with microswitches
Time intervals	1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment ❸	range - with microswitches within the range - with a potentiometer
Setting accuracy \ Repeatability	$\pm 1\%$ \ 0,2%
Temperature influence	$\pm 0,01\%$ / °C
Recovery time	150 ms
LED indicator	green LED - indication of time period T and the status of outputs after the time T has been measured ❹

❶ Descriptions of time functions - see pages 20-21. ❷ Settings of switches - see page 216. ❸ The green LED - T time measurement (flashing); excited operational relay, time not measured (steady light); de-excited operational relay, time not measured (no light).

### Settings of switches

Function adjustment switches 1, 2, 3	E / E(S)	Wu / Wu(S)	Bi / Bi(S)	Bp / Bp(S)	R	Ws	Wa	Es
Timing adjustment (max.) switches 4, 5, 6	1 s	10 s	1 min.	10 min.	1 h	10 h	1 d	10 d

### Input data - DC voltage version

Table 1

Input voltage code	Rated input voltage $U_n$ V DC	Input resistance $\pm 10\%$ at 20 °C $\Omega$	Input - voltage range V DC	
			min. (at 20 °C)	max. (at 55 °C)
<b>024DC</b>	<b>24</b>	<b>430</b>	<b>19,2</b>	<b>26,4</b>
048DC	48	1 750	38,4	52,8
060DC	60	2 700	48,0	66,0
110DC	110	9 200	88,0	121,0
120DC	120	11 000	96,0	132,0
<b>220DC</b>	<b>220</b>	<b>37 000</b>	<b>176,0</b>	<b>242,0</b>

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

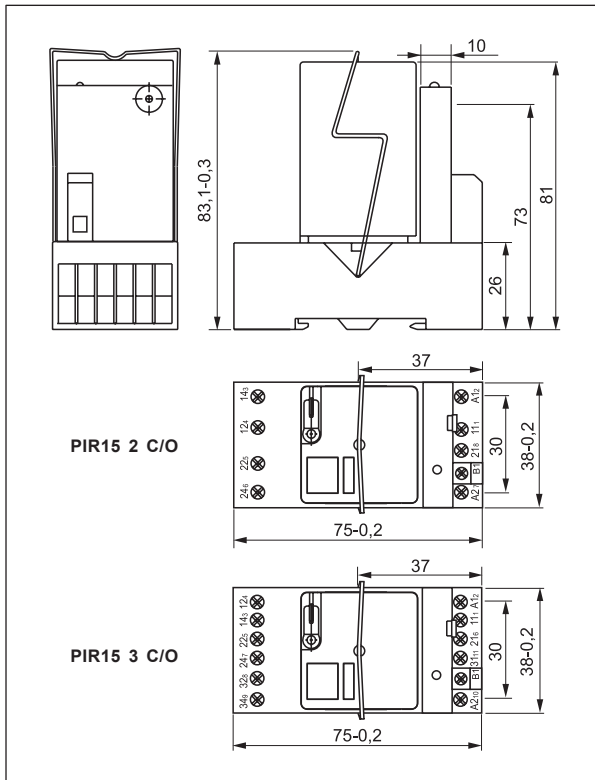
### Input data - AC 50/60 Hz voltage version

Table 2

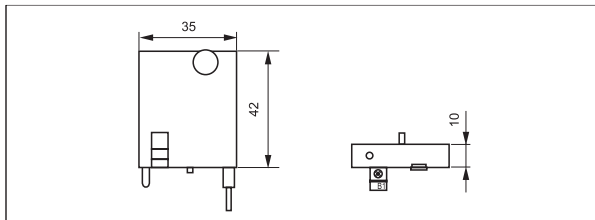
Input voltage code	Rated input voltage $U_n$ V AC	Input resistance $\pm 15\%$ at 20 °C $\Omega$	Input - voltage range V AC	
			min. (at 20 °C)	max. (at 55 °C)
<b>024AC</b>	<b>24</b>	<b>75</b>	<b>19,2</b>	<b>26,4</b>
048AC	48	305	38,4	52,8
060AC	60	475	48,0	66,0
110AC	110	1 700	88,0	121,0
120AC	120	1 910	96,0	132,0
<b>230AC</b>	<b>230</b>	<b>7 080</b>	<b>184,0</b>	<b>253,0</b>
240AC	240	7 760	192,0	264,0

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

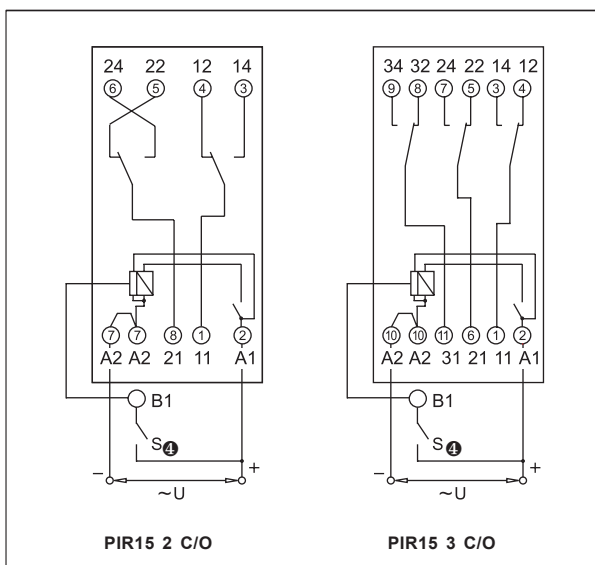
## Dimensions - PIR 2 C/O, PIR 3 C/O relays



## Dimensions - time modules T(COM3)



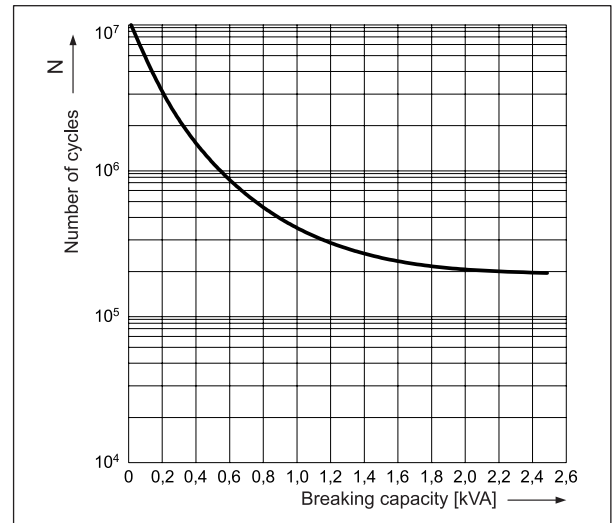
## Connections diagrams (screw terminals side view)



④ Control contact (B1) S is activated by connecting it to A1 terminal.

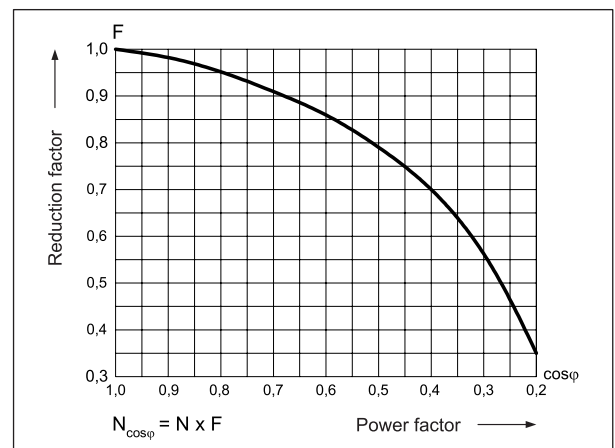
## Electrical life at resistive load. Maximum switching frequency at rated load

Fig. 1



## Electrical life reduction factor at AC inductive load

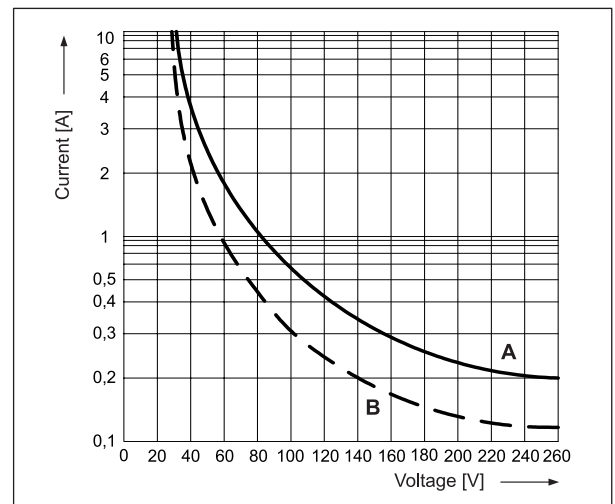
Fig. 2



## Max. DC breaking capacity

A - resistive load  $T = 0$  ms  
B - inductive load  $L/R = 40$  ms

Fig. 3





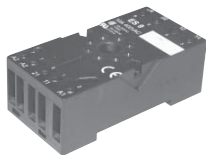
## Mounting

Relays **PIR15...T** are designed for 35 mm DIN rail mount, EN 50022 or on panel mounting with two M3 screws. Interface relay **PIR15 2 C/O** consists of: electromagnetic relay **R15 2 C/O**, plug-in socket **ES 9** black, time module **T(COM3)** and spring wire clip **PZ11 0031**.

Interface relay **PIR15 3 C/O** consists of: electromagnetic relay **R15 3 C/O**, plug-in socket **ES 12** black, time module **T(COM3)** and spring wire clip **PZ11 0031**.



R15 2 C/O



ES 9



R15 3 C/O



ES 12

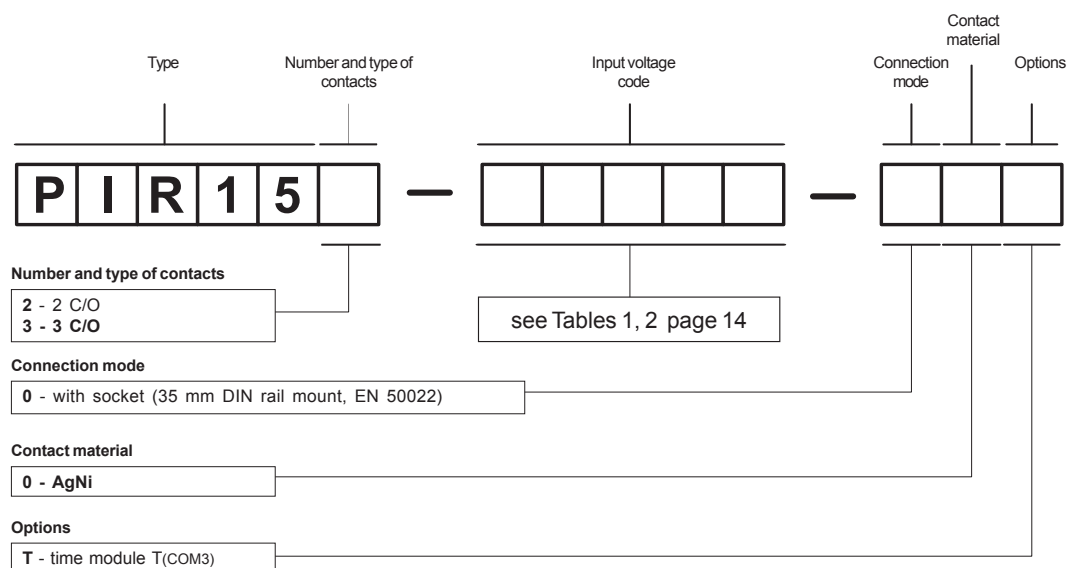


T(COM3)



PZ11 0031

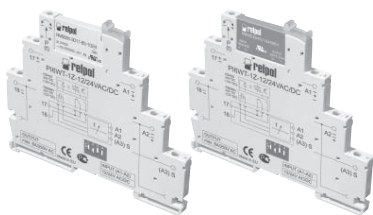
## Ordering codes



Examples of ordering codes:

**PIR152-012DC-00T** interface relay **PIR15 2 C/O**, which consists of: relay **R15 2 C/O**, contact material AgNi, rated input voltage 12 V DC, plug-in socket **ES 9** black (screw terminals), time module **T(COM3)**, spring wire clip **PZ11 0031**

**PIR153-230AC-00T** interface relay **PIR15 3 C/O**, which consists of: relay **R15 3 C/O**, contact material AgNi, rated input voltage 230 V AC 50/60 Hz, plug-in socket **ES 12** black (screw terminals), time module **T(COM3)**, spring wire clip **PZ11 0031**



- 9-functions electronic time relays
- Time relay **PIR6WT-1Z** consists of:
  - universal socket with electronic **PI6WT-1Z** with screw terminals,
  - changeover relay **RM699V**, rated load 6 A / 230 V (AC1) ❶ or solid state relay **RSR30** ❶
- 35 mm DIN rail mount, EN 50022 • Adapted for the co-operation with interconnection strip type **ZG20** • Equipped in LED green
- Recognitions, certifications, directives:

Type of relay

**PIR6WT-1Z**

## Output circuit (RM699V) - contact data ❶

Number and type of contacts (code of output)		1 NO - normally open (R)
Contact material		<b>AgSnO<sub>2</sub></b>
Max. switching voltage	AC/DC	250 V / 300 V
Min. switching voltage	AC/DC	12 V
Rated load	AC1	6 A / 230 V AC
	DC1	6 A / 24 V DC
Min. switching current		100 mA
Max. inrush current		15 A 20 ms
Rated current		6 A
Max. breaking capacity	AC1	1 500 VA
Min. breaking capacity		1 W
Contact resistance		≤ 100 mΩ 100 mA, 24 V
Max. operating frequency		360 cycles/hour
• at rated load	AC1	72 000 cycles/hour
• no load		

## Output circuit (RSR30) - output data ❶

Type of output (code of output)	Triac (T) 240 V / 2 A	Transistor (C) 48 V / 1 A	Transistor (O) 24 V / 2 A
Number and type of outputs	1 NO - normally open	1 NO - normally open	1 NO - normally open
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 DC1	1 A / 240 V AC	2 A / 60 V DC
Min. making capacity current	50 mA	1 mA	1 mA
Max. off-state leakage current (rest condition)	1,5 mA	1 mA	1 mA
Output rated current	1 A	1 A	2 A
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 control circuit

Rated voltage	AC: 50/60 Hz AC/DC	<b>12-24 V</b>
Operating range of supply voltage		0,9...1,2 U <sub>n</sub> 12 V AC/DC 0,85...1,2 U <sub>n</sub> 24 V AC/DC
Rated power consumption	AC/DC	0,5 VA / 0,5 W 12 V AC/DC 1,0 VA / 1,0 W 24 V AC/DC
Range of supply frequency		AC: 48...100 Hz
Control contact (A3) S ❷		
• control voltage		between terminals (A3) S and A1
• min. voltage ❸		≥ 8 V
• min. time of pulse duration ❹		≥ 15 ms

## Insulation

Insulation category		B250
Insulation rated voltage		250 V AC
Rated surge voltage		2 500 V AC
Overvoltage category		II PN-EN 60664-1
Insulation pollution degree		2
Flammability degree		contact plate: V-0 cover: V-1 UL94
Dielectric strength	• input - output	2 500 V AC 50/60 Hz, 1 min.
	• contact clearance	1 000 V AC 50/60 Hz, 1 min., output R

The data in bold type pertain to the standard versions of the relays. ❶ Characteristics of the contact capacity of relays **PIR6WT-1Z with RM699V** - see catalogue Relpol S.A. "Electromagnetic relays", pages 49-51; **PIR6WT-1Z with RSR30** - see catalogue Relpol S.A. "Solid state relays", pages 10-14. ❷ Control contact (A3) S is activated by connecting it to A1 terminal. ❸ Where the control signal is recognizable.

## General data

Dimensions (L x W x H) \ Weight	98,5 x 6,2 x 85,5 mm \ 50 g
Ambient temperature • storage \ operating	-40...+70 °C \ -20...+55 °C
Protection category	IP 20
Environmental protection	RTI PN-EN 116000-3
Shock resistance	10 g
Vibration resistance	5 g 10...55 Hz
Relative humidity	up to 85%

## Time module data

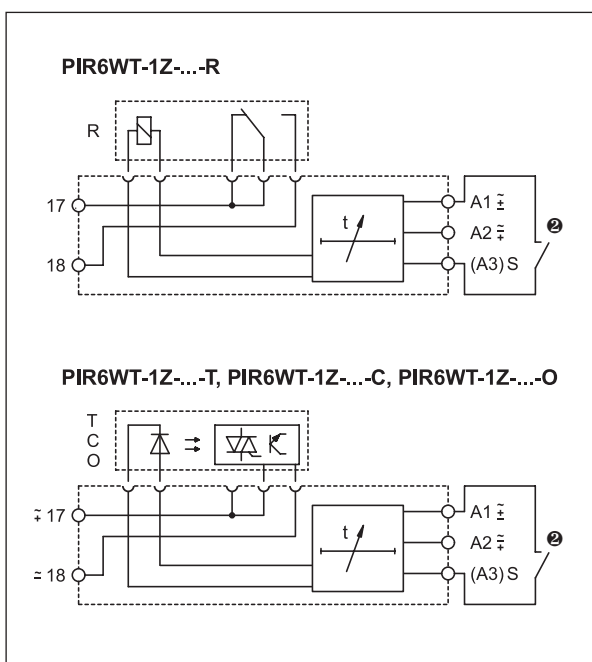
Functions ❶	E, Wu, Bp, Bi, R, Ws, Wa, Esa, B OFF - OFF mode
Function adjustment ❷	selection with microswitches
Time intervals	1 s ❸; 10 s; 1 min.; 10 min.; 1 h; 10 h; 1 d; 10 d
Timing adjustment ❹	smooth - (0,1...1) x time interval
Repeatability	± 0,5% ❺
Temperature influence	± 0,01% / °C
Humidity influence	± 0,05% / %HR
Recovery time	max. 80 ms
LED indicator	green LED - indication of time period T and the status of outputs after the time T has been measured ❻

❶ Descriptions of time functions - see pages 20-21. ❷ Settings of switches - see page 218. ❸ For the first range (1 s) repeatability is smaller than the given one 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). ❹ The green LED - T time measurement (flashing); excited operational relay, time not measured (steady light); de-excited operational relay, time not measured (no light).

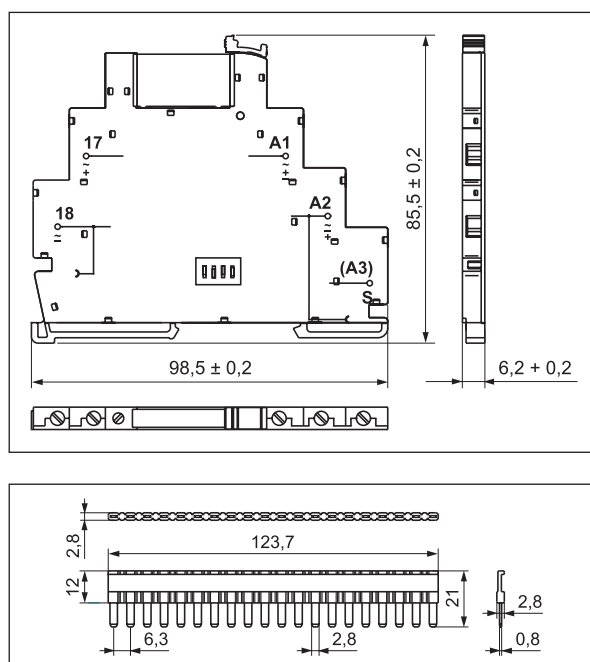
## Settings of switches

<div><div><div>1</div><div>2</div><div>3</div><div>4</div></div><div><div>+</div><div>0</div><div>-</div></div><div>TIMEMODE</div></div>		Function adjustment (MODE) switches 3, 4	E	Wu	Bp	Bi	R	Ws	Wa	Esa	B	
		<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>	<div><div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div></div></div></div>
		Timing adjustment (TIME) switches 1, 2	1 s	10 s	1 min.	10 min.	1 h	10 h	1 d	10 d	OFF	
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## Connections diagrams



## Dimensions



❷ Control contact (A3) S is activated by connecting it to A1 terminal.

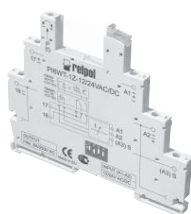


## Ordering codes

Ordering codes **PIR6WT-1Z** are specified in Table 1, "Time relay code" column.

## Mounting

Relays **PIR6WT-1Z** are designed for 35 mm DIN rail mount, EN 50022. Maximum size of wires 1 x 2,5 mm<sup>2</sup> (1 x 14 AWG). Rated contactability 2 x 1,5 mm<sup>2</sup> (2 x 16 AWG). Maximum screw torque: 0,3 Nm. Time relay **PIR6WT-1Z** consists of: universal socket with electronic **PI6WT-1Z** and electromagnetic relay **RM699V** or solid state relay **RSR30**. **PIR6WT-1Z** are adapted for the co-operation 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.



PIR6WT-1Z



RM699V



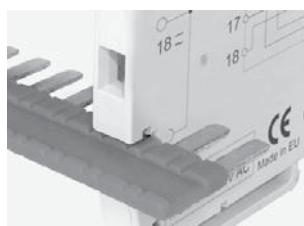
RSR30



ZG20



**Potentiometer P (t):**  
smooth regulation of time within the range.  
It is recommended to use a screwdriver of max. 2,5 mm.



**Interconnection strip ZG20:**  
bridging of common input or output signals.



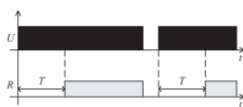
**Transparent, movable ejector:**  
protection and easy replacement of the operational relay, it plays the role of light indicator (optical wave-guide of LED diode).

Table of codes

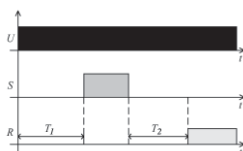
Table 1

Time relay code	Rated input voltage $U_n$ ⑤	Power of input control circuit	Socket code	Operational relay code	Rated voltage of operational relay $U_s$ ⑤
PIR6WT-1Z-12VAC/DC-R	12 V AC/DC	0,5 VA / 0,5 W	PI6WT-1Z-12/24VAC/DC	RM699V-3011-85-1012	12 V DC
<b>PIR6WT-1Z-24VAC/DC-R</b>	<b>24 V AC/DC</b>	<b>1,0 VA / 1,0 W</b>	<b>PI6WT-1Z-12/24VAC/DC</b>	<b>RM699V-3011-85-1024</b>	<b>24 V DC</b>
PIR6WT-1Z-12VAC/DC-T	12 VAC/DC	0,5 VA / 0,5 W	PI6WT-1Z-12/24VAC/DC	RSR30-D12-A1-24-020-1	12 V DC
<b>PIR6WT-1Z-24VAC/DC-T</b>	<b>24 VAC/DC</b>	<b>1,0 VA / 1,0 W</b>	<b>PI6WT-1Z-12/24VAC/DC</b>	<b>RSR30-D24-A1-24-020-1</b>	<b>24 V DC</b>
PIR6WT-1Z-12VAC/DC-C	12 VAC/DC	0,5 VA / 0,5 W	PI6WT-1Z-12/24VAC/DC	RSR30-D12-D1-04-025-1	12 V DC
<b>PIR6WT-1Z-24VAC/DC-C</b>	<b>24 V AC/DC</b>	<b>1,0 VA / 1,0 W</b>	<b>PI6WT-1Z-12/24VAC/DC</b>	<b>RSR30-D24-D1-04-025-1</b>	<b>24 V DC</b>
PIR6WT-1Z-12VAC/DC-O	12 VAC/DC	0,5 VA / 0,5 W	PI6WT-1Z-12/24VAC/DC	RSR30-D12-D1-02-040-1	12 V DC
<b>PIR6WT-1Z-24VAC/DC-O</b>	<b>24 V AC/DC</b>	<b>1,0 VA / 1,0 W</b>	<b>PI6WT-1Z-12/24VAC/DC</b>	<b>RSR30-D24-D1-02-040-1</b>	<b>24 V DC</b>

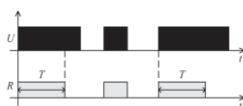
The data in bold type pertain to the standard versions of the relays. ⑤ It shall be remarked that rated input voltage of the operational relay  $U_s$  not always complies with the rated input voltage  $U_n$  (which is important on ordering operational relays for sockets).

**E - ON Delay Voltage Controlled**

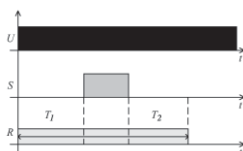
After the supply voltage [U] has been applied, the preset time [T] measurement starts. After the time [T] has been measured, the output relay [R] switches to ON position and remains in such until the supply voltage [U] is removed.

**E(S) - ON Delay Voltage Controlled with Control Contact**

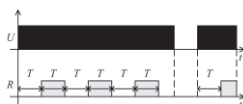
After the supply voltage [U] has been applied, the time [T] measurement starts. If the control contact [S] is switched on, the measurement of time [T] is interrupted for the time of switching the control contact [S]. After the control contact [S] has been switched off, the time [T] ( $T=T_1+T_2$ ) is continued to be measured. After the time [T] has been measured, the output relay [R] will switch, and it will be in operating position until the supply voltage [U] is removed.

**Wu - Single Shot Leading Edge Voltage Controlled**

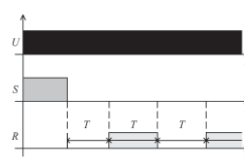
After the supply voltage [U] has been applied, the output relay [R] switches immediately, and the preset time [T] is measured. After the preset time [T] has been measured, the output relay [R] returns to the initial state.

**Wu(S) - Single Shot Leading Edge Voltage Controlled with Control Contact**

After the supply voltage [U] has been applied, the output relay [R] switches immediately and the preset time [T] measurement starts. If the control contact [S] is switched on, the time [T] measurement will be interrupted for the time for which the control contact [S] is switched. After the control contact [S] has been released, the time [T] ( $T=T_1+T_2$ ) is continued to be measured. After the preset time [T] has been measured, the output relay [R] returns to the initial position.

**Bp - Flasher Pause First**

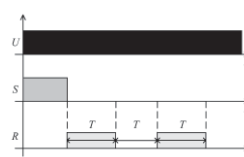
After the supply voltage [U] has been applied, the preset time [T] measurement starts. After the time [T] has been measured, the output relay [R] switches to ON position and the preset time [T] is being measured once more. After the preset time [T] has been measured, the output relay [R] returns to the initial state, and the next operating cycle of the relay starts. The relay operates until the supply voltage is removed.

**Bp(S) - Flasher Pause First with Control Contact**

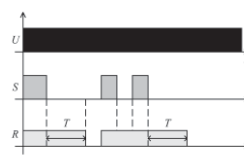
After the control contact [S] has been switched on and then off at the supply voltage [U] being applied, the measurement of the preset time [T] starts. After the time has been measured, the output relay [R] switches, and the time [T] is measured again. After the time has been measured, the output relay returns to the initial position, and the next cycle of the relay operation starts. The relay operates until the supply voltage is removed.

**Bi - Flasher Impulse First**

After the supply voltage [U] has been applied, the preset time [T] measurement starts simultaneously with switching of the output relay [R]. After the preset time [T] has been measured, the output relay [R] returns to the initial state, and the next operating cycle of the relay starts. The relay operates until the supply voltage is removed.

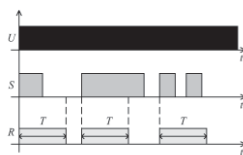
**Bi(S) - Flasher Impulse First with Control Contact**

After the control contact [S] has been switched on and then off at the supply voltage [U] being applied, the measurement of the preset time [T] starts with the simultaneous switching of the output relay [R]. After the time [T] has been measured, the output relay [R] returns to the initial position and the time [T] measurement starts again. After the time [T] has been measured, the next cycle of the relay operation starts. The relay operates until the supply voltage is removed.

**R - OFF Delay with Control Contact**

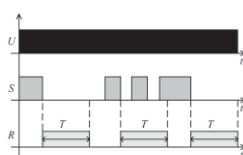
The supply voltage [U] must be applied to the time relay continuously. After the control contact [S] has been closed, the output relay [R] switches immediately. After opening of the control contact [S] measurement of the preset time [T] starts. After the preset time [T] has lapsed, the output relay [R] returns to the initial position. If the control contact [S] is closed again, even before the preset time [T] has lapsed, the previously measured time is cancelled, and after the control contact [S] has been opened, the preset time [T] is measured again.

### Ws - Single Shot Leading Edge with Control Contact



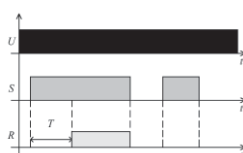
The supply voltage [U] must be applied to the time relay continuously. After the control contact [S] has been closed, the output relay [R] switches immediately. After opening of the control contact [S] measurement of the preset time [T] starts. After the preset time [T] has lapsed, the output relay [R] returns to the initial position. In course of the time [T] measurement the control contact [S] may be repeatedly closed and opened with no influence upon the output relay [R]. It is only after the time [T] has lapsed that closing of the control contact [S] causes switching the output relay [R] on again and measurement of the time [T].

### Wa - Single Shot Trailing Edge with Control Contact



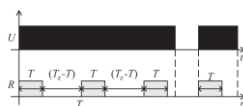
The supply voltage [U] must be applied to the time relay continuously. Closing of the control contact [S] does not result in measurement of the time delay or switching of the output relay [R]. It is only when the control contact [S] is opened that the output relay [R] switches immediately and the preset time [T] measurement starts. After the preset time [T] has lapsed, the output relay [R] returns to the initial position. In course of the time [T] measurement the control contact [S] may be repeatedly closed and opened with no influence upon the output relay [R]. It is only after the time [T] has lapsed that closing and opening of the control contact [S] causes switching the output relay [R] on again and measurement of the time [T].

### Es - ON Delay with Control Contact



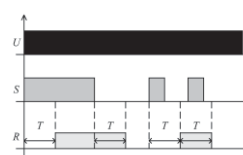
The supply voltage [U] shall be applied to the time relay continuously. After the control contact [S] has been closed, the preset time [T] is measured after which the output relay [R] is switched on and remains in this position until the control contact [S] is opened. If the closing time of [S] is shorter than the preset time [T], the relay [R] will not operate.

### PWM - Pulse with Modulation



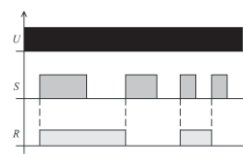
After the supply voltage has been applied, the output relay switches on for the preset time [T], and then switches off for the remaining time interval to complete the full value of the preset interval [Tz].

### Esa - Delayed Switching ON and OFF Controlled with Control Contact



The supply voltage [U] must be applied to the time relay continuously. After the control contact [S] has been closed, the preset time [T] measurement starts, and after it has lapsed, the output relay [R] is switched on. If closing time of control contact [S] is shorter than setting time delay [T] output relay [R] will switch on after time delay [T] and will be on during time [T]. Closing of control contact [S] during time of switch on output relay [R] will not influence for realize function.

### B - Flasher with Control Contact



Each closing of the control contact [S] results in the change of the output relay position to the opposite one (a feature of bistable relay).

### Permanent switching ON and OFF

**The functions available in TR4N relays.** 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.

### OFF - OFF mode

**The mode available in PIR6WT-1Z relays.** The OFF mode is selected with the switches of TIME range settings. In the OFF mode the normally open contact is permanently open. The position of MODE setting switches is of no significance with this mode. The OFF mode appears useful in operation control of the the time relay in electrical system.

U - supply voltage; R - output state of the relay; S - control contact state; T, T1, T2 - measured times; Tz - value of the set interval; t - time axis



- Multifunction time relay
- 7 time functions: E, Wu, Bp, R, Ws, Wa, Es
- 7 time ranges: 1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
- Wide input voltage range: 12...240 V AC/DC
- 1 changeover contact: 1 C/O
- Rated load: 8 A / 250 V AC at cat. AC1
- Installation design: width 17,5 mm
- Recognitions, certifications, directives:

Type of relay

TR-EM1P-UNI

## Output circuit

Number and type of contacts		1 C/O - changeover	
Rated load	AC1	8 A / 250 V AC	
Max. breaking capacity	AC1	2 000 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Input circuit		
Supply voltage U		12...240 V AC/DC, AC: 50/60 Hz; terminals A1(+)-A2
Drop-out voltage		AC: $\geq 0,3 U_n$
Operating range of supply voltage		$0,9 < U_n < 1,1$
Rated power consumption		4,0 VA / 1,5 W
Rated frequency		AC: 48...63 Hz
Duty cycle		100%
Residual ripple to DC		10%
Control contact	• input	terminals A1-B1
	• loadable	yes
	• max. line length	10 m
	• trigger level (sensitivity)	automatic adaption to supply voltage

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

## General data

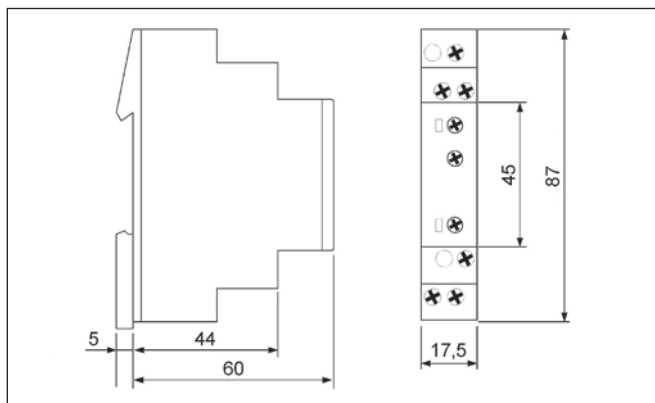
Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		87 x 17,5 x 60 mm
Weight		63 g
Ambient temperature	• storage, transport	-25...+70 °C
	• operating	-25...+55 °C PN-EN 60068-1
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Time module data

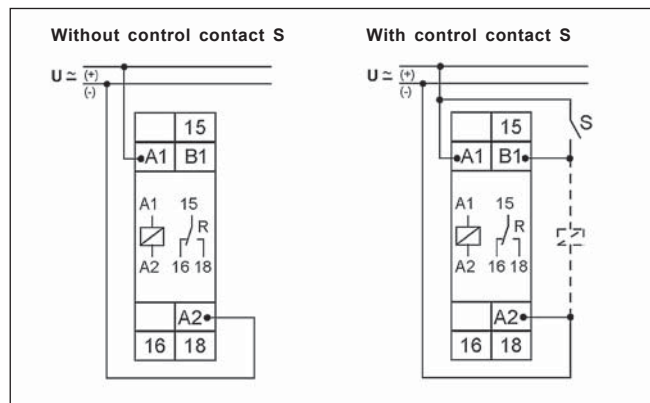
Functions	E, Wu, Bp, R, Ws, Wa, Es ❶
Time intervals (timing adjustment)	1 s (50 ms...1 s); 10 s (0,5...10 s); 1 min. (3 s...1 min.); 10 min. (30 s...10 min.); 1 h (3 min. ...1 h); 10 h (30 min. ...10 h); 100 h (5...100 h)
Base accuracy	$\pm 1\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 0,5\%$ or $\pm 5$ ms
Temperature influence	$\pm 0,01\% / ^\circ\text{C}$
Recovery time	100 ms
Min. pulse of the control contact	AC: 100 ms DC: 50 ms
LED indicator	green LED U/T ON - indication of supply voltage green LED U/T flashing - indication of time period T yellow LED R ON/OFF - indication of output relay

❶ The function has to be set before connecting the relay to the supply voltage.

## Dimensions



## Connections diagrams



## Mounting, mechanical design

Relays **TR-EM1P-UNI** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## Functions

### E - ON delay



When the supply voltage **U** is applied, the set interval **T** begins (green LED **U/T** flashes). After the interval **T** has expired (green LED **U/T** 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 - single shot leading edge voltage controlled



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 **U/T** flashes). After the interval **T** has expired (green LED **U/T** 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 expired is erased and is restarted when the supply voltage is next applied.

### Bp - flasher pause first



When the supply voltage **U** is applied, the set interval **T** begins (green LED **U/T** 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



The supply voltage **U** must be constantly applied to the device (green LED **U/T** 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 **U/T** 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 leading edge with control input S



The supply voltage **U** must be constantly applied to the device (green LED **U/T** illuminated). When the control contact **S** is closed, the output relay **R** switches into on-position (yellow LED illuminated) and the set interval **T** begins (green LED **U/T** flashes). After the interval **T** has expired (green LED **U/T** 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 - single shot trailing edge with control input S



The supply voltage **U** must be constantly applied to the device (green LED **U/T** 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 **U/T** flashes). After the interval **T** has expired (green LED **U/T** 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.

### Es - ON delay with control input S



The supply voltage **U** must be constantly applied to the device (green LED **U/T** illuminated). When the control contact **S** is closed, the set interval **T** begins (green LED **U/T** flashes). After the interval **T** has expired (green LED **U/T** 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 relay;  
**S** - control contact; **T** - timing adjustment





**NEW**  
product

- Multifunction time relay
- 7 time functions: E, Wu, Bp, R, Ws, Wa, Es
- 7 time ranges: 1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
- Wide input voltage range: 12...240 V AC/DC
- 2 changeover contacts: 2 C/O
- Rated load: 8 A / 250 V AC at cat. AC1
- Installation design: width 35 mm
- Recognitions, certifications, directives:

Type of relay

TR-EM2P-UNI

## Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	8 A / 250 V AC	
Max. breaking capacity	AC1	2 000 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U	12...240 V AC/DC, AC: 50/60 Hz; terminals A1(+)-A2
Drop-out voltage	AC: $\geq 0,3 U_n$
Operating range of supply voltage	$0,9 < U_n < 1,1$
Rated power consumption	6,0 VA / 2,0 W
Rated frequency	AC: 48...63 Hz
Duty cycle	100%
Residual ripple to DC	10%
Control contact	terminals A1-B1
• input	
• loadable	yes
• max. line length	10 m
• trigger level (sensitivity)	automatic adaption to supply voltage

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

## General data

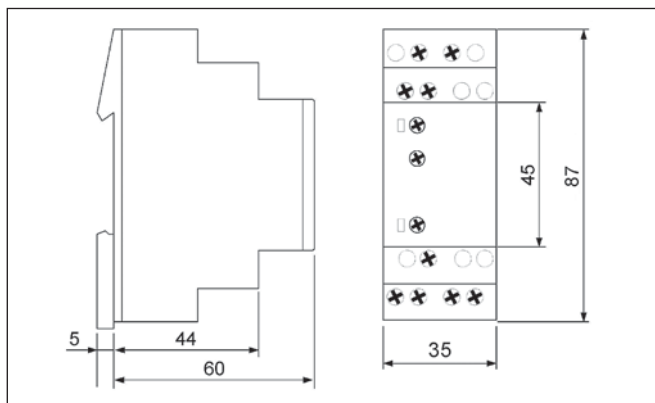
Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		87 x 35 x 60 mm
Weight		120 g
Ambient temperature	• storage, transport	-25...+70 °C
	• operating	-25...+55 °C PN-EN 60068-1
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Time module data

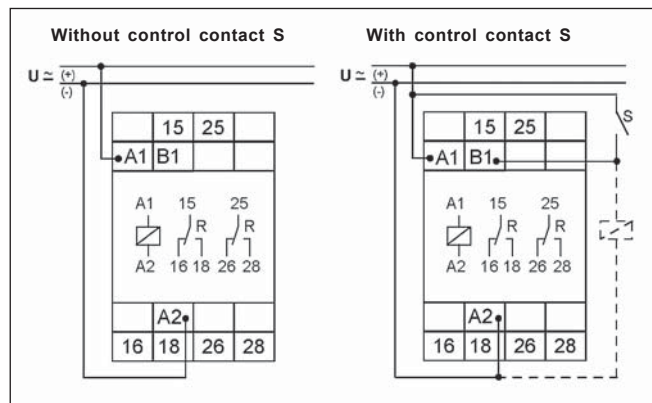
Functions	E, Wu, Bp, R, Ws, Wa, Es ❶
Time intervals (timing adjustment)	1 s (50 ms...1 s); 10 s (0,5...10 s); 1 min. (3 s...1 min.); 10 min. (30 s...10 min.); 1 h (3 min. ...1 h); 10 h (30 min. ...10 h); 100 h (5...100 h)
Base accuracy	$\pm 1\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 0,5\%$ or $\pm 5$ ms
Temperature influence	$\pm 0,01\% / ^\circ\text{C}$
Recovery time	100 ms
Min. pulse of the control contact	AC: 100 ms DC: 50 ms
LED indicator	green LED U/T ON - indication of supply voltage green LED U/T flashing - indication of time period T yellow LED R ON/OFF - indication of output relay

❶ The function has to be set before connecting the relay to the supply voltage.

## Dimensions



## Connections diagrams



## Mounting, mechanical design

Relays **TR-EM2P-UNI** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## Functions

### E - ON delay



When the supply voltage U is applied, the set interval T begins (green LED U/T flashes). After the interval T has expired (green LED U/T 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 - single shot leading edge voltage controlled



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 U/T flashes). After the interval T has expired (green LED U/T 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 expired is erased and is restarted when the supply voltage is next applied.

### Bp - flasher pause first



When the supply voltage U is applied, the set interval T begins (green LED U/T flashes). After the interval T has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval T begins

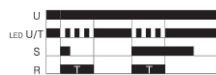
again. After the interval T has expired, the output relay switches into off-position (yellow LED not illuminated). The output relay is triggered at a ratio of 1:1 until the supply voltage is interrupted.

### R - OFF delay



The supply voltage U must be constantly applied to the device (green LED U/T 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 U/T 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 leading edge with control input S



The supply voltage U must be constantly applied to the device (green LED U/T illuminated). When the control contact S is closed, the output relay R switches into on-position (yellow LED illuminated) and the set interval T begins (green LED U/T flashes). After the interval T has expired (green LED U/T 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 - single shot trailing edge with control input S



The supply voltage U must be constantly applied to the device (green LED U/T 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 U/T flashes). After the interval T has expired (green LED U/T 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.

### Es - ON delay with control input S



The supply voltage U must be constantly applied to the device (green LED U/T illuminated). When the control contact S is closed, the set interval T begins (green LED U/T flashes). After the interval T has expired (green LED U/T 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 relay;  
S - control contact; T - timing adjustment



- Asymmetric flasher with controlled times T1 and T2
- 2 time functions: li, lp
- 7 time ranges: 1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
- Wide input voltage range: 12...240 V AC/DC
- 1 changeover contact: 1 C/O
- Rated load: 8 A / 250 V AC at cat. AC1
- Installation design: width 17,5 mm
- Recognitions, certifications, directives:

Type of relay

TR-EI1P-UNI

## Output circuit

Number and type of contacts		1 C/O - changeover	
Rated load	AC1	8 A / 250 V AC	
Max. breaking capacity	AC1	2 000 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U	12...240 V AC/DC, AC: 50/60 Hz; terminals A1(+)-A2
Drop-out voltage	AC: $\geq 0,3 U_n$
Operating range of supply voltage	$0,9 < U_n < 1,1$
Rated power consumption	4,0 VA / 1,5 W
Rated frequency	AC: 48...63 Hz
Duty cycle	100%
Residual ripple to DC	10%
Control contact	terminals A1-B1
• input	
• loadable	yes
• max. line length	10 m
• trigger level (sensitivity)	automatic adaption to supply voltage

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

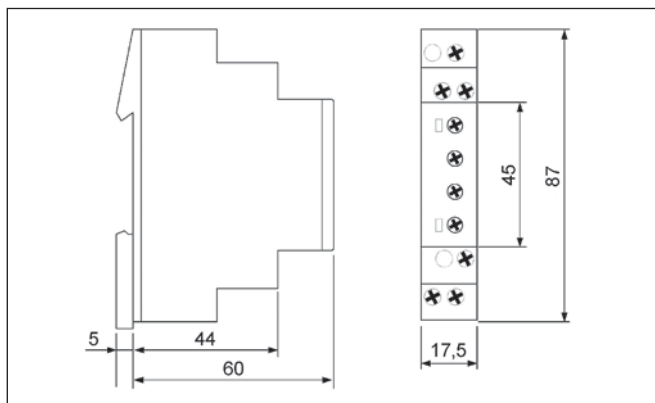
## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		87 x 17,5 x 60 mm
Weight		63 g
Ambient temperature	• storage, transport	-25...+70 °C
	• operating	-25...+55 °C PN-EN 60068-1
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

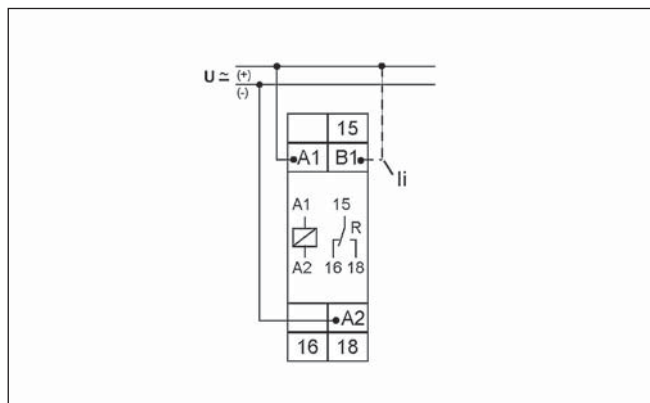
## Time module data

Functions	li - A1-B1 terminals bridged lp - terminals not bridged
Time intervals (timing adjustment)	1 s (50 ms...1 s); 10 s (0,5...10 s); 1 min. (3 s...1 min.); 10 min. (30 s...10 min.); 1 h (3 min. ...1 h); 10 h (30 min. ...10 h); 100 h (5...100 h)
Base accuracy	$\pm 1\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 0,5\%$ or $\pm 5$ ms
Temperature influence	$\pm 0,01\%$ / °C
Recovery time	100 ms
LED indicator	green LED U/T ON - indication of supply voltage green LED U/T slow flashing - indication of time period T1 green LED U/T fast flashing - indication of time period T2 yellow LED R ON/OFF - indication of output relay

### Dimensions



### Connections diagram



### Mounting, mechanical design

Relays **TR-EI1P-UNI** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

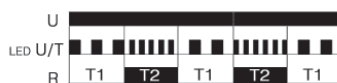
### Functions

#### li - asymmetric flasher pulse first



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 U/T 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 U/T 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.

#### lp - asymmetric flasher pause first



When the supply voltage U is applied, the set interval T1 begins (green LED U/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 U/T flashes fast). After the interval T2 has expired, the output relay switches into off-position (yellow LED not illuminated). The output relay is triggered at the ratio of T1:T2 until the supply voltage is interrupted.

#### li - A1-B1 terminals bridged



#### lp - terminals not bridged



U - supply voltage; R - output relay; T1-T2 - timing adjustment



- Multifunction time relays with controlled times T1 and T2
- 7 time functions: li, lp, EWu, ER, EWs, WsWa, Wt
- 7 time ranges: 1 s; 10 s; 1 min.; 10 min.; 1 h; 10 h; 100 h
- Wide input voltage range: 12...240 V AC/DC
- 2 changeover contacts: 2 C/O
- Rated load: 8 A / 250 V AC at cat. AC1
- Installation design: width 35 mm
- Recognitions, certifications, directives:

Type of relay

TR-EI2P-UNI

## Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	8 A / 250 V AC	
Max. breaking capacity	AC1	2 000 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U	12...240 V AC/DC, AC: 50/60 Hz; terminals A1(+)-A2
Drop-out voltage	AC: $\geq 0,3 U_n$
Operating range of supply voltage	$0,9 < U_n < 1,1$
Rated power consumption	6,0 VA / 2,0 W
Rated frequency	AC: 48...63 Hz
Duty cycle	100%
Residual ripple to DC	10%
Control contact	• input • loadable • max. line length • trigger level (sensitivity)
	terminals A1-B1 yes 10 m automatic adaption to supply voltage

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		87 x 35 x 60 mm
Weight		120 g
Ambient temperature	• storage, transport • operating	-25...+70 °C -25...+55 °C PN-EN 60068-1
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

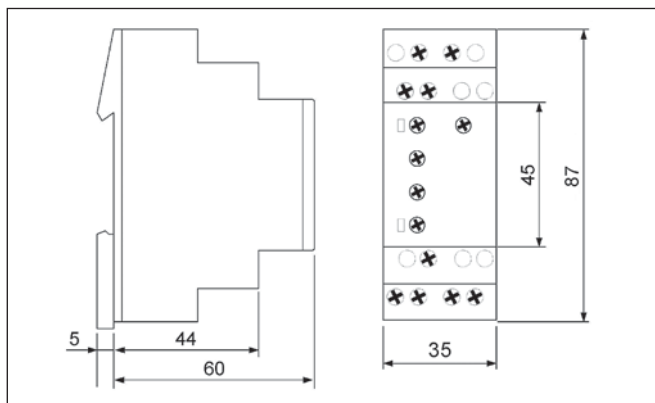
## Time module data

Functions	EWu, ER, EWs, WsWa, Wt
	li - A1-B1 terminals bridged lp - terminals not bridged
Time intervals (timing adjustment)	1 s (50 ms...1 s); 10 s (0,5...10 s); 1 min. (3 s...1 min.); 10 min. (30 s...10 min.); 1 h (3 min. ...1 h); 10 h (30 min. ...10 h); 100 h (5...100 h)
Base accuracy	$\pm 1\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 0,5\%$ or $\pm 5$ ms
Temperature influence	$\pm 0,01\%$ / °C
Recovery time	100 ms
Min. pulse of the control contact	AC: 100 ms DC: 50 ms
LED indicator	green LED U/T ON - indication of supply voltage green LED U/T slow flashing - indication of time period T1 green LED U/T fast flashing - indication of time period T2 yellow LED R ON/OFF - indication of output relay

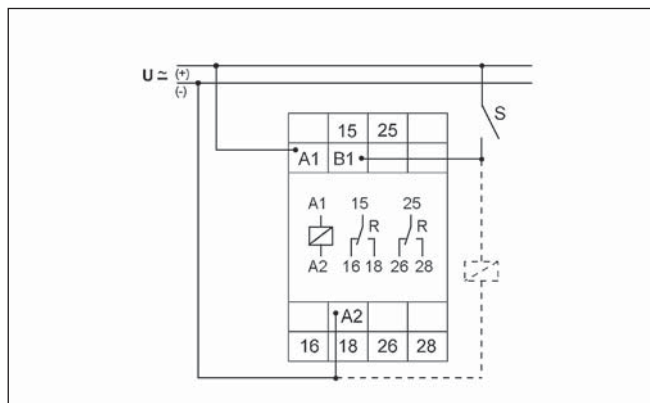
The function has to be set before connecting the relay to the supply voltage.



## Dimensions



## Connections diagram



## Mounting, mechanical design

Relays **TR-EI2P-UNI** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

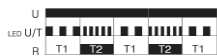
## Functions

### li - asymmetric flasher pulse first



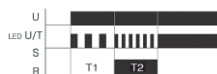
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval T1 begins (green LED U/T flashes slowly). After the interval T1 has expired, the output relay switches into off-position (yellow LED not illuminated) and the set interval T2 begins (green LED U/T 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.

### lp - asymmetric flasher pause first



When the supply voltage U is applied, the set interval T1 begins (green LED U/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 U/T flashes fast). After the interval T2 has expired, the output 2 changeover contacts switches into off-position (yellow LED not illuminated). The output 2 changeover contacts is triggered at the ratio of T1:T2 until the supply voltage is interrupted.

### EWu - ON delay and single shot leading edge voltage controlled



When the supply voltage U is applied, the set interval T1 begins (green LED U/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 U/T flashes fast). After the interval T2 has expired, the output relay switches into off-position (yellow LED not illuminated).

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.

### ER - ON delay and OFF delay with control contact



The supply voltage U must be constantly applied to the device (green LED U/T illuminated). When the control contact S is closed, the set interval T1 begins (green LED U/T 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 U/T 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 single shot leading edge with control contact



The supply voltage U must be constantly applied to the device (green LED U/T illuminated). When the control contact S is closed, the set interval T1 begins (green LED U/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 U/T 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.

### WsWa - single shot leading and single shot trailing edge with control contact



The supply voltage U must be constantly applied to the device (green LED U/T illuminated). When the control contact S is closed, the set interval T1 begins (green LED U/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 U/T 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 - pulse sequence monitoring



When the supply voltage U is applied, the set interval T1 begins (green LED U/T 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 U/T 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 relay;  
S - control contact; T1-T2 - timing adjustment



**NEW**  
product

- Star-delta start up with controlled times T1 and T2
- 4 time ranges: 10 s; 30 s; 1 min.; 3 min.
- 4 transit times (fixed): 40 ms; 60 ms; 80 ms; 100 ms
- Wide input voltage range: 12...240 V AC/DC
- 2 changeover contacts: 2 C/O
- Rated load: 8 A / 250 V AC at cat. AC1
- Installation design: width 35 mm
- Recognitions, certifications, directives: **CE**

Type of relay

**TR-ES2P-UNI**

### Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	8 A / 250 V AC	
Max. breaking capacity	AC1	2 000 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

### Input circuit

Supply voltage U		12...240 V AC/DC, AC: 50/60 Hz; terminals A1(+)-A2	
Drop-out voltage		AC: $\geq 0,3 U_n$	
Operating range of supply voltage		$0,9 < U_n < 1,1$	
Rated power consumption		4,0 VA / 1,5 W	
Rated frequency		AC: 48...63 Hz	
Duty cycle		100%	
Residual ripple to DC		10%	
Control contact	• input	terminals A1-B1	
	• loadable	yes	
	• max. line length	10 m	
	• trigger level (sensitivity)	automatic adaption to supply voltage	

### Insulation

Rated surge voltage		4 000 V AC	
Overvoltage category		III PN-EN 60664-1	
Insulation pollution degree		2, if built-in 3 PN-EN 60664-1	

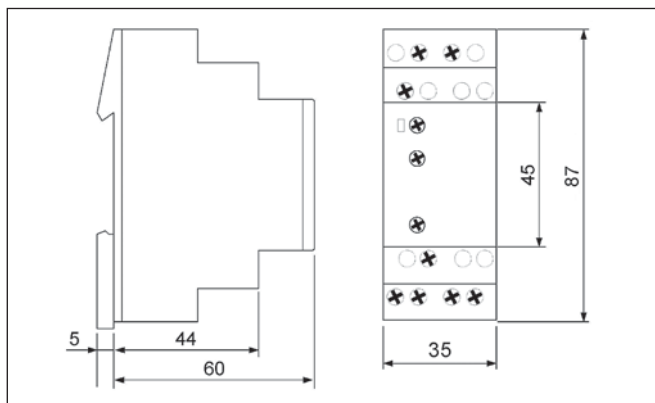
### General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA	
Mechanical life (cycles)		$\geq 2 \times 10^7$	
Dimensions (L x W x H)		87 x 35 x 60 mm	
Weight		120 g	
Ambient temperature	• storage, transport	-25...+70 °C	
	• operating	-25...+55 °C PN-EN 60068-1	
Housing protection category		IP40	
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3	
Shock resistance		15 g 11 ms PN-EN 60068-2-27	
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6	

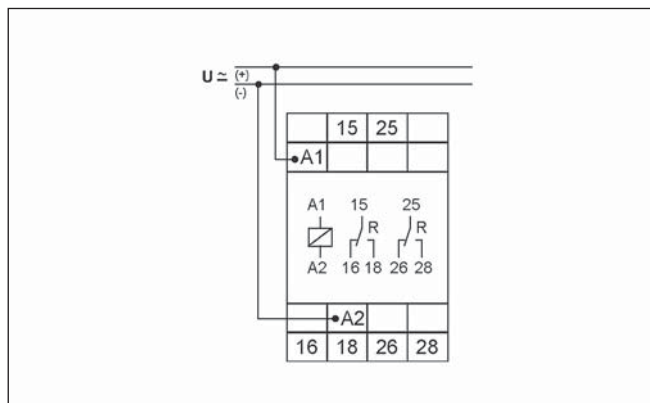
### Time module data

Functions		S	
Time intervals (timing adjustment)		10 s (0,5...10 s); 30 s (1,5...30 s); 1 min. (3 s...1 min.); 3 min. (9 s...3 min.)	
transit times (fixed)		40 ms; 60 ms; 80 ms; 100 ms	
Base accuracy		$\pm 1\%$ (calculate from final range value)	
Setting accuracy		$\pm 5\%$ (calculate from final range value)	
Repeatability		$\pm 0,5\%$ or $\pm 5$ ms	
Temperature influence		$\pm 0,01\%$ / °C	
Recovery time		100 ms	
LED indicator		green LED U/T ON - indication of supply voltage delta-contactor in on-position (terminals 25-28) green LED U/T flashing - indication of time period star time yellow LED R ON/OFF - indication of star-contactor (terminals 15-18)	

### Dimensions



### Connections diagram

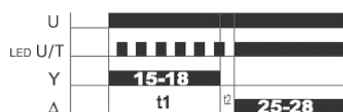


### Mounting, mechanical design

Relays **TR-ES2P-UNI** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

### Functions

#### S - Star-delta start up



When the supply voltage U is applied, the star-contact switches into on-position (yellow LED illuminated) and the set star-time T1 begins (green LED U/T flashes). After the interval T1 has expired (green LED U/T 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 switches into on-position. To restart the function the supply voltage must be interrupted and re-applied.

U - supply voltage; T1-T2 - timing adjustment



- Voltage monitoring in 3-phase mains
- Monitoring of phase sequence and phase failure
- Monitoring of asymmetry ❶
- Connection of neutral wire optional
- Supply voltage = measuring voltage
- 1 changeover contact: 1 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 17,5 mm
- Recognitions, certifications, directives:

Type of relay

**MR-EU3M1P****Output circuit**

Number and type of contacts		1 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load • at 1 000 VA resistive load		360 cycles/hour	

**Input circuit**

Supply voltage U		= measuring voltage; terminals (N)-L1-L2-L3	
Rated voltage U <sub>n</sub>		3(N)-400/230 V	
Drop-out voltage		AC: $\geq 0,2 U_n$	
Operating range of supply voltage		$0,7 < U_n < 1,3$	
Rated power consumption		8,0 VA / 0,8 W	
Rated frequency		AC: 48...63 Hz	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• asymmetry</li> </ul>	(N)-L1-L2-L3 3(N)~, sinus, 48...63 Hz = supply voltage determined by tolerance specified for supply voltage 5...25%	

**Insulation**

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

**General data**

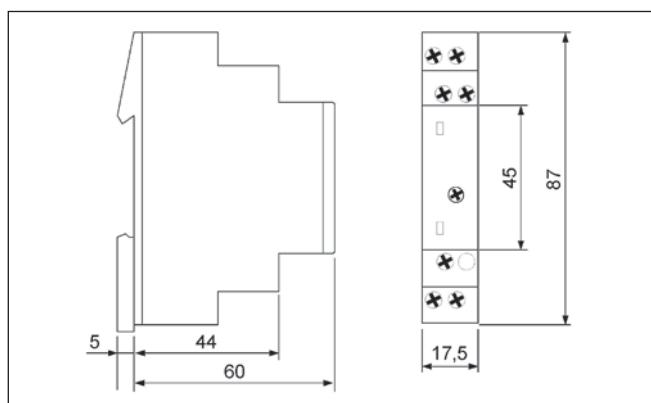
Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		87 x 17,5 x 60 mm
Weight		63 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

**Measuring circuit data**

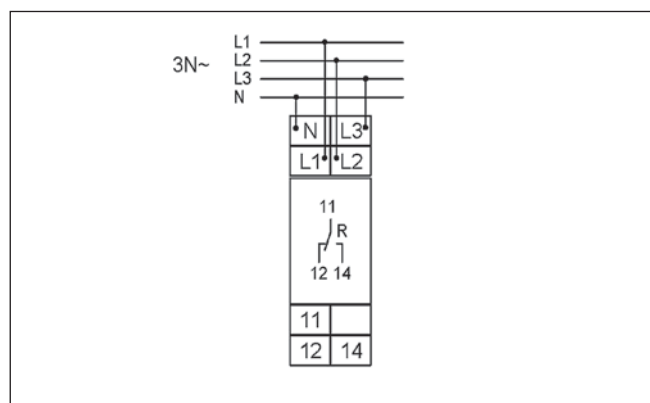
Functions	monitoring of phase sequence, phase failure and asymmetry with adjustable asymmetry ❶, connection of neutral wire optional
Time intervals	tripping delay (fixed, approx. 0,1 s)
Base accuracy	$\pm 5\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 2\%$
Temperature influence	$\pm 0,05\% / ^\circ\text{C}$
Recovery time	500 ms
LED indicator	green LED U/T ON - indication of supply voltage yellow LED R ON/OFF - indication of output relay

❶ By means of evaluating the asymmetry.

## Dimensions



## Connections diagram

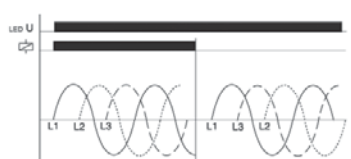


## Mounting, mechanical design

Relays **MR-EU3M1P** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

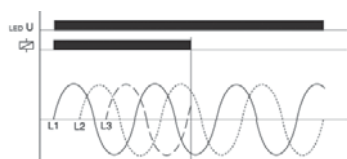
## Functions

### Phase sequence monitoring



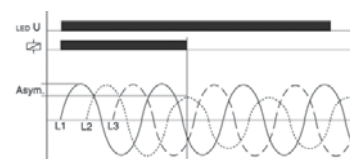
When all the phases are connected in the correct sequence and the measured asymmetry is less than the fixed value, the output relay R switches into on-position (yellow LED illuminated). When the phase sequence changes, the output relay R switches into off-position (yellow LED not illuminated).

### Phase failure monitoring



The output relay R switches into off-position (yellow LED not illuminated), when one of the three phases fails.

### Asymmetry monitoring



The output relay R switches into off-position (yellow LED not illuminated) when the asymmetry exceeds the value set at the ASYM-regulator. Reverse voltages of a consumer (e.g. a motor which continues to run on two phases only) do not effect the disconnection.

U - supply voltage; R - output relay





**NEW**  
product

- Voltage monitoring in 3-phase and 1-phase mains ❶
- Multifunctions monitoring relays
- Monitoring of phase sequence ❷ and phase failure
- Connection of neutral wire optional
- Supply voltage = measuring voltage
- 1 changeover contact: 1 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 17,5 mm
- Recognitions, certifications, directives:

Type of relay

**MR-EU31UW1P**

### Output circuit

Number and type of contacts		1 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load • at 1 000 VA resistive load		360 cycles/hour	

### Input circuit

Supply voltage U		= measuring voltage; terminals (N)-L1-L2-L3	
Rated voltage U <sub>n</sub>		3(N)-400/230 V	
Drop-out voltage		AC: $\geq 0,2 U_n$	
Operating range of supply voltage		$0,7 < U_n < 1,3$	
Rated power consumption		8,0 VA / 1,0 W	
Rated frequency		AC: 48...63 Hz	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• switching threshold U<sub>s</sub></li> </ul>	(N)-L1-L2-L3 3(N)-, sinus, 48...63 Hz = supply voltage determined by tolerance specified for supply voltage max.: $0,8 < U_n < 1,3$ min.: $0,7 < U_n < 1,2$	

### Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

### General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		87 x 17,5 x 60 mm
Weight		72 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

### Measuring circuit data

Functions	UNDER, UNDER+SEQ, WIN, WIN+SEQ ❸ monitoring of phase sequence ❷ and phase failure, connection of neutral wire optional
Time intervals (timing adjustment)	tripping delay (0,1...10 s)
Base accuracy	$\pm 5\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 2\%$
Temperature influence	$\pm 0,05\% / ^\circ\text{C}$
Recovery time	500 ms
LED indicator	red LED ON/OFF - indication of failure ❹ red LED flashes - indication of tripping delay ❹ yellow LED R ON/OFF - indication of output relay

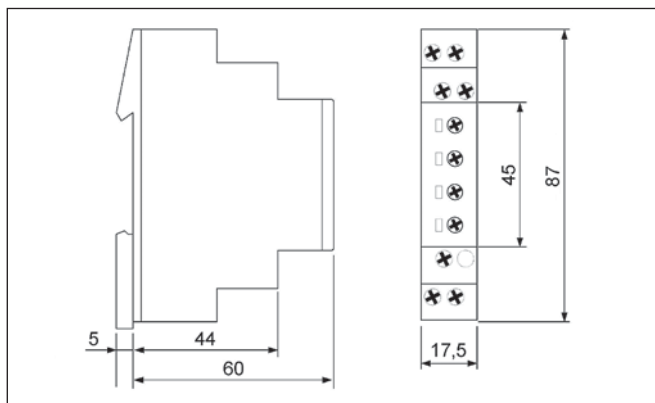
❶ With adjustable thresholds.

❷ Selectable.

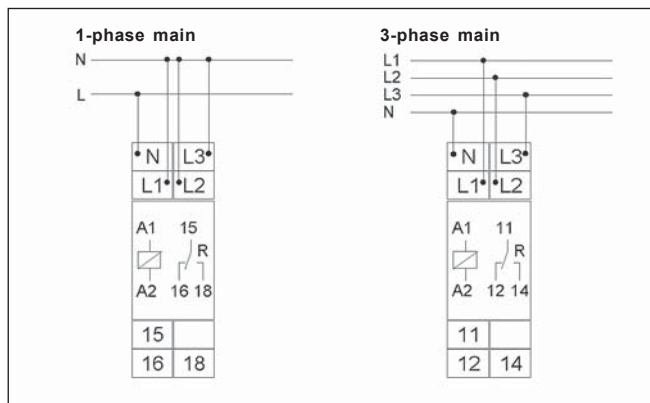
❸ Selectable by means of rotary switch.

❹ Of the corresponding threshold.

## Dimensions



## Connections diagrams



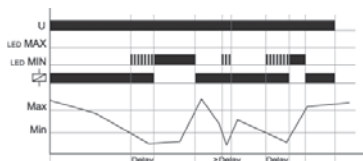
## Mounting, mechanical design

Relays **MR-EU31UW1P** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## 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 separately every phase voltage (L-N) and monitors it according to the selected function (UNDER or WINDOW).

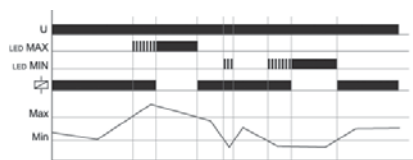
**UNDER, UNDER+SEQ** - undervoltage monitoring, undervoltage monitoring and monitoring of phase sequence



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.

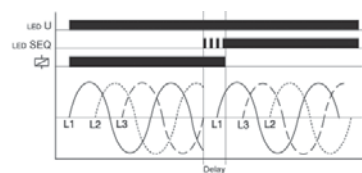
U - supply voltage; R - output relay

**WIN, WIN+SEQ** - voltage monitoring in windowfunction between MIN and MAX values, voltage monitoring in windowfunction between MIN and MAX values and monitoring of phase sequence



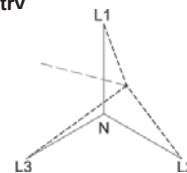
The output relay R switches into on-position (yellow LED illuminated), when the measured voltage (all phase voltages) exceeds the value adjusted at the MIN-regulator. When the measured voltage (one of the phase voltages) exceeds the value adjusted at the MAX-regulator, the set interval of tripping delay (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 switches into on-position again (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated). When the measured voltage (one of the phase voltage) falls below the value adjusted at the MAX-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-position (yellow LED not illuminated).

**SEQ** - phase sequence monitoring




Phase sequence monitoring is selectable for all functions. In single phase circuit, the phase sequence monitoring 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).

**Loss of neutral wire by means of evaluation of asymmetry**



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 switches into off-position (yellow LED not illuminated).



- AC/DC voltage monitoring in 1-phase mains ❶
- Multifunctions monitoring relays
- Minimum value supervision with the hysteresis mode
- Supply voltage = measuring voltage
- 1 changeover contact: 1 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 17,5 mm
- Recognitions, certifications, directives: 

Type of relay

MR-EU1W1P

## Output circuit

Number and type of contacts		1 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U		= measuring voltage; terminals: 230 V AC: E-F3 24 V AC: E-F2 24 V DC: E-F1	
Rated voltage U <sub>n</sub>		24 V AC/DC, 230 V AC	
Drop-out voltage		determined by undervoltage detection (see measured circuit)	
Operating range of supply voltage		0,75 < U <sub>n</sub> < 1,2	
Rated power consumption		230 V AC: 10,0 VA / 0,6 W 24 V AC: 1,3 VA / 0,8 W 24 V DC: 0,6 W	
Rated frequency \ wave form		AC: 48...63 Hz \ DC, AC sinus	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• switching threshold U<sub>s</sub></li> <li>• hysteresis H</li> </ul>	230 V AC: E-F3 24 V AC: E-F2 24 V DC: E-F1 DC or AC sinus, 48...63 Hz = supply voltage ≥ 1,2 U <sub>n</sub> max.: 0,8 < U <sub>n</sub> < 1,2 min.: 0,75 < U <sub>n</sub> < 1,15 see table ordering information or printing on the unit	

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	≥ 2 x 10 <sup>5</sup> 1 000 VA
Mechanical life (cycles)		≥ 2 x 10 <sup>7</sup>
Dimensions (L x W x H)		87 x 17,5 x 60 mm
Weight		72 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1
Housing protection category		IP 40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Measuring circuit data

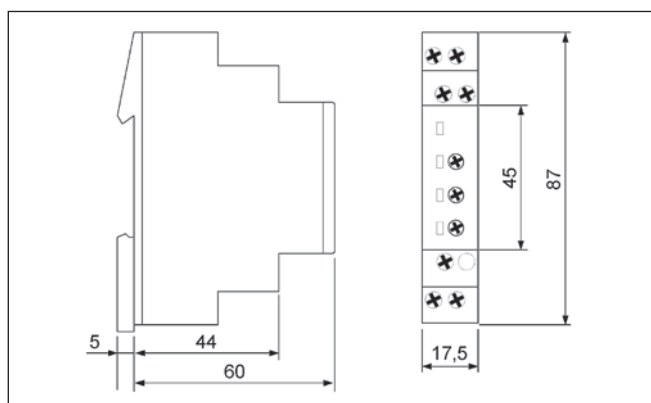
Functions	UNDER, WIN ❷ minimum value supervision with the hysteresis mode
Base accuracy	± 5% (calculate from final range value)
Setting accuracy	± 5% (calculate from final range value)
Repeatability	± 2%
Temperature influence	± 1% / °C
Recovery time	500 ms
LED indicator	green LED ON/OFF - indication of supply voltage red LED ON/OFF - indication of failure ❸ yellow LED R ON/OFF - indication of output relay

❶ With adjustable threshold.

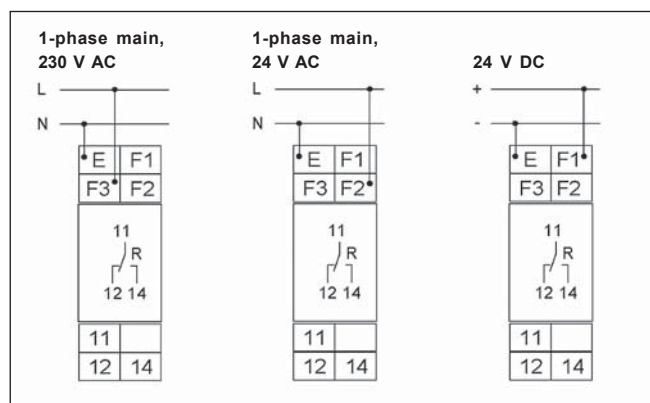
❷ Selectable by means of rotary switch.

❸ Of the corresponding threshold.

## Dimensions



## Connections diagrams

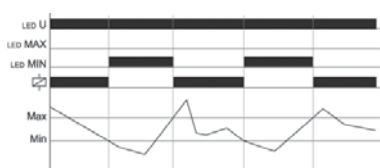


## Mounting, mechanical design

Relays **MR-EU1W1P** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

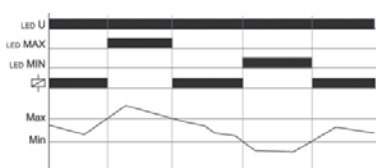
## Functions

### 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 relay



**NEW**  
product

- AC current monitoring in 1-phase mains ❶
- Multifunctions monitoring relays
- Hysteresis mode and the possibility of setting the tripping delay
- Supply voltage 230 V AC
- 1 changeover contact: 1 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 17,5 mm
- Recognitions, certifications, directives: **CE**

Type of relay

**MR-EI1W1P**

## Output circuit

Number and type of contacts		1 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U		230 V AC; terminals (N)-Li	
Rated voltage U <sub>n</sub>		230 V AC	
Drop-out voltage		AC: $\geq 0,2 U_n$	
Operating range of supply voltage		$0,85 < U_n < 1,15$	
Rated power consumption		5,0 VA / 0,8 W	
Rated frequency \ wave form		AC: 48...63 Hz \ AC sinus	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• starting current</li> <li>• input resistance</li> <li>• switching threshold U<sub>s</sub></li> <li>• hysteresis H</li> </ul>	(N)-Li-Lk AC sinus, 48...63 Hz 10 AAC 13 A 1 s: 100 A 3 s: 50 A 3 mΩ max.: $0,1 < I_n < 1,0$ min.: $0,05 < I_n < 0,95$ adjustable	

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	2, if built-in 3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		87 x 17,5 x 60 mm
Weight		72 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1
Housing protection category		IP 40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Measuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH ❷ hysteresis mode and the possibility of setting the tripping delay
Time intervals (timing adjustment)	tripping delay (0,1...10 s)
Base accuracy	$\pm 5\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 2\%$
Temperature influence	$\pm 0,05\% / ^\circ\text{C}$
Recovery time	500 ms
LED indicator	green LED U/T ON - indication of supply voltage red LED ON/OFF - indication of failure ❸ red LED flashes - indication of tripping delay ❸ yellow LED R ON/OFF - indication of output relay

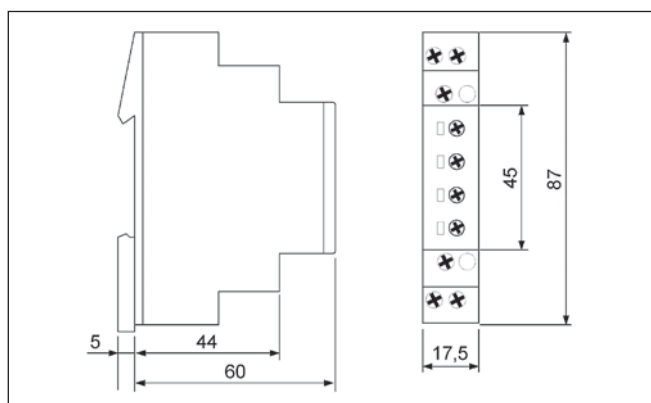
❶ With adjustable thresholds.

❷ Selectable by means of rotary switch.

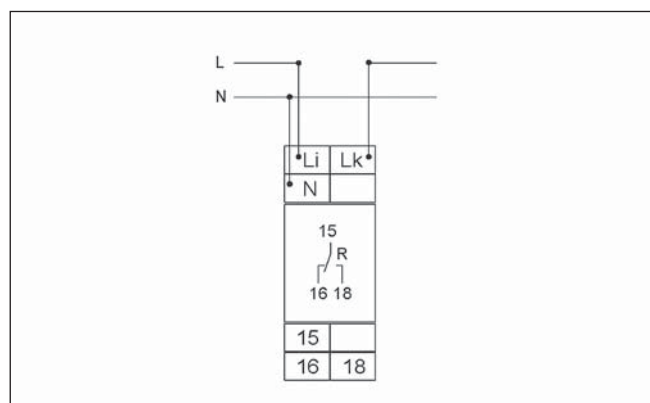
❸ Of the corresponding threshold.



## Dimensions



## Connections diagram

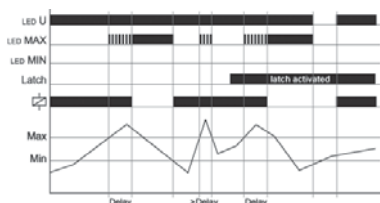


## Mounting, mechanical design

Relays **MR-EI1W1P** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## Functions

**OVER, OVER+LATCH** - overcurrent monitoring, overcurrent monitoring with fault latch

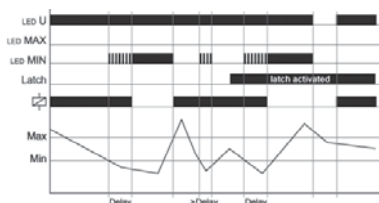


When the supply voltage U is applied, the output relay R switches into on-position, if the measured current is below the MAX-value. When the measured current exceeds the MAX-value, the output relay R switches into off-position after the interval of the tripping delay (Delay) has expired.

**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

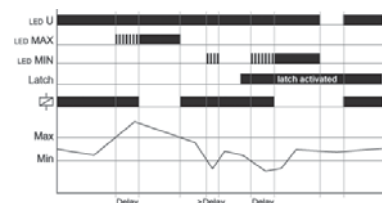


When the supply voltage U is applied, the output relay R switches into on-position, if the measured current is beyond the MIN-value. When the measured current falls below the MIN-value, the output relay R switches into off-position after the interval of the tripping delay (Delay) has expired.

**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.

**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.

U - supply voltage; R - output relay



**NEW**  
product

- Monitoring of motor temperature
- The relay responds to short circuit or wire break ❶
- Test function with integrated Test/Reset key
- Rated isolated voltage on the sensor circuit up to 690 V
- 1 changeover contact: 1 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 35 mm
- Recognitions, certifications, directives:

Type of relay

**MR-ET1P**

## Output circuit

Number and type of contacts		1 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	(thermal constant current 5 A)
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U		230 V AC; terminals A1-A2	
Rated voltage U <sub>n</sub>		230 V AC	
Drop-out voltage		AC: $\geq 0,3 U_n$	
Operating range of supply voltage		$0,85 < U_n < 1,1$	
Rated power consumption		1,3 VA / 1,0 W	
Rated frequency		AC: 48...63 Hz	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• initial resistance</li> <li>• response value</li> <li>• release value</li> <li>• disconnection</li> <li>• measuring voltage T1-T2</li> </ul>	T1-T2 or T1-T3 $< 1,5 \text{ k}\Omega$ relay in OFF-position: $\geq 3,6 \text{ k}\Omega$ relay in ON-position: $\leq 1,65 \text{ k}\Omega$ short circuit thermistor: yes (T1-T2); no (T1-T3) $\leq 7,5 \text{ V}$ at $R \leq 4 \text{ k}\Omega$ PN-EN 60947-8	
Control contact	<ul style="list-style-type: none"> <li>• function</li> <li>• loadable</li> <li>• max. line length</li> <li>• control pulse length</li> <li>• Reset</li> </ul>	connection of an external Reset key no R1-R2: 10 m (twisted pair) min. 50 ms contact 1 NO; terminals R1-R2 ❷	

## Insulation

Rated surge voltage		6 000 V AC	
Overvoltage category		III PN-EN 60664-1	
Insulation pollution degree		2, if built-in 3 PN-EN 60664-1	

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA	
Mechanical life (cycles)		$\geq 2 \times 10^7$	
Dimensions (L x W x H)		87 x 35 x 60 mm	
Weight		100 g	
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1	
Housing protection category		IP40	
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3	

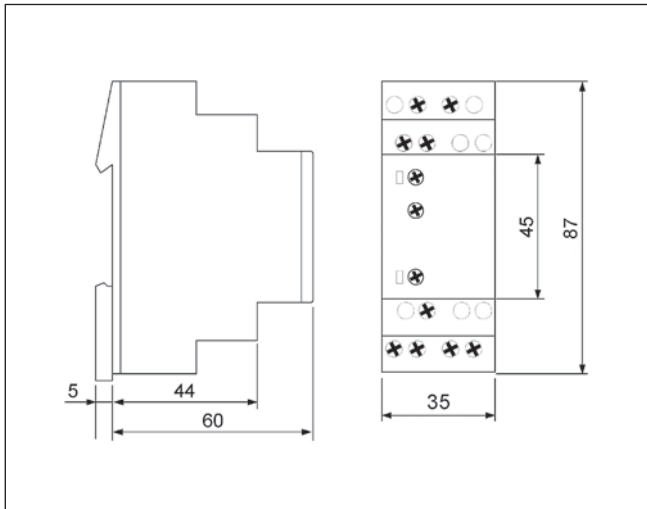
## Measuring circuit data

Functions	monitoring of temperature of the motor winding (max. 6 PTC) with fault latch, for temperature sensors DIN 44081, short circuit monitoring of the thermistor line ❶, test function with integrated Test/Reset key	
Base accuracy	$\pm 5\%$ (calculate from final range value)	
Repeatability	$\pm 1\%$	
Temperature influence	$\pm 0,15\% / ^\circ\text{C}$	
Recovery time	250 ms	
Residual ripple to DC	50 ms	
LED indicator	green LED ON - indication of supply voltage red LED ON/OFF - indication of failure	

❶ Selectable by means of terminals.

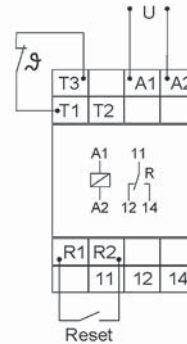
❷ Terminals R2-T2 are internal affiliated with each other.

## Dimensions

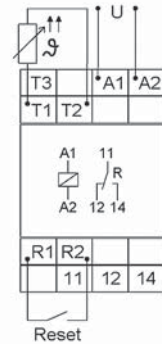


## Connections diagrams

### Temperature sensor monitoring



### Thermal contact monitoring



**Note:** only one of this circuit versions (either monitoring of the temperature sensor or monitoring of the thermal contact) can be executed.

## Mounting, mechanical design

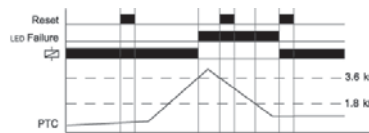
Relays **MR-ET1P** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## Functions

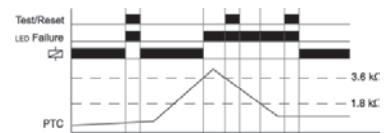
### Monitoring of motor temperature with fault latch

If the supply voltage U is applied (green LED illuminated) and the cumulative resistance of the PTC-circuit is less than 3,6 k $\Omega$  (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 cumulative resistance of the PTC-circuit exceeds 3,6 k $\Omega$  (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 k $\Omega$  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 an external Reset key



### Application of internal Test/Reset key



U - supply voltage; R - output relay



**NEW**  
product

- AC/DC current monitoring in 1-phase mains ❶
- Multifunctions monitoring relays (16,6...400 Hz)
- Timing adjustment for start-up suppression time and tripping delay ❷
- Fault latch mode
- Relay supply via the supply transformer of TR2 type ❸ - see page 58
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives: **CE**

Type of relay

**MR-GI1M2P-TR2**

### Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

### Input circuit

Supply voltage U		12...400 V AC; terminals A1-A2 (galvanically separated) ❶	
Drop-out voltage		AC: $\geq 0,3 U_n$	
Operating range of supply voltage		as per the specification of TR2 supply transformer	
Rated power consumption		2,0 VA / 1,5 W	
Rated frequency		as per the specification of TR2 supply transformer	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• input resistance</li> <li>• switching threshold <math>U_s</math></li> </ul>	0,1 A AC/DC: K-I1 1 A AC/DC: K-I2 10 A AC/DC: K-I3 (distance > 5 mm) DC or AC sinus, 16,6...400 Hz (frequency response: -10...+5%) 0,1-1-10 AAC/DC 0,1 A AC/DC: 0,8 A 1 A AC/DC: 3 A 10 A AC/DC: 12 A 0,1 A AC/DC: 470 mΩ 1 A AC/DC: 47 mΩ 10 A AC/DC: 5 mΩ max.: $0,1 < I_n < 1,0$ min.: $0,05 < I_n < 0,95$	

### Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	3 PN-EN 60664-1

### General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C
Housing protection category		-25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Relative humidity		IP 40
Shock resistance		15...85% PN-EN 60721-3-3 class 3K3
Vibration resistance		15 g 11 ms PN-EN 60068-2-27
		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

### Measuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH ❶
Time intervals (timing adjustment)	timing adjustment for start-up suppression time and tripping delay ❷
Base accuracy	start-up suppression time (0...10 s) tripping delay (0,1...10 s)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 5\%$ (calculate from final range value)
Temperature influence	$\pm 2\%$
Recovery time	$\pm 0,1\% / ^\circ\text{C}$
LED indicator	500 ms
	green LED ON - indication of supply voltage
	green LED flashes - indication of start-up suppression time
	red LED ON/OFF - indication of failure ❸
	red LED flashes - indication of tripping delay ❸
	yellow LED ON/OFF - indication of output relay

❶ With adjustable threshold.

❷ Separately adjustable.

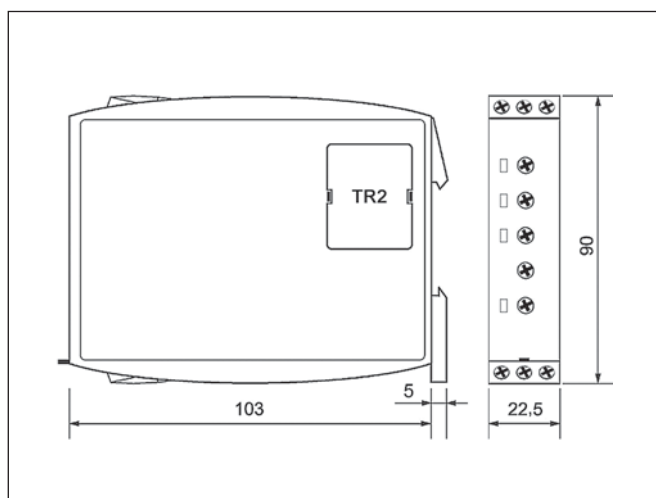
❸ TR2 transformers shall be ordered separately.

❶ Selectable via supply transformers TR2.

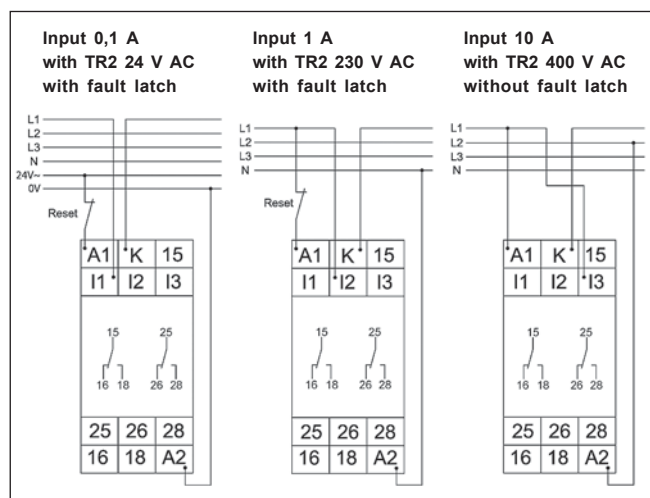
❷ Selectable by means of rotary switch.

❸ Of the corresponding threshold.

## Dimensions



## Connections diagrams



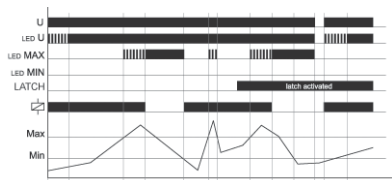
## Mounting, mechanical design

Relays **MR-GI1M2P-TR2** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## 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  $U$  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.

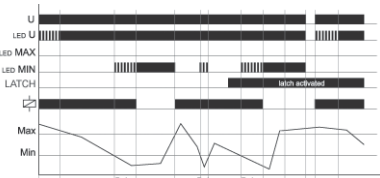
### OVER, OVER+LATCH - overcurrent monitoring, overcurrent monitoring with fault latch



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).

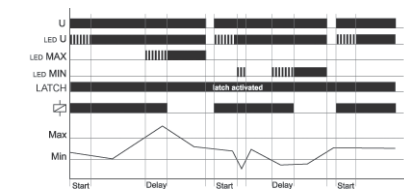
### UNDER, UNDER+LATCH - undercurrent monitoring, undercurrent monitoring with fault latch



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



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).



- Current monitoring in 3-phase mains ❶
- Multifunctions monitoring relays
- Timing adjustment for start-up suppression time and tripping delay ❷
- Fault latch mode
- Relay supply via the supply transformer of TR2 type ❸ - see page 58
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives:

Type of relay

MR-GI3M2P-TR2

## Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U		12...400 V AC; terminals A1-A2 (galvanically separated) ❶	
Drop-out voltage		AC: $\geq 0,3 U_n$	
Operating range of supply voltage		as per the specification of TR2 supply transformer	
Rated power consumption		2,0 VA / 1,5 W	
Rated frequency		as per the specification of TR2 supply transformer	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• input resistance</li> <li>• switching threshold <math>U_s</math></li> </ul>	K-I1 or K-I2 or K-I3 (distance > 5 mm) AC sinus, 48...63 Hz 5 AAC 6 AAC 10 m $\Omega$ max.: $0,1 < I_n < 1,0$ min.: $0,05 < I_n < 0,95$	

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Measuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH ❺ timing adjustment for start-up suppression time and tripping delay ❷
Time intervals (timing adjustment)	start-up suppression time (0...10 s) tripping delay (0,1...10 s)
Base accuracy	$\pm 5\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 2\%$
Temperature influence	$\pm 0,1\% / ^\circ\text{C}$
Recovery time	100 ms
LED indicator	green LED ON - indication of supply voltage red LED ON/OFF - indication of failure ❸ red LED flashes - indication of tripping delay ❹ yellow LED ON/OFF - indication of output relay

❶ With adjustable threshold.

❷ Separately adjustable.

❸ TR2 transformers shall be ordered separately.

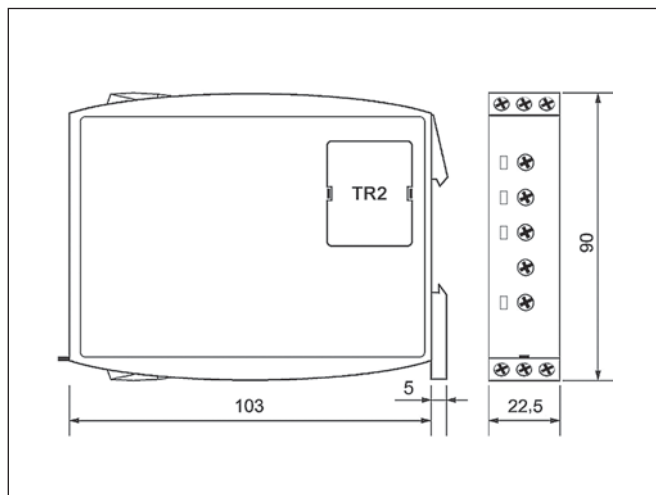
❹ Selectable via supply transformers TR2.

❺ Selectable by means of rotary switch.

❻ Of the corresponding threshold.



## Dimensions



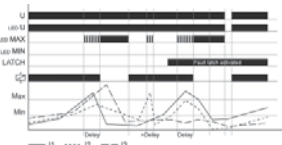
## Mounting, mechanical design

Relays **MR-GI1M2P-TR2** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## 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.

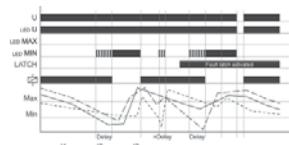
### OVER, OVER+LATCH - overcurrent monitoring, overcurrent monitoring with fault latch



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).

### 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.

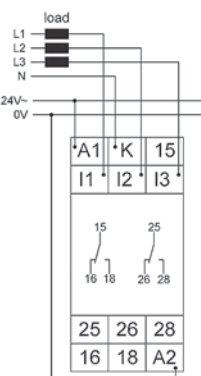
If the fault latch is activated (UNDER+LATCH) and the measured current of one of the phases remains below the MIN-value longer than the set interval of the tripping delay, the output relay R remains in the off-position even if the measured current of all the phases exceeds the value adjusted at the MAX-regulator. 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

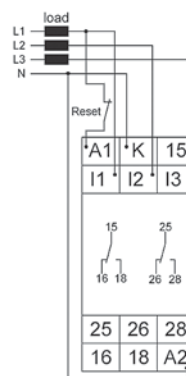
The output relay R switches into on-position (yellow LED illuminated) when the measured current of all the phases exceeds the value adjusted at the

## Connections diagrams

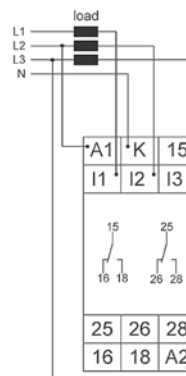
Input 5 A with TR2 24 V AC without fault latch



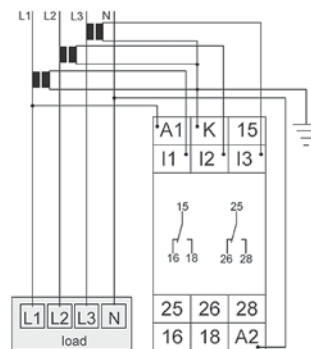
Input 5 A with TR2 230 V AC with fault latch



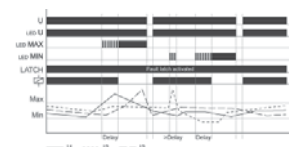
Input 5 A with TR2 400 V AC without fault latch



Input 5 A with TR2 230 V AC and current transformer



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).



- AC/DC voltage monitoring in 1-phase mains ❶
- Frequency of supply voltage (16,6...400 Hz)
- Timing adjustment for start-up suppression time and tripping delay ❷
- Fault latch mode
- Relay supply via the supply transformer of TR2 type ❸ - see page 58
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives:

Type of relay

MR-GU1M2P-TR2

## Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U	12...400 V AC; terminals A1-A2 (galvanically separated) ❶
Drop-out voltage	AC: $\geq 0,3 U_n$
Operating range of supply voltage	as per the specification of TR2 supply transformer
Rated power consumption	2,0 VA / 1,5 W
Rated frequency	as per the specification of TR2 supply transformer
Duty cycle	100%
Measuring circuit	<ul style="list-style-type: none"> <li>• fusing max. 20 A UL 508</li> <li>• terminals 30 V AC/DC: E-F1 60 V AC/DC: E-F2 300 V AC/DC: E-F3</li> <li>• measuring variable DC or AC sinus, 16,6...400 Hz (frequency response: -10...+5%)</li> <li>• measuring input 30-60-300 V AC/DC</li> <li>• overload capacity 30 V AC/DC: 100 V<sub>eff</sub> 60 V AC/DC: 150 V<sub>eff</sub> 300 V AC/DC: 440 V<sub>eff</sub></li> <li>• input resistance 60 V AC/DC: 47 k<math>\Omega</math> 60 V AC/DC: 100 k<math>\Omega</math> 300 V AC/DC: 470 k<math>\Omega</math></li> <li>• switching threshold U<sub>s</sub> max.: 0,1 &lt; U<sub>n</sub> &lt; 1,0 min.: 0,05 &lt; U<sub>n</sub> &lt; 0,95</li> </ul>

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	• storage, transport • operating	-25...+70 °C -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Measuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH ❺ timing adjustment for start-up suppression time and tripping delay ❷
Time intervals (timing adjustment)	start-up suppression time (0...10 s) tripping delay (0,1...10 s)
Base accuracy	$\pm 5\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 2\%$
Wpływ napięcia	$\pm 0,5\%$
Temperature influence	$\pm 0,1\% / ^\circ\text{C}$
Recovery time	500 ms
LED indicator	green LED ON - indication of supply voltage green LED flashes - indication of start-up suppression time red LED ON/OFF - indication of failure ❸ red LED flashes - indication of tripping delay ❸ yellow LED ON/OFF - indication of output relay

❶ With adjustable thresholds.

❷ Separately adjustable.

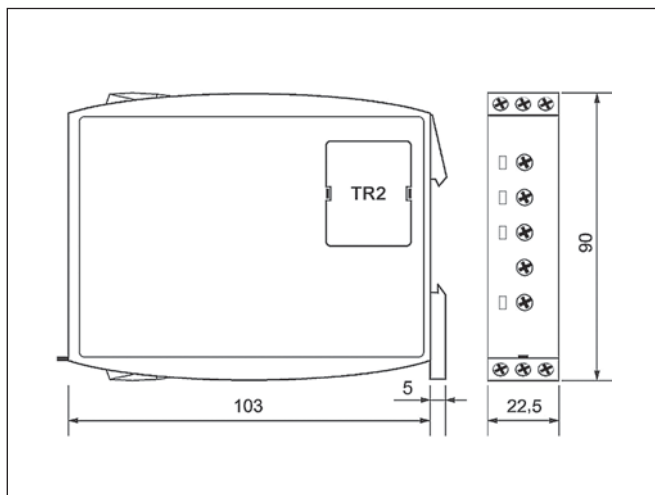
❸ TR2 transformers shall be ordered separately.

❹ Selectable via supply transformers TR2.

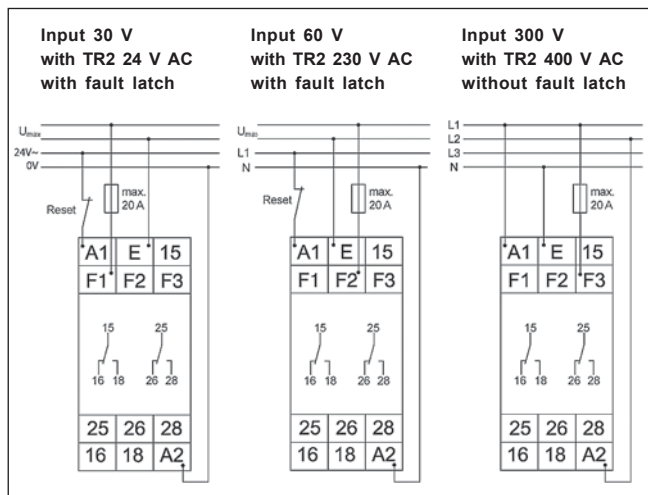
❺ Selectable by means of rotary switch.

❻ Of the corresponding threshold.

## Dimensions



## Connections diagrams



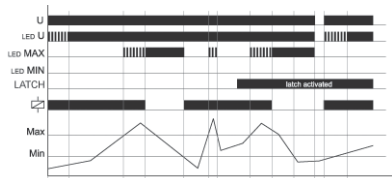
## Mounting, mechanical design

Relays **MR-GU1M2P-TR2** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## 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  $U$  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.

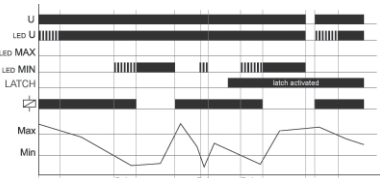
### OVER, OVER+LATCH - overvoltage monitoring, overvoltage monitoring with fault latch



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).

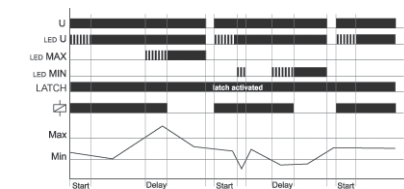
### UNDER, UNDER+LATCH - undervoltage monitoring, undervoltage monitoring with fault latch



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**



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 relay



**NEW**  
product

- Voltage monitoring in 3-phase mains ❶
- Multifunctions monitoring relays • Timing adjustment for tripping delay ❷
- Fault latch mode
- Connection of neutral wire necessary
- Relay supply via the supply transformer of TR2 type ❸ - see page 58
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives: **CE**

Type of relay

**MR-GU32P-TR2**

## Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U		12...400 V AC; terminals A1-A2 (galvanically separated) ❶	
Drop-out voltage		AC: $\geq 0,3 U_n$	
Operating range of supply voltage		as per the specification of TR2 supply transformer	
Rated power consumption		2,0 VA / 1,5 W	
Rated frequency		as per the specification of TR2 supply transformer	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• fusing</li> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• input resistance</li> <li>• switching threshold <math>U_s</math></li> </ul>	max. 20 A UL 508 (N)-L1 or (N)-L2 or (N)-L3 AC sinus, 48...63 Hz 230 V AC 440 V AC 3(N)-400/230 V: 470 k $\Omega$ max.: $-0,2 < U_n < 0,3$ min.: $-0,3 < U_n < 0,2$	

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Measuring circuit data

Functions	OVER, OVER+LATCH, UNDER, UNDER+LATCH, WIN, WIN+LATCH ❺
Time intervals (timing adjustment)	timing adjustment for tripping delay ❷
Base accuracy	tripping delay (0,1...10 s)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 5\%$ (calculate from final range value)
Temperature influence	$\pm 2\%$
Recovery time	$\pm 0,1\% / ^\circ\text{C}$
LED indicator	100 ms
	green LED ON - indication of supply voltage
	red LED ON/OFF - indication of failure ❻
	red LED flashes - indication of tripping delay ❸
	yellow LED ON/OFF - indication of output relay

❶ With adjustable thresholds.

❷ Adjustable.

❸ TR2 transformers shall be ordered separately.

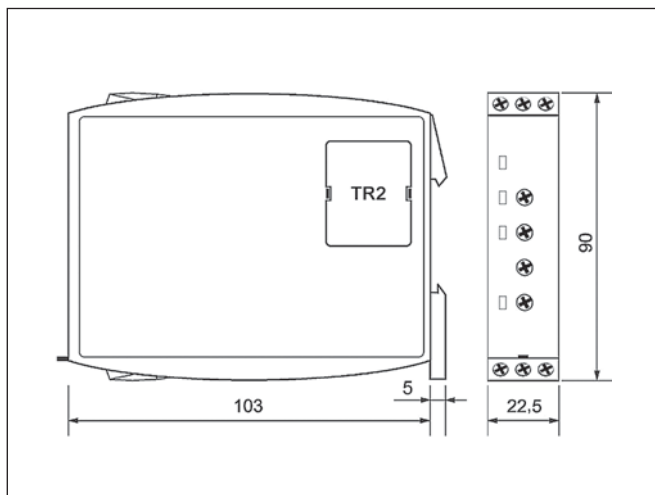
❹ Selectable via supply transformers TR2.

❺ Selectable by means of rotary switch.

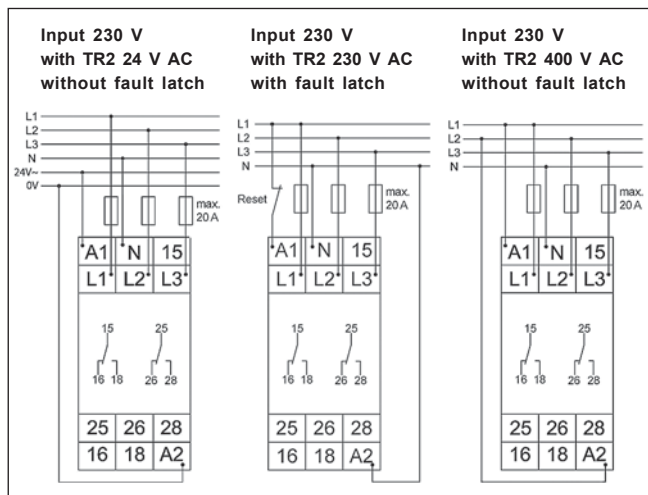
❻ Of the corresponding threshold.



## Dimensions



## Connections diagrams



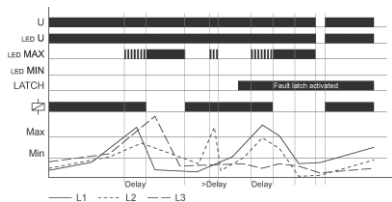
## Mounting, mechanical design

Relays **MR-GU32P-TR2** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## 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.

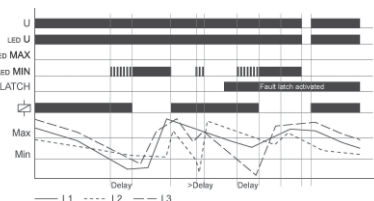
### OVER, OVER+LATCH - overvoltage monitoring, overvoltage monitoring with fault latch



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 and a new measuring cycle begins with the set interval of the start-up suppression (START).

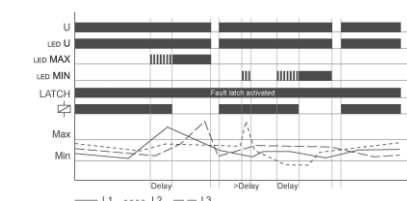
### UNDER, UNDER+LATCH - undervoltage monitoring, undervoltage monitoring with fault latch



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 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 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 and a new measuring cycle begins with the set interval of the start-up suppression (START).

U - supply voltage; R - output relay



- Voltage monitoring in 3-phase mains ❶ • Multifunctions monitoring relays
- Monitoring of phase sequence, phase failure and asymmetry ❷
- Timing adjustment for tripping delay ❸
- Connection of neutral wire optional, detection of loss of neutral wire
- Relay supply via the supply transformer of TR2 type ❹ - see page 58
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives: CE

Type of relay

MR-GU3M2P-TR2

## Output circuit

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

## Input circuit

Supply voltage U		12...400 V AC; terminals A1-A2 (galvanically separated) ❶	
Drop-out voltage		AC: $\geq 0,3 U_n$	
Operating range of supply voltage		as per the specification of TR2 supply transformer	
Rated power consumption		2,0 VA / 1,5 W	
Rated frequency		as per the specification of TR2 supply transformer	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• fusing</li> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• input resistance</li> <li>• switching threshold <math>U_s</math></li> <li>• asymmetry</li> </ul>	max. 20 A UL 508 (N)-L1-L2-L3 AC sinus, 48...63 Hz 3(N)-400/230 V 3(N)-600/346 V 3(N)-400/230 V: 1 M $\Omega$ max.: $-0,2 < U_n < 0,3$ min.: $-0,3 < U_n < 0,2$ 5...25%	

## Insulation

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Housing protection category		IP40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Measuring circuit data

Functions	UNDER, UNDER+SEQ, WIN, WIN+SEQ ❶ monitoring of phase sequence, phase failure and asymmetry ❷ timing adjustment for tripping delay ❸
Time intervals (timing adjustment)	tripping delay (0,1...10 s)
Base accuracy	$\pm 5\%$ (calculate from final range value)
Setting accuracy	$\pm 5\%$ (calculate from final range value)
Repeatability	$\pm 2\%$
Wpływ napięcia	$\pm 0,5\%$
Temperature influence	$\pm 0,1\% / ^\circ\text{C}$
Recovery time	500 ms
LED indicator	red LED ON/OFF - indication of failure ❷ red LED flashes - indication of tripping delay ❷ yellow LED ON/OFF - indication of output relay

❶ With adjustable thresholds. ❷ Asymmetry - with adjustable threshold.

❸ Adjustable.

❹ TR2 transformers shall be ordered separately.

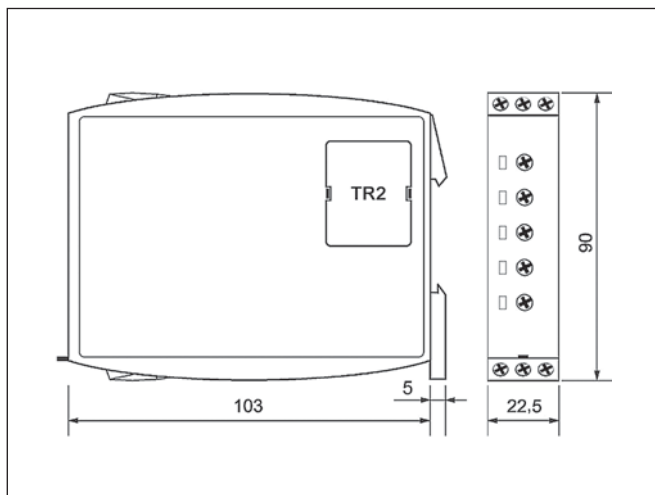
❺ Selectable via supply transformers TR2.

❻ Selectable by means of rotary switch.

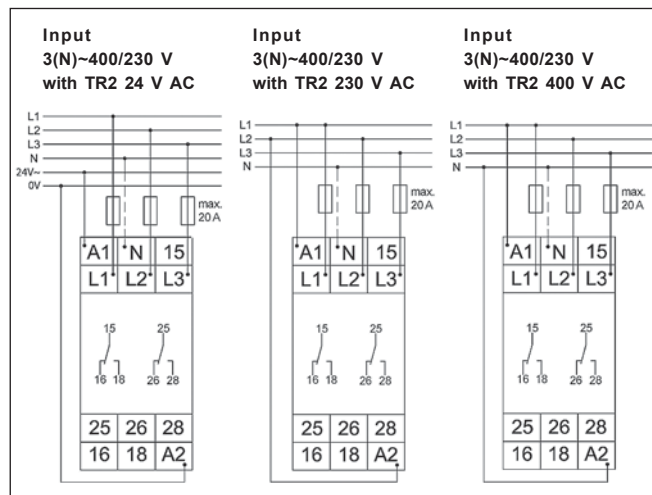
❼ Of the corresponding threshold.



## Dimensions



## Connections diagrams



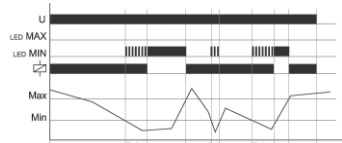
## Mounting, mechanical design

Relays **MR-GU3M2P-TR2** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## Functions

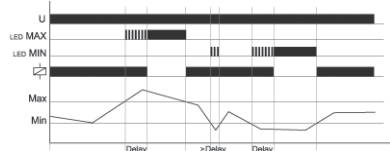
For all functions the LED's MIN and MAX are flashing alternating, when the minimum value for the measured voltage was chosen to be greater than the maximum value. If a failure already exists, when the device is activated, the output relay R remains in off-position and the LED for the corresponding threshold is illuminated.

**UNDER, UNDER+SEQ** - undervoltage monitoring, undervoltage monitoring and 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.

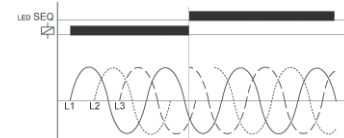
**WIN, WIN+SEQ** - voltage monitoring in window-function between MIN and MAX values, voltage monitoring in window-function between MIN and MAX values and monitoring of phase sequence



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.

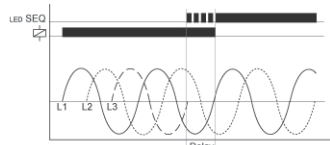
When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (Delay) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relay R switches into off-position (yellow LED not illuminated). The output relay R again switches into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator. 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).

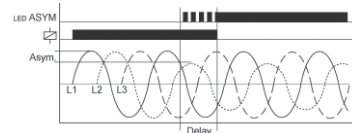
**SEQ** - phase failure monitoring



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

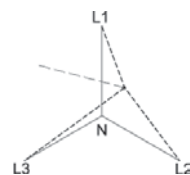
the disconnection but can be monitored by using a proper value for the asymmetry.

**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 relays switch 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 relays switch into off-position (yellow LED not illuminated).

**Loss of neutral wire by means of evaluation of asymmetry:** 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 relays switch 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 relay



- Voltage monitoring in 3-phase mains
- Monitoring of phase sequence and phase failure
- Detection of reverse voltage ❶
- Connection of neutral wire optional
- Supply voltage = measuring voltage
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives:

Type of relay

**MR-GU3M2P****Output circuit**

Number and type of contacts		2 C/O - changeover	
Rated load	AC1	5 A / 250 V AC	
Max. breaking capacity	AC1	1 250 VA	
Max. operating frequency		3 600 cycles/hour	PN-EN 60947-5-1
• at 100 VA resistive load		360 cycles/hour	
• at 1 000 VA resistive load			

**Input circuit**

Supply voltage U	= measuring voltage; terminals (N)-L1-L2-L3 (galvanically separated)		
Drop-out voltage		AC: $\geq 0,2 U_n$	
Operating range of supply voltage		3(N)~ 342...457 V	
Rated power consumption		2,0 VA / 1,5 W	
Rated frequency		AC: 48...63 Hz	
Duty cycle		100%	
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• measuring variable</li> <li>• measuring input</li> <li>• overload capacity</li> <li>• input resistance</li> <li>• asymmetry</li> </ul>	(N)-L1-L2-L3 AC sinus, 48...63 Hz = supply voltage 3(N)~ 457/264 V 3(N)~400/230 V: 15 k $\Omega$ fixed, typical value 30%	

**Insulation**

Rated surge voltage	4 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	3 PN-EN 60664-1

**General data**

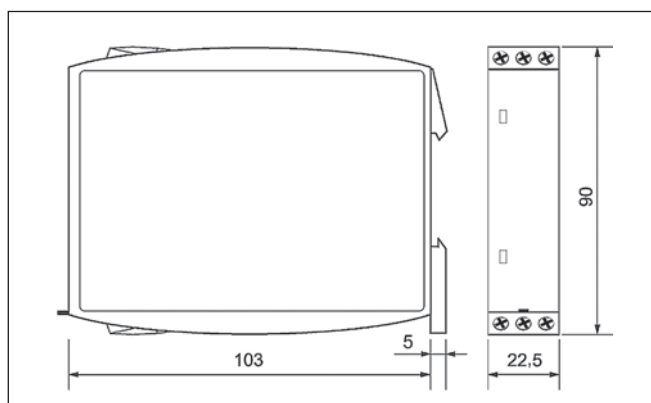
Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Housing protection category		IP 40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

**Measuring circuit data**

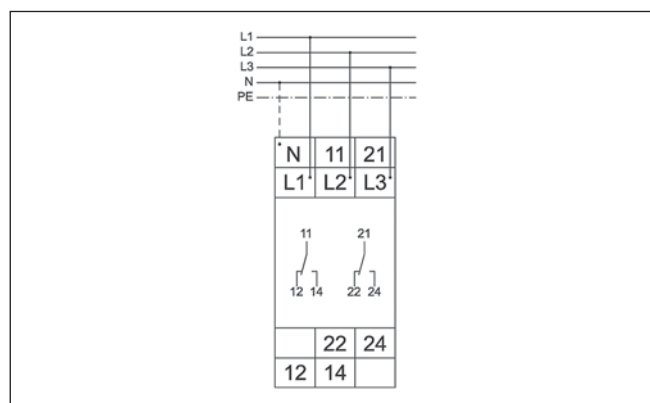
Functions	monitoring of phase sequence and phase failure detection of reverse voltage ❶
Time intervals	start-up suppression time (stała, max. 0,5 s) tripping delay (stała, max. 0,35 s)
Recovery time	100 ms
LED indicator	green LED ON - indication of supply voltage yellow LED ON/OFF - indication of output relay

❶ By means of evaluating the asymmetry.

## Dimensions



## Connections diagram

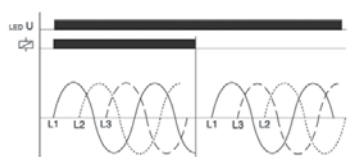


## Mounting, mechanical design

Relays **MR-GU3M2P** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

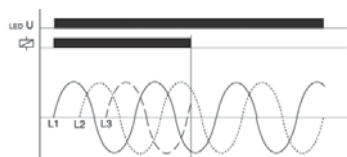
## Functions

### Phase sequence monitoring



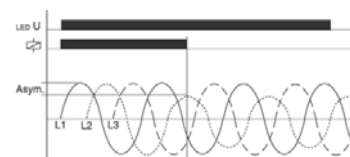
When all the phases are connected in the correct sequence and the measured asymmetry is less than the fixed value, the output relay R switches into on-position (yellow LED illuminated). When the phase sequence changes, the output relay R switches into off-position (yellow LED not illuminated).

### Phase failure monitoring



The output relay R switches into off-position (yellow LED not illuminated), when one of the three phases fails.

### Detection of reverse voltage (by means of evaluation 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 in monitoring relay. 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 relay



**NEW**  
product

- Monitoring of motor temperature
- Test function with integrated Test/Reset key
- External Reset key connectable
- Relay supply via the supply transformer of TR2 type ❶ - see page 58
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives:

Type of relay

**MR-GT2P-TR2**

### Output circuit

Number and type of contacts		2 C/O - changeover
Rated load	AC1	5 A / 250 V AC
Max. breaking capacity	AC1	1 250 VA
Max. operating frequency		3 600 cycles/hour
• at 100 VA resistive load		360 cycles/hour
• at 1 000 VA resistive load		PN-EN 60947-5-1

### Input circuit

Supply voltage U		12...400 V AC; terminals A1-A2 (galvanically separated) ❷
Drop-out voltage		AC: $\geq 0,3 U_n$
Operating range of supply voltage		as per the specification of TR2 supply transformer
Rated power consumption		2,0 VA / 1,5 W
Rated frequency		as per the specification of TR2 supply transformer
Duty cycle		100%
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• initial resistance</li> <li>• response value</li> <li>• release value</li> <li>• disconnection</li> <li>• measuring voltage T1-T2</li> </ul>	T1-T2 $< 1,5 \text{ k}\Omega$ relay in OFF-position: $\geq 3,6 \text{ k}\Omega$ relay in ON-position: $\leq 1,8 \text{ k}\Omega$ no $\leq 2,5 \text{ V}$ at $R \leq 4 \text{ k}\Omega$ PN-EN 60947-8
Control contact	<ul style="list-style-type: none"> <li>• function</li> <li>• loadable</li> <li>• max. line length</li> <li>• Reset</li> </ul>	connection of an external Reset key no R1-R2: 10 m (twisted pair) contact 1 NO; terminals R-T2

### Insulation

Rated surge voltage		4 000 V AC
Overvoltage category		III PN-EN 60664-1
Insulation pollution degree		3 PN-EN 60664-1

### General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Housing protection category		IP 40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

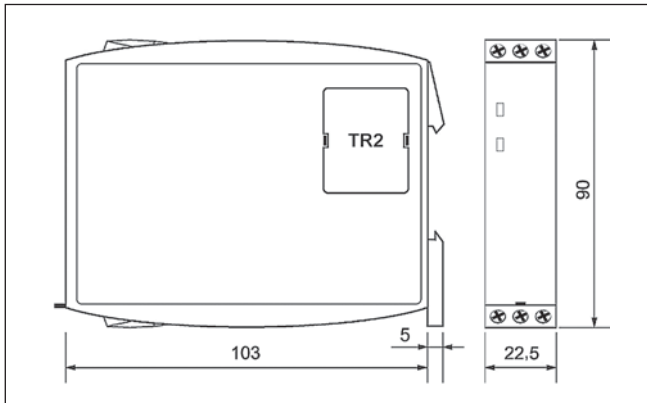
### Measuring circuit data

Functions		monitoring of temperature of the motor winding (max. 6 PTC) with fault latch, for temperature sensors DIN 44081, test function with integrated Test/Reset key
Base accuracy		$\pm 10\%$ (calculate from final range value)
Repeatability		$\pm 1\%$
Wpływ napięcia		$\pm 2,2\%$
Temperature influence		$\pm 0,1\% / ^\circ\text{C}$
Recovery time		500 ms
LED indicator		green LED ON - indication of supply voltage red LED ON/OFF - indication of failure

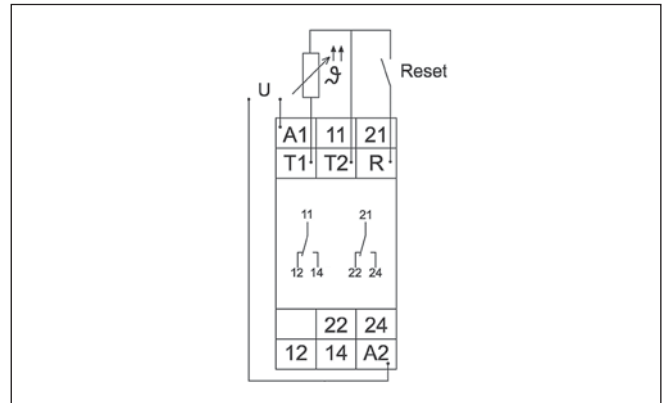
❶ TR2 transformers shall be ordered separately.

❷ Selectable via supply transformers TR2.

## Dimensions



## Connections diagram



## Mounting, mechanical design

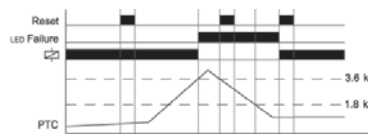
Relays **MR-GT2P-TR2** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

## Functions

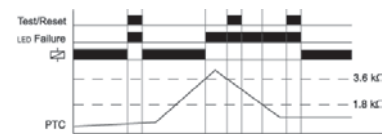
### Monitoring of motor temperature with fault latch

If the supply voltage U is applied (green LED illuminated) and the cumulative resistance of the PTC-circuit is less than 3,6 k $\Omega$  (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 cumulative resistance of the PTC-circuit exceeds 3,6 k $\Omega$  (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 k $\Omega$  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 an external Reset key



### Application of internal Test/Reset key



U - supply voltage; R - output relay



- Level monitoring of conductive liquids MIN, MAX
- Multifunctions monitoring relays
- Timing adjustment for tripping delay (Delay ON) and turn-off delay (Delay OFF) ❶
- Secure isolation of the measuring circuit
- 2 changeover contacts: 2 C/O
- Rated load: 5 A / 250 V AC at cat. AC1
- Installation design: width 22,5 mm
- Recognitions, certifications, directives:

Type of relay

MR-GP2P

## Output circuit

Number and type of contacts		2 C/O - changeover
Rated load	AC1	5 A / 250 V AC
Max. breaking capacity	AC1	1 250 VA
Max. operating frequency		3 600 cycles/hour
• at 100 VA resistive load		360 cycles/hour
• at 1 000 VA resistive load		PN-EN 60947-5-1

## Input circuit

Supply voltage U		24-110-230 V AC; terminals A1-A2 (galvanically separated)
Drop-out voltage		AC: $\geq 0,3 U_n$
Operating range of supply voltage		24-110 V AC: $-0,15 < U_n < 0,1$ 230 V AC: $-0,15 < U_n < 0,15$
Rated power consumption		2,0 VA / 1,5 W
Rated frequency		AC: 48...63 Hz
Duty cycle		100%
Measuring circuit	<ul style="list-style-type: none"> <li>• terminals</li> <li>• sensitivity</li> <li>• sensor voltage</li> <li>• sensor current</li> <li>• wiring distance</li> </ul>	probes (type SK1, SK2, SK3); terminals E1-E2-E3 0,25...100 k $\Omega$ (4 mS...1 $\mu$ S) 12 V AC max. 7 mA capacity of cable 100 nF/km: max. 1000 m (set value < 50%) max. 100 m (set value 100%)

## Insulation

Rated surge voltage	6 000 V AC
Overvoltage category	III PN-EN 60664-1
Insulation pollution degree	3 PN-EN 60664-1

## General data

Electrical life	• resistive AC1	$\geq 2 \times 10^5$ 1 000 VA
Mechanical life (cycles)		$\geq 2 \times 10^7$
Dimensions (L x W x H)		90 x 22,5 x 103 mm
Weight		100 g
Ambient temperature	<ul style="list-style-type: none"> <li>• storage, transport</li> <li>• operating</li> </ul>	-25...+70 °C -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508
Housing protection category		IP 40
Relative humidity		15...85% PN-EN 60721-3-3 class 3K3
Shock resistance		15 g 11 ms PN-EN 60068-2-27
Vibration resistance		0,35 mm DA 10...55 Hz PN-EN 60068-2-6

## Measuring circuit data

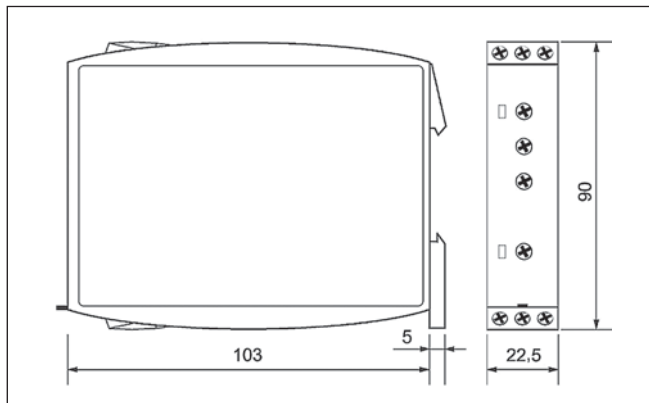
Functions	PUMPUP, PUMPDOWN ❷ timing adjustment for tripping delay (Delay ON) and turn-off delay (Delay OFF) ❶
Time intervals (timing adjustment)	tripping delay (0,5...10 s) turn-off delay (0,5...10 s)
Recovery time	500 ms
LED indicator	green LED ON - indication of supply voltage yellow LED ON/OFF - indication of output relay

❶ Separately adjustable.

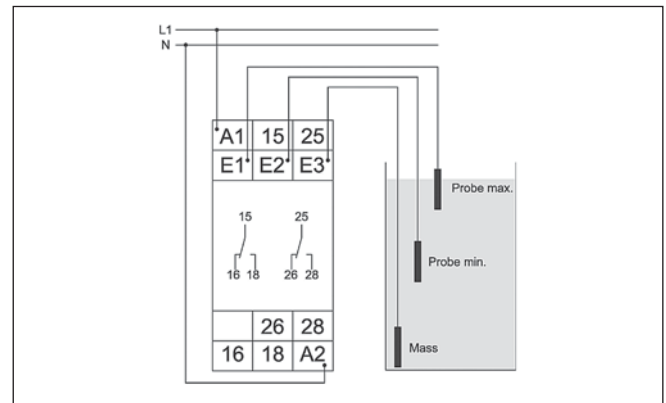
❷ Selectable by means of rotary switch.



## Dimensions



## Connections diagram

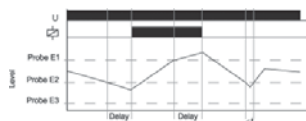


## Mounting, mechanical design

Relays **MR-GP2P** are designed for direct mounting on 35 mm DIN rail mount, EN 50022. Mounting position: any. Self-extinguishing plastic housing, IP 40. Shockproof terminal connection according to VBG 4 (PZ1 required), IP 20. Maximum screw torque: 1,0 Nm. Terminal capacity: 1 x 0,5 do 2,5 mm<sup>2</sup> with/without multicore cable end, 1 x 4 mm<sup>2</sup> without multicore cable end, 2 x 0,5 do 1,5 mm<sup>2</sup> with/without multicore cable end, 2 x 2,5 mm<sup>2</sup> flexible without multicore cable end.

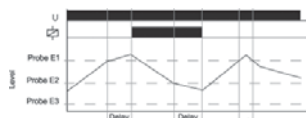
## Functions

### PUMP UP



Connection of the probe rods E1, E2 and E3. Alternatively the electrically conducting container can be connected in lieu of the test probe E3. When the air-fluid level falls below the minimum probe E2 the set interval of the tripping delay (Delay ON) begins. After the expiration of the interval the output relay R switches into on-position (yellow LED illuminated). When the air-fluid level again rises above the maximum probe E1, the set interval of the turn-off delay (Delay OFF) begins. After the expiration of the interval the output relay R switches into off-position (yellow LED not illuminated).

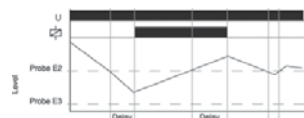
### PUMP DOWN



Connection of the probe rods E1, E2 and E3. Alternatively the electrically conducting container can be connected in lieu of the test probe E3. When the maximum probe E1 gets moistened the set interval of the tripping delay (Delay ON) begins. After the expiration of the interval the output relay R switches into on-position (yellow LED illuminated). When the air-fluid level falls below the minimum probe E2, the set interval of the turn-off delay

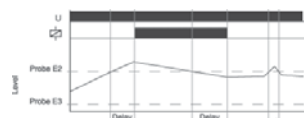
(Delay OFF) begins. After the expiration of the interval the output relay R switches into off-position (yellow LED not illuminated).

### Minimum monitoring (PUMP UP)



Connection of probe rods E2 and E3 (bridge E1-E3). Alternatively the electrically conducting container can be connected in lieu of the test probe E3. When the air-fluid level falls below the probe E2 the set interval of the tripping delay (DELAY ON) begins. After the expiration of the interval the output relays switch into on-position (yellow LED illuminated). When the air-fluid level again rises above the probe E2, the set interval of the turn-off delay (DELAY OFF) begins. After the expiration of the interval the output relays switch into off-position (yellow LED not illuminated).

### Maximum monitoring (PUMP DOWN)



Connection of probe rods E2 and E3 (Bridge E1-E3). Alternatively the electrically conducting container can be connected in lieu of the test probe E3. When the max. probe E2 gets moistened the set interval of the tripping delay (Delay ON) begins. After the expiration of the interval the output relay R switches into

on-position (yellow LED illuminated). When the air-fluid level sinks below the probe E2, the set interval of the turn-off delay (Delay OFF) begins. After the expiration of the interval the output relay R switches into off-position (yellow LED not illuminated).

**Note:** use cables with low capacity for wiring the probes especially with extended wiring length.

Following processes are suggested for the adjustment:

- the existent time delay should be to minimum (0,5 s),
- the function selector switch must be in position pump down,
- turn the sensitivity controller slowly clockwise from min. to max. until the relays switch into on-position (probes must be in dipped state),
- the moistened probes should be taken out of the liquid to control if the relays switch into off-position; if the relays doesn't switch into off-position, turn the sensitivity controller slightly back to min. (counter clockwise),
- set the existent time delay to desired value to fade out a short term moisten the probes by waves in the liquid,
- set the function selector switch to desired position (either pump up or pump down).

**U** - supply voltage; **R** - output relay



- Separating supply transformers TR2... 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 internal level of 24 V AC
- TR2 transformers shall be ordered separately.

Type of transformer

TR2

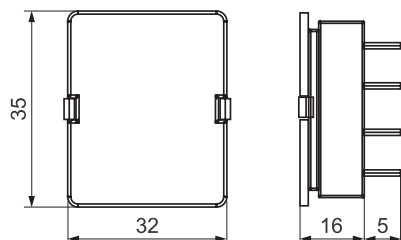
## Input circuit

Supply voltage U	12-24-42-48-110-127-230-400 V AC
Operating range of supply voltage	$0,85 < U_n < 1,1$
Rated power consumption	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	<ul style="list-style-type: none"> <li>• storage, transport -25...+70 °C</li> <li>• operating -25...+55 °C PN-EN 60068-1 -25...+40 °C UL 508</li> </ul>
Housing protection category	IP40
Relative humidity	15...85% PN-EN 60721-3-3 class 3K3

## Dimensions



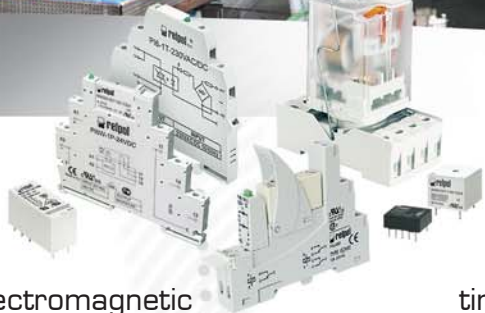
## Mounting, mechanical design

**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 from the relay, which protects the terminals of TR2... Then, TR2... shall be placed in the assembly opening of the MR-G... relay. The housing of TR2... is made of self-extinguishing plastic. When mounted, the tightness of TR2... is IP 40.

## Ordering codes

Ordering codes: **TR2-12VAC**, **TR2-24VAC**, **TR2-42VAC**, **TR2-48VAC**, **TR2-110VAC**, **TR2-127VAC**, **TR2-230VAC**, **TR2-400VAC**.

# Trade offer of Relpol S.A.



electromagnetic  
and interface relays



time and  
monitoring relays



NEED  
programmable relays

RPS - DIN rail  
power supply



solid state relays



softstarts



contactors



motor protection  
circuit breakers



switches and  
rotary switches



digital protection  
sets CZIP



overvoltage  
arresters



## Returnable card <sup>6E</sup>

Kindly send this card by fax +48 68 37 43 830 or by letter.

### 1 Provide us, free of charge, following catalogues and marketing materials:

- ☐ **CD - a set of catalogues**
- ☐ CD - a set of approvals, certificates and declarations
- ☐ Electromagnetic relays, interface relays, plug-in sockets and accessories for relays
- ☐ Contactors and thermal overload relays
- ☐ Time relays
- ☐ NEED programmable relays
- ☐ Solid State Relays
- ☐ **I am interested in, free of charge, training in the area of the Relpol S.A. company offer.**

### 2 Client's remarks:

.....

.....

### 3 Client's details:

I am interested in the telephone ☐ or e-mail ☐ contact.

Send the offer to:

Full name .....

Company .....

Address .....

Zip code .....

Telephone ..... Fax .....

E-mail .....

I agree to receive by e-mail commercial informations regarding promotions, news and other events connected to the activity of Relpol S.A. company. In this scope I make my e-mail address available to the above mentioned company.

.....  
Date

.....  
Signature

We thank you for submitting this card to the Relpol S.A. company.

**RELPOŁ S.A.**  
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# Declaration of conformity RoHS

RELPOL S.A.  
ul. 11 Listopada 37  
68-200 Żary, Poland

**RELPOL S.A. hereby confirms**  
that time and monitoring relays  
and sockets supplied by our company  
meet the requirements  
of the **Directive 2002/95/EC "RoHS"**.

1.11.2005 r.

Date

A handwritten signature in blue ink, appearing to read "A. Hyska".

R&D Department Director  
Andrzej Hyska





Project part - financed by the EUROPEAN UNION  
European Regional Development Fund



UNION FOR ENTERPRISING PEOPLE  
COMPETITIVENESS PROGRAMME

The offer of Relpol S.A.  
includes the following products:

- **subminiature signal relays**  
rated switching capacity: from 1 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 30 A,  
mounting: to plug-in sockets on 35 mm DIN rail mount,  
EN 50022 or on panel mounting, for PCB
- **interface relays**  
rated switching capacity: from 0,5 A to 16 A,  
number of contacts: from 1 to 4
- **plug-in sockets for relays**  
PCB plug-in sockets, plug-in sockets  
for 35 mm DIN rail mount, EN 50022
- **contactors**  
rated switching power: from 2,2 kW to 200 kW  
/at 400 V/
- **motor protection circuit breakers**  
setting range: from 0,1 A to 63 A
- **time relays**  
single- and multifunction time relays,  
wide range of time adjustments
- **monitoring relays**  
monitoring of current, voltage, temperature
- **NEED programmable relays**  
versions: 8 inputs / 4 relay outputs,  
16 inputs / 8 relay outputs, programming: LAD, STL,  
supply voltages: 230 V AC, 24 V DC, 12 V DC,  
LED indicators of the relay and input / output status
- **RPS - DIN rail power supply**  
for automation systems, output circuit: 12 or 24 V DC,  
rated currents: from 1,5 A to 10 A
- **solid state relays**  
rated load currents: from 1 A to 100 A,  
switching at zero or at any time
- **overvoltage arresters**  
classes I, II and III, available with changeover  
signal contact
- **switches and rotary switches**  
lever switches of 1-, 2-, 3- and 4-pole versions,  
rotary switches from 1 to 6 sections  
and from 2 to 12 positions
- **digital protection sets for automation,  
measurements and control  
for mid-voltage fields**
- **production and installation  
of stationary devices for monitoring  
of radioactive radiation**



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