AMRA
CHAUVIN ARNOUX GROUP

# RELAYS

## ENERGY | RAILWAY SERIES

AMRA and MTI lines

## UPDATE

Ed.2 07/18

| | |
|---|---|
| **RCG/RDG** | RELAYS WITH 2-4 FORCIBLY GUIDED CONTACTS EN61810-3 |
| **RMGX** | RELAY WITH 8 FORCIBLY GUIDED CONTACTS EN61810-3 |
| **RMGW** | RELAY WITH 8 FORCIBLY GUIDED CONTACTS |
| **RMMX** | MONOSTABLE RELAY WITH 8 CONTACTS |
| **RMBX** | BISTABLE (LATCHING) RELAY WITH 7-8 CONTACTS |
| **TMM** | MULTIFUNCTION MULTISCALE RELAY WITH 4 CONTACTS |
| **PRIR** | SOCKET WITH REAR CONNECTION SPRING CLAMP |

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RELAYbility

# INSTANTANEOUS RELAY, WELD-NO-TRANSFER 2-4 CONTACTS

## RCG - RDG SERIES
## WITH FORCIBLY GUIDED CONTACTS

RCG

RDG

### OVERVIEW

- Forcibly guided (mechanically linked) contacts, relay compliant with **EN 61810-3, type A**
- Weld-no-transfer technology
- Compact plug-in monostable instantaneous relay
- Suitable for safety applications
- Solid and rugged construction for heavy or intensive duty, IP50 protection
- Self-cleaning knurled contacts
- High electrical life expectancy
- New "HIGH POWER" magnetic arc blow-out for improved breaking capacity, as option
- Wide range of option: LED indicating power on, FLYBACK DIODE i.e.
- Retaining clip for secure locking of relay on socket
- Transparent cover, pull-out handle

### APPLICATIONS

*Shipbuilding* · *Petroleum industry* · *Heavy industry* · *Power generation* · *Power distribution* · *Railway equipment* · *Rolling stock*

### DESCRIPTION

Relays of the RCG / RDG line are highly reliable products featuring high performance, suitable for applications in very harsh and disturbed environments. They are provided with forcibly guided (mechanically linked) contacts. The component conforms to the **EN 61810-3** requirements, **type A** relay (all contacts are mechanically linked). Forcibly guided contacts are also known as weld-no-transfer contacts. A typical application is the check reading of a contact for determining, with absolute certainty, the state of the other contacts in self-monitoring control systems.
Thanks to the exceptional breaking capacity, the relay is suitable for controlling heavy duty loads with intensive switching frequency where safety and electrical continuity is an all-important factor.
The versatility in manufacture allows producing relays with various voltages.
The types of contacts allow obtaining remarkable performance levels both for high, inductive loads or very low loads; the optional presence of the magnetic arc blow-out contributes considerably to the breaking capacity. The knurled contacts ensure better self-cleaning characteristics and lower ohm resistance thanks to the various points of electrical connection, thereby improving the electrical life of the component.

In relays with forcibly guided (mechanically linked) or weld-no-transfer contacts, special design and constructional measures are used to ensure that make (normally-open) contacts can not assume the same state as break (normally-closed) contacts.
- If, when powering up a relay, a NC contact fails to open, the remaining NO contacts must not close, maintaining a contact gap ≥0.5 mm
- When the relay is de-energized, if a NO contact fails to open, the remaining NC contact must not close, maintaining a contact gap ≥0.5 mm

**EN 61810-3** lays down the standard requirements for relays with forcibly guided contacts. This standard defines two types of relay with forcibly guided contacts, namely:
- Type A: Relay whose contacts are all mechanically linked (forcibly guided).
- Type B: Relay containing mechanically linked contacts and contacts which are not mechanically linked.

In the case of relays that include changeover contacts, either the make circuit or the break circuit of a changeover contact can be considered to meet the requirements of this standard.

| Models | Number of contacts | Magnetic arc blow-out | HIGH POWER Magnetic arc blow-out |
|---|---|---|---|
| RCG.x2 | 2 | | |
| RCG.x6 | 2 | • | |
| RCG.x8 | 2 | | • |
| RDG.x2 | 4 | | |
| RDG.x6 | 4 | • | |
| RDG.x8 | 4 | | • |

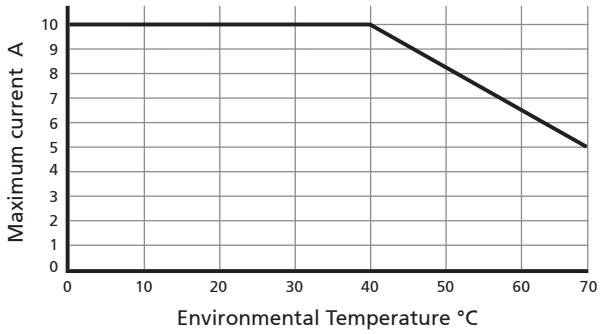
**FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE**

| Coil data | RCG | RDG |
|---|---|---|
| Nominal voltages Un | **DC: 24-36-48-72-96-110-125** (1) | |
| Consumption at Un | 2,2 W | 2,7 W |
| Operating range<br>Operating range for rolling stock version (2) | 80 ÷ 115 % Un<br>70 ÷ 125 % Un | |
| Type of duty | Continuous | |
| Drop-out voltage (3) | DC: > 5% Un | |

(1) Other values on request.
(2) See "Ordering scheme" table for order code. Suitable for application on ROLLING STOCK. Operating range in accordance with EN60077.
(3) Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.

| Contact data | | RCG | | RDG | |
|---|---|---|---|---|---|
| Number and type | | 2 SPDT, form C | | 4 SPDT, form C | |
| Current | Nominal<br>Maximum peak (1)<br>Maximum pulse (1) | See the following chart<br>13A for 1min - 20A per 1s<br>100A for 10ms | | | |
| Example of electrical life (2)<br>* 1.200 oper./h<br>** 600 oper./h | | Standard: RCG.x**2** / RDG.**x2**: 0,2A - 110Vdc - L/R 40ms - $5x10^5$ oper. *<br>With Magnetic arc blowout: RCG.x**6** / RDG.**x6**: 0,5A - 110Vdc - L/R 40ms - $1,5x10^5$ oper. *<br>With **HIGH POWER** Magn. arc blowout: RCG.x**8** / RDG.**x8**: 0,7A - 132Vdc - L/R 40ms - $7x10^4$ oper. ** | | | |
| Minimum load | Standard contacts<br>Gold-plated contact | 100mW (10V, 5mA)<br>50mW (5V, 5mA) | | | |
| Making capacity | | 30 A - 110Vdc - L/R 0 ms : 2.000 operations | | | |
| Maximum breaking voltage | | 250 Vdc / 300 Vac | | | |
| Contact material | | $AgSnO_2$ (mobile contacts) - AgNi (fixed contacts) | | | |
| Operating time at Un (ms) (3) | | Standard | With diode | Standard | With diode |
| Pick-up (NC contact opening) | | ≤ 13 | ≤ 13 | ≤ 17 | ≤ 17 |
| Pick-up (NO contact closing) | | ≤ 19 | ≤ 19 | ≤ 25 | ≤ 25 |
| Drop-out (NO contact opening) | | ≤ 4 | ≤ 11 | ≤ 4 | ≤ 20 |
| Drop-out (NC contact closing) | | ≤ 16 | ≤ 25 | ≤ 14 | ≤ 34 |

(1) The max. peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
(2) For other examples, see electrical life expectancy table.
(3) Unless specified otherwise, the operating times refer to the stabilization of the contact (including bounces).



## Insulation

| | |
|---|---|
| Insulation resistance (at 500Vdc) | |
| between electrically independent circuits and between these circuits and ground | > 1.000 MΩ |
| between open contact parts | > 1.000 MΩ |
| Dielectric withstanding voltage at industrial frequency | |
| between electrically independent circuits and ground | 4 kV (1 min) |
| between coil and contacts parts | 3 kV (1 min) |
| between adjacent contacts | 3,5 kV (1 min) |
| between open contact parts | 2 kV (1 min) |
| Impulse withstand (1.2/50µs - 0.5J) | |
| between electrically independent circuits and ground | 5 kV |
| between open contact parts | 3 kV |

## Mechanical specifications

| | | | |
|---|---|---|---|
| Mechanical life expectacy | | 20x10$^6$ operations | |
| Maximum switching rate | Mechanical | 3.600 operations / h | |
| Protection rating | | IP50 | |
| | | RCG | RDG |
| Dimensions (mm) | | 40x20x50 (1) | 40x40x50 (1) |
| Weight (g) | | 60 | 115 |

1. Output terminals excluded.

## Environmental characteristics

| | | |
|---|---|---|
| Operating temperature | Standard | -25 ÷ +55°C |
| | Version for railways, rolling stock | -25 ÷ +70°C (+85°C for 10min) -40°C as option |
| Storage and shipping temperature | | -40 ÷ +85°C |
| Relative humidity | | Standard: 75% RH - Tropicalized: 95% RH |
| Fire behaviour | | V0 |

## Standards and reference values

| | |
|---|---|
| EN 61810-1, EN 61810-7 | Electromechanical elementary relays |
| EN 61810-3, type A | Relays with forcibly guided (mechanically linked) contacts, type A |
| EN 60695-2-10 | Fire behaviour |
| EN 60529 | Degree of protection provided by enclosures |
| EN 61000-4 | Electromagnetic compatibility |

Unless otherwise specified, the products are designed and manufactured according to the requirements of the above-mentioned European and International standards.
In accordance with EN 61810-1, all technical data are referred to ambient temperature of 23°C, atmospheric pressure of 96kPa and 50% humidity. Tolerance for coil resistance and nominal power is ±5%.

| Railways, rolling stock - Standards | Applicable to RCGR & RDGR versions |
|---|---|
| EN 60077 | Electric equipment for rolling stock - General service conditions and general rules |
| EN 50155 | Electronic equipment used on rolling stock - T3 class |
| EN 61373 | Shock and vibration tests, Cat 1, Class B |
| EN 45545-2 | Fire behaviour, HL3 : Cat E10 (Requirement R26) |
| ASTM E162, E662 | Fire behaviour |

## Configurations - Options

| | |
|---|---|
| TROPICALIZATION | Surface treatment of the coil with protective coating for use with RH 95%. |
| GOLD PLATING | Surface treatment of the contacts, blades and output terminals with gold-cobalt alloy ≥ 2µ. This treatment ensures long-term capacity of the contact to conduct lower currents. |
| LED | LED indicator showing presence of power supply. Flyback diode mounted as standard. |
| FLYBACK DIODE | Component connected in parallel to the coil (type BYW56) designed to dampen overvoltages generated by the coil when de-energized. |
| TRANSIL | Non-polarized component connected in parallel to the coil. Behaviour is similar to that of a varistor with faster operating times. |
| LOW TEMPERATURE | Minimum operating temperature -40°C, only for rolling stock version (option "L"). |

## Ordering scheme

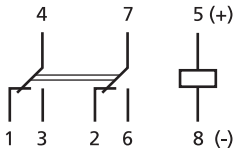
| Product code | Application [1] | Configuration A | Configuration B | Type of power supply | Nominal voltage (V) [2] | Finish [3] | Keying position code [4] |
|---|---|---|---|---|---|---|---|
| RCG (2 contacts) | **E**: Energy<br>**F**: Railway Fixed Equipment<br>**R**: Railway Rolling stock | 1: Standard<br>3: Diode //<br>4: Gold plating<br>6: Gold plating + Diode //<br>7: Diode // + Led<br>8: Transil | 2: Standard<br>6: With magnetic arc blow-out<br>8: With **HIGH POWER** magnetic arc blow-out | C: Vdc | 024 - 036<br>048 - 072<br>096 - 110 - 125 | T: Tropicalized coil<br>L: Low temperature | XX |
| RDG (4 contacts) | | | | | | | |

Example

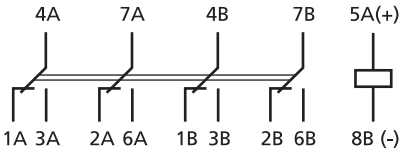
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **RCG** | **E** | **4** | **2** | **C** | **048** | | |
| **RCGE42-C048 = ENERGY series relay with 2 SPDT gold-plated contacts, 48Vdc coil** | | | | | | | |
| **RDG** | **R** | **1** | **6** | **C** | **110** | | |
| **RDGR16-C110 = RAILWAY series relay, rolling stock, with 4 SPDT contacts, magnetic arc blow-out, 110Vdc coil** | | | | | | | |

1. **ENERGY**: all applications except for railway.
   **RAILWAYS, FIXED EQUIPMENT**: application on fixed power systems and electrical railway traction. Construction according to RFI (FS Group, Italy) specification n° RFI DPRIM STF IFS TE 143 A, if applicable for list of RFI approved and conforming products, consult dedicated catalogue "RAILWAY SERIES - RFI APPROVED"
   **RAILWAYS, ROLLING STOCK**: Application on board rolling stock. Electrical characteristics according to EN60077.
2. Other values on request.
3. Optional value.
4. Optional value. The positive mechanical keying is applied according to the manufacturer's model.

## Wiring diagram

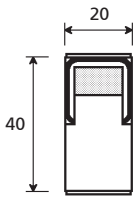



RCGR

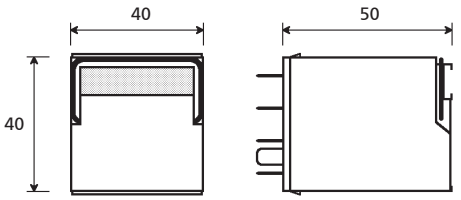



RDGR

## Dimensions




RCG




RDG

## Electrical life expectancy

Some examples of electrical life expectancy.

| RCG.12, RDG.12 (without magnetic arc blow-out) | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Oper. |
| 110Vdc | 0,2 | 40 | 500.000 |
| 220Vdc | 0,2 | 10 | 80.000 |
| U | I (A) | cosφ | Oper. |
| 110Vac | 1 | 1 | 1.200.000 |
| 110Vac | 1 | 0,5 | 1.000.000 |
| 110Vac | 5 | 1 | 500.000 |
| 110Vac | 5 | 0,5 | 300.000 |
| 220Vac | 0,5 | 1 | 1.200.000 |
| 220Vac | 1 | 0,5 | 500.000 |
| 220Vac | 5 | 1 | 400.000 |
| 220Vac | 5 | 0,5 | 300.000 |

| RCG.16, RDG.16 (with magnetic arc blow-out) | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Oper. |
| 110Vdc | 0,2 | 40 | 1.000.000 |
| 110Vdc | 0,5 | 40 | 150.000 |
| 110Vdc | 0,6 | 10 | 300.000 |
| 110Vdc | 1 | 10 | 100.000 |
| 220Vdc | 0,2 | 10 | 100.000 |
| U | I (A) | cosφ | Oper. |
| 110Vac | 1 | 1 | 2.000.000 |
| 110Vac | 1 | 0,5 | 1.500.000 |
| 110Vac | 5 | 1 | 950.000 |
| 110Vac | 5 | 0,5 | 500.000 |
| 220Vac | 0,5 | 1 | 2.000.000 |
| 220Vac | 1 | 0,5 | 800.000 |
| 220Vac | 5 | 1 | 600.000 |
| 220Vac | 5 | 0,5 | 500.000 |

| RCG.18, RDG.18 (with HIGH POWER magnetic arc blow-out) | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Oper. |
| 24Vdc | 1 | 0 | 5.100.000 |
| 24Vdc | 2 | 0 | 3.900.000 |
| 24Vdc | 3 | 0 | 2.900.000 |
| 24Vdc | 4 | 0 | 2.600.000 |
| 24Vdc | 5 | 0 | 2.200.000 |
| 24Vdc | 1 | 20 | 2.700.000 |
| 24Vdc | 2 | 20 | 2.100.000 |
| 24Vdc | 3 | 20 | 1.500.000 |
| 24Vdc | 3,5 | 20 | 1.000.000 |
| 24Vdc | 1 | 40 | 2.000.000 |
| 24Vdc | 2 | 40 | 1.500.000 |
| 24Vdc | 3 | 40 | 1.100.000 |
| 24Vdc | 3,5 | 40 | 800.000 |
| 110Vdc | 0,3 | 0 | 1.000.000 |
| 110Vdc | 0,5 | 0 | 700.000 |
| 110Vdc | 1 | 0 | 190.000 |
| 110Vdc | 0,3 | 20 | 450.000 |
| 110Vdc | 0,5 | 20 | 260.000 |
| 110Vdc | 1 | 20 | 100.000 |
| 110Vdc | 0,3 | 40 | 300.000 |
| 110Vdc | 0,5 | 40 | 180.000 |
| 110Vdc | 0,6 | 40 | 150.000 |
| 110Vdc | 0,7 | 40 | 100.000 |
| 132Vdc | 0,7 | 40 | 70.000 |

Switching frequency: 1200 operations/hour.

| Sockets and retaining clips | | RCG | RDG | Retaining clip |
|---|---|---|---|---|
| Type of installation | Type of outputs | Model | Model | Molla di ritenuta |
| Wall or DIN H35 rail mounting | Spring clamp | PAIR080 | PAIR160 | VM1831 |
| | Screw | 50IP20-I DIN | 48BIP20-I DIN | VM1831 |
| Flush mounting | Spring clamp | PRIR080 | PRIR160 | VM1831 |
| | Double faston (4.8 x 0.8 mm) | ADF1 | ADF2-BIPOK | VM1831 |
| PCB-mount | Solder | 65 (1) | 65 | VM1841 |

(1) Suitable for mounting 2 relays side by side.

## Mounting tips

The preferred mounting position is on the wall, with the relay positioned horizontally in the reading direction on the nameplate.
For correct use of the relays, they should be spaced apart by at least 5 mm in the horizontal direction and 20 mm in the vertical direction. This is to allow correct upward dissipation of the heat generated by the coil. Set these distances according to the socket used. Distances can be reduced depending on the environmental application conditions and on the relay duty cycle.
For maximum reliability in operation, it is advisable to use retaining clips.
No special maintenance is required.
Condensation can form inside the relay when powered up and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. The plastic materials of the relay do not possess hygroscopic properties.

# INSTANTANEOUS RELAY, WELD-NO-TRANSFER 8 CONTACTS

## RMGX SERIES
## WITH FORCIBLY GUIDED CONTACTS

### OVERVIEW

- Mechanically linked contacts, relay compliant with IEC **EN 61810-3, type A**
- Weld-no-transfer technology
- Plug-in monostable instantaneous relay
- Suitable for safety applications
- Solid and rugged construction for heavy or intensive duty
- Self-cleaning knurled contacts
- Very high electrical life expectancy and exceptional endurance
- Magnetic arc blow-out (optional) for higher breaking capacity
- Wide range of option: LED indicating power on, FLYBACK DIODE i.e.
- Transparent cover, with access for manual operation (standard) and pull-out handle
- Retaining clip for secure locking of relay on socket

### APPLICATIONS

*Shipbuilding* · *Petrochemical industry* · *Heavy industry* · *Power generation* · *Power distribution* · *Railway equipment* · *Rolling stock*

### DESCRIPTION

RMGX relays are highly reliable products offering top performance, suitable for applications in particularly harsh and unsettled environments. Meeting the requirements of standard **EN 61810-3 type A**; the relay is equipped with mechanically linked contacts (forcibly guided), an indispensable feature for applications where there is a need to guarantee that make (NO) contacts will never assume the same status as break (NC) contacts. Forcibly guided contacts are also known as weld-no-transfer contacts.
With change-over contacts, customers have the greatest possible flexibility in selecting the configuration (6 NC+2 NO, 5 NC+3 NO, etc.) best suited to their particular needs.
Thanks to its exceptional breaking capacity, the relay is suitable for controlling heavy duty loads with intensive switching frequency, where safety and continuity of operation are all-important.
Manual operation as standard for all models, allowing tests to be conducted in the absence of any power supply. The contacts used are of a type designed to give top performance both with high and strongly inductive DC loads, and with particularly low loads; inclusion of the magnetic arc blow-out function (optional) helps to achieve a considerable increase in breaking capacity. Knurled contacts ensure not only better self-cleaning characteristics, but also lower ohmic resistance thanks to multiple points of electrical connection, thereby extending the electrical life expectancy of the component.

In relays with forcibly guided (mechanically linked) or weld-no-transfer contacts, special design and constructional measures are used to ensure that make (normally-open) contacts can not assume the same state as break (normally-closed) contacts.
- If, when powering up a relay, a NC contact fails to open, the remaining NO contacts must not close, maintaining a contact gap ≥0.5 mm
- When the relay is de-energized, if a NO contact fails to open, the remaining NC contact must not close, maintaining a contact gap ≥0.5 mm

**EN 61810-3** lays down the standard requirements for relays with forcibly guided contacts. This standard defines two types of relay with forcibly guided contacts, namely:
- Type A: Relay whose contacts are all mechanically linked (forcibly guided).
- Type B: Relay containing mechanically linked contacts and contacts which are not mechanically linked.

In the case of relays that include changeover contacts, either the make circuit or the break circuit of a changeover contact can be considered to meet the requirements of this standard.

| Models | Number of contacts | Magnetic arc blow-out |
|---|---|---|
| RMG.x2X | 6spdt+2 NC | |
| RMG.x6X | 6spdt+2 NC | • |

**FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE**

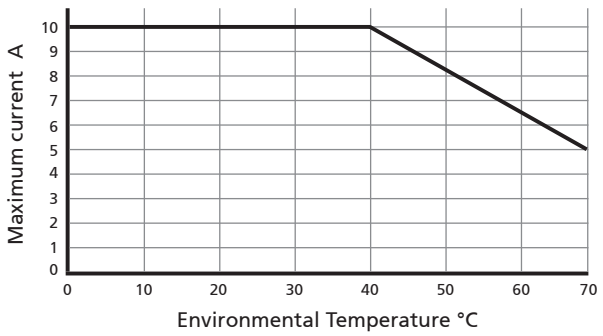
| Electrical data | RMGExyX - RMGFxyX | RMGRxyX |
|---|---|---|
| Nominal voltages Un | **DC : 24-48-110-125-132-220** (1) | **DC : 24-36-72-96-110** (2) |
| Consumption at Un (DC/AC) | 3W | |
| Operating range | DC : 80÷115% Un | DC : 70÷125% Un |
| Type of duty | Continuous | |
| Drop-out voltage (3) | DC : > 5% Un | |

(1) Other values on request.
(2) Suitable for application on rolling stock. Operating range in compliance with EN 60077 standard.
(3) Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certain to be de-energized.

| Contact data | | RMG.12X-16X-42X-46X | RMG.32X-36X-62X-66X-52X-56X |
|---|---|---|---|
| Number and type | | 6 SPDT+ 2 NA, form C | |
| Current | Nominal | See following graph | |
| | Maximum peak (1) | 20A for 1min - 40A for 1s | |
| | Maximum pulse (1) | 150A for 10ms | |
| Example of electrical life expectancy | | RMG.x2X : 0.5A - 110Vdc - L/R 40ms - $10^5$ operations - 1800oper./h<br>RMG.x6X : 1A - 110Vdc - L/R 40ms - $10^5$ operations - 1800oper./h | |
| Minimum load | Standard contacts | 200mW (10V, 10mA) | |
| | Gold-plated contacts | 50mW (5V, 5mA) | |
| Maximum breaking voltage | | 350 VDC / 440 VAC | |
| Contact material | | AgCdO | |
| Operating time at Un (ms) (2) | | DC | |
| Pick-up (NC contact opening) | | ≤ 35 | |
| Pick-up (NO contact closing) | | ≤ 60 | |
| Drop-out (NO contact opening) | | ≤ 4 | |
| Drop-out (NC contact closing): | | ≤ 45 | |

(1) Maximum peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
(2) Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces).

## Rated current contact




Note: reduction of 30% on all the contacts simultaneously.

| Insulation | |
|---|---|
| Insulation resistance (at 500VCD) | |
| between electrically independent circuits and between these circuits and ground | > 10.000 MΩ |
| between open contact parts | > 10.000 MΩ |
| Withstand voltage at industrial frequency | |
| between electrically independent circuits and between these circuits and ground | 2 kV (1 min.) - 2,2kV (1 s) |
| between open contact parts | 2 kV (1 min.) - 2,2kV (1 s) |
| between adjacent contacts | 2 kV (1 min.) - 2,2kV (1 s) |
| Impulse withstand voltage (1,2/50µs - 0,5J) | |
| between electrically independent circuits and between these circuits and ground | 5 kV |
| between open contact parts | 5 kV |

| Mechanical specifications | RMBE.x3X / RMBFx3X-RMBZ12X |
|---|---|
| Mechanical life expectancy | $10x10^6$ operations |
| Maximum mechanical switching rate | 3600 operations/h |
| Degree of protection | IP50 fitted to socket |
| Dimensions (mm) | 45x90x100 (1) |
| Weight (g) | 380 |

(1) Output terminals excluded.

| Environmental specifications | |
|---|---|
| Standard operating temperature standard | -25 to +55 °C |
| Version for railways, rolling stock (RMGR) | -25 to +70°C (+85°C for 10 min) -40°C as option |
| Storage and shipping temperature | -25 to +85°C |
| Relative humidity | Standard: 75% RH - Tropicalized: 95% RH |
| Fire behaviour | V0 |

| Standards and reference values | |
|---|---|
| EN 61810-1, EN 61810-2, EN 61810-7 | All-or-nothing relays |
| EN 61810-3, type A | Relays with forcibly guided (mechanically linked) contacts |
| EN 60695-2-10 | Fire behaviour |
| EN 60529 | Degree of protection provided by enclosures |

Unless otherwise specified, products are designed and manufactured to the requirements of the European and International standards indicated above.
In accordance with EN 61810-1, all items of technical data are referred to ambient temperature 23 °C, atmospheric pressure 96kPa and 50% humidity.
Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

| Railways, rolling stock - Standards | Applicable to RMGRX version |
|---|---|
| EN 60077 | Electric equipment for rolling stock - General service conditions and general rules |
| EN 61373 (1) | Shock and vibration tests, cat 1, class B |
| EN 45545-2 | Fire behaviour, cat E10, requirement R26, V0 |
| ASTM E162, E662 | Fire behaviour |

(1) Opening of NC contacts allowed only at de-energized relay t<3ms.

| Configurations - Options | |
|---|---|
| TROPICALIZATION | Surface treatment of coil with protective coating for use in conditions of RH 95%. This treatment serves to give the coil added protection against corrosion that could occur as a result of moisture reacting with certain chemical agents such as those found in acid or saline atmospheres. |
| GOLD PLATING | Surface treatment of contacts, blades and output terminals with gold, thickness ≥ 2µ. This treatment ensures long-term capacity of the contact to conduct low levels of current, even in adverse ambient conditions. |
| LED | LED indicator showing presence of power supply, wired in parallel with the coil. |
| FLYBACK DIODE | Component connected in parallel with the coil designed to suppress overvoltages generated by the coil when de-energized. |
| LOW TEMPERATURE | Minimum operating temperature -40°C, only for rolling stock version (option "L"). |

## Ordering scheme

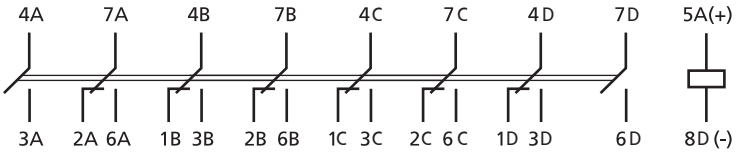
| Product code | Application (1) | Configuration A | Configuration B | Type of power supply | Nominal voltage (V) (2) | Finish (3) | Keying position code (4) |
|---|---|---|---|---|---|---|---|
| RMG | **E**: Energy<br>**F**: Railway Fixed Equipment<br>**R**: Railway Rolling stock | 1: Standard<br>3: Diode //<br>4: Gold plating<br>5: Led<br>6: Gold plating + Diode //<br>7: Diode // + Led | 2X: 6 SPDT contacts + 2 NO<br>6X: 6 SPDT contacts + 2 NO with magnetic arc blow-out | C: Vdc | 024 - 036 - 048<br>072 - 096 - 110<br>125 - 132 - 220 | T: Tropicalized coil<br>L: Low temperature | XX |

Example

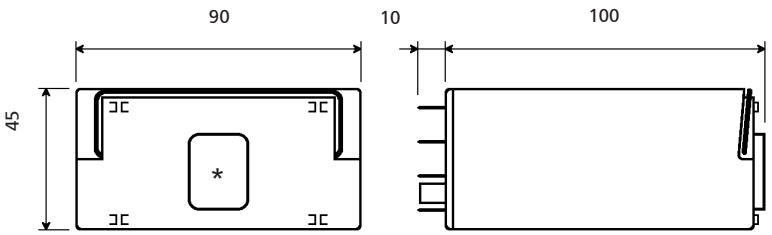
| RMG | E | 3 | 6X | C | 048 | T | |
|---|---|---|---|---|---|---|---|
| **RMGE36X-C048/T = ENERGY series relay with back EMF suppression diode, magnetic arc blow-out and 48Vdc tropicalized coil.** | | | | | | | |
| **RMG** | **R** | **7** | **2X** | **C** | **110** | | |
| **RMGR72X-C110 = RAILWAY series relay, equipped with flyback diode and indicator Led and 110Vdc coil.** | | | | | | | |

1. **ENERGY**: all applications except for railway.
   **RAILWAYS, FIXED EQUIPMENT**: application on fixed power systems and electrical railway traction. Construction according to RFI (FS Group, Italy) specification n° RFI DPRIM STF IFS TE 143 A, if applicable for list of RFI approved and conforming products, consult dedicated catalogue "RAILWAY SERIES - RFI APPROVED"
   **RAILWAYS, ROLLING STOCK**: Application on board rolling stock. Electrical characteristics according to EN60077.
2. Other values on request.
3. Optional value.
4. Optional value. The positive mechanical keying is applied according to the manufacturer's model.

## Wiring diagram



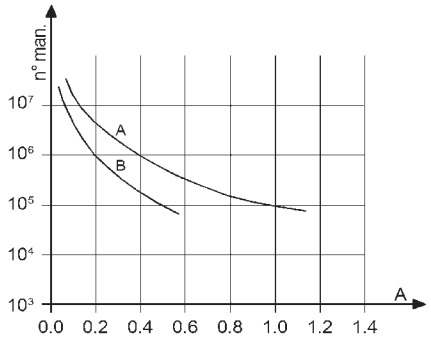

## Dimensions




RMG.x2X - RMG.x6X

(*) access to the manual operating lever

## Electrical life expectancy




**Contact loading: 110Vdc, L/R 40 ms**
Curve A: RMG.x6X
Curve B: RMG.x2X

| RMG.x2X | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Operations |
| 110Vdc | 0.5 | 40 | 100,000 |
| 110Vdc | 0.6 | 10 | 300,000 |
| 120Vdc | 0.7 | 40 | 50,000 |
| 125Vdc | 1.2 | 0 | 1,000,000 |
| 220Vdc | 0.1 | 40 | 100,000 |
| 220Vdc | 0.25 | 10 | 100,000 |
| U | I (A) | cosφ | Operations |
| 110Vac | 1 | 1 | 2,000,000 |
| 110Vac | 1 | 0.5 | 1,500,000 |
| 110Vac | 5 | 1 | 1,000,000 |
| 110Vac | 5 | 0.5 | 500,000 |
| 220Vac | 0.5 | 1 | 2,000,000 |
| 220Vac | 1 | 0.5 | 600,000 |
| 220Vac | 5 | 1 | 650,000 |
| 220Vac | 5 | 0.5 | 600,000 |

| RMG.x6X | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Operations |
| 24Vdc | 1 | 0 | 7,000,000 |
| 24Vdc | 1 | 40 | 3,000,000 |
| 24Vdc | 2 | 40 | 2,000,000 |
| 24Vdc | 5 | 0 | 3,000,000 |
| 24Vdc | 5 | 40 | 200,000 |
| 24Vdc | 9 | 0 | 800,000 |
| 48Vdc | 5 | 20 | 200,000 |
| 110Vdc | 0.4 | 40 | 1,000,000 |
| 110Vdc | 1 | 40 | 100,000 |
| 110Vdc | 10 | 0 | 100,000 |
| U | I (A) | cosφ | Operations |
| 220Vac | 5 | 0.5 | 100,000 |
| 220Vac | 10 | 1 | 100,000 |
| 230Vac | 1 | 0.7 | 2,500,000 |
| 230Vac | 3 | 0.7 | 1,200,000 |

**Switching frequency: 1,200 operations/hour**

## Sockets and retaining clips

| Type of installation | Type of outputs | Model | Retaining clip |
|---|---|---|---|
| Wall or DIN rail mounting | Screw | 96IP20-I DIN | RMC48 |
| | Spring clamp | PAIR320 | |
| Flush mounting | Double faston (4.8 x 0.8 mm) | ADF4-E1 | |
| | Spring clamp | PRIR321 | |

## Mounting tips

The preferred mounting position is on the wall, with the relay positioned horizontally in the reading direction on the nameplate.
To ensure correct use of the relays, they should be spaced apart by at least 20 mm in the vertical direction; this will allow the heat generated by the coils to rise and dissipate as necessary. Check the distances according to the socket used. These distances can be reduced, depending on the environmental conditions during operation and on the relay duty cycle.
Retaining clips are used to ensure that the relay is secured correctly to the socket.
No special maintenance is required.
Condensation can form inside the relay when powered up and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. The plastic materials of the relay do not possess hygroscopic properties.

# INSTANTANEOUS RELAY, WELD-NO-TRANSFER 8 CONTACTS

## RMGW SERIES
## WITH FORCIBLY GUIDED CONTACTS

### OVERVIEW

- Weld-no-transfer contacts, compliant to the standard NF F62-002 (§12.3.10)
- Plug-in monostable instantaneous relay
- Suitable for safety applications
- Solid and rugged construction for heavy or intensive duty
- Self-cleaning knurled contacts
- Very high electrical life expectancy and exceptional endurance
- Magnetic arc blow-out (optional) for higher breaking capacity
- Wide range of option: i.e. LED indicating power on, FLYBACK DIODE
- Transparent cover, with access for manual operation (standard) and pull-out handle
- Retaining clip for secure locking of relay on socket

### APPLICATIONS

*Shipbuilding* · *Petrochemical industry* · *Heavy industry* · *Power generation* · *Power distribution* · *Railway equipment* · *Rolling stock*

### DESCRIPTION

RMGW relays are highly reliable products offering top performance, suitable for applications in particularly harsh and unsettled environments. The relay is equipped with mechanically linked contacts (forcibly guided), an indispensable feature for applications where there is a need to guarantee that make (NO) contacts will never assume the same status as break (NC) contacts. Forcibly guided contacts are also known as weld-no-transfer contacts.

The testing method is according to NF F62002 (§12.3.10).

With change-over contacts, customers have the greatest possible flexibility in selecting the configuration best suited to their particular needs.

Thanks to its exceptional breaking capacity, the relay is suitable for controlling heavy duty loads with intensive switching frequency, where safety and continuity of operation are all-important.

Manual operation as standard for all models, allowing tests to be conducted in the absence of any power supply. The contacts used are of a type designed to give top performance both with high and strongly inductive DC loads, and with particularly low loads; inclusion of the magnetic arc blow-out function (optional) helps to achieve a considerable increase in breaking capacity.

Knurled contacts ensure not only better self-cleaning characteristics, but also lower ohmic resistance thanks to multiple points of electrical connection, thereby extending the electrical life expectancy of the component.

In relays with forcibly guided (mechanically linked) or weld-no-transfer contacts, special design and constructional measures are used to ensure that make (normally-open) contacts can not assume the same state as break (normally-closed) contacts.

- If, when powering up a relay, a NC contact fails to open, the remaining NO contacts must not close, the other NC contacts may open.
- When the relay is de-energized, if a NO contact fails to open, the remaining NC contact must not close, the other NO contacts may open.

Testing method is according to NF F62002 (§12.3.10):

- The NC contact is kept closed. Relay is enegized with a voltage of 150% of Umax (150% * 125% Unom = 188 % Unom). NO contact should NOT close with a test load of 220V 50Hz, 10 mA.
- The NO contact is kept closed. NC contact should NOT close with a test load of 220V 50Hz, 10 mA.

| Models | Number of contacts | Magnetic arc blow-out |
|---|---|---|
| RMG.x2W | 8 SPDT | |
| RMG.x6W | 8 SPDT | • |

**FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE**

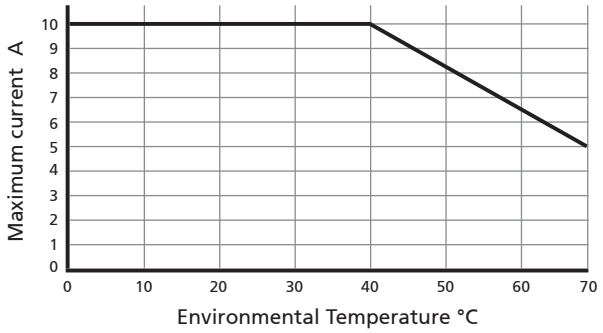
| Electrical data | RMGExyW - RMGFxyW | RMGRxyW |
|---|---|---|
| Nominal voltages Un | **DC : 24-48-110-125-132-220** (1) | **DC : 24-36-72-96-110** (2) |
| Consumption at Un (DC) | 3W | |
| Operating range | DC : 80÷115% Un | DC : 70÷125% Un |
| Type of duty | Continuous | |
| Drop-out voltage (3) | DC : > 5% Un | |

(1) Other values on request.
(2) Suitable for application on rolling stock. Operating range in compliance with EN 60077 standard.
(3) Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certain to be de-energized.

| Contact data | | RMG.12W-16W-42W-46W | RMG.32W-36W-62W-66W-52W-56W |
|---|---|---|---|
| Number and type | | 8 SPDT, form C | |
| Current | Nominal | See following graph | |
| | Maximum peak (1) | 20A for 1min - 40A for 1s | |
| | Maximum pulse (1) | 150A for 10ms | |
| Example of electrical life expectancy | | RMG.x2W : 0.5A - 110Vdc - L/R 40ms - $10^5$ operations - 1800oper./h<br>RMG.x6W : 1A - 110Vdc - L/R 40ms - $10^5$ operations - 1800oper./h | |
| Minimum load | Standard contacts | 200mW (10V, 10mA) | |
| | Gold-plated contacts | 50mW (5V, 5mA) | |
| Maximum breaking voltage | | 350 VDC / 440 VAC | |
| Contact material | | AgCdO | |
| Operating time at Un (ms) (2) | | DC | |
| Pick-up (NC contact opening) | | ≤ 20 | |
| Pick-up (NO contact closing) | | ≤ 40 | |
| Drop-out (NO contact opening) | | ≤ 6 | |
| Drop-out (NC contact closing): | | ≤ 60 | |

(1) Maximum peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
(2) Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces).

## Rated current contact




Note: reduction of 30% on all the contacts simultaneously.

| Insulation | |
|---|---|
| Insulation resistance (at 500VCD) | |
| between electrically independent circuits and between these circuits and ground | > 10.000 MΩ |
| between open contact parts | > 10.000 MΩ |
| Withstand voltage at industrial frequency | |
| between electrically independent circuits and between these circuits and ground | 2 kV (1 min.) - 2,2kV (1 s) |
| between open contact parts | 2 kV (1 min.) - 2,2kV (1 s) |
| between adjacent contacts | 2 kV (1 min.) - 2,2kV (1 s) |
| Impulse withstand voltage (1,2/50µs - 0,5J) | |
| between electrically independent circuits and between these circuits and ground | 5 kV |
| between open contact parts | 5 kV |

| Mechanical specifications | |
|---|---|
| Mechanical life expectancy | $10x10^6$ operations |
| Maximum mechanical switching rate | 3600 operations/h |
| Degree of protection | IP50 fitted to socket |
| Dimensions (mm) | 45x90x100 (1) |
| Weight (g) | 380 |

(1) Output terminals excluded.

| Environmental specifications | |
|---|---|
| Standard operating temperature standard | -25 to +55 °C |
| Version for railways, rolling stock (RMGR) | -25 to +70°C (+85°C for 10 min) -40°C as option |
| Storage and shipping temperature | -25 to +85°C |
| Relative humidity | Standard: 75% RH - Tropicalized: 95% RH |
| Fire behaviour | V0 |

| Standards and reference values | |
|---|---|
| EN 61810-1, EN 61810-2, EN 61810-7 | All-or-nothing relays |
| EN 60695-2-10 | Fire behaviour |
| EN 60529 | Degree of protection provided by enclosures |

Unless otherwise specified, products are designed and manufactured to the requirements of the European and International standards indicated above.
In accordance with EN 61810-1, all items of technical data are referred to ambient temperature 23 °C, atmospheric pressure 96kPa and 50% humidity.
Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

| Railways, rolling stock - Standards | Applicable to RMGR version |
|---|---|
| EN 60077 | Electric equipment for rolling stock - General service conditions and general rules |
| EN 61373 (1) | Shock and vibration tests, cat 1, class B |
| NF F62-002 (§12.3.10) | Weld-no-transfer contacts, test method |
| EN 45545-2 | Fire behaviour, cat E10, requirement R26, V0 |
| ASTM E162, E662 | Fire behaviour |

(1) Opening of NC contacts allowed only at de-energized relay t<3ms.

| Configurations - Options | |
|---|---|
| TROPICALIZATION | Surface treatment of coil with protective coating for use in conditions of RH 95%. This treatment serves to give the coil added protection against corrosion that could occur as a result of moisture reacting with certain chemical agents such as those found in acid or saline atmospheres. |
| GOLD PLATING | Surface treatment of contacts, blades and output terminals with gold, thickness ≥ 2µ. This treatment ensures long-term capacity of the contact to conduct low levels of current, even in adverse ambient conditions. |
| LED | LED indicator showing presence of power supply, wired in parallel with the coil. |
| FLYBACK DIODE | Component connected in parallel with the coil designed to suppress overvoltages generated by the coil when de-energized. |
| LOW TEMPERATURE | Minimum operating temperature -40°C, only for rolling stock version (option "L"). |

## Ordering scheme

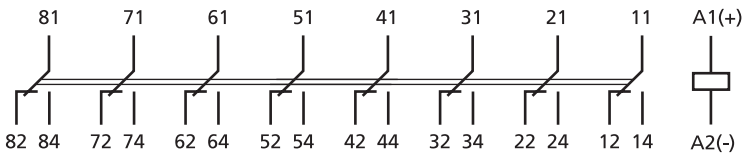
| Product code | Application (1) | Configuration A | Configuration B | Type of power supply | Nominal voltage (V) (2) | Finish (3) | Keying position code (4) |
|---|---|---|---|---|---|---|---|
| RMG | **E**: Energy<br>**F**: Railway Fixed Equipment<br>**R**: Railway Rolling stock | 1: Standard<br>3: Diode //<br>4: Gold plating<br>5: Led<br>6: Gold plating + Diode //<br>7: Diode // + Led | 2W: 8 SPDT contacts<br>6W: 8 SPDT contacts with magnetic arc blow-out | C: Vdc | 024 - 036 - 048<br>072 - 096 - 110<br>125 - 132 - 220 | T: Tropicalized coil<br>L: Low temperature | XX |

Example

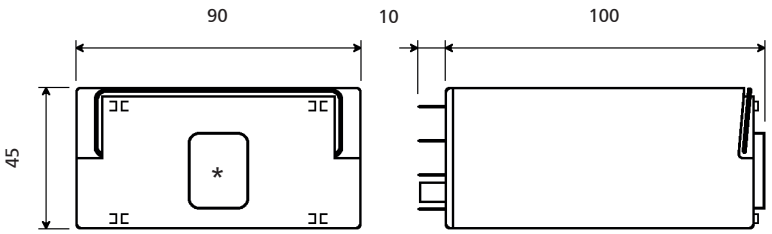
| RMG | E | 3 | 6W | C | 048 | T | |
|---|---|---|---|---|---|---|---|
| **RMGE36W-C048/T = ENERGY series relay with back EMF suppression diode, magnetic arc blow-out and 48Vdc tropicalized coil.** | | | | | | | |
| **RMG** | **R** | **7** | **2W** | **C** | **110** | | |
| **RMGR72W-C110 = RAILWAY series relay, equipped with flyback diode and indicator Led and 110Vdc coil.** | | | | | | | |

1. **ENERGY**: all applications except for railway.
   **RAILWAYS, FIXED EQUIPMENT**: application on fixed power systems and electrical railway traction. Construction according to RFI (FS Group, Italy) specification n° RFI DPRIM STF IFS TE 143 A, if applicable for list of RFI approved and conforming products, consult dedicated catalogue "RAILWAY SERIES - RFI APPROVED"
   **RAILWAYS, ROLLING STOCK**: Application on board rolling stock. Electrical characteristics according to EN60077.
2. Other values on request.
3. Optional value.
4. Optional value. The positive mechanical keying is applied according to the manufacturer's model.

## Wiring diagram

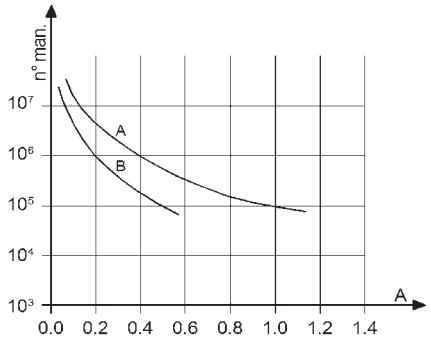



## Dimensions




(*) access to the manual operating lever

## Electrical life expectancy




**Contact loading: 110Vdc, L/R 40 ms**
Curve A: RMG.x6W
Curve B: RMG.x2W

| RMG.x2W | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Operations |
| 110Vdc | 0.5 | 40 | 100,000 |
| 110Vdc | 0.6 | 10 | 300,000 |
| 120Vdc | 0.7 | 40 | 50,000 |
| 125Vdc | 1.2 | 0 | 1,000,000 |
| 220Vdc | 0.1 | 40 | 100,000 |
| 220Vdc | 0.25 | 10 | 100,000 |
| U | I (A) | cosφ | Operations |
| 110Vac | 1 | 1 | 2,000,000 |
| 110Vac | 1 | 0.5 | 1,500,000 |
| 110Vac | 5 | 1 | 1,000,000 |
| 110Vac | 5 | 0.5 | 500,000 |
| 220Vac | 0.5 | 1 | 2,000,000 |
| 220Vac | 1 | 0.5 | 600,000 |
| 220Vac | 5 | 1 | 650,000 |
| 220Vac | 5 | 0.5 | 600,000 |

| RMG.x6W | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Operations |
| 24Vdc | 1 | 0 | 7,000,000 |
| 24Vdc | 1 | 40 | 3,000,000 |
| 24Vdc | 2 | 40 | 2,000,000 |
| 24Vdc | 5 | 0 | 3,000,000 |
| 24Vdc | 5 | 40 | 200,000 |
| 24Vdc | 9 | 0 | 800,000 |
| 48Vdc | 5 | 20 | 200,000 |
| 110Vdc | 0.4 | 40 | 1,000,000 |
| 110Vdc | 1 | 40 | 100,000 |
| 110Vdc | 10 | 0 | 100,000 |
| U | I (A) | cosφ | Operations |
| 220Vac | 5 | 0.5 | 100,000 |
| 220Vac | 10 | 1 | 100,000 |
| 230Vac | 1 | 0.7 | 2,500,000 |
| 230Vac | 3 | 0.7 | 1,200,000 |

**Switching frequency: 1,200 operations/hour**

## Sockets and retaining clips

| Type of installation | Type of outputs | Model | Retaining clip |
|---|---|---|---|
| Wall or DIN rail mounting | Screw | 96IP20-I DIN | RMC48 |
| | Spring clamp | PAIR320 | |
| Flush mounting | Double faston (4.8 x 0.8 mm) | ADF4 | |
| | Spring clamp | PRIR320 | |

## Mounting tips

The preferred mounting position is on the wall, with the relay positioned horizontally in the reading direction on the nameplate.
To ensure correct use of the relays, they should be spaced apart by at least 20 mm in the vertical direction; this will allow the heat generated by the coils to rise and dissipate as necessary. Check the distances according to the socket used. These distances can be reduced, depending on the environmental conditions during operation and on the relay duty cycle.
Retaining clips are used to ensure that the relay is secured correctly to the socket.
No special maintenance is required.
Condensation can form inside the relay when powered up and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. The plastic materials of the relay do not possess hygroscopic properties.

# INSTANTANEOUS MONOSTABLE RELAY WITH 8 C/O CONTACTS

## RMMX SERIES

## OVERVIEW

- Plug-in monostable instantaneous relay
- Compact dimensions than RMM Series
- Solid and rugged construction for heavy or intensive duty
- High electrical life expectancy and exceptional endurance
- Operation using d.c. or a.c. power supply (directly, without rectifiers or diodes)
- Magnetic arc blow-out (optional) for higher breaking capacity
- Self-cleaning knurled contacts
- Mechanical optical device (standard) or Led (optional for d.c. versions) indicating energized status of coil
- Transparent cover, with access for manual operation (standard) and pull-out handle
- Retaining clip for secure locking of relay on socket
- Positive mechanical keying for relay and socket

## APPLICATIONS

*Shipbuilding* · *Petrochemical industry* · *Heavy industry* · *Power generation* · *Power distribution* · *Railway equipment*

## DESCRIPTION

RMMX relays line are derived from models of RGMX line, offering the same specifications and performance and available with a generous number of contacts (8): in short, highly reliable products providing top performance and suitable for applications in particularly harsh and unsettled environments, such as high voltage electricity distribution stations and medium voltage substations. The mechanical design of the relay is such as to allow the development of numerous custom solutions, in the event that the standard models do not fully respond to the required performance parameters.

Thanks to its high breaking capacity, the relay is suitable for controlling heavy duty loads with intensive switching frequency, where safety and continuity of operation are all-important.

Versatility in manufacture allows the production of relays with any voltage between 12 and 250Vd.c./380Va.c.
Manual operation is specified for all models, allowing tests to be conducted in the absence of any power supply.

The contacts used are of a type designed to give top performance both with high and strongly inductive d.c. loads, and with particularly low loads; inclusion of the magnetic arc blow-out function (optional) helps to achieve a considerable increase in breaking capacity.

Knurled contacts ensure not only better self-cleaning characteristics, but also lower ohmic resistance thanks to multiple points of electrical connection, thereby extending the electrical life expectancy of the component.
Benefiting from careful selection of materials, plus the technical and professional skills of human resources involved in design and production, this is a product suitable for the most demanding of environments.

Like all AMRA relays, these models are assembled as part of a controlled manufacturing process in which every step of production is verified by the next step in succession. Each relay is calibrated and tested individually, by hand, so as to guarantee top reliability.

| Model | Number of contacts | Magnetic arc blow-out |
|---|---|---|
| RMM.x2X | 8 | |
| RMM.x6X | 8 | • |

**FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE**

| Electrical data | RMM.x2X-x6X |
|---|---|
| Nominal voltages Un | **DC : 12-24-48-110-125-132-220 (1) - AC : 12-24-48-110-125-230-380-440 (1-2)** |
| Consumption at Un (DC/AC) | 3W / 6,5VA (3) - 11,5VA (4) |
| Operating range | DC : 80÷115% Un - AC : 85÷110% Un |
| Type of duty | Continuous |
| Drop-out voltage (5) | DC : > 5% Un - AC : > 15% Un |

(1) Other values on request.
(2) Maximum value, AC = 380V 50Hz - 440V 60Hz.
(3) In operation.
(4) On pick-up.
(5) Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certain to be de-energized.

| Contact data | | RMM.12X-16X-42X-46X | RMM.32X-36X-52X-56X-62X-66X-72X-76X |
|---|---|---|---|
| Number and type | | 8 SPDT, form C | |
| Current | Nominal (1) | 10A | |
| | Maximum peak (2) | 20A for 1min - 40A for 1s | |
| | Maximum pulse (2) | 150A for 10ms | |
| Example of electrical life expectancy (3) | | RMMEx2X : 0.5A - 110Vdc - L/R 40ms - $10^5$ operations - 1800 operations/hour<br>RMMEx6X : 1A - 110 Vdc - L/R 40ms - $10^5$ operations - 1800 operations/hour | |
| Minimum load | Standard contacts | 200mW (10V, 10mA) | |
| | Gold-plated contacts | 50mW (5V, 5mA) | |
| Maximum breaking voltage | | 350 VDC / 440 VAC | |
| Contact material | | AgCdO | |
| Operating time at Un (ms) (4) | | DC - AC | DC |
| Pick-up (NC contact opening) | | ≤ 20 - ≤ 13 | ≤ 20 |
| Pick-up (NO contact closing) | | ≤ 45 - ≤ 50 | ≤ 45 |
| Drop-out (NO contact opening) | | ≤ 8 - ≤ 25 | ≤ 42 |
| Drop-out (NC contact closing): | | ≤ 45 - ≤ 60 | ≤ 85 |

(1) On all contacts simultaneously, reduction of 30%.
(2) Maximum peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
(3) For other examples, see electrical life expectancy curves.
(4) Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces).

| Insulation | |
|---|---|
| Insulation resistance (at 500VCD) | |
| between electrically independent circuits and between these circuits and ground | > 10.000 MΩ |
| between open contact parts | > 10.000 MΩ |
| Withstand voltage at industrial frequency | |
| between electrically independent circuits and between these circuits and ground | 2 kV (1 min.) - 2,2kV (1 s) |
| between open contact parts | 2 kV (1 min.) - 2,2kV (1 s) |
| between adjacent contacts | 2 kV (1 min.) - 2,2kV (1 s) |
| Impulse withstand voltage (1.2/50µs - 0.5J) | |
| between electrically independent circuits and between these circuits and ground | 5 kV |
| between open contact parts | 5 kV |

| Mechanical specifications | |
|---|---|
| Mechanical life expectancy | $20x10^6$ operations |
| Maximum mechanical switching rate | 3600 operations/h |
| Degree of protection | IP50 fitted to socket |
| Dimensions (mm)<br>Weight (g) | 45x90x100 (1)<br>380 |

(1) Output terminals excluded.

| Environmental specifications | |
|---|---|
| Operating temperature | -25 ÷ +55°C |
| Storage and shipping temperature | -25 ÷ +70°C |
| Relative humidity | Standard: 75% RH - Tropicalized: 95% RH |
| Fire behaviour | V0 |

| Standards and reference values | |
|---|---|
| EN 61810-1, EN 61810-2, EN 61810-7<br>EN 60695-2-10<br>EN 60529 | All-or-nothing relays<br>Fire behaviour<br>Degree of protection provided by enclosures |

Unless otherwise specified, products are designed and manufactured to the requirements of the European and International standards indicated above.
In accordance with EN 61810-1, all items of technical data are referred to ambient temperature 23 °C, atmospheric pressure 96kPa and 50% humidity.
Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

| Configurations - Options | |
|---|---|
| TROPICALIZATION | Surface treatment of coil with protective coating for use in conditions of RH 95%. This treatment serves to give the coil added protection against corrosion that could occur as a result of moisture reacting with certain chemical agents such as those found in acid or saline atmospheres. |
| GOLD PLATING | Surface treatment of contacts, blades and output terminals with gold, thickness ≥ 2µ. This treatment ensures long-term capacity of the contact to conduct low levels of current, even in adverse ambient conditions. |
| LED | Luminous indicator showing presence of power supply, wired in parallel with the coil, as alternative to mechanical optical indicator. |
| FLYBACK DIODE | Component connected in parallel with the coil designed to suppress overvoltages generated by the coil when de-energized. |

## Ordering scheme

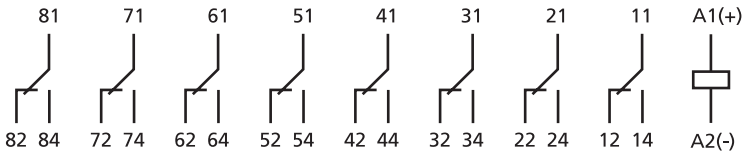
| Product code | Application (1) | Configuration A | Configuration B | Type of power supply | Nominal voltage (V) (2) | Finish (3) | Keying position code (4) |
|---|---|---|---|---|---|---|---|
| RMM | **E**: Energy<br>**F**: Railway Fixed Equipment | 1: Standard<br>3: Diode //<br>4: Gold plating<br>5: Led<br>6: Gold plating + Diode //<br>7: Diode // + Led | 2X: 8 SPDT contacts<br>6X: 8 SPDT contacts with magnetic arc blow-out | C: Vdc<br>A: Vac 50 Hz<br>H: Vac 60 Hz | 012 - 024 - 048<br>110 - 125 - 132<br>220 - 230 - 380<br>440 | T: Tropicalized coil | XX |

Example

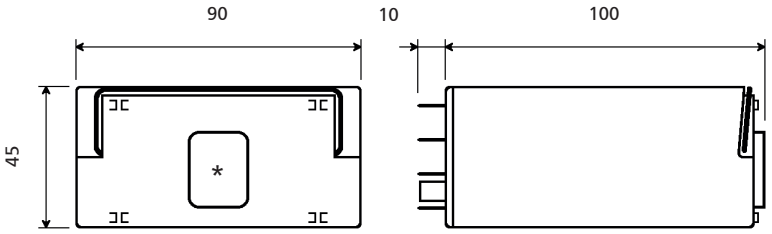
| RMM | E | 4 | 6X | A | 024 | | |
|---|---|---|---|---|---|---|---|
| **RMME46X-A024 = ENERGY series relay with 8 gold-plated contacts, magnetic arc blow-out and 24Vac coil.** | | | | | | | |
| **RMM** | **F** | **1** | **2X** | **C** | **110** | **T** | |
| **RMMF12X-C110/T = Standard RAILWAY series relay with 8 contacts and 110Vdc tropicalized coil.** | | | | | | | |

(1) **ENERGY**: all applications except for railway.
**RAILWAYS, FIXED EQUIPMENT**: application on fixed power systems and electrical railway traction. For list of RFI compliant and type-approved products, consult dedicated catalogue "RAILWAY SERIES – RFI APPROVED".
Also available is the **STATIONS** series, with ENEL approved material meeting LV15/LV16 specifications. For list of ENEL compliant and type-approved products, consult dedicated catalogue "STATIONS SERIES – LV15-LV16-LV20".
(2) Other values on request. Voltages 380V and 440V available as Vac only.
(3) (4) Optional value. Positive mechanical keying is applied according to the manufacturer's product model.

## Wiring diagram

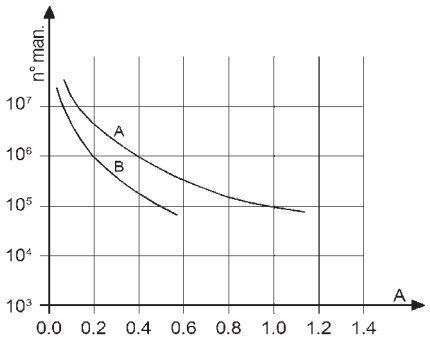



## Dimensions




(*) access to the manual operating lever

## Electrical life expectancy




**Contact loading: 110Vdc, L/R 40 ms**
Curve A: RMM.x6X
Curve B: RMM.x2X

| RMM.x2X | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Operations |
| 110Vdc | 0.5 | 40 | 100,000 |
| 110Vdc | 0.6 | 10 | 300,000 |
| 120Vdc | 0.7 | 40 | 50,000 |
| 125Vdc | 1.2 | 0 | 1,000,000 |
| 220Vdc | 0.1 | 40 | 100,000 |
| 220Vdc | 0.25 | 10 | 100,000 |
| U | I (A) | cosφ | Operations |
| 110Vac | 1 | 1 | 2,000,000 |
| 110Vac | 1 | 0.5 | 1,500,000 |
| 110Vac | 5 | 1 | 1,000,000 |
| 110Vac | 5 | 0.5 | 500,000 |
| 220Vac | 0.5 | 1 | 2,000,000 |
| 220Vac | 1 | 0.5 | 600,000 |
| 220Vac | 5 | 1 | 650,000 |
| 220Vac | 5 | 0.5 | 600,000 |

| RMM.x6X | | | |
|---|---|---|---|
| U | I (A) | L/R (ms) | Operations |
| 24Vdc | 1 | 0 | 7,000,000 |
| 24Vdc | 1 | 40 | 3,000,000 |
| 24Vdc | 2 | 40 | 2,000,000 |
| 24Vdc | 5 | 0 | 3,000,000 |
| 24Vdc | 5 | 40 | 200,000 |
| 24Vdc | 9 | 0 | 800,000 |
| 48Vdc | 5 | 20 | 200,000 |
| 110Vdc | 0.4 | 40 | 1,000,000 |
| 110Vdc | 1 | 40 | 100,000 |
| 110Vdc | 10 | 0 | 100,000 |
| U | I (A) | cosφ | Operations |
| 220Vac | 5 | 0.5 | 100,000 |
| 220Vac | 10 | 1 | 100,000 |
| 230Vac | 1 | 0.7 | 2,500,000 |
| 230Vac | 3 | 0.7 | 1,200,000 |

**Switching frequency: 1,200 operations/hour**

| Sockets and retaining clips | | | |
|---|---|---|---|
| Type of installation | Type of outputs | Model | Retaining clip |
| Wall or DIN rail mounting | Screw | 96IP20-I DIN | RMC48 |
| | quick wiring | PAIR320 | |
| Flush mounting | Double faston (4.8 x 0.8 mm) | ADF4 | |
| | quick wiring | PRIR320 | |

(1) Suitable for mounting 2 relays side by side.

## Mounting tips

The preferred mounting position is on the wall, with the relay positioned horizontally in the reading direction on the nameplate.
To ensure correct use of the relays, they should be spaced apart by at least 20 mm in the vertical; this will allow the heat generated by the coils to rise and dissipate as necessary. Check the distances according to the socket used. Distances can be reduced depending on the environmental application conditions and on the relay duty cycle.
Retaining clips are used to ensure that the relay is secured correctly to the socket.
No special maintenance is required.
Condensation can form inside the relay when powered up and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. The plastic materials of the relay do not possess hygroscopic properties.

# INSTANTANEOUS BISTABLE (LATCHING) RELAY WITH 7-8 CONTACTS

## RMBX SERIES

## OVERVIEW

- Plug-in instantaneous bistable relay
- Compact dimensions than RMB Series
- Solid and rugged construction for heavy or intensive duty
- Self-cleaning knurled contacts
- Pulsed or permanent power supply and de-energization system
- High electrical life expectancy and exceptional endurance
- Operation with DC or AC power supply
- Fitted with mechanical optical contact status indicator as standard
- Transparent cover, with access for manual operation (standard) and pull-out handle
- Retaining clip for secure locking of relay on socket
- Wide variety of configurations and customizations
- Positive mechanical keying for relay and socket

## APPLICATIONS

*Shipbuilding* | *Petrochemical industry* | *Heavy industry* | *Power generation* | *Power distribution* | *Railway equipment*

## DESCRIPTION

RMBX relays are derived from models of the RMB line, offering the same specifications and performance and available with a generous number of contacts (up to 8); in short, highly reliable products providing top performance and suitable for applications in particularly harsh and unsettled environments, such as high voltage electricity distribution stations and medium voltage substations. The mechanical design of the relay is such as to allow the development of numerous custom solutions, in the event that the standard models do not fully respond to the required performance parameters.

Thanks to its exceptional breaking capacity, the relay is suitable for controlling heavy duty loads where safety and continuity of operation are all-important.

Versatility in manufacture allows the production of relays with any voltage between 12 and 250Vd.c./230Va.c., and with a variety of operating ranges adaptable to different application requirements.

Manual operation is specified for all models, allowing tests to be conducted in the absence of any power supply.
RMBX relays are equipped with an automatic coil de-energization system, operated mechanically, designed to reduce the power consumption of the device to zero on completion of the cycle.

The contacts used are of a type designed to give top performance both with high and strongly inductive loads, and with particularly low loads.

Knurled contacts ensure not only better self-cleaning characteristics, but also lower ohmic resistance thanks to multiple points of electrical connection, thereby extending the electrical life expectancy of the component.

Benefiting from careful selection of materials, plus the technical and professional skills of human resources involved in design and production, this is a product suitable for the most demanding of environments.

Like all AMRA relays, these models are assembled as part of a controlled manufacturing process in which every step of production is verified by the next step in succession. Each relay is calibrated and tested individually, by hand, so as to guarantee top reliability.

| Models | Number of contacts | Power input to coils |
|---|---|---|
| RMB.x3X | 7 | Common negative |
| RMB.x2X | 8 | Common negative |

**FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE**

| Electrical data | RMB.x3X | RMB.x2X |
|---|---|---|
| Nominal voltages Un | **DC / AC: 12-24-48-110-125-132-220-230-380-440** (1) | |
| Consumption at Un (DC/AC) (2) | 15W / 15VA | 19W / 19VA |
| Operating range | DC: 80÷120% Un - AC: 85÷110% Un | |
| Type of duty | Continuous | |

Minimum control pulse: 50ms.
(1) Other values on request.
(2) Latch and unlatch. Power consumption is zero on completion of the operating cycle, as the coil de-energizes automatically.

| Contact data | | RMBE.x3X | RMB.x2X |
|---|---|---|---|
| Number and type | | 7 SPDT, form C | 8 SPDT, form C |
| Current | Nominal (1) | 10A | |
| | Maximum peak (2) | 20A for 1min - 40A for 1s | |
| | Maximum pulse (2) | 150A for 10ms | |
| Example of electrical life expectancy (3) | | 0.7A - 132Vdc - L/R 40ms - $10^5$ operations - 600 operations/hour | |
| Minimum load | Standard contacts | 200mW (10V, 10mA) | |
| | Gold-plated contacts | 50mW (5V, 5mA) | |
| Maximum breaking voltage | | 350 VDC / 440 VAC | |
| Contact material | | AgCdO | |
| Operating time at Un (ms) (4) | | DC - AC | DC - AC |
| Pick-up (NC contact opening) | | ≤ 25 - ≤ 25 | ≤ 25 - ≤ 25 |
| Pick-up (NO contact closing) | | ≤ 45 - ≤ 40 | ≤ 28 - ≤ 35 |
| Drop-out (NO contact opening) | | ≤ 12 - ≤ 25 | ≤ 10 - ≤ 20 |
| Drop-out (NC contact closing): | | ≤ 45 - ≤ 55 | ≤ 43 - ≤ 53 |

(1) On all contacts simultaneously, reduction of 30%.
(2) Maximum peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
(3) For other examples, see electrical life expectancy curves.
(4) Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces).

| Insulation | |
|---|---|
| Insulation resistance (at 500VCD) | |
| between electrically independent circuits and between these circuits and ground | > 10.000 MΩ |
| between open contact parts | > 10.000 MΩ |
| Withstand voltage at industrial frequency | |
| between electrically independent circuits and between these circuits and ground | 2 kV (1 min.) - 2,2kV (1 s) |
| between open contact parts | 2 kV (1 min.) - 2,2kV (1 s) |
| between adjacent contacts | 2 kV (1 min.) - 2,2kV (1 s) |
| Impulse withstand voltage (1,2/50µs - 0,5J) | |
| between electrically independent circuits and between these circuits and ground | 5 kV |
| between open contact parts | 4 kV |

## Mechanical specifications

| | |
|---|---|
| Mechanical life expectancy | $10x10^6$ operations |
| Maximum mechanical switching rate | 900 operations/hour |
| Degree of protection | IP50 fitted to socket |
| Dimensions (mm) (1)<br>Weight (g) | 45x90x100 (1)<br>RMB.x3X: 400<br>RMB.x2X: 410 |

(1) Output terminals excluded.

## Environmental specifications

| | |
|---|---|
| Operating temperature | -25 to +55 °C |
| Storage and shipping temperature | -25 to +70°C |
| Relative humidity | Standard: 75% RH - Tropicalized: 95% RH |
| Fire behaviour | V0 |

## Standards and reference values

| | |
|---|---|
| EN 61810-1, EN 61810-2, EN 61810-7 | All-or-nothing relays |
| EN 60695-2-10 | Fire behaviour |
| EN 60529 | Degree of protection provided by enclosures |

Unless otherwise specified, products are designed and manufactured to the requirements of the European and International standards indicated above.
In accordance with EN 61810-1, all items of technical data are referred to ambient temperature 23 °C, atmospheric pressure 96kPa and 50% humidity.
Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

## Configurations - Options

| | |
|---|---|
| TROPICALIZATION | Surface treatment of coil with protective coating for use in conditions of RH 95%. This treatment serves to give the coil added protection against corrosion that could occur as a result of moisture reacting with certain chemical agents such as those found in acid or saline atmospheres. |
| GOLD PLATING | Surface treatment of contacts, blades and output terminals with gold, thickness ≥ 2µ. This treatment ensures long-term capacity of the contact to conduct low levels of current, even in adverse ambient conditions. |
| FLYBACK DIODE | Component connected in parallel with the coil designed to suppress overvoltages generated by the coil when de-energized. |

## Ordering scheme

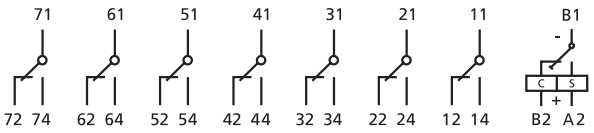
| Product code | Application (1) | Configuration A | Configuration B | Type of power supply | Nominal voltage (V) (2) | Finish (3) | Keying position code (4) |
|---|---|---|---|---|---|---|---|
| RMB | **E**: Energy<br>**F**: Railway Fixed Equipment | 1: Standard<br>3: Diode //<br>4: Gold plating<br>6: Gold plating + Diode // | 2X: 8 SPDT contacts<br>3X: 7 SPDT contacts | C: Vdc<br>A: Vac 50 Hz<br>H: Vac 60 Hz | 012 - 024 - 048<br>110 - 125 - 132<br>220 - 230 - 380<br>440 | T: Tropicalized coil | XX |

Example

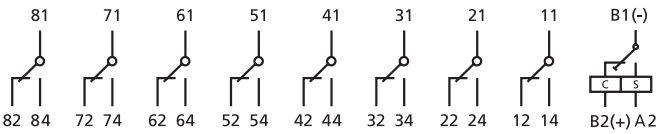
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **RMB** | **E** | **4** | **3X** | **C** | **110** | | |
| **RMBE43X-C110 = ENERGY series relay with 7 SPDT gold-plated contactsand 110Vdc coil** | | | | | | | |
| **RMB** | **E** | **1** | **2X** | **C** | **110** | **T** | |
| **RMBE12X-C110T = ENERGY series relay with 8 SPDT contacts and 110Vdc tropicalized coil** | | | | | | | |

(1) **ENERGY**: all applications except for railway.
**RAILWAYS, FIXED EQUIPMENT**: application on fixed power systems and electrical railway traction. For list of RFI compliant and type-approved products, consult dedicated catalogue "RAILWAY SERIES – RFI APPROVED".
Also available is the **STATIONS** series, with ENEL approved material meeting LV15/LV16 specifications. For list of ENEL compliant and type-approved products, consult dedicated catalogue "STATIONS SERIES – LV15-LV16-LV20".
(2) Other values on request. Voltages 380V and 440V available as Vac only.
(3) Optional value.
(4) Optional value. Positive mechanical keying is applied according to the manufacturer's product model.

## Wiring diagram

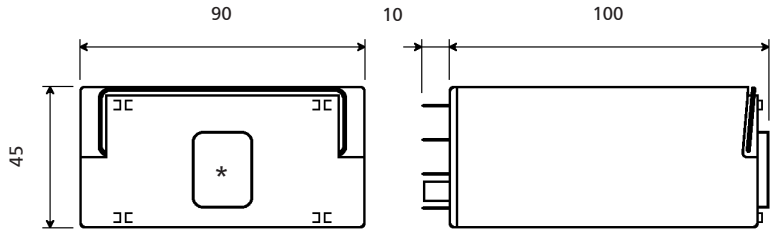



RMB.x3X



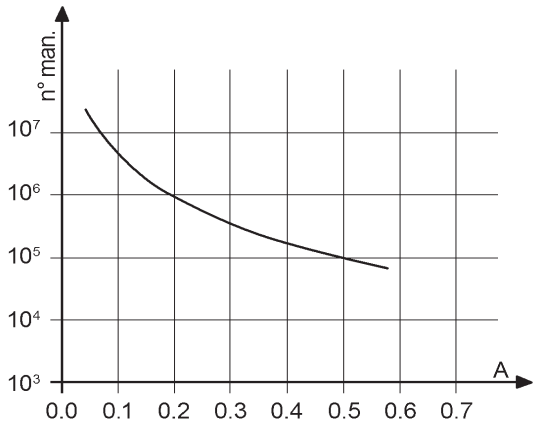

RMB.x2X

## Dimensions




(*) access to the manual operating lever

## Electrical life expectancy




**Contact loading: 110Vdc, L/R 40 ms**

| U | I (A) | L/R (ms) | Operations |
|---|---|---|---|
| 110Vdc | 0.5 | 40 | 150,000 |
| 110Vdc | 0.6 | 10 | 300,000 |
| 132Vdc | 0.7 | 40 | 100,000 |
| 125Vdc | 1.2 | 0 | 1,000,000 |
| 220Vdc | 0.1 | 40 | 100,000 |
| 220Vdc | 0.25 | 10 | 100,000 |
| U | I (A) | cosφ | Operations |
| 110Vac | 1 | 1 | 2,000,000 |
| 110Vac | 1 | 0.5 | 1,500,000 |
| 110Vac | 5 | 1 | 1,000,000 |
| 110Vac | 5 | 0.5 | 500,000 |
| 220Vac | 0.5 | 1 | 2,000,000 |
| 220Vac | 1 | 0.5 | 600,000 |
| 220Vac | 5 | 1 | 650,000 |
| 220Vac | 5 | 0.5 | 600,000 |

**Switching frequency: 1,200 operations/hour**

## Sockets and retaining clips

| Type of installation | Type of outputs | Model | Retaining clip |
|---|---|---|---|
| Wall or DIN rail mounting | Screw | 96IP20-I DIN | RMC48 |
| | quick wiring | PAIR320 | |
| Flush mounting | Double faston (4.8 x 0.8 mm) | ADF4 | |
| | quick wiring | PRIR320 | |

(1) Suitable for mounting 2 relays side by side.

## Mounting tips

The preferred mounting position is on the wall, with the relay positioned horizontally in the reading direction on the nameplate.
Retaining clips are used to ensure that the relay is secured correctly to the socket.
No special maintenance is required.
Condensation can form inside the relay when powered up and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. The plastic materials of the relay do not possess hygroscopic properties.

# MULTIFUNCTION MULTISCALE TIMER RELAY - 4 CONTACTS

## TMM SERIES

TMM

## OVERVIEW

- Plug-in relay with time delay, multifunction
- 9 different time delay functions
- 4 time delay contacts or 2 time delay contacts + 2 instantaneous contacts
- Wide time setting range from 0.1s to 99 hours, extreme accuracy across the adjustment range
- High electromagnetic interference immunity
- Solid and rugged construction for heavy or intensive duty, considerable long-life
- Independent and self-cleaning contacts
- Magnetic arc blow-out standard
- Separate arc breaking chambers
- Excellent shock and vibration resistance
- Wide range of sockets
- Wide variety of configurations and customizations
- Retaining clip for secure locking of relay on socket
- Transparent cover, pull-out handle
- Positive mechanical keying for relay and socket

## APPLICATIONS

*Shipbuilding* · *Petroleum industry* · *Heavy industry* · *Power generation* · *Power distribution* · *Railway equipment* · *Rolling stock*

## DESCRIPTION

The TMM series is a range of MULTIFUNCTION relays with electronic time delay, consisting of 2 models with 4 change-over contacts, rated 10 A (nominal). They are obtained by assembling the electromechanical units of the POKS series with a digital electronic circuit.

The electromechanical part features the reliability and ruggedness of relays belonging to the POKS series, while the electronics offers high reliability thanks to the use of a circuit requiring few components and to the careful choice of professional products.

A single TMM series relay offers 9 different timer functions, freely programmable by the user; these include, by way of example, time delay on pick-up or on drop-out, flasher, one-shot, etc.
The switching time can be selected within a wide range extending from 0.1 second to 99 hours, with extreme accuracy guaranteed across the full scale of adjustment. This is made possible by providing the relay with 10 intermediate scales.
The timer function, the scale and the switching time are adjustable by means of 4 rotary switches, each having 10 positions, located on the front of the relay.

The electronic circuit is immune to high electromagnetic interference, typical of high voltage electricity distribution stations.
The construction of the relays and careful choice of the materials are such that they ensure long life and considerable ruggedness even in harsh operating environments and in the presence of strong temperature fluctuations.
Excellent electrical and mechanical performance levels allow the product to be used in the most demanding of sectors such as, for example, rail transport, control and signalling functions in electricity generating stations, electrical transformer stations, or in industries with continuous production processes (chemical and petroleum industries, rolling mills, cement factories, etc.). Above all, the excellent ability to withstand shock and vibration allow their use on rolling stock.

| Models | Nominal current | Number of contacts | | Rolling stock application |
|---|---|---|---|---|
| | | Time-delayed | Instantaneous | |
| TMM2 | 10 A | 2 | 2 | • |
| TMM4 | 10 A | 4 | - | • |

**FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE**

## Coil data

| | |
|---|---|
| Nominal voltages Un (1) | **DC:** 12-24-36-48-72-110-125-132-144-220 **AC:** 12-24-48-110-127-220-230 |
| Max. consumption at Un (DC/AC) | TMM2: 5,5 W / 7,5VA TMM4: 4,5 W / 6,5 VA |
| Operating range (1)<br>Rolling stock version (2) (3) | 80 ÷ 115 % Un<br>DC : 70 ÷ 125 % Un |
| Type of duty | Continuous |
| Drop-out voltage (4) | > 15% Un |

(1) Other values on request.
(2) See "Ordering scheme" table for order code.
(3) For operating ranges different to that specified by EN60077, refer to table "Rolling stock versions - Special Ranges".
(4) Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.

| Contact data | | TMM2 | TMM4 |
|---|---|---|---|
| Number and type | | 2 timed + 2 instantaneous SPDT, form C | 4 timed, SPDT, form C |
| Current | Nominal (1) | 10 A | |
| | Maximum peak (1s) (2) | 20 A (1min) / 40 A (500ms) | |
| | Maximum pulse (10ms) (2) | 150 A | |
| Example of electrical life expectancy (3)<br>1.800 operations/h | | 0,7 A – 132 Vdc – L/R 40 ms : $10^5$ operations<br>1 A – 110 Vdc – L/R 0 ms : $10^5$ operations | |
| Making capacity | | 30 A (for 200 ms) – 110Vdc – L/R 0 ms : 2.000 operations | |
| Minimum load | Standard contacts | 500 mW (20V, 20 mA) | |
| | Gold-plated contact **P4GEO** (4) | 100 mW (10V, 5 mA) | |
| | Gold-plated contact **P8** (4) | 50 mW (5V, 5 mA) | |
| Maximum breaking voltage | | 250 Vdc / 350 Vac | |
| Contact material | | AgCu | |
| Operating time at Un (ms) (5) (6)<br>Pick-up (NO contact closing)<br>Drop-out (NC contact closing) | | DC (7) – AC<br>≤ 20 - ≤ 20<br>≤ 15 - ≤ 20 | |

(1) On all contacts simultaneously, reduction of 30%.
(2) The max. peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
(3) For other values, see electrical life expectancy curves.
(4) Specifications of contacts on new relay
a) Plating material: **P4 GEO: gold-nickel alloy (>6µ)** **P8: gold-cobalt alloy (>5µ), knurled contact**
b) When the gold-plated contact is subject to heavy loads, it will be degraded on the surface. In such case, the characteristics of the standard contact should be taken into consideration. This does not impair relay operation.
(5) Times for the instantaneous component of the relay (TMM2 model).
(6) Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces). They should be added to the preset delay time.
(7) Addition of a flyback diode connected in parallel with the coil (DC version only) causes an increase in operating time when the relay drops out.

## Insulation

| | |
|---|---|
| Insulation resistance (at 500Vdc) | |
| between electrically independent circuits and between these circuits and ground | > 1.000 MΩ |
| between open contact parts | > 1.000 MΩ |
| Withstand voltage at industrial frequency | |
| between electrically independent circuits and between these circuits and ground | 2 kV (1 min) - 2,2 kV (1 s) |
| between open contact parts | 1 kV (1 min) - 1,1 kV (1 s) |
| between adjacent contacts | 2,5 kV (1 min) - 3 kV (1 s) |
| Impulse withstand voltage (1.2/50µs - 0.5J) | |
| between electrically independent circuits and between these circuits and ground | 5 kV |
| between open contact parts | 3 kV |

## Mechanical Specifications

| | |
|---|---|
| Mechanical life expectancy | 10 x $10^6$ |
| Maximum switching rate Mechanical | 3.600 operations / h |
| Degree of protection (with relay mounted) | IP40 |
| Dimensions (mm) (1) | 40 x 50 x 97 |
| Weight (g) | ~ 220 |

(1) Output terminals excluded.

## Environmental specifications

| | |
|---|---|
| Operating temperature Standard | -25 ÷ + 55 °C |
| Rolling stock version | -25 ÷ + 70 °C |
| Storage and shipping temperature | -40 ÷ + 70 °C |
| Relative humidity | Standard: 75% UR, Tropicalized: 95% UR |
| Resistance to vibrations | 5g - 10 ÷ 55 Hz - 1min. |
| Resistance to shock | 20g - 11ms |
| Fire behaviour | V0 |

## Standards and reference values

| | |
|---|---|
| EN 61810-1, EN 61810-2, EN 61810-7 | Electromechanical elementary relays |
| EN 61812-1 | Timer relays |
| EN 60695-2-10 | Fire behaviour |
| EN 50082, EN 61000-4 | Electromagnetic compatibility |
| EN 60529 | Degree of protection provided by enclosures |

Unless otherwise specified, the products are designed and manufactured according to the requirements of the above-mentioned European and International standards.
In accordance with EN 61810-1, all technical data are referred to ambient temperature of 23°C, atmospheric pressure of 96kPa and 50% humidity. Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

## Railways, rolling stock - Standards

| | |
|---|---|
| EN 60077 | Electric equipment for rolling stock - General service conditions and general rules |
| EN 50155 | Electronic equipment used on rolling stock |
| EN 61373 | Shock and vibration tests, Cat 1 Class B |
| EN 45545-2 | Fire behaviour, Cat E10, Requirement R26, V0 |
| NF F 16-101/102 | Fire behaviour, Cat A1 rolling stock |
| ASTM E162, E662 | Fire behaviour |
| UNI CEI 11170-3 | Fire behaviour, Level of risk 4 |

## Railways, rolling stock – Special operating ranges (1)

| Nominal voltage | Minimum pick-up voltage | Maximum operating voltage | Order symbol (1) |
|---|---|---|---|
| 24 Vdc | 16,8 | 32 | Z01 |
| 72 Vdc | 55 | 104 | Z01 |
| 110 Vdc | 77 | 144 | Z01 |

(1) To request the special range, indicate the "Z0x" symbol in the "Keying position" field in the "Ordering scheme" table. The special range may be subject to operating specifications different from standard specifications. Please contact us for further information.

## Configurations - Options

| | |
|---|---|
| P2 | Tropicalization of coil with epoxy resin for exposure to 95% RH (@ T 50 °C). This treatment also protects the coil against corrosion which could occur by combination of the humidity with certain chemical agents, such as those found in acidic or saline atmospheres. |
| P4GEO | Gold plating of contacts with gold-nickel alloy, thickness ≥ 6µ. This treatment ensures long-term capacity of the contact to conduct lower currents in harsh ambient conditions such as acid atmospheres (typical of geothermal power stations) or saline atmospheres. |
| P5GEO | Gold-plating of contacts **P4GEO** + tropicalization of coil **P2.** |
| P6GEO | P4GEO type gold-plating, but applied to contacts, contact terminals and output terminals + **P2** coil tropicalization. |
| P7 | AgCdO (silver cadmium oxide) contacts. |
| P8 | Gold plating of contacts with gold-cobalt alloy, thickness ≥ 5µ, knurled fixed contact. This finish allows further improvement of the gold-plated contact performance compared to the treatment P4GEO. |
| FLYBACK DIODE | Polarized component connected in parallel with the coil (type 1N4007 or BYW56 for rolling stock version) designed to suppress overvoltages generated by the coil when de-energized. |
| TRANSIL | Non-polarized component connected in parallel with the coil. Behaviour is similar to that of a varistor, with faster operating times. |

## Ordering scheme

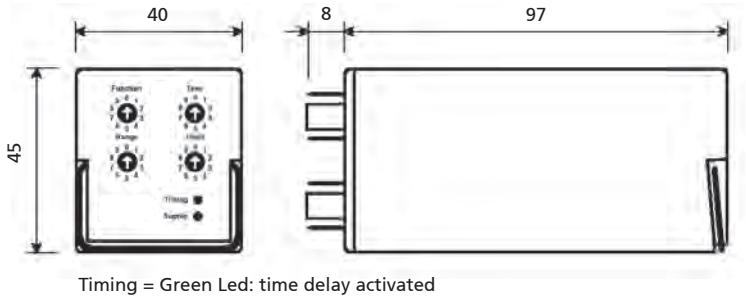
| Product code | Application (1) | Configuration A | Configuration B | Type of power supply | Nominal voltage (V) (2) | Keying position (3) |
|---|---|---|---|---|---|---|
| TMM2<br>TMM4 | **E:** Energy<br>**F:** Railway Fixed Equipment<br>**R:** Railway Rolling Stock | 1: Standard<br>2: Diode //<br>3: Varistor<br>7: Transil | 0 : Standard<br>2: P2<br>4: P4 GEO<br>5: P5 GEO<br>6: P6 GEO<br>7: P7<br>8: P8 | C: Vdc<br>A: Vac 50 Hz | 012 - 024 - 036<br>048 - 072 - 100<br>110 - 125 - 127<br>132 - 144 - 220<br>230 | XXX |

Example

| | | | | | | |
|---|---|---|---|---|---|---|
| **TMM2** | **E** | **1** | **8** | **C** | **024** | |
| **TMM2E18-C024 - TMM2 relay, ENERGY series, nominal voltage 24 Vdc, with P8 finish (gold-plated contacts)** | | | | | | |
| **TMM4** | **R** | **1** | **0** | **C** | **110** | |
| **TMM4R10-C024 - TMM4 relay, ROLLING STOCK series, nominal voltage 110 Vdc** | | | | | | |

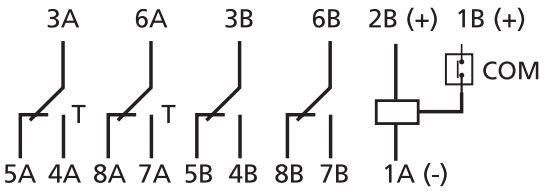
(1) **ENERGY**: all applications except for railway.
**RAILWAYS, FIXED EQUIPMENT**: application on fixed power systems and electrical railway traction. Construction according to RFI (FS Group) specification no. RFI DPRIM STF IFS TE 143 A, if applicable. For list of RFI compliant and type-approved products, consult dedicated catalogue "RAILWAY SERIES – RFI APPROVED"
**RAILWAYS, ROLLING STOCK**: Application on board rolling stock (rail-tram-trolley vehicles). Electrical characteristics according to EN60077.
(2) Other values on request.
(3) Optional value. The positive mechanical keying is applied according to the manufacturer's model.

## Dimensions and indicators

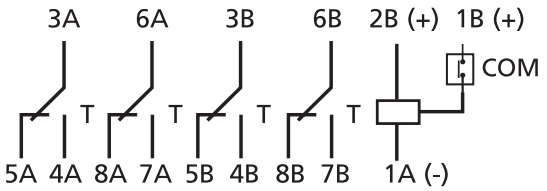



Timing = Green Led: time delay activated
Supply = Red Led: auxiliary power on

## Wiring diagram




TMM2




TMM4

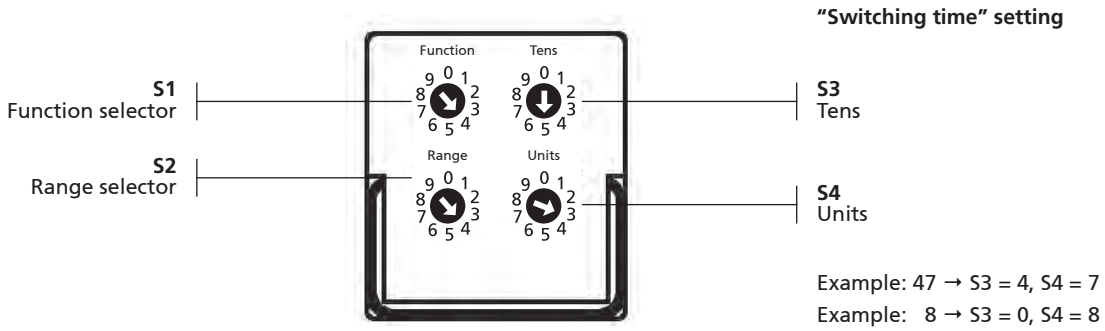
T= time delay contacts
Terminals 2B and 1A are allocated to the auxiliary power supply.
Terminal 1B is allocated to CONTROL. The negative of the control circuit is common with that of the auxiliary power supply.
Certain functions require an auxiliary power supply to guarantee operation of the time delay (terminal 2B).

## Time delay – Switching time setting

| | |
|---|---|
| Controls setting function, range and time | 4 rotary switches with 10 positions (0...9) |
| Time setting range | 100 ms...99 h |
| Intermediate scales | 10, from 9,9 seconds to 99 hours |
| Resolution of switching time setting | 1% of intermediate scale |
| Accuracy, time delay (0.8...1.1 Un, t=20°C) | **DC**: ± 1% of selected time or ± 5 ms (1)<br>**AC:** ± 1% of selected time; 0,1s...10s: ± 2% ± 20ms |
| Accuracy, repeatability | **DC** : ± 0,5% **AC** : ± 0,5% + 20 ms |
| Reset | < 200ms during time delay interval < 400ms |

(1) Whichever of the two values is higher.

The function and switching time are adjustable by means of 4 rotary-switch located on the front of the relay, each having 10 positions, with which the user can select time delay settings between 100 ms and 99 hours.
The position of the arrow point on each rotary switch indicates the number selected. Adjustments are made by discrete steps, which means that no intermediate settings are possible.



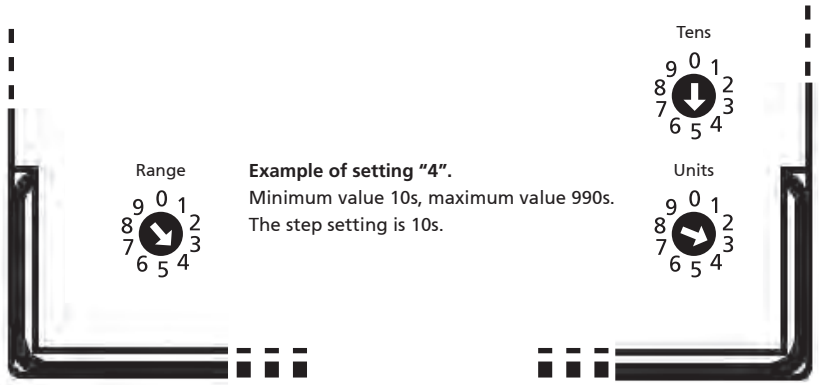

## Adjustment of switching time (except for function F6)

To adjust the switching time, the first step is to adjust the intermediate scale T(s), by selecting one of the 10 available scales using the S2 rotary switch. The values available are given in table 1.

| Scale | Minimum value | Maximum value | Step |
|---|---|---|---|
| 0 | 0,1s | 9,9s | 100ms |
| 1 | 1s | 99s | 1s |
| 2 | 3s | 297s | 3s |
| 3 | 5s | 495s | 5s |
| 4 | 10s | 990s | 10s |
| 5 | 1min | 99min | 1min |
| 6 | 3min | 297min | 3min |
| 7 | 5min | 495min | 5min |
| 8 | 10min | 990min | 10min |
| 9 | 1h | 99h | 1h |

Table 1 – Available scales

Next, the switching time is adjusted by means of rotary-switch selectors S3 and S4.
The combination of these two 10-position controls, located on the right, allows the selection of a number between 1 and 99. The number selected with the "Tens" arrow combined with the number selected with the "Units" arrow represents the multiplier of the step selected via the "Range" control. The resulting value gives the time used by the relay in operation.




**Example of setting "4".**
Minimum value 10s, maximum value 990s.
The step setting is 10s.

**Example of setting "53".**
The scale selected previously is number 4, which has an adjustment step of 10s.
The time used by the relay in operation will be:
53 x 10s = 530 seconds

## Adjustment of switching time for function F6 – Asymmetric flash

Function F6 pilots an asymmetric flash. The "ON" time and the "OFF" time are adjustable independently
"ON" time (t) → selector S3
"OFF" time (T) → selector S4

**In this instance, selector S3 and selector S4 are both calibrated in UNITS. Position "0" assumes the value of 10 integers.**

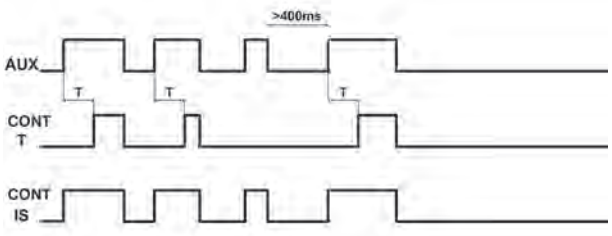
Once the scale has been set by means of selector S2, selectors S3 and S4 are used to set the number that will provide the multiplier for the step of the selected scale.

Example: S2 = 1 → unit of time : seconds
S3 = 3 → t = 3 seconds
S4 = 0 → T = 10 seconds

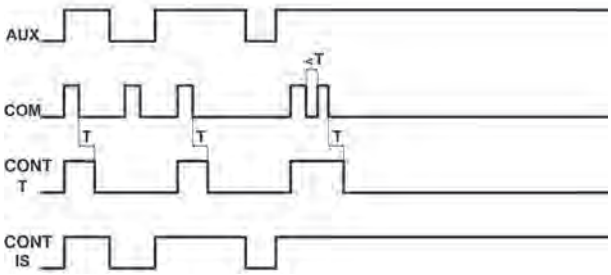
## Functions - selections and operating diagrams

SELECTING THE FUNCTION
The function is selected by positioning the arrow of selector S1 so that the point is aligned with the number of the required function.

| Function | Description |
|---|---|
| F0 | Time delay on pick-up. |
| F1 | Time delay on drop-out. Instantaneous contacts follow the status of the auxiliary power supply. |
| F2 | Time delay on drop-out, instantaneous contacts on "CONTROL". Instantaneous contacts follow the status of the control signal. |
| F3 | One-shot function. |
| F4 | Flasher, symmetrical. The "ON" time and the "OFF" time are the same. |
| F5 | Flasher, asymmetrical. The "ON" time and the "OFF" time are different, and adjustable independently. |
| F6 | One-shot function on "CONTROL". The timing cycle starts on activation of the control signal. |
| F7 | One-shot function with fixed pulse (3s), delayed at pick-up. Pulse delay adjustable. |
| F8 | One-shot function, on "CONTROL", with fixed pulse (3s), delayed at pick-up. The timing cycle starts on activation of the control signal. Pulse delay adjustable. |

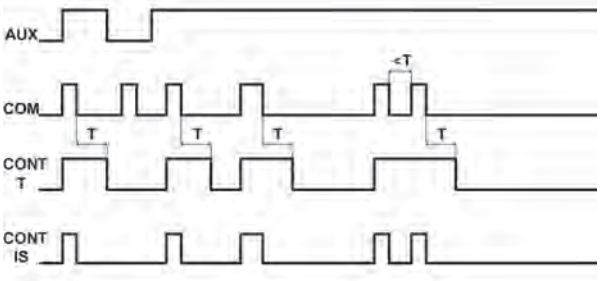



F0 – Time delay on pick-up.



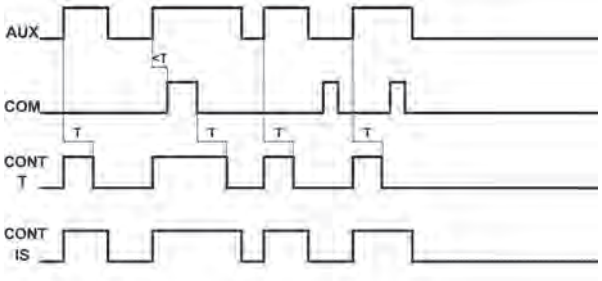

F1 – Time delay on drop-out.

The instantaneous contacts follow the status of the auxiliary power supply (2B terminal).



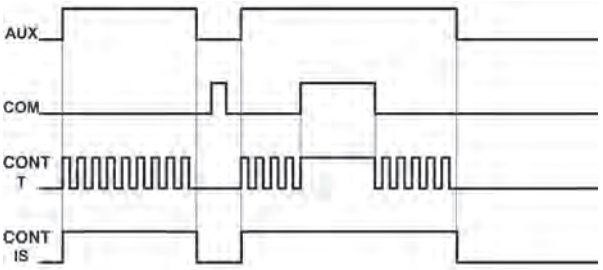

F2– Time delay on drop-out, instantaneous contacts on "CONTROL" (COM).

The instantaneous contacts follow the status of the control signal ("COM", 1B terminal).



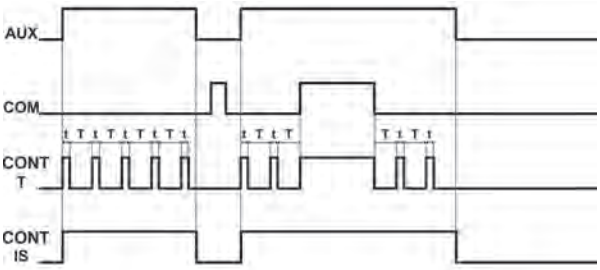

F3 – One-shot function.

The control signal ("COM", 1B terminal) resets the time "t", on drop-out.



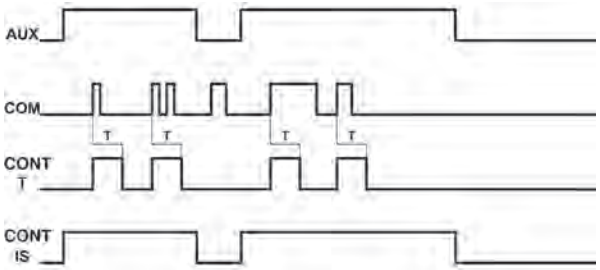

F4 – Flasher, symmetrical.

The control signal (“COM”, 1B terminal) stops the flash.

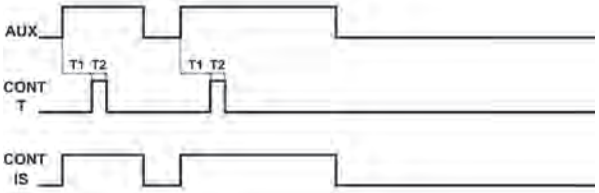



F5 – Flasher, asymmetrical.

The control signal (“COM”, 1B terminal) stops the flash t and T are adjustable using the same unit of time.
Example: S2 = 1 → unit of time: seconds
S3 = 3 → t = 3 seconds
S4 = 0 → T = 10 seconds

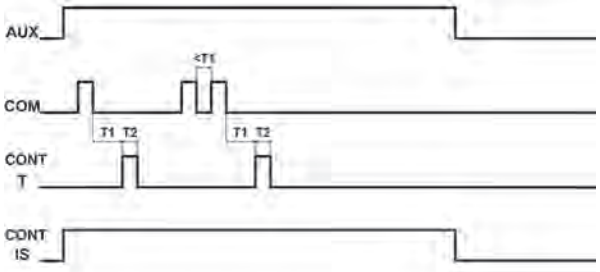



F6– One-shot function on “CONTROL” (COM).



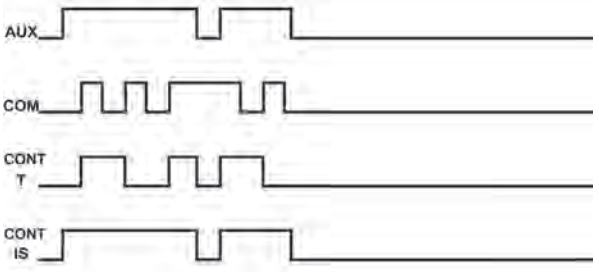

F7 – One-shot function with fixed pulse (3s), delayed at pick-up.

T1: adjustable by way of selector S3 / S4
T2 : fixed, 3 seconds




F8 – One-shot function, on “CONTROL”, with fixed pulse (3s), delayed at pick-up.

T1: adjustable by way of selector S3 / S4
T2 : fixed, 3 seconds
Control signal (“COM”, 1B terminal) starts time delay T1
Control signal (“COM”, 1B terminal) restarts the time, if this appears during the time delay.




F9 – Step function

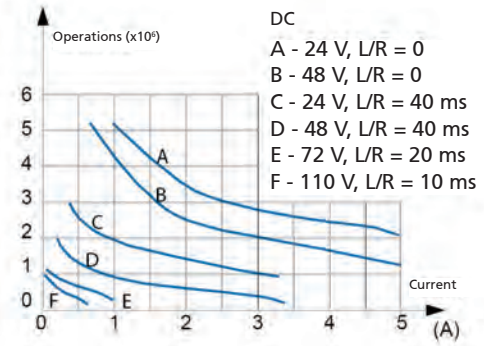
The S3 and S4 switches have no effect on the relay operation.

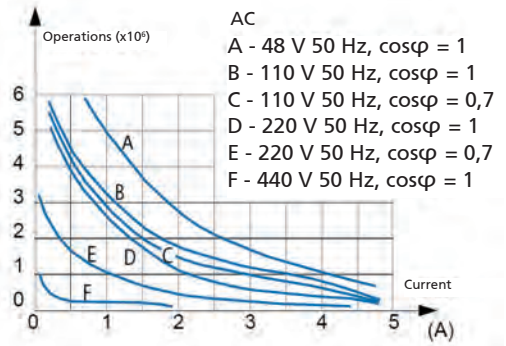
Applicable note for all operatings diagrams:

AUX: 2B - 1A terminals
COM: 1B terminal
CONT T: timed contacts
CONT I: instantaneous contacts

See “Wiring diagram” to identify the instantaneous and timed contacts terminals’.

## Electrical life expectancy [1]




**Some examples of electrical life expectancy**

12Vdc - 10 A - Resistive : $10^6$ operations
48Vdc - 5 A - L/R 10 ms : 5 x $10^5$ operations
80Vdc - 5 A - Resistive : 5 x $10^5$ operations
110Vdc - 0,5 A - L/R 10 ms : 5 x $10^5$ operations
110Vdc - 1 A - L/R 0 ms : $10^5$ operations
132 Vdc - 0,7 A - 132 Vdc - L/R 40 ms : $10^5$ operations
220Vdc - 0,2 A - L/R 10 ms : $10^5$ operations
110Vac - 5 A - Cosφ 0,7 : 5 x $10^5$ operations
220Vac - 3 A – Cosφ 0,7 : 5 x $10^5$ operations
440Vac - 0,2 A - Resistive : 5 x $10^5$ operations

(1) Switching frequency 1,200 operations/hour, 50% cycle.

## Sockets and retaining clips

| Number of terminals (standard dimensions 5x0.8mm) | 16 | Retaining clip |
|---|---|---|
| For wall or rail mounting | | |
| Spring clamp, wall or DIN H35 rail mounting | PAIR160 | RT48 |
| Screw, wall or DIN H35 rail mounting | 48BIP20-I DIN | RT48 |
| Screw, wall mounting | 48BL | RT48 |
| For flush mounting | | |
| Spring clamp | PRIR160 | RT48 |
| Double faston (4.8 x 0.8 mm) | ADF2 | RT48 |
| Screw | 43IL [1] | RT43 |
| For mounting on PCB | 65 | RT43 |

(1) Insert the clip before fastening the socket on the panel.
For more details, see specifications of mounting accessories.

## Mounting tips

The preferred mounting position is on the wall, with the relay positioned horizontally in the reading direction on the nameplate.
For correct use of the relays, they should be spaced apart by at least 5 mm in the horizontal direction and 20 mm in the vertical direction. This is to allow correct upward dissipation of the heat generated by the coil. Set these distances according to the socket used. Distances can be reduced depending on the environmental application conditions and on the relay duty cycle.
For safe and secure operation, it is advisable to use retaining clips.
No special maintenance is required.
Condensation can form inside the relay when powered up and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. The plastic materials of the relay do not possess hygroscopic properties.

Connection: **REAR**
Terminal type: **SPRING CLAMP**
Mounting: **PANEL**

Also suitable for Rolling stock

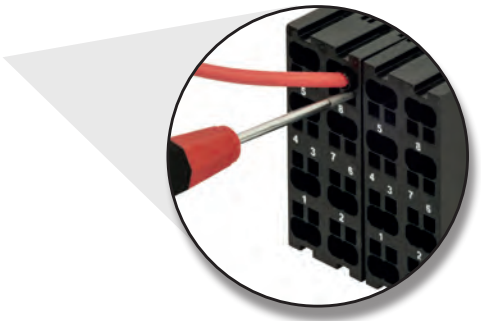
**PRIR08x**
**PRIR16x**
**PRIR24x**
**PRIR32x**
**PRIR48x**

## OVERVIEW

- Cable secured with spring clamp mechanism
- Insertion of lug with no need for tools
- Quick and easy wiring, saving more than half the time taken with conventional wiring
- Panel mounting
- Excellent contact pressure on relay terminals
- Sturdy construction, no internal soldering
- Compatible with cable up to 2.5mm$^2$, bare (flexible or rigid) and with lug; 2 inputs per terminal
- Provision for fitment of keying pins
- Provision for fitment of retaining clip
- Protection IP20

PRIR08x

PRIR16x



Detail of connections

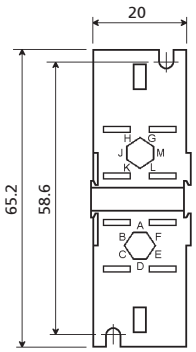
PRIR24x

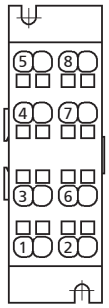
PRIR32x

PRIR48x

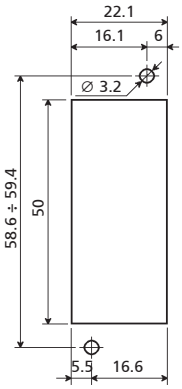
AMRA
CHAUVIN ARNOUX GROUP

## PRIR08x

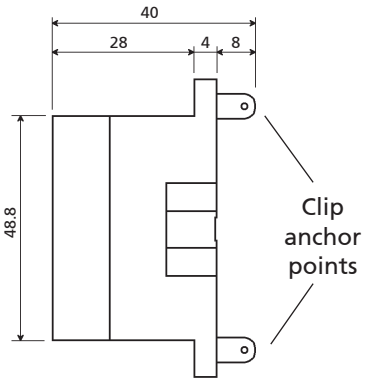


**PRIR080**
Rear view

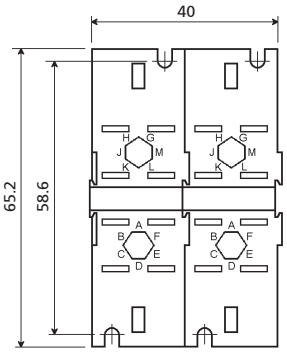


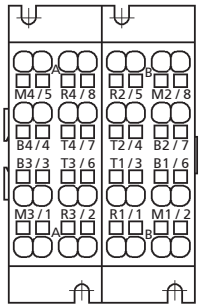

Drilling template




Side view

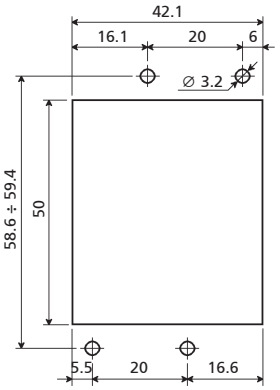
## PRIR16x



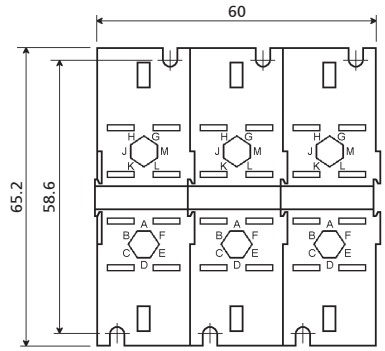

Rear view

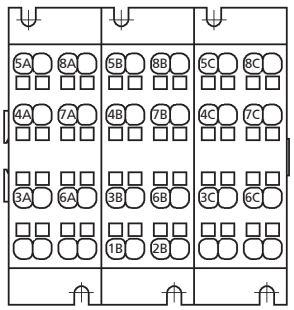
**PRIR160**



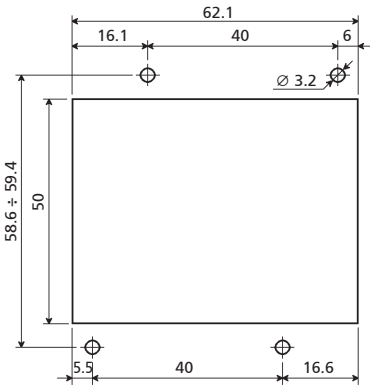

Drilling template

## PRIR24x

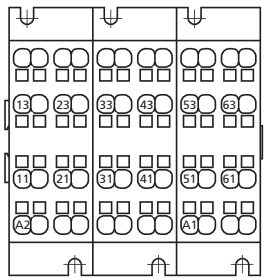


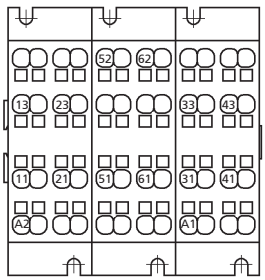

**PRIR240**
Model with "TRIPOK" numbering
Rear view



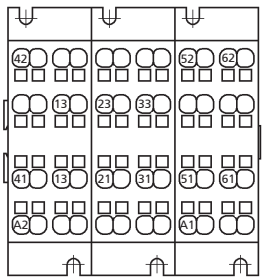

Drilling template



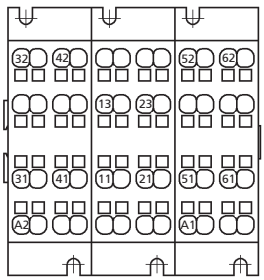

**PRIR241**
Model with
numbering for RVLV16/1




**PRIR242**
Model with
numbering for RVLV16/2

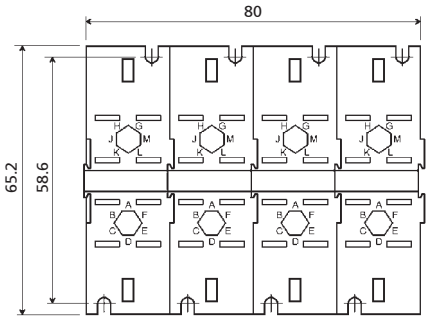


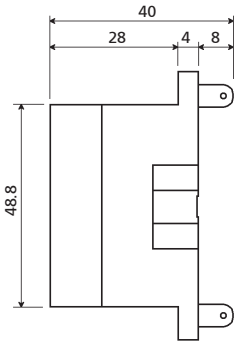

**PRIR243**
Model with
numbering for RVLV16/3



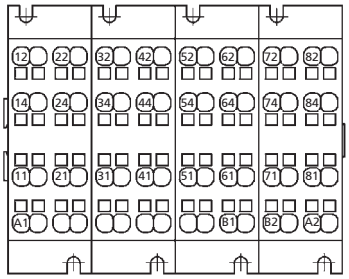

**PRIR244**
Model with
numbering for RVLV16/5

## PRIR32x

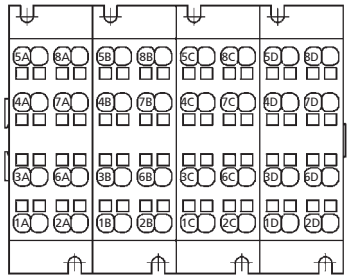


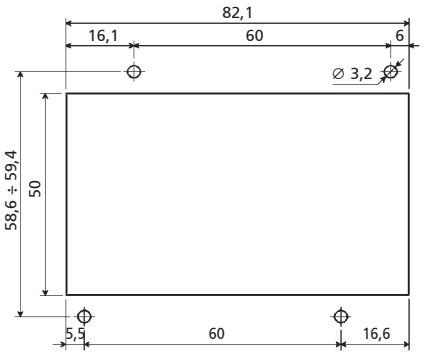

Side view



**PRIR320** Rear view

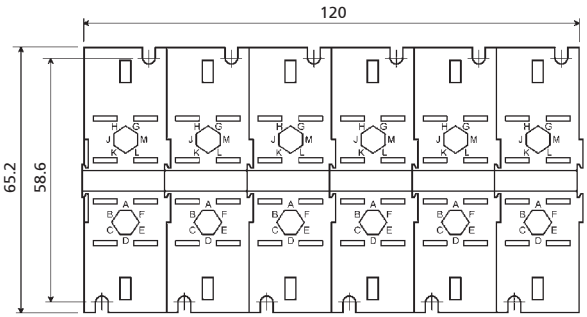


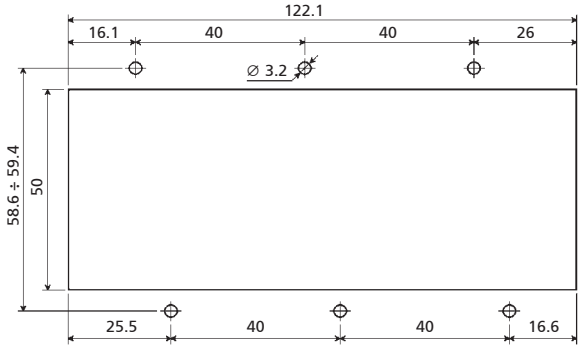
**PRIR321** Rear view



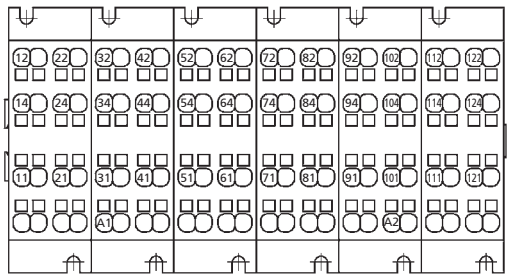

Drilling template

## PRIR48x

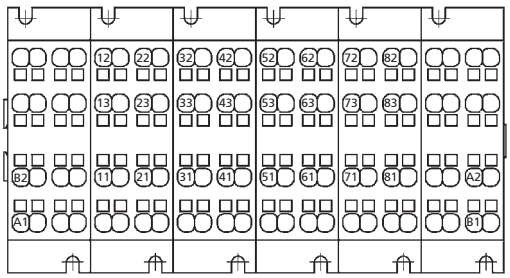



Drilling template



**PRIR480** / Model with "ESAPOK" numbering



**PRIR481** / Model with "BAS8NB" numbering

## Specifications

Weight: 35 / 70 / 105 / 140 / 210 g
Operating temperature: -50°C…+70°C
Storage temperature: -50°C…+85°C
Panel mounting:
- ⌀ holes: 3,2mm

**Degree of protection**: IP20
**Dielectric strength**: 2.5kV 50Hz 1min
**Fire resistance**: EN60695-2-1, UL94 - V0, NF16-101, EN45545-2, UNI CEI11170 (LR4), NFPA130
**Norme**: EN 61810, EN61373

**Terminal type:** spring clamp
**Inputs for each relay terminal**: 2
**Minimum section of cable**: 2 x 1 mm²
**Maximum section of cable**: 2 x 2,5 mm²
**Wire stripping length, mm**: 10 mm ± 0,5 mm
**Length of lug**: 12 mm
**Wiring with rigid cables or lug**: pressure grip
**Wiring with flexible cables, extraction of cables**: using screwdriver type tool with slim shaft and slotted head measuring 2.5mm x 0.4mm, inserted perpendicularly to the socket.

**FRANCE - Headquarter**

CHAUVIN ARNOUX GROUP

**Chauvin Arnoux**
190, Rue Championnet - 75876 PARIS Cedex 18
Phone: (0033) 1 44 85 44 85 - Fax: (0033) 1 46 27 73 89
info@chauvin-arnoux.com - www.chauvin-arnoux.com

**AUSTRIA**
Chauvin Arnoux Ges.m.b.H.
Slamastrasse 29/2/4
1230 WIEN
Phone: (0043) 1 61 61 9 61
Fax: (0043) 1 61 61 9 6161
vie-office@chauvin-arnoux.at
www.chauvin-arnoux.at

**CHINA**
Shangai Pujiang
Enerdis Instruments Co. Ltd
3F, 1st building
n°381 Xiang De Road 200081 SHANGHAI
Phone: (0086) 21 65 21 51 96
Fax: (0086) 21 65 21 61 07
info@chauvin-arnoux.com.cn
www.chauvin-arnoux.com.cn

**GERMANY**
Chauvin Arnoux GmbH
Ohmstrasse, 1
77694 KELH/RHEIN
Phone: (0049) 7851 99 26 0
Fax: (0049) 7851 99 26 60
info@chauvin-arnoux.de
www.chauvin-arnoux.de

**UNITED KINGDOM**
Chauvin Arnoux Ltd
Unit 1 Nelson Court, Flagship
Square Shaw Cross Business Park
Dewsbury West Yorkshire WF127TH
Phone: (0044) 1924 460 494
Fax: (0044) 1924 455 328
info@chauvin-arnoux.co.uk
www.chauvin-arnoux.com

**MIDDLE EAST**
Chauvin Arnoux Middle East
Ain El Zalka - Immeub 686
P.O. BOX 60-154 / 1241 2020
JAL EL DIB - BEIRUT (LIBANO)
Phone: (00961) 1 890 425
Fax: (00961) 1 890 424
camie@idm.net.lb

**SPAIN**
Chauvin Arnoux Iberica S.A.
C/Roger de Flor n° 293 - Planta 1
08025 BARCELONA
Phone: (0034) 902 20 22 26
Fax: (0034) 934 59 14 43
info@chauvin-arnoux.es
www.chauvin-arnoux.es

**SCANDINAVIA**
CA Mätsystem AB
Sjöflygvägen, 35
PO Box NR 4501
SE 18362 TÄBY (Svezia)
Phone: (0046) 8 50 52 68 00
Fax: (0046) 8 50 52 68 10
info@camatsystem.com
www.camatsystem.com

**SWITZERLAND**
Chauvin Arnoux AG
Moosacherstrasse 15
CH 8804 AU/ZH
Phone: (0041) 44 727 75 55
Fax: (0041) 44 727 75 56
info@chauvin-arnoux.ch
www.chauvin-arnoux.ch

**USA**
Chauvin Arnoux Inc
dba AEMC Instruments
200 Foxborough blvd
Foxborough, MA 02035
Phone: (001) 508 698 2115
Fax: (001) 508 698 2118
sales@aemc.com
www.aemc.com

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AMRA® CHAUVIN ARNOUX GROUP

**AMRA S.p.A. - Chauvin Arnoux Group**
Via Sant'Ambrogio, 23/25 - 20846 MACHERIO (MB) - ITALY
Phone +39 039 2457545 - Fax +39 039 481561
E-mail: info@amra-chauvin-arnoux.it
Web: www.amra-chauvin-arnoux.it

CERTIFICAZIONE DI SISTEMA QUALITÀ DNV·GL ISO 9001