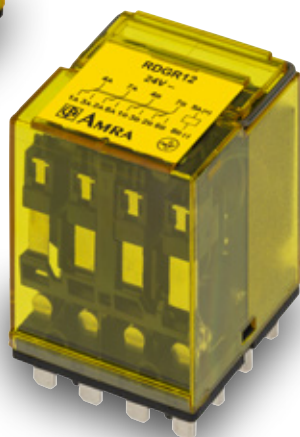


# RCG RDG

## FORCIBLY GUIDED CONTACTS



RCG



RDG

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

### APPLICATIONS



### OVERVIEW

- Forcibly guided (mechanically linked) contacts, relay compliant with **EN 61810-3, type A**
- Weld-no-transfer technology
- High performance, compact dimensions, light weight
- Compact plug-in monostable instantaneous relay
- Suitable for safety applications
- Solid and rugged construction for intensive duty, IP50 protection
- Self-cleaning knurled contacts, C/O Type
- High electrical life expectancy
- Wide temperature range -40°C ... +85°C
- 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

### DESCRIPTION

RCG & RDG relay, with 2 & 4 changeover contacts, are highly reliable products featuring high performance, suitable for applications in very harsh and disturbed environments, such as per **ROLLING STOCK** applications.

The component is compliant 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.

The construction of the relays and careful choice of the materials ensure long life and considerable ruggedness even in harsh operating environments and in the presence of strong temperature fluctuations.

Wide range of coil's nominal voltage are available. The manufacturing versatility allows to adapt power supply to customer needs.

The IP50 protection allows the relay to be used even in dusty environments, protecting contact's surface against harmful deposits, with great benefit in conducting very low loads.

The operating temperature range is -40°C to +85°C. RCG and RDG can operate in environment with high thermal shocks.

Contacts are designed to obtain remarkable performances both for high, inductive loads or very low loads. Contact is able to switch from 5mA – 10V even without contact gilding.

The knurled surface ensures an excellent self-cleaning effect, lower ohmic resistance thanks to the various points of electrical contact, improving also the electrical life of the component.

The magnetic arc blow-out contributes to increase breaking capacity: the relay is suitable for controlling heavy duty loads with intensive switching frequency.

In relays with forcibly guided (mechanically linked) special design and constructional measures are used to ensure that make (NO) contacts cannot assume the same state as break (NC) contacts.

- If, when powering up a relay, a NC contact fails to open, the remaining NO contacts must not close, maintaining a contact gap  $\geq 0.5$  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  $\geq 0.5$  mm

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.

### STANDARD COMPLIANCY

EN 61810-3	EN 61810-1
EN 60077	EN 61810-7
EN 50155	EN 60695-2-10
EN 61373	EN 60529
EN 45545-2	EN 50082-2
ASTM E162, E662	

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 <sup>(1)</sup>	
Consumption at Un	2,2 W	2,7 W
Operating range	80 ÷ 115 % Un	
Operating range for rolling stock version <sup>(2)</sup>	70 ÷ 125 % Un	
Type of duty	Continuous	
Drop-out voltage <sup>(3)</sup>	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	<b>2 SPDT, form C</b>	<b>4 SPDT, form C</b>		
Current	See the following chart 13A for 1min - 20A for 1s 100A for 10ms			
Nominal				
Maximum peak <sup>(1)</sup>				
Maximum pulse <sup>(1)</sup>				
Example of electrical life <sup>(2)</sup>	Standard: RCG.x2 / RDG.x2: 0,2A - 110Vdc - L/R 40ms - 5x10 <sup>5</sup> oper. * * 1.200 oper./h With Magnetic arc blowout: RCG.x6 / RDG.x6: 0,5A - 110Vdc - L/R 40ms - 1,5x10 <sup>5</sup> oper. * ** 600 oper./h With <b>HIGH POWER</b> Magn. arc blowout: RCG.x8 / RDG.x8: 0,7A - 132Vdc - L/R 40ms - 7x10 <sup>4</sup> oper. **			
Minimum load <sup>(3)</sup>	100mW (10V, 5mA) 50mW (5V, 5mA)			
Standard contacts				
Gold-plated contact <sup>(4)</sup>				
Making capacity	30 A - 110Vdc - L/R 0 ms : 2.000 operations			
Maximum breaking voltage	250 Vdc / 300 Vac			
Contact material	AgSnO <sub>2</sub> (mobile contacts) - AgNi (fixed contacts)			
Operating time at Un (ms) <sup>(5)</sup>	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	≤ 27
Drop-out (NC contact closing)	≤ 16	≤ 30	≤ 14	≤ 43

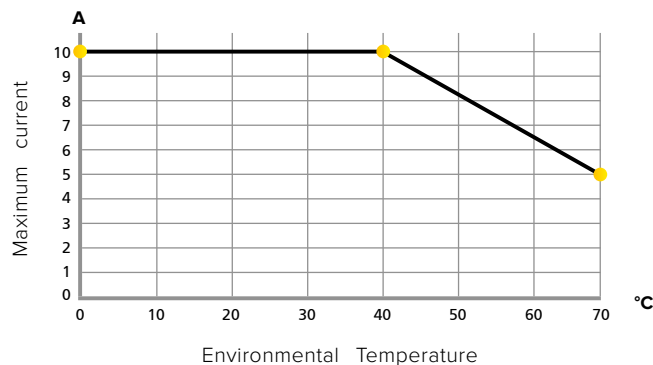
(1) The max. peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.

(2) For other examples, see electrical life expectancy table.

(3) Values referred to a new product, measured in laboratory. The ability to maintain this performance over the time depends on the environmental conditions and the contact' frequency use  
The use of gold plated contacts is recommended in the case of very low loads.

(4) A gold contact, if subjected to high loads, degrades superficially. In this case, the characteristics of the standard contact must be considered. This does not affect the operation of the relay.

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

**MECHANICAL SPECIFICATIONS**

Mechanical life expectancy	20x10 <sup>6</sup> operations	
Maximum switching rate	Mechanical	3.600 operations / h
Protection rating (with relay mounted)	IP50	
	RCG	RDG
Dimensions (mm)	40x20x50 <sup>(1)</sup>	40x40x50 <sup>(1)</sup>
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 <sup>(1)</sup>	Shock and vibration tests, Cat 1, Class B
EN 45545-2	Fire behaviour, HL3 : Cat E10 (Requirement R26)
ASTM E162, E662	Fire behaviour

(1) only for RDGR family: permissible opening time of contacts on a de-energized relay t&lt;100μs

**CONFIGURATIONS - OPTIONS**

<b>TROPICALIZATION</b>	Surface treatment of the coil with protective coating for use with RH 95%.
<b>GOLD PLATING</b>	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.
<b>LED</b>	LED indicator showing presence of power supply. Flyback diode mounted as standard.
<b>FLYBACK DIODE</b>	Component connected in parallel to the coil (type BYW56) designed to dampen overvoltages generated by the coil when de-energized.
<b>TRANSIL</b>	Non-polarized component connected in parallel to the coil. Behaviour is similar to that of a varistor with faster operating times.
<b>LOW TEMPERATURE</b>	Minimum operating temperature -40°C, only for rolling stock version (option "L").



## ORDERING SCHEME

PRODUCT CODE	APPLICATION <sup>(1)</sup>	CONFIGURATION A	CONFIGURATION B	TYPE OF POWER SUPPLY	N	FINISH <sup>(3)</sup>	KEYING POSITION CODE <sup>(4)</sup>
<b>RCG</b> (2 contacts)	<b>E:</b> Energy	<b>1:</b> Standard <b>2:</b> Gold plating + Diode // + Led	<b>2:</b> Standard	<b>C:</b> Vdc	024 - 036 048 - 072 096 - 110 - 125	<b>T:</b> Tropicalized coil	XX
<b>RDG</b> (4 contacts)	<b>F:</b> Railway Fixed Equipment <b>R:</b> Railway Rolling stock	<b>3:</b> Diode // <b>4:</b> Gold plating <b>6:</b> Gold plating + Diode // <b>7:</b> Diode // + Led <b>8:</b> Transil	<b>6:</b> With magnetic arc blow-out <b>8:</b> With <b>HIGH POWER</b> magnetic arc blow-out				

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

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.

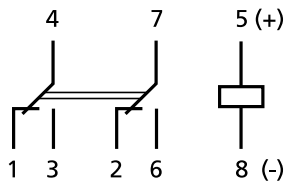
2. Other values on request.

3. Optional value.

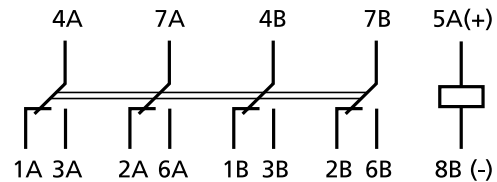
4. Optional value. The positive mechanical keying is applied according to the manufacturer's model.



## WIRING DIAGRAM



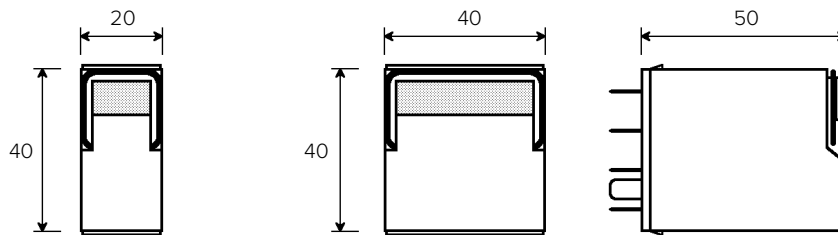
RCG



RDG



## DIMENSIONS



RCG

RDG



## 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 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: 1.200 operations/hour

## SOCKETS AND RETAINING CLIPS

## RCG

## RDG

## RETAINING CLIP

Type of installation	Type of outputs	Model	Model	Model
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 <sup>(1)</sup>	65	VM1841

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

## INSTALLATION, OPERATION AND MAINTENANCE

## Installation

Before installing the relay on wired socket, disconnect the power supply.

The preferential mounting position is on the wall, with the relay positioned horizontally in the "reading orienting" of marking.

Spacing: the distance between adjacent relays depends on use' conditions.

If relay is used in the "less favorable" conditions that occur "simultaneously":

- Power supply: the maximum allowed, permanently
- Ambient temperature: the maximum allowed, permanently
- Current on the contacts: the maximum allowed, permanently
- Contacts used: 100%

it is strongly recommended to space relay at least 5 mm horizontally and 20 mm vertically, to allow for proper upward heat' dissipation and increase the longevity of the component.

Actually, relays could be used in less severe conditions. In this case, the distance between adjacent relays can be reduced or abolished. A correct interpretation of the use' conditions allows the optimization of the available spaces. Contact AMRA for more information.

To increase relay' longevity, we recommend mounting relays intended for "continuous use" (permanent power supply), alternating them with relays intended for less frequent use.

For safe use, use of retaining clip is recommended. For use on rolling stock, relays have been tested to EN 61373 standard equipped with retaining clip(s).

## Operation

**Before use:** if relay is not used, for example after long storage periods, contact resistance may increase due to a natural and slight oxidation or polluting deposits.

In order to restore the optimal conductivity and for standard contacts (**NOT gold plated**) it is recommended to switch several time a load of at least 110Vdc - 100mA or 24Vdc - 500mA. The contacts will be "cleaned" thanks to the electric arc generated during the current' interruption and the mechanical self-cleaning action.

The common contact slides against the fixed poles (NO and NC contacts) both when opening and when closing, which ensures a self-cleaning action.

A contact resistance increase very often is not a problem. Many factors contribute to the correct use of contact and consequently to the relay' long-term reliability:

- **Load:** the current switching generates an electric arc with cleaning effects. For proper electrical cleaning and performance' keeping we recommend:
  - Standard contacts: Minimum current = 20mA
  - Gold plated contacts: Minimum current = 10mA
- **Operating frequency:** relays are components that can operate with a wide range of switching frequency. High frequency' operation also allows a continuous cleaning effect by "sliding" (mechanical cleaning). In case of low frequency' operation (for example few time a day), we advise:
  - Use of contact with currents twice compared to those indicated.
  - For currents in the order of 10mA, use of gold plated contacts and the connection in parallel of 2 contacts of the same type and rely, in order to reduce the equivalent contact resistance
- **Pollution:** the presence of pollution can cause impurities on contact surface. Contact, cause its nature, leads superficial and localized accumulation of electrical charges that attract organic molecules and impurities. Electrical and mechanical cleaning, respectively, burn and remove such impurities. In pollution presence, the minimum recommended currents must be respected. In extreme cases, provide a safety factor of 2.

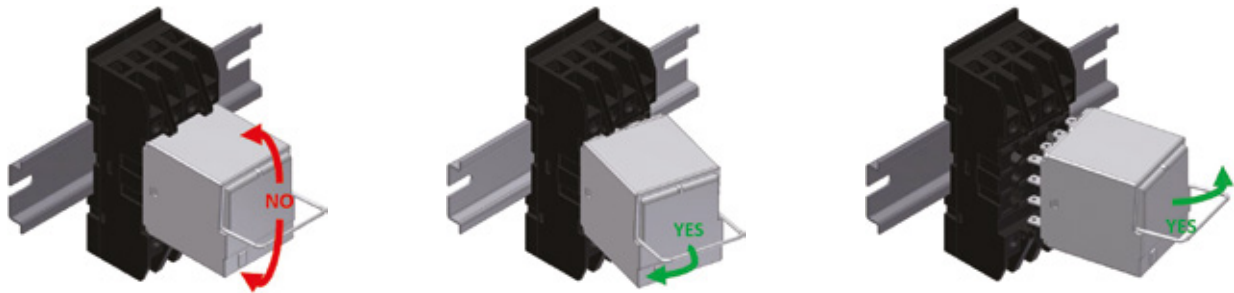
Condensation is possible inside the relay when energized and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. Plastic materials of relay do not possess hygroscopic properties.

## Maintenance

No maintenance is required.

In case of normal relay wear (reaching the end of electrical or mechanical life), the relay cannot be restored and must be replaced.

To check the component, relay' removal must be carried out with slight lateral movements. An "up and down" movement can cause terminals damage.



Often the malfunctions are caused by power supply with inverted polarity, by external events or by use with loads exceeding the contact performance.

In case of suspected malfunction, energize relay and observe if mechanical operation of contacts / relay mechanism is performed. Pay attention to the power supply polarity, if relay is equipped with polarized components (example: diode, led).

- In case of expected operation, clean the contacts (see paragraph "OPERATION") and check if the circuit load ranges within the contact performance. If necessary, replace with relays with gold contacts. Note: the electrical continuity of contacts must be checked with adequate current.
- If it does not work and replacement, we recommend to use a relay of the same model and configuration.

If an investigation by AMRA is required, limit to the minimum any manipulation that could alter the relay after removing from socket, among these avoid removing the cap. Collect the "operation information" to be transmitted to the manufacturer (environmental conditions, power supply, switching frequency, contact load, number of operations performed).

Details the fault by contacting AMRA through the "CONTACT US / TECHNICAL SUPPORT" section of the website [www.amra-chauvin-arnoux.it](http://www.amra-chauvin-arnoux.it).

In any case, the relay cannot be repaired by the user.

## Storage

Storage areas of the materials awaiting use must guarantee the environmental conditions (temperature, humidity and pollution) required for the product conservation, in order to avoid deterioration.

The product must be stored in an environment sheltered from atmospheric agents and not polluted, with an ambient temperature between -40 and + 85 ° C with max 80% RH. Humidity can reach peaks of 95%. In any case, there must be no condensation. Before use, please read carefully "OPERATION" section.