

# POK

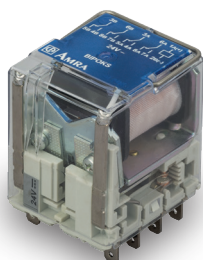
SERIES

## INSTANTANEOUS MONOSTABLES RELAYS 2-4-6-8-12 CONTACTS

### APPLICATIONS



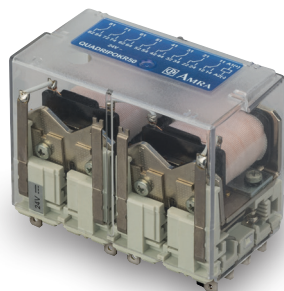
POK



BIPOK



TRIPOK



QUADRIPOK

### OVERVIEW

- Compact plug-in monostables instantaneous relays
- Solid and rugged construction for heavy or intensive duty
- Considerable long-life
- Independent and self-cleaning contacts
- Separate arc breaking chambers
- Magnetic arc blow-out standard
- Excellent shock and vibration resistance
- Option for use in geothermal sites available
- Also available in current-monitoring version
- Also available in PCB-mount version
- 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

### DESCRIPTION

The POK range consists of a 2-contact relay module that can be constructively assembled to reach relays with up to 12 contacts SPDT.

Designed in 1972 immediately after the OK relays, the POK relay whose name originates in "Petite OK", was born as a **series of high-performance relays with small dimensions**. This series totally represents the core values of the company and the constructive objectives that it sets itself: to create electromechanical components that are able to achieve the maximum **reliability**, and that are suitable for use in **severe operating environments**, covering roles with the highest **responsibility for intervention**.

The choice of materials is also very accurate in the various options available. For example, it is possible to choose between different gold-plating treatments of the contacts, which together with the tropicalization of the coil, make the POK relay usable also in **geothermal production plants** and in all those environments where strong **corrosive gases** are present.

The POK relay, despite its size, guarantees remarkable mechanical and electrical performance that make it ideal for use in control and signalling functions in power generation plants, electrical substations, in railway transport or in industries with production processes.

In particular, the considerable resistance to shocks and vibrations allows it to be used on rolling stock.

The peculiarities of this relay model are:

- the absence of connection braids and soldering on the contact terminals. The socket connection terminals are the direct extension of the contacts.
- the absence of return springs inside the mechanism.
- the movement, which is made entirely of metallic material, is not subject to thermal aging typical of plastic materials.
- the remarkable resistance to shocks and vibrations, as well as resistance to high operating temperatures and high thermal shocks.

The contacts are independent and physically divided between them, allowing a better interruption of the electric arc.

They are equipped with a magnetic blower that guarantees particular efficiency in opening direct current loads.

### STANDARD COMPLIANCE

EN 60077	EN 61810-1
EN 50155	EN 61810-2
EN 61373	EN 61810-7
EN 45545-2	EN 60695-2-10
ASTM E162, E662	EN 61000
	EN 60529



MODELS	NUMBER OF CONTACTS	NOMINAL CURRENT	ROLLING STOCK APPLICATION
POK	2	5 A	•
POKS	2	10 A	•
BIPOK	4	5 A	•
BIPOKS	4	10 A	•
TRIPOK	6	5 A	•
TRIPOKS	6	10 A	•
QUADRIPOKS	8	10 A	•
ESAPOKS	12	10 A	



FOR PRODUCT CODE CONFIGURATION, SEE THE "ORDERING SCHEME" TABLE



COIL DATA	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Nominal voltages Un <sup>(1)</sup>	DC: 12-24-36-37.5-48-72-96-110-125-132-144-220			AC: 12-24-48-110-127-220-230	
Max. consumption at Un (DC/AC)	2.5W / 3.5 VA	3W / 4 VA	3.5W / 5.5 VA	6W / 8 VA	7W / 11 VA
Operating range <sup>(1)</sup>	DC: 80...115% Un AC: 85...110% Un				
Rolling stock version <sup>(2) (3)</sup>	DC: 70...125% Un   <b>Only for Un=37.5Vdc:</b> 23...42.5Vdc				
Type of duty	Continuous				
Drop-out voltage <sup>(4)</sup>	DC: > 5% Un		AC: > 15% Un		

1. Other values on request. For ESAPOKS, values > 24V.

2. See "Ordering scheme" table for order code.

3. For operating ranges different to that specified by EN60077, refer to table "Railways, rolling stock - Special operating ranges".

4. Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.



CONTACT DATA	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Number and type	2 SPDT, Form C	4 SPDT, Form C	6 SPDT, Form C	8 SPDT, Form C	12 SPDT, Form C
	POK - BIPOK - TRIPOK			POKS - BIPOKS - TRIPOKS - QUADRIPOKS - ESAPOKS	
Current	Nominal <sup>(1)</sup> 5 A			10 A	
	Maximum peak (1 min) <sup>(2)</sup> 10 A			20 A	
	Maximum pulse (10 ms) <sup>(2)</sup> 100 A			150 A	
Example of electrical life expectancy <sup>(3)</sup>	0.2 A – 110 Vdc – L/R 40 ms : 10 <sup>5</sup> operations			0.5 A – 110 Vdc – L/R 40 ms : 10 <sup>5</sup> operations	
	1800 operations/h			1 A – 110 Vdc – L/R 0 ms : 10 <sup>5</sup> operations	
Minimum load <sup>(4)</sup>	Standard contacts 500 mW (20V, 20 mA)				
	Gold-plated contact <b>P4GEO</b> <sup>(5)</sup> 100 mW (10V, 5 mA)				
	Gold-plated contact <b>P8</b> <sup>(5)</sup> 50 mW (5V, 5 mA)				
Maximum breaking voltage	250 Vdc / 350 Vac				
Contact material	AgCu			Ag / AgCu	
Operating time at Un (ms) <sup>(6) (7)</sup>	DC – AC				
Pick-up (NO contact closing)	≤ 20 - ≤ 20	≤ 25 - ≤ 25	≤ 25 - ≤ 25	≤ 25 - ≤ 25	≤ 25 - ≤ 25
Drop-out (NC contact closing)	≤ 15 - ≤ 20	≤ 20 - ≤ 40	≤ 20 - ≤ 45	≤ 20 - ≤ 40	≤ 20 - ≤ 45

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. 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. For a correct contact use, refer to chapter "INSTALLATION ,OPERATION AND MAINTENANCE".

5. Specifications of contacts on new relay

a. Plating material: **P4GEO:** 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 this case, the characteristics of the standard contact should be taken into consideration.

This does not impact relay operation.

6. Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces).

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 between open contact parts	> 1,000 MΩ > 1,000 MΩ
Withstand voltage at industrial frequency between electrically independent circuits and between these circuits and ground between open contact parts between adjacent contacts	2 kV (1 min) - 2.2 kV (1 s) 1 kV (1 min) - 1.1 kV (1 s) 2.5 kV (1 min) - 3 kV (1 s)
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	DC: 20 x 10 <sup>6</sup> - AC: 10 x 10 <sup>6</sup> operations				
Maximum switching rate	Mechanical	3,600 operations / hour			
Degree of protection (with relay mounted)		IP40			
	<b>POK - POKS</b>	<b>BIPOK - BIPOKS</b>	<b>TRIPOK - TRIPOKS</b>	<b>QUADRIPOKS</b>	<b>ESAPOKS</b>
Dimensions (mm) <sup>(1)</sup>	20 x 50 x 45	40 x 50 x 45	60 x 50 x 45	80 x 61 x 45	120 x 50 x 45
Weight (g)	~ 90	~ 170	~ 250	~ 340	~ 520

1. Output terminals excluded.

## ENVIRONMENTAL SPECIFICATIONS



Operating temperature	Standard	-25° to +55°C
	Version for railways, rolling stock	-25° to +70°C
Storage and shipping temperature		-50° to +85°C
Relative humidity		Standard: 75% RH - Tropicalized: 95% RH
Resistance to vibrations		5g - 10 to 55 Hz - 1 min
Resistance to shock		20g - 11 ms
Fire behaviour		V0

See the "Operation" chapter of this document for more information and operating notes.

## STANDARDS AND REFERENCE VALUES



EN 61810-1, EN 61810-2, EN 61810-7	Electromechanical elementary relays
EN 60695-2-10	Fire behaviour
EN 61000	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 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
ASTM E162, E662	Fire behaviour



## RAILWAYS, ROLLING STOCK - SPECIAL OPERATING RANGES FOR POK(S) - BIPOK(S) RELAYS

For some nominal voltages and on request, special operating ranges, different from the EN 60077-2 standard, are available. To order the relay with the special operating range, indicate the "Z0x" symbol in the "Keying position" field of the ordering scheme. The special range may be subject to operating specifications different from standard specifications. Please contact us for further information.

Nominal voltage	Minimum pick-up voltage	Maximum operating voltage	Order symbol
24 Vdc	18	33	Z01
24 Vdc	16	32	Z02
24 Vdc	16.8	32	Z03
24 Vdc	19	30	Z04
36 Vdc	28	46	Z01
37.5 Vdc	25	42	Z01
37.5 Vdc	23	42.5	Z02
72 Vdc	55	104	Z01
72 Vdc	55	96	Z02
110 Vdc	77	144	Z01



## CONFIGURATION - OPTIONS

<b>P2</b>	Tropicalization of the coil with epoxy resin for use with 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 acid atmospheres (typical of geothermal power stations) or saline atmospheres.
<b>P4GEO</b>	Gold plating of contacts with gold-nickel alloy, thickness $\geq 6\mu$ . 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.
<b>P5GEO</b>	P4GEO gold-plating of contacts + P2 coil tropicalization.
<b>P6GEO</b>	P4GEO type gold-plating, but applied to contacts, contact terminals and output terminals + P2 coil <b>tropicalization</b> .
<b>P7</b>	<b>AgCdO</b> (silver cadmium oxide) contacts.
<b>P8</b>	Gold plating of contacts <b>with gold-cobalt</b> alloy, thickness $\geq 5\mu$ , knurled fixed contact. This finish allows further improvement of <b>the performance</b> provided by gold-plated contact, compared to P4GEO treatment.
<b>LED</b>	LED <b>indicator</b> showing presence of power supply, wired <b>in</b> parallel with the coil.
<b>FLYBACK DIODE</b>	Polarized component connected in parallel with the coil (type 1N4007 or BYW56 for rolling <b>stock version</b> ) designed to suppress overvoltages generated by the coil when de- <b>energized</b> .
<b>VARISTOR</b>	Non-polarized component connected in <b>parallel</b> with the coil, <b>designed to suppress</b> overvoltages higher than the clamping voltage, generated by the coil when de-energized.
<b>TRANSIL</b>	Non-polarized component connected in parallel with the coil. Behaviour is similar to that of a varistor, with faster operating times.
<b>LOW TEMPERATURE</b>	Minimum operating temperature $-50^{\circ}\text{C}$ , only for rolling stock version (option "L").
<b>C.S.</b>	PCB-mount version (for POK-POKS-BIPOK-BIPOKS only).



## ORDERING SCHEME

MODEL	NUMBER OF SPDT CONTACTS	PRODUCT CODE	APPLICATION <sup>(1)</sup>	CONFIGURATION A	CONFIGURATION B	TYPE OF POWER SUPPLY	NOMINAL VOLTAGE (V) <sup>(2)</sup>	KEYING POSITION <sup>(3)</sup> / OPTION
POK	2 - 5A	POK	<b>E:</b> Energy Railway Fixed Equipment	<b>1:</b> Standard <b>2:</b> Diode // <b>3:</b> Varistor <b>4:</b> Led <b>5:</b> Diode // + Led	<b>0:</b> Standard <b>2:</b> P2 <b>4:</b> P4 GEO <b>5:</b> P5 GEO <b>6:</b> P6 GEO <b>7:</b> P7 <b>8:</b> P8	<b>C:</b> Vdc <b>A:</b> Vac 50 Hz <b>H:</b> Vac 60 Hz	012 - 024	XXX <b>CS</b> = PCB-mount version <b>L</b> = low temperature
POKS	2 - 10A	POKS					036 - 037	
BIPOK	4 - 5A	BPOK					048 - 072	
BIPOKS	4 - 10A	BPOKS					096 - 100	
TRIPOK	6 - 5A	TPOK	<b>R:</b> Railway Rolling Stock	<b>6:</b> Varistor + Led <b>7:</b> Transil <b>8:</b> Transil + Led			110 - 125	
TRIPOKS	6 - 10A	TPOKS					127 - 132	
QUADRIPOKS	8 - 10A	QPOK					144 - 220	
ESAPOKS	12 - 10A	EPOK					230	

Example

TPOKS	E	3	0	A	230	
TPOKSE30-A230 - TRIPOKS relay, ENERGY series, nominal voltage 230 Vac, equipped with varistor						
BPOKS	R	5	8	C	024	
BPOKSR58-C024 - BIPOKS relay, ROLLING STOCK series, nominal voltage 24 Vdc, equipped with diode, LED, with P8 finish (gold-plated contacts)						
POK	R	1	0	C	110	L
POKR10 - C110 L - POK relay, rolling stock series, nominal voltage 110 Vdc with option "low temperature"						

(1) **E = ENERGY:** all applications, except for railways rolling stock.

Suitable on energy production, transport and distribution plants, railways fixed equipment, petrochemical and heavy industry.

**R = RAILWAYS, ROLLING STOCK:** Application on board rolling stock (rail-tram-trolley vehicles). Electrical characteristics according to EN60077.

Available also the product series:

**RAILWAYS, FIXED EQUIPMENT:** Approved and conforming relays and products to RFI (FS Group) specification no. RFI DPRIM STF IFS TE 143 A

For the list of RFI approved and conforming products, consult dedicated catalogue "RAILWAY SERIES – RFI APPROVED".

**STATIONS:** ENEL approved material meeting LV15/LV16 specifications.

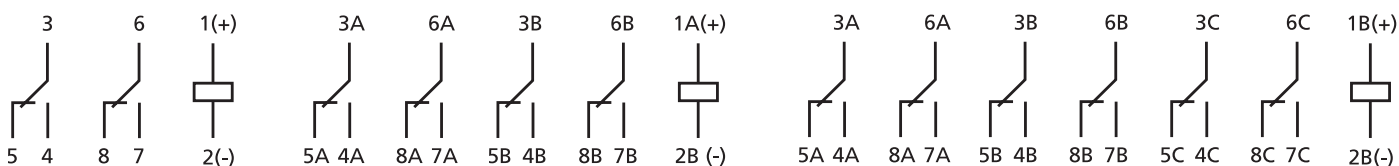
For the list of ENEL approved and conforming products, consult the dedicated catalogue "STATIONS SERIES – LV15-LV16-LV20".

(2) Other values on request. Use 037 for Un=37.5Vdc.

(3) Optional value. PCB-mount version available for POK - POKS - BIPOK - BIPOKS only. Multiple selection possible (e.g. CS - L).

The positive mechanical keying is applied according to the manufacturer's model (not available for PCB-mount versions).

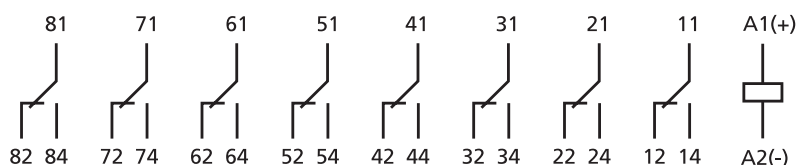
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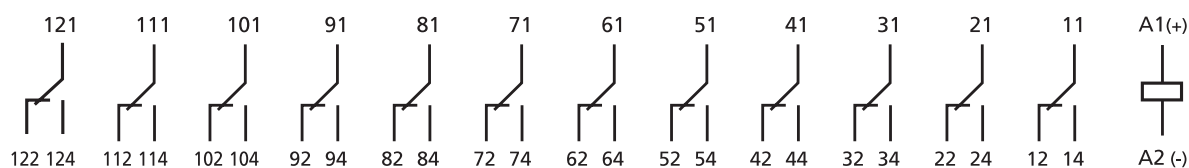
POK - POKS

BIPOK - BIPOKS

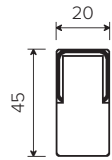
TRIPOK - TRIPOKS



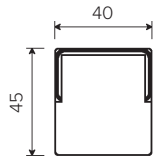
QUADRIPOKS



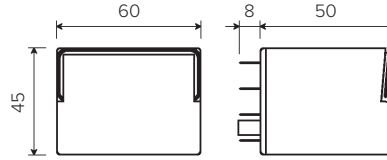
ESAPOKS



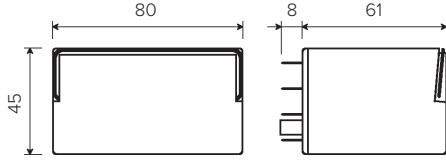
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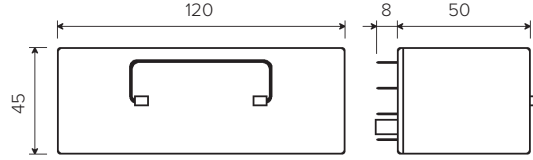
BIPOK - BIPOKS



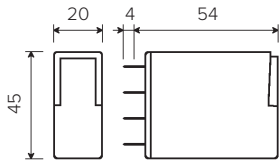
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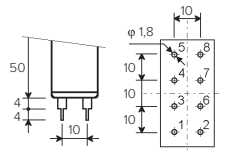
QUADRIPOKS



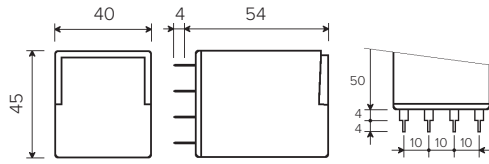
ESAPOKS



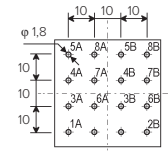
POK-CS - POKS-CS



Hole layout  
(from solder side)

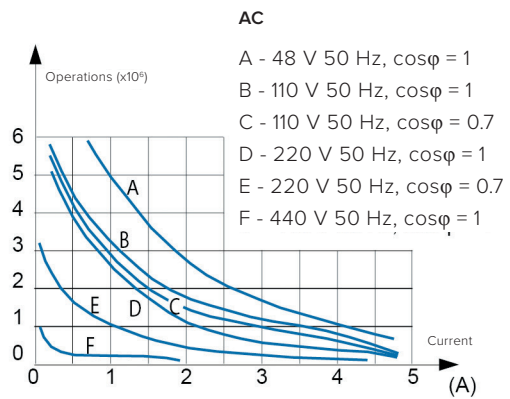
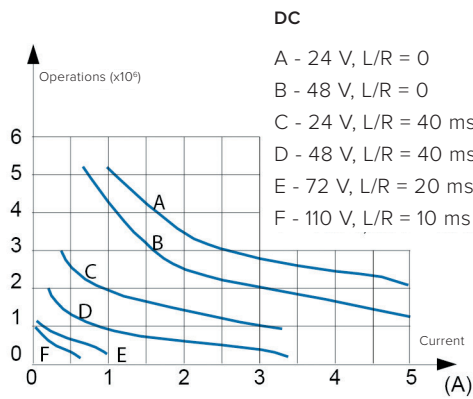


BIPOK-CS - BIPOKS-CS



Hole layout  
(from solder side)

**ELECTRICAL LIFE EXPECTANCY**



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

**Some examples of electrical life expectancy**

- 48Vdc – 5 A – L/R = 10 ms : 5 x 10<sup>5</sup> operations
- 80Vdc – 5 A – Resistive : 5 x 10<sup>5</sup> operations
- 110Vdc – 0.5 A – L/R = 10 ms : 5 x 10<sup>5</sup> operations

- 220Vdc – 0.2 A – L/R = 10 ms : 10<sup>5</sup> operations
- 110Vac – 5 A – Cosφ = 0.7 : 5 x 10<sup>5</sup> operations
- 220Vac – 3 A – Cosφ = 0.7 : 5 x 10<sup>5</sup> operations
- 440Vac – 0.2 A – Resistive : 5 x 10<sup>5</sup> operations

SOCKETS	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Number of terminals	8	16	24	32	48
For wall or rail mounting					
Spring clamp, wall or DIN H35 rail mounting	PAIR080	PAIR160	PAIR240	PAIR320	PAIR480
Screw, wall or DIN H35 rail mounting	50IP20-I DIN	48BIP20-I DIN	78BIP20-I DIN	96IP20-I DIN	156IP20-I DIN
Screw, wall mounting	50L	48BL	78BL	96BL	156BL
For flush mounting					
Spring clamp	PRIR080	PRIR160	PRIR240	PRIR320	PRIR480
Double faston (4.8 x 0.8 mm)	ADF1	ADF2	ADF3	ADF4	ADF6
Screw	53IL	43IL	73IL	-	-
For mounting on PCB					
	65 <sup>(1)</sup>	65	-	-	-

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

RETAINING CLIPS (correspondence with sockets)	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Number of clips per relay	1	1 <sup>(1)</sup>	2	2	2
<b>SOCKET MODEL</b>	<b>CLIP MODEL</b>				
For wall or rail mounting					
PAIR080, PAIR160, PAIR240, PAIR320, PAIR480	RPB48	RPB48	RPB48	RQ48	RPB48
50IP20-I DIN, 48BIP20-I DIN, 78BIP20-I DIN, 96IP20-I DIN, 156IP20-I DIN	RPB48	RPB48	RPB48	RQ48	RPB48
50L, 48BL, 78BL, 96BL, 156BL	RPB48	RPB48	RPB48	RQ48	RPB48
For flush mounting					
PRIR080, PRIR160, PRIR240, PRIR320, PRIR480	RPB48	RPB48	RPB48	RQ48	RPB48
ADF1, ADF2, ADF3, ADF4, ADF6	RPB48	RPB48	RPB48	RQ48	RPB48
ADF, 53IL, 43IL, 73IL <sup>(2)</sup>	RPB43	RPB43	RPB43	-	-
For mounting on PCB					
	65	RPB43	RPB43	-	-

(1) Assume two clips for use on rolling stock.

(2) Insert the clip before fastening the socket on the panel.

## INSTALLATION, OPERATION AND MAINTENANCE

### Installation

Before installing the relay on a 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 so that the label is readable in the correct sense.

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

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

- Power supply: the maximum allowed, permanently
- Ambient temperature: the maximum allowed, permanently
- Current on the contacts: the maximum allowed, permanently
- Number of 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 a safe use, the 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 rubs against the fixed poles (NO and NC contacts) both when opening and when closing, which ensures a self-cleaning action.

An increase in contacts' resistance, in most cases, does not represent 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 lower than 10mA, use gold plated contacts and connect 2 contacts in parallel, in order to reduce the equivalent contact resistance
- **Pollution:** the presence of pollution can cause impurities on contact surface. Electric charges attract organic molecules and impurities that are deposited on the contact surface. Electrical and mechanical cleaning, respectively, burn and remove such impurities. In pollution presence, the minimum recommended currents must be respected. In extreme cases, provide double the cleaning current.

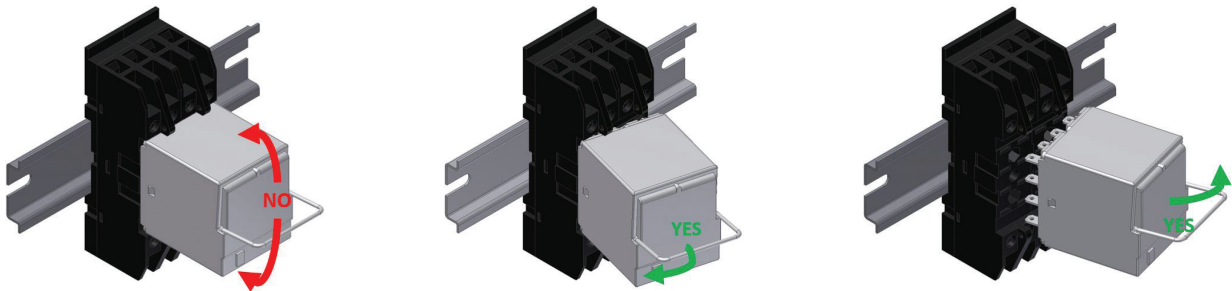
The possible formation of condensation inside the relay, when it is powered and the external ambient temperature is cold, is a normal phenomenon that has no effect on the electrical safety of the relay. In case of polluted or saline atmosphere, any condensation deposits on the contacts can degrade their performance in terms of conductivity.

## 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, we recommend to use a relay of the same model and configuration.

If an investigation by AMRA is required, pull-out the relay from the socket, don't remove the cap, avoid any other manipulation and contact us. You will be asked for the following data: environmental conditions, power supply, switching frequency, contact load, number of operations performed.

The fault can be described through the "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 conditions 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 -50 and +85°C with max 75% RH. In any case, there must be no condensation. Before use, please read carefully "OPERATION" section.