

# OKT-OKR

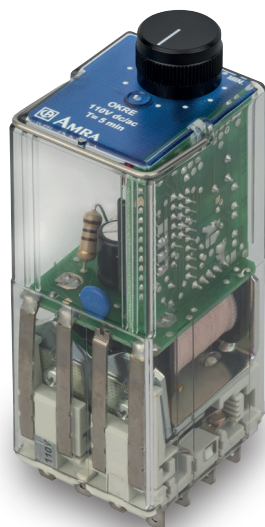
SERIES

## TIMER RELAYS 4 CONTACTS

### APPLICATIONS



**OKTA**  
Time setting flat head  
slotted screw



**OKRE**  
Time setting Knob

### OVERVIEW

- Plug-in relay with time delay on pick-up or on drop-out
- Time delay setting from 0.1 second up to 1 hour
- Wide range of time settings available
- DC or AC operating power supply with a single product
- Solid and rugged construction for heavy or intensive duty
- Considerable long-life
- Separate arc breaking chambers
- Magnetic arc blow-out standard
- Independent and self-cleaning contacts
- Excellent shock and vibration resistance
- Wide range of sockets
- Retaining clip for secure locking of relay on socket
- Transparent cover, pull-out handle
- Positive mechanical keying for relay and socket

### DESCRIPTION

Relays of the OKR and OKT series are monostable types with time delay, using 4 or 3 SPDT contacts (depending on the model). Manufactured following the same basic electromechanical design of the POK model, they embody all the features and benefits of this product.

Excellent electrical and mechanical performance levels allow the product to be used in the most demanding of sectors such as, for example, control and signalling functions in electricity generating stations, electrical transformer stations, rail transport or in industries with continuous production processes (chemical industry, petroleum industry, rolling mills, cement factories, etc.). In particular, with their notable shock and vibration resistance, they are ideal for use on rolling stock.

The electronic timing circuit is designed using analog technology: by adopting a limited number of select components, the end product is guaranteed to meet high standards of quality and reliability.

OKRe and OKTa models offer time delay on pick-up, whereas OKRr and OKTr models offer time delay on drop-out.

In the case of the OKTr model, one of the 4 contacts must be connected to the power coil (see functional diagram).

This obviates the need for connection of an auxiliary power supply to the relay, separate from the control.

In this situation, the contacts available for switching purposes are 3 in number.

Models are available with different full scale time values (from 1 second up to 60 minutes), so as to offer a wide range of time delay settings. The full scale value is a fixed, factory set value determined as part of the manufacturing process.

The end user can adjust the response time from a minimum 10% up to 100% of full scale with absolute ease, by way of the knob-operated or slotted screw-driven potentiometer located on the top of the relay housing. Power can be supplied to the relay from a d.c. or an a.c. source operating at 50 or 60 Hz.

### STANDARD COMPLIANCE

EN 61810-1	EN 60077
EN 61810-2	EN 50155
EN 61810-7	EN 60695-2-10
EN 61812-1	EN 61000
EN 61373	EN 60529
EN 45545-2	ASTM E162, E662



MODELS	FUNCTION		NUMBER OF TIME DELAYED CONTACTS	SETTING CONTROL		ROLLING STOCK APPLICATIONS
	Pick-up	Drop-out		Knob	Flat head slotted screw	
OKTa	•		4	•	•	•
OKTr		•	3	•	•	•
OKRe	•		4	•	•	•
OKRf		•	4	•	•	•



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



COIL DATA	
Nominal voltages at Un <sup>(1)</sup>	DC / AC: 24 - 36 - 48 - 72 - 110 - 125 - 132 - 144 - 220 - 230
Max Consumption at Un	4 W / 5 VA
Operating range <sup>(1)</sup>	Standard 80..115% Un
Rolling stock version <sup>(2) (3)</sup>	DC: 70..125% Un
Type of duty	Continuous
Drop-out voltage <sup>(4)</sup>	> 5% Un

(1) Other values on request. Operation with DC or AC power supply.

(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	OKTa	OKTr	OKRe - OKRr
Number and type	4 SPDT, form C	3 SPDT, form C	4 SPDT, form C
Current		5A	
Nominal <sup>(1)</sup>			
Maximum peak (1 s) <sup>(2)</sup>		10 A	
Maximum pulsed (10 ms) <sup>(2)</sup>		100 A	
Example of electrical life expectancy <sup>(3)</sup>	0.5A - 110Vdc - L/R = 40ms : 10 <sup>5</sup> operations, 1,800 operations/hour		
Minimum load <sup>(4)</sup>	Standard contacts	500mW (20V, 20mA)	
Gold-plated contacts P4GEO <sup>(5)</sup>		100mW (10V, 5mA)	
Gold-plated contacts P8 <sup>(5)</sup>		50mW (5V, 5mA)	
Maximum breaking voltage		250 Vdc / 350 Vac	
Contact material		AgCu	
Switching time at Un (ms) <sup>(6) (7)</sup>		DC - AC	
Pick-up (NO contact closing)		≤ 20 - ≤ 20	
Drop-out (NC contact closing)		≤ 15 - ≤ 20	

(1) Nominal current: 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) 1,800 operations/hour - 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.

(5) Specifications of gold-plated 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 this case, the characteristics of the standard contact should be taken into consideration.

This does not impair relay operation.

(6) Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces). It 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 (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		20x10 <sup>6</sup> operations
Maximum switching rate	Mechanical	3,600 operations/hour
Degree of protection (with relay mounted)		IP40
Dimensions (mm)		40x45x97 <sup>(1)</sup>
Weight (g)		~ 220

(1) Excluding output terminals and adjuster knob, if specified.

## ENVIRONMENTAL SPECIFICATIONS



Operating temperature	Standard	-10 ÷ +55°C
	Rolling stock version	-25 ÷ +70°C
Storage and shipping temperature		-25 ÷ +85°C
Relative humidity		Standard: 75% RH - Tropicalized: 95% RH
Resistance to vibrations		5g - 10 to 55 Hz - 1 min.
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 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



Nominal voltage	Minimum pick-up voltage	Maximum operating voltage	Order symbol <sup>(1)</sup>
24 Vdc	18	33	Z01
72 Vdc	55	104	Z01
110 Vdc	77	140	Z01
128 Vdc	85	155	Z01

(1) 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.



## CONFIGURATIONS - 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 the combination of 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>	<b>P4GEO</b> type gold-plating, but applied to contacts, contact terminals and output terminals + <b>P2</b> coil tropicalization.
<b>P6GEO</b>	Gold-plating of contacts, contact terminals and output terminals + <b>P2</b> coil tropicalization.
<b>P7</b>	Silver cadmium oxide contacts.
<b>P8</b>	Gold plating of contacts with gold-cobalt alloy, thickness $\geq 5\mu$ , knurled fixed contact. This finish allows further improvement of the gold-plated contact performance compared to the treatment P4GEO.
<b>LED</b>	LED indicator showing presence of power supply, wired in parallel with the coil.
<b>FLYBACK DIODE</b>	Polarized component connected in parallel with the coil designed to suppress overvoltages 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.



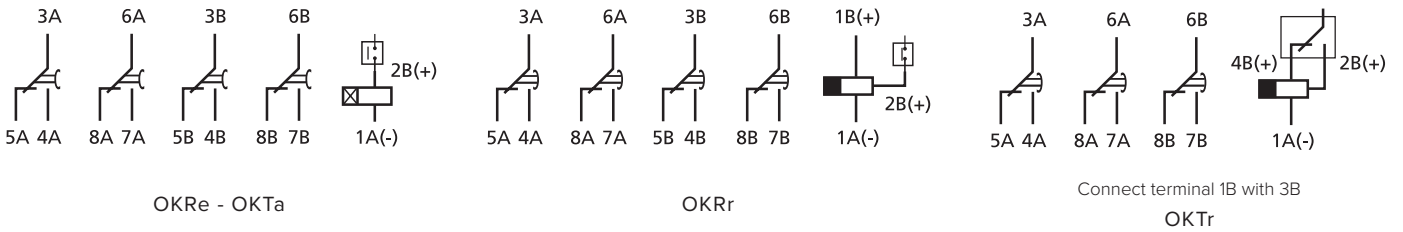
## ORDERING SCHEME

PRODUCT CODE	APPLICATION <sup>(1)</sup>	CONFIGURATION A	CONFIGURATION B	TYPE OF POWER SUPPLY	NOMINAL VOLTAGE (V) <sup>(2)</sup>	SETTING CONTROL	FULL SCALE TIME <sup>(3)</sup>	KEYING POSITION CODE <sup>(3)</sup>
OKRe OKTa OKRr OKTr	<b>E:</b> Energy <b>F:</b> Railway Fixed equipment <b>R:</b> Railway Rolling stock <b>M:</b> MMI	<b>1:</b> Standard <b>2:</b> Diode // <b>3:</b> Varistor <b>4:</b> Led <b>5:</b> Diode // + LED <b>6:</b> Varistor // + LED <b>7:</b> Transil <b>8:</b> Transil + 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>T:</b> Vdc/ac <b>C:</b> Vdc <sup>(4)</sup>	024 - 036 048 - 072 110 - 125 132 - 144 220 - 230	<b>M:</b> Knob <b>C:</b> Flat head slotted screw	<b>01S:</b> 1 s <b>05S:</b> 5 s <b>10S:</b> 10 s <b>15S:</b> 15 s <b>30S:</b> 30 s <b>01M:</b> 1 min <b>02M:</b> 2 min <b>05M:</b> 5 min <b>10M:</b> 10 min <b>15M:</b> 15 min <b>30M:</b> 30 min <b>60M:</b> 60 min	XX

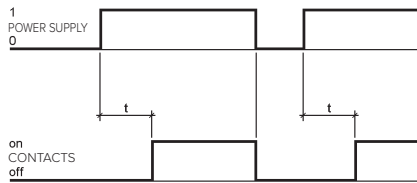
Example	OKRe	E	1	0	T	110	M	05S	
	OKReE10-T110-M05S - OKRe relay, ENERGY Series, nominal voltage 110Vdc, full scale 5 seconds, knob setting control								
	OKRr	R	5	0	C	072	C	30M	Z01
OKRrR50-C072-C30M-Z01 - OKRr relay, ROLLING STOCK Series, nominal voltage 72Vdc, special range 55-104V, equipped with diode, LED, full scale 30 minutes, slotted screw setting control									

- 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 EN 60077.  
**MMI:** Italian Navy specification. P6 GEO treatment as standard (see Configuration B). SLOTTED SCREW setting control only.
- Other values on request.
- Optional value. The positive mechanical keying is applied according to the manufacturer's model.
- Rolling Stock version, VDC only available.

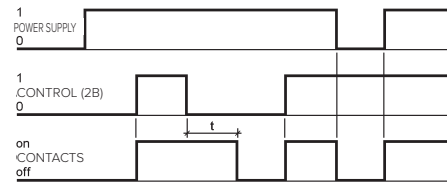
## WIRING DIAGRAM



## FUNCTIONAL DIAGRAM



OKRe - OKTa



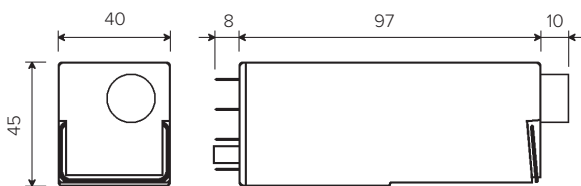
OKRr - OKTr

## TIME DELAY – SWITCHING TIME SETTING

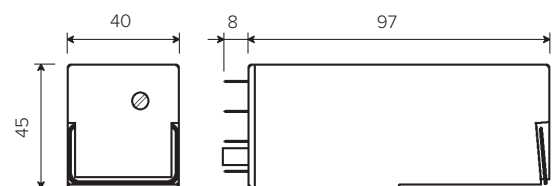
Time setting	By way of potentiometer, with knob or flat head slotted screw setting control
Full scale times available	1-5-10-15-30 seconds, 1-2-5-10-30-60 minutes
Time setting range	10...100 % of full scale
Accuracy, setting (0.8...1.1 Un, t=20°C)	±10% of time delay
Accuracy, repeatability	DC: ±0.5% / AC: ±0.5% +20ms
Reset	< 100ms - in time-delay phase < 1s

The setting time scale shown on the front of the relay (0.1...1) is approximate.

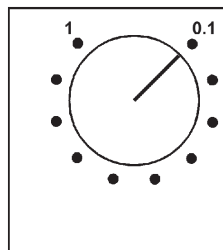
## DIMENSIONS



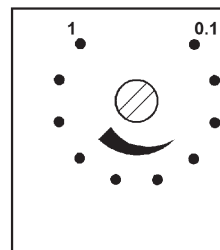
Relay with knob setting control



Relay with flat head slotted screw setting control



Knob setting control

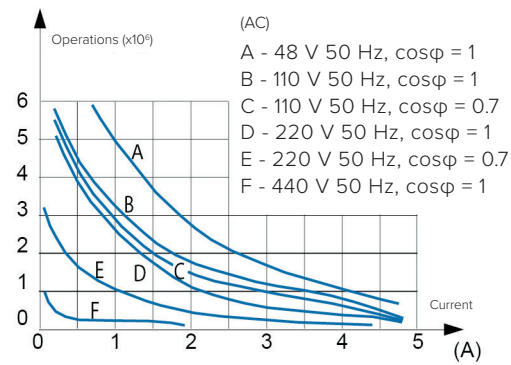
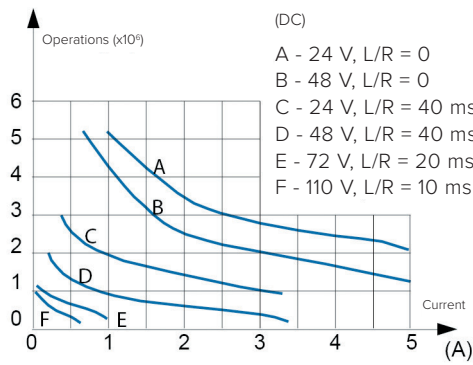


Flat head slotted screw setting control

The scale shown on the relay (0.1-1) is approximate



## ELECTRICAL LIFE EXPECTANCY



**Some examples of electrical life expectancy**  
 48Vdc - 5 A - L/R = 10 ms:  $5 \times 10^5$  operations  
 80Vdc - 5 A - Resistive:  $5 \times 10^5$  operations  
 110Vdc - 0.5 A - L/R = 10 ms:  $5 \times 10^5$  operations

220Vdc - 0.2 A - L/R = 10 ms:  $10^5$  operations  
 110Vac - 5 A -  $\cos\phi = 0.7$ :  $5 \times 10^5$  operations  
 220Vac - 3 A -  $\cos\phi = 0.7$ :  $5 \times 10^5$  operations  
 440Vac - 0.2 A - Resistive:  $5 \times 10^5$  operations

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



## SOCKETS AND RETAINING CLIPS

Number of terminals (standard dimensions 5x0.8)	16		Retaining Clip
For wall or rail mounting			
Spring clamp, wall or DIN H35 rail mounting	PAIR160		RC48
Screw, wall or DIN H35 rail mounting	48BIP20-I DIN		RC48
Screw, wall mounting	48BL		RC48
Double faston, wall mounting	48L		RC48
For flush mounting			
Spring clamp	PRIR160		RC48
Double faston (4.8 x 0.8 mm)	ADF2		RC48
Screw	43IL <sup>(1)</sup>		RC43
For mounting in PCB	65		RC43

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



## 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.

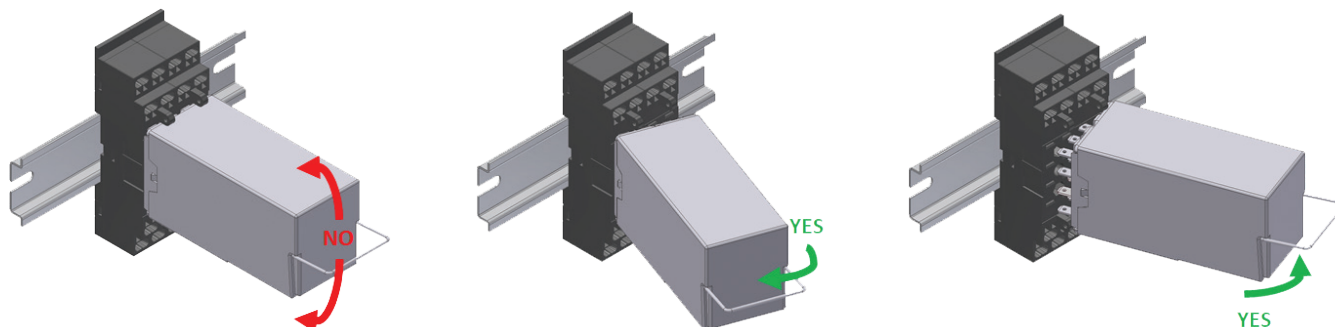
Condensation is possible inside the relay when energized and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. Plastic materials of relay do not possess hygroscopic properties.

## 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, 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 -25 and +85°C with max 75% RH. Humidity can reach peaks of 95%. In any case, there must be no condensation. Before use, please read carefully "OPERATION" section.