

RDT

SERIES

MONOSTABLE MULTISCALE TIMER RELAY 4 SPDT CONTACTS

APPLICATIONS



Shipbuilding

Petroleum
industryHeavy
industryPower
generationPower
distributionRailway
equipment

RDT

OVERVIEW

- Plug-in relay with time delay on pick-up or on drop-out
- Only model programmable on pick-up or on drop-out
- High-performance, compact dimensions
- Wide time setting range from 0.1s to more than 16 hours, great accuracy over the entire adjustment range
- Led optical indicators monitoring power supply and timer status
- Magnetic arc blow-out for higher breaking capacity
- Self-cleaning knurled contacts
- Relay coupled automatically to socket, no need of retaining clip
- Operation with DC and/or AC power supply
- Wide variety of configurations and customizations
- Transparent cover, pull-out handle
- Label holder in cover for customer's use
- Positive mechanical keying for relay and socket

DESCRIPTION

The RDT series is a range of relays with electronic time delay on pick-up or on drop-out, consisting of 6 models with 4 change-over contacts, from 10 A (nominal).

RDT relays are created by assembling electromechanical units of the RDM series with a digital electronic circuit. The electronic circuit is assembled using a small number of selected professional components for top reliability. The electronics are immune to strong EMC interference, typical of high voltage electricity distribution stations.

These monostable relays are capable of switching times ranging from 0.1 second to over 16 hours, providing extreme accuracy over the entire setting range. This is made possible by the fact that the relay offers intermediate scales, which the user can select by means of rotary switches positioned on the front of the enclosure.

The contacts used are of a type designed to give good levels of performance both with high and strongly inductive d.c. loads, and with particularly low loads such as interface signals; inclusion of the magnetic arc blow-out function, when installed, 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.

The timing function can be utilized in two modes: "on pick-up" or "on drop-out"; models are available with 4 timer contacts or with 2 timer contacts and 2 instantaneous contacts.

The construction of the relays and their simplified mechanical design combine to ensure these products offer high reliability in operation, as proven by their use for over 40 years in electrical energy transport and distribution systems, and fixed equipment used in the railway sector. Typical sectors of use are among the most demanding, such as, for example, electricity generating stations, electrical transformer stations, fixed equipment for railways, or industries using continuous production processes (chemical and petrochemical, rolling mills, cement factories, etc.).

Like all AMRA relays, models of the RDT series are assembled as part of a controlled manufacturing process in which every step of production is verified by the next step in succession. In effect, each relay is calibrated and tested individually, by hand, in such a way as to guarantee top reliability.

STANDARD COMPLIANCY

EN 60695-2-10
EN 61000
EN 60529

EN 61810-1
EN 61810-2
EN 61810-7
EN 61812-1



MODELS	NUMBER OF CONTACTS		MAGNETIC ARC BLOW-OUT	SEPARATE CONTROL VOLTAGE	FUNCTION
	INSTANTANEOUS	TIME-DELAYED			
RDT.x1c	-	4			Pick-up / Drop-out
RDT.x7c	-	4	•		Pick-up / Drop-out
RDT.x2c	2	2			Pick-up / Drop-out
RDT.x8c	2	2	•		Pick-up / Drop-out
RDT.x4c	-	4		•	Pick-up / Drop-out
RDT.x9c	-	4	•	•	Pick-up / Drop-out



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



COIL DATA	RDT.x1c-x4c-x7c-x9c	RDT.x2c-x8c
Nominal voltages at Un	AC / DC: 12 - 24 - 48 - 110 - 125 - 132 - 144 - 220 ⁽¹⁾	
Consumption at Un	3.5 W	DC: 4.5 W / AC: 6 VA
Operating range	DC: 80...120% Un	
Type of duty	Continuous	
Drop-out voltage ⁽²⁾	> 5% Un	

(1) Other values on request.

(2) Limit value for supply voltage, expressed as % of the nominal voltage, beneath which the relay is certain to be de-energized.



CONTACT DATA		
	Number and type	4 SPDT, form C
Current	Nominal ⁽¹⁾	10A
	Maximum peak ⁽²⁾	13A for 1min - 20A for 1s
	Maximum pulse ⁽²⁾	100A for 10ms
	Example of electrical life expectancy ⁽³⁾	RDT.x1c-x2c-x4c: 0.2A - 110Vdc - L/R 40ms - 10 ⁵ operations - 1,800 operations/hour RDT.x7c-x8c-x9c: 0.5A - 110Vdc - L/R 40ms - 10 ⁵ operations - 1,800 operations/hour
Minimum load ⁽⁴⁾	Standard contacts	200mW (10V, 10mA)
	Gold-plated contacts ⁽⁵⁾	50mW (5V, 5mA)
Maximum breaking voltage		250 VDC / 300 VAC
Contact material		AgCdO (moving contacts) - AgNi (fixed contacts)
Operating time at Un (ms) ^{(6) (7)}	DC - AC	
	Pick-up (NC contact opening)	≤ 10 - ≤ 10
	Pick-up (NO contact closing)	≤ 19 - ≤ 18
	Drop-out (NO contact opening)	≤ 4 - ≤ 8
	Drop-out (NC contact closing)	≤ 16 - ≤ 19

(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) 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 the chapter "Installation, operation and maintenance".

(5) 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

(6) Unless specified otherwise, operating times are understood as comprising stabilization of the contact (inclusive of bounces)

(7) Times for instantaneous contacts, if installed



INSULATION		
Insulation resistance (at 500Vdc)	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) - 2.2 kV (1 s)
	between open contact parts	2 kV (1 min) - 2.2 kV (1 s)
	between adjacent contacts	2 kV (1 min) - 2.2 kV (1 s)
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 expectancy	20 x 10 ⁶ operations
Maximum switching rate	3,600 operations/hour
Degree of protection	IP40
Dimensions (mm)	40x40x82 ⁽¹⁾
Weight (g)	150

(1) Output terminals excluded.

ENVIRONMENTAL CHARACTERISTICS

Operating temperature	-25 ÷ +55°C
Storage and shipping temperature	-25 ÷ +70°C
Relative humidity	Standard: 75% RH - Tropicalized: 95% RH
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 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%.

CONFIGURATIONS - OPTIONS

TROPICALIZATION	Surface treatment of the coil with protective coating for use with RH 95%.
GOLD PLATING	Surface treatment of the contacts, with gold-cobalt alloy ≥ 5μ (since 2023, May). This treatment ensures long-term ability of the contact to conduct lower currents.

ORDERING SCHEME

PRODUCT CODE	APPLICATION ⁽¹⁾	CONFIGURATION A	CONFIGURATION B	TYPE OF POWER SUPPLY	NOMINAL VOLTAGE (V) ⁽²⁾	FINISH ⁽³⁾	KEYING POSITION CODE ⁽⁴⁾
RDT	E: Energy F: Railway Fixed equipment	1: Standard 4: Gold plating	1C: 4 SPDT timer contacts 2C: 2 SPDT timer contacts + 2 SPDT instantaneous contacts 4C: 4 SPDT timer contacts with control voltage 7C: 4 SPDT timer contacts with magnetic arc blow-out 8C: 2 SPDT timer contacts + 2 SPDT instantaneous contacts with magnetic arc blow-out 9C: 4 SPDT timer contacts with control voltage and magnetic arc blow-out	C: Vdc A: Vac 50 Hz H: Vac 60 Hz T ⁽⁵⁾ : Vdc + Vac 50 Hz	012 - 024 048 - 110 125 - 132 144 - 220	T: Tropicalized coil	XX

Example	RDT	E	1	7C	T	110	T	ZH
	RDTE17C-T110/T-ZH = ENERGY series relay with 4 SPDT timer contacts, magnetic arc blow-out, 110 VDC or VAC (50 Hz) tropicalized coil and keying position ZH							
	RDT	F	4	2C	C	024		XG
RDTF42C-C024 = RAILWAY series relay, fixed equipment, with 2 SPDT timer contacts and 2 instantaneous, gold-plated contacts and 24Vdc 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.

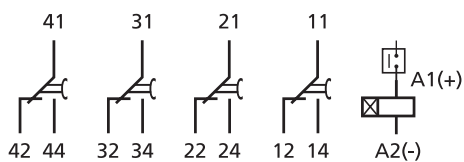
3. Optional value.

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

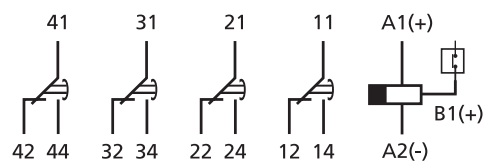
5. AC+DC power input possible only with models RDT.x1c and RDT.x7c.



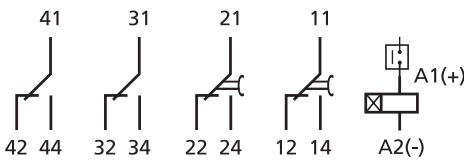
WIRING DIAGRAM



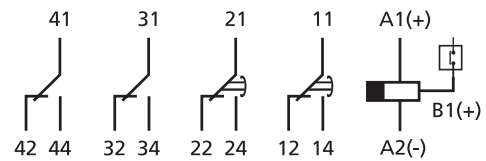
Pick-up diagram RDT.x1c-x7c



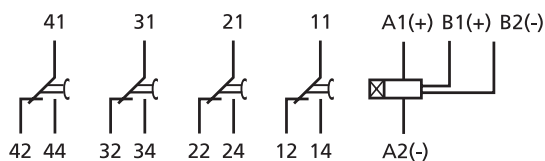
Drop-out diagram RDT.x1c-x7c



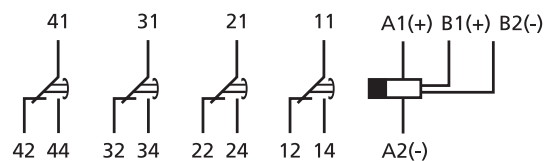
Pick-up diagram RDT.x2c-x8c



Drop-out diagram RDT.x2c-x8c

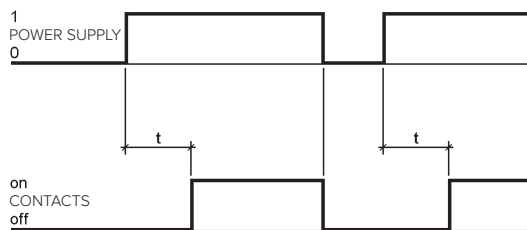


Pick-up diagram RDT.x4c-x9c

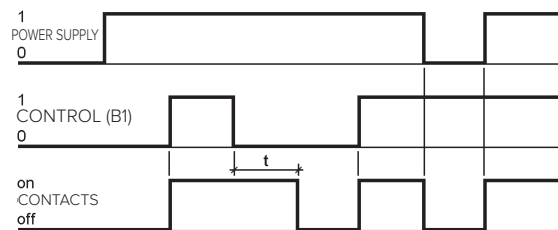


Drop-out diagram RDT.x4c-x9c

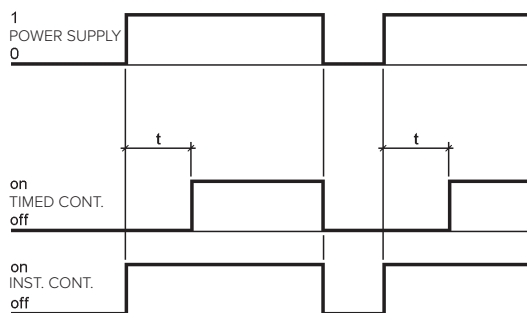
FUNCTIONAL DIAGRAM



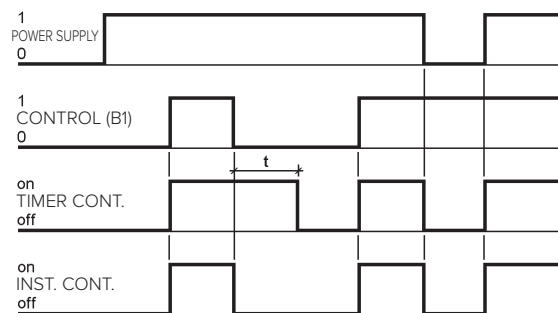
Pick-up diagram RDT.x1c-x7c



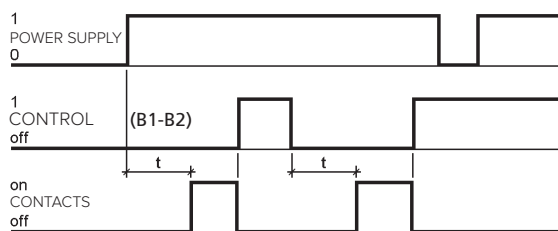
Drop-out diagram RDT.x1c-x7c



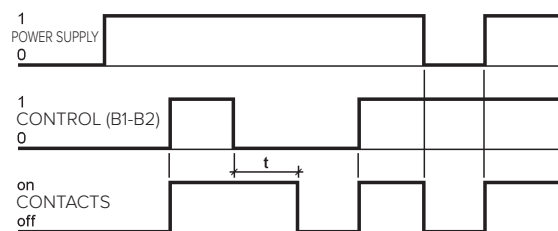
Pick-up diagram RDT.x2c-x8c



Drop-out diagram RDT.x2c-x8c



Pick-up diagram RDT.x4c-x9c



Drop-out diagram RDT.x4c-x9c



Time setting	By means of DIP switches and selectors
Time setting range	100 ms...990 min
Intermediate scale	6 (0.99 - 9.9 - 99 - 990 seconds / 99 - 990 minutes)
Resolution of switching time setting	1/100 of selected scale
Operating accuracy (0.8...1.1 Un, t=20°C) ⁽¹⁾	±3 % at low end of scale - ±0.5 % at high end of scale
Accuracy, repeatability	±2%
Reset	< 200ms
Insensitivity to voltage drops	< 100 ms
Indication	Red led = presence of power supply Green led = status of relay outputs (lights up with relay energized)

(1) Additional error for drop-out versions: 100 ms

The timer function and the switching time are set by way of a single 4-bit DIP switch and two rotary selectors adjustable through 10 positions, located on the front of the relay (see "FRONT"). These are accessible by opening the flap on the cover of the relay. The time delay function can be associated either with pick-up or with drop-out; settings range from 100 ms up to 990 minutes.

Selection of function: select the OFF or ON position at switch no. 4. OFF: Pick-up - ON: Drop-out.

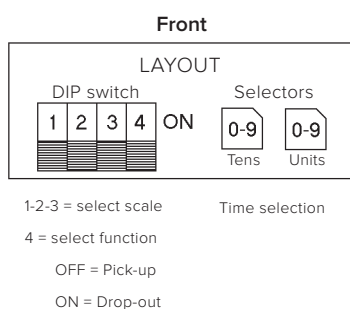
Selection of operating time: the unit of measure is selected with switches no. 1-2-3, and the desired delay interval by means of the 2 rotary selectors.

To set the switching time correctly, the first step required is to identify and select one of the 6 intermediate scales indicated in table 1.

The intermediate scale should be the next higher numerically than the value of the required switching time.

E.g. Switching time: 1'14" (74 seconds), Intermediate scale setting: 99 seconds.

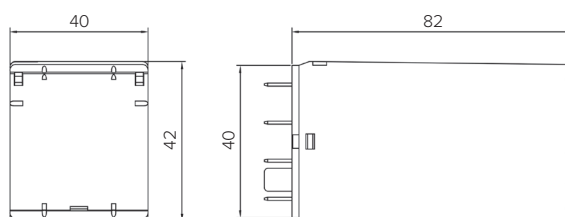
This done, proceed to set the desired value with the two rotary selectors. E.g. 74 seconds, select 7 on the "TENS" selector and 4 on the "UNITS" selector.



Scales / Setting range			Switch position		
Min	Max	Unit of measure	1	2	3
1	99	Hundredths (0.01s)	OFF	ON	OFF
1	99	Tenths (0.1s)	OFF	ON	ON
1	99	Seconds	ON	OFF	OFF
1	99	Seconds x 10	ON	OFF	ON
1	99	Minutes	ON	ON	OFF
1	99	Minutes x 10	ON	ON	ON

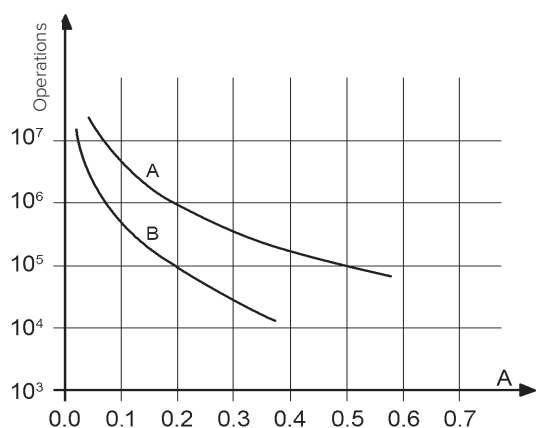
Table 1

DIMENSIONS





ELECTRICAL LIFE EXPECTANCY



RDT.x1 - RDT.x2 - RDT.x4			
U	I (A)	L/R (ms)	Operations
110Vdc	0.2	40	500,000
220Vdc	0.2	10	80,000
U	I (A)	cosφ	Operations
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

Contact loading: 110Vdc, L/R 40 ms

Curve A: RDT.x7-x8-x9

Curve B: RDT.x1-x2-x4

RDT.x7 - RDT.x8 - RDT.x9			
U	I (A)	L/R (ms)	Operations
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	Operations
110Vdc	1	1	2,000,000
110Vdc	1	0.5	1,500,000
110Vdc	5	1	950,000
110Vdc	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

Switching frequency: 1,200 operations/hour
(*) 600 operations/hour



SOCKETS AND RETAINING CLIPS

Type of installation	Type of outputs	Model	Retaining Clip
Wall or DIN 35 rail mounting	Screw	PAVD161	VM1823
Flush mounting	Screw	PRVD161	-
PCB-mount	Solder	PRCD161	-



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 - 2A. 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:
 - o Standard contacts: Minimum current = 20mA (20V)
 - o Gold plated contacts: Minimum current = 10mA (20V)
- **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:
 - o Use of contact with currents twice compared to those indicated.
 - o 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.

While a contact open high loads, impurities develop inside the relay due to the formation and interruption of the electric arc. These impurities are greater the higher the load and the more frequent the switching operation. These impurities could deposit on the adjacent contacts and alter the initial conductivity characteristics. If all contacts are used with similar loads, this is not a problem. Please, contact AMRA for further informations.

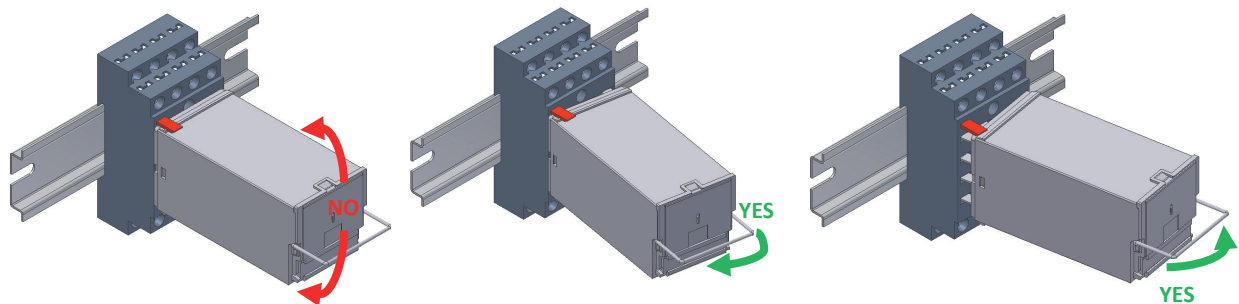
The possible formation of condensation inside the relay, when it is powered and the external ambient temperature is cold, is a normal phenomenon that has no effect on the electrical safety of the relay. In case of polluted or saline atmosphere, any condensation deposits on the contacts can degrade their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

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 +70°C with max 75% RH. In any case, there must be no condensation. Before use, please read carefully "OPERATION" section.