

**RV**

SERIES

## FAST-ACTING MONOSTABLES RELAYS 6 CONTACTS

### APPLICATIONS



Shipbuilding



Petroleum industry



Heavy industry



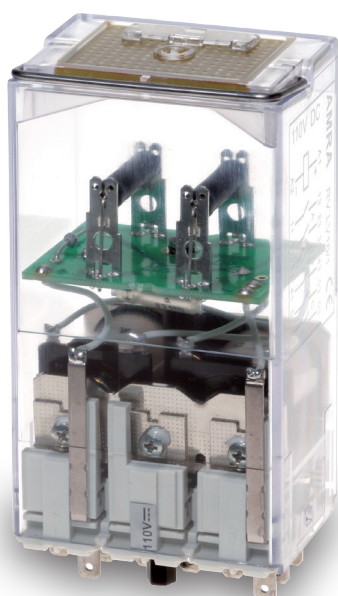
Power generation



Power distribution



Railway equipment



RV

### OVERVIEW

- Plug-in monostables type fast-acting relays
- Ultra fast switching  $\leq 6\text{ms}$ , including bounces
- Solid and rugged construction
- Considerable long-life
- High electromagnetic interference immunity
- Separate arc breaking chambers
- Magnetic arc blow-out standard
- Independent and self-cleaning contacts
- Direct current operation
- 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

The RV series offer a **high switching speed** and are designed to generate, at the power supply, a very high intensive magnetic flux that allows to obtain a **very rapid switching of the contacts**.

Like all AMRA relays this series is designed to operate in the **most severe operating environments**. Thanks to the **high resistance to strong EMC disturbances** typical of **high voltage power transmission stations**, it is typically used as a **trip relay on high-voltage** line protections.

The high electrical and mechanical performances allow it to be used also in other areas of the energy sector and also in heavy industry.

The contacts of this series have the following peculiarities, they are:

- **Self cleaning** thanks to the rubbing action that is performed at each operation.
- Independent, which means that they are neither bound to one another nor to a common mechanism.

- Placed in separate chambers.  
This leads to a **better interruption of the electric arc** generated on switching.
- supported by the magnetic blower, which plays a fundamental role in opening direct current loads.
- furthermore, the common pole of each contact has its own return device consisting of an elastic metal sheet capable of ensuring uniformity of the pressure on each rest (NC) pole.

All this guarantees the achievement of a **high electrical life** and a clear **reliability** that have led this component to be **approved by the most important international electricity production, transmission and distribution companies**.

### STANDARD COMPLIANCE

EN 61810-3	EN 61810-1
EN 60077	EN 61810-7
EN 50155	EN 60695-2-10
EN 61373	EN 61000
EN 45545-2	EN 60529
ASTM E162, E662	



MODELS	NUMBER OF NO CONTACTS	NUMBER OF NC CONTACTS
RV LV16/1	6	0
RV LV16/2	4	2
RV LV16/3	3	3
RV LV16/5	2	4



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



COIL DATA	
Nominal voltages Un	DC : 110-125
Max. consumption at Un (DC)	< 7W
Operating range	80...110% Un
Type of duty	Continuous
Drop-out voltage <sup>(1)</sup>	> 5% Un

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



CONTACT DATA		RV LV16/1	RV LV16/2	RV LV16/3	RV LV16/5
Number and type		6 NA	4 NA + 2 NC	3 NA + 3 NC	2 NA + 4 NC
Current	Nominal <sup>(1)</sup>	5 A			
	Maximum peak (1 min) <sup>(2)</sup>	10 A			
	Maximum pulse (10 ms) <sup>(2)</sup>	100 A			
Example of electrical life expectancy 1,800 operations / h		opening 0.3A - 110Vdc - L/R = 40ms : 10 <sup>5</sup> operations closing 30A - 110Vdc - L/R = 0ms : 2,000 operations			
Minimum load <sup>(3)</sup>	Standard contacts	500mW (20V, 20mA)			
	Gold-plated contact <sup>(4)</sup>	100mW (10V, 5mA)			
Maximum breaking voltages		250 Vdc / 350 Vac			
Contact material		AgCu			
Operating time at Un (ms) <sup>(5)</sup>		≤ 6			
Pick-up (NO contact closing / NC contact opening)					

(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) 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) Specifications of contacts on new relay

a) Plating material: gold-nickel alloy (>6μ)

b) When the gold-plated contact is subject to heavy loads, it will be degraded on the surface. In such case, the characteristics of the standard contact should be taken into consideration.  
This does not impair relay operation.

(5) Unless specified otherwise, the operating time signifies until 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
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	10 <sup>6</sup> operations
Maximum switching rate	900 operations/hour
Degree of protection (with relay mounted)	IP40
Dimensions (mm)	45x60x109 <sup>(1)</sup>
Weight (g)	~ 300

(1) Output terminals excluded.

## ENVIRONMENTAL SPECIFICATIONS



Operating temperature	-10° to +55°C
Storage and shipping temperature	-25° to +70°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%.

## 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 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 ≥ 6μ. This treatment ensures long-term capacity of the contact to conduct lower currents in harsh ambient conditions such as acid atmospheres (typical of geothermal power stations) or saline atmospheres.
<b>P5GEO</b>	<b>P4GEO</b> gold-plating of contacts + <b>P2</b> coil tropicalization.

## ORDERING SCHEME



PRODUCT CODE	NUMBER OF SPDT CONTACTS	CONFIGURATION A	CONFIGURATION B	TYPE OF POWER SUPPLY	NOMINAL VOLTAGE (V) <sup>(2)</sup>	KEYING POSITION <sup>(3)</sup> / OPTION
RVLV16/1	6NO	1: Standard	0: Standard	C: Vdc	110 - 125	XXX
RVLV16/2	4 NO + 2 NC		2: P2			
RVLV16/3	3 NO + 3 NC		4: P4 GEO			
RVLV16/4	2 NO + 4 NC		5: P5 GEO			

Example	RVLV16/1	1	2	C	110	
	RVLV16/112-C110: RV relay with 6 NO contacts, ENEL-approved according to LV16 specification, nominal voltage 110Vdc, P2 finish					
	RVLV16/5	1	0	C	110	
	RVLV16/510-C110: RV relay with 2 NO contacts + 4 NC contacts, ENEL-approved according to LV16 specification, nominal voltage 110Vdc					

(1) This product is available only in the ENEL type-approved version, according to LV15/LV16 specification.

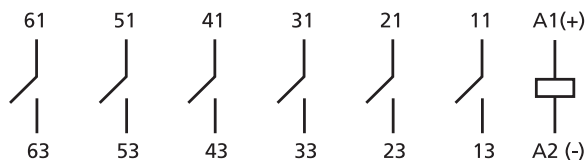
The designation "LV16/x" contained in the product code identifies the type-approved model.

For a full list of ENEL compliant and type-approved products, refer to the dedicated catalogue "STATIONS SERIES - LV15-LV16-LV20".

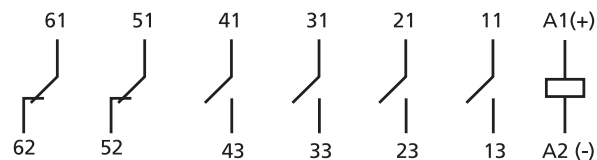
(2) Optional value. The positive mechanical keying is applied according to the manufacturer's model.



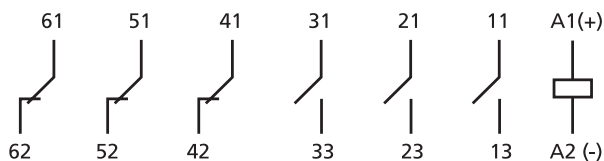
## WIRING DIAGRAM



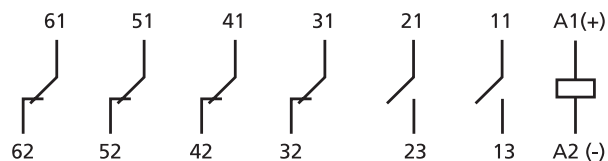
RV LV16/1



RV LV16/2



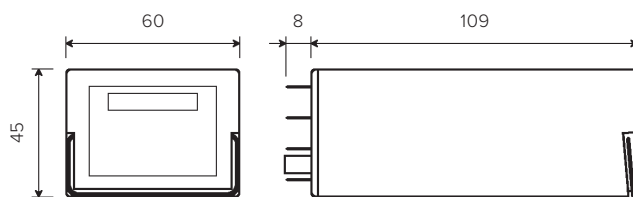
RV LV16/3



RV LV16/5



## DIMENSIONS



## SOCKETS AND RETAINING CLIPS

Number of terminals (standard dimensions 5x0.8mm)

## SOCKET

14

## RETAINING CLIP

For wall or rail mounting

Spring clamp, wall or DIN H35 rail mounting

PAIR240

RL48

Screw, wall or DIN H35 rail mounting

78BIP20-I DIN

RL48

Screw, wall mounting

78BL

RL48

Double faston, wall mounting

78L

RL48

For flush mounting

Double faston (4.8 x 0.8 mm)

ADF3

RL48

Screw

73IL <sup>(1)</sup>

RL43

(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:
  - o Standard contacts: Minimum current = 20mA
  - o 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:
  - 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.

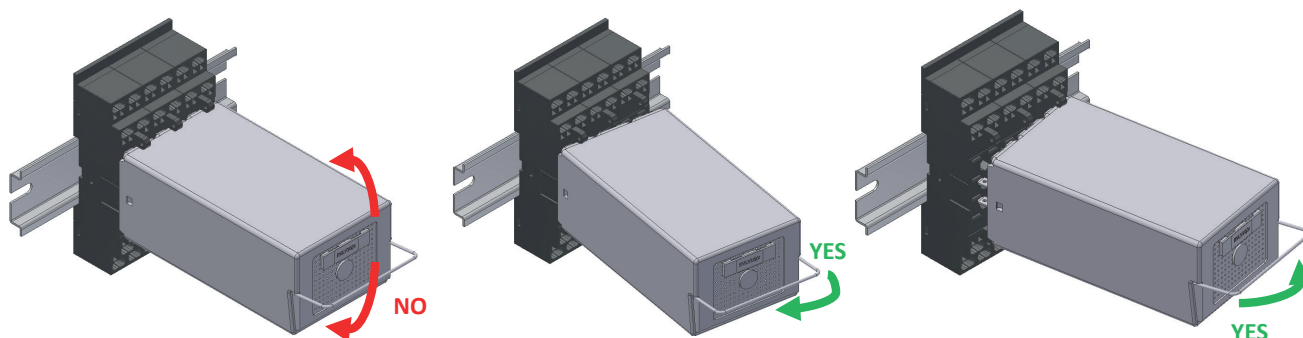
The possible formation of condensation inside the relay, when it is powered and the external ambient temperature is cold, is a normal phenomenon that has no effect on the electrical safety of the relay. In case of polluted or saline atmosphere, any condensation deposits on the contacts can degrade their 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 -25 and +70°C with max 75% RH. In any case, there must be no condensation. Before use, please read carefully "OPERATION" section.