

RGK

MULTISCALE TIME RELAY, WELD-NO-TRANSFER 4 CONTACTS

FORCIBLY GUIDED CONTACTS



APPLICATIONS



OVERVIEW

- Plug-in monostable timed delay relays, “pick-up” or “drop-out” function
- Forcibly guided (mechanically linked) contacts, relays compliant with **EN 61810-3, type A**
- Weld-no-transfer technology
- Wide time delay range, from 0.1s to more than 16 hours
- Great accuracy over the entire adjustment range
- Suitable for safety applications
- Operation with d.c. and/or a.c. power supply
- Self-cleaning knurled contacts, C/O type
- Magnetic arc blow-out for higher breaking capacity
- Led optical indicators monitoring power supply and timer status

DESCRIPTION

RGK relay are highly reliable products featuring high performance, suitable for applications in very harsh and disturbed environments, such as **ROLLING STOCK** applications.

Referring to the standard **EN61810-3**, these relays are classified as fully compliant and identified as **type A** relays, (all the contacts are mechanically linked). Forcibly guided contacts are also known as weld-no-transfer contacts.

Wide contact gap for a very high breaking capacity, electrical life expectancy and insulation.

Time delay is guaranteed by high reliability electronic. The electronic is immune to strong EMC interference, typical of high voltage electricity distribution stations.

Time delay from 0.1s to over 16 hours, with extreme accuracy over the entire setting range. Intermediate scales are available, selectable by means of rotary switches. The timing function is selectable by user: “pick-up” or “drop-out”.

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

The knurled surface ensures an excellent self-cleaning effect, a lower ohmic resistance thanks to the various points of electrical contact, and will also improve 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 this relay range, with forcibly guided contacts (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 ≥ 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 ≥ 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 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 CONTACTS	MAGNETIC ARC BLOW-OUT	FUNCTION
RGK.x7X	4	•	Pick-up / Drop-out

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

COIL DATA	RGKE	RGKR
Nominal voltages Un	AC/DC : 24-36-48-72-96-110-125-230 ⁽¹⁾	
Consumption at Un (DC/AC)	3.5W	
Operating range	80...120% Un	70...125% 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 value, beneath which the relay is certainly de-energized.

CONTACT DATA

Number and type	4 SPDT, form C
Current	Nominal ⁽¹⁾ 12A
	Maximum peak ⁽²⁾ 20A for 1min - 40A for 1s
	Maximum pulse ⁽²⁾ 150A for 10ms
Example of electrical life expectancy ⁽³⁾	1A - 110Vdc - L/R 40ms - 10 ⁵ operations - 1,800 operations/hour
Minimum load ⁽⁴⁾	Standard contacts 200mW (10V, 10mA)
	Gold-plated contact ⁽⁵⁾ 50mW (5V, 5mA)
Maximum breaking voltage	350 VDC / 440 VAC
Contact material	AgCdO
Operating time at Un (ms) ⁽⁶⁾	DC / AC
Pick-up (NC contact opening)	≤ 20
Pick-up (NO contact closing)	≤ 35
Drop-out (NO contact opening)	≤ 10
Drop-out (NC contact closing)	≤ 53

(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 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.

(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, 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	> 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.) - 2,2kV (1 s)
between open contact parts	2 kV (1 min.) - 2,2kV (1 s)
between adjacent contacts	2 kV (1 min.) - 2,2kV (1 s)
Impulse withstand voltage (1,2/50μs - 0,5J)	
between electrically independent circuits and between these circuits and ground	5 kV
between open contact parts	4 kV

MECHANICAL SPECIFICATIONS

Mechanical life expectancy	10x10 ⁶ operations
Maximum switching rate	3600 operations/h
Degree of protection	IP40
Dimensions (mm)	45x50x112 ⁽¹⁾
Weight (g)	300

1. Output terminals excluded.

ENVIRONMENTAL SPECIFICATIONS



Operating temperature	Standard	-25 to +55°C
	Version for railways, rolling stock	-25 to +70°C -40°C as option
Storage and shipping temperature		-40 to +85°C
Relative humidity		Standard : 75% RH Tropicalized : 95% RH
Fire behaviour		V0

STANDARDS AND REFERENCE VALUES



EN 61810-1	Electromechanical elementary relays Part 1: General and safety requirements
EN 61810-7	Electromechanical elementary relays Part 7: Test and measurement procedures
EN 61810-3, type A ⁽¹⁾	Electromechanical elementary relays Part 3: Relays with forcibly guided (mechanically linked) contacts ⁽²⁾
EN 60695-2-10	Fire hazard testing Part 2-10: Glowing/hot-wire based test methods
EN 61000	Electromagnetic compatibility
EN 60529	Degrees of protection provided by enclosures (IP Code)

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%.

(1) Gap verification as per method described at §5.3.1.1 b.

(2) Vibration resistance, frequency range, $f = 10 \div 200$ Hz - no contact opening up to 0.828G
Shocks resistance: 15 G – no damages

RAILWAYS, ROLLING STOCK - STANDARDS APPLICABLE TO RGKR VERSIONS



EN 60077-2	Railway applications - Electric equipment for rolling stock Part 2: Electrotechnical components - General rules
EN 50155	Railway applications - Rolling stock - Electronic equipment - T3 class Testing
EN 61373	Railway applications - Rolling stock equipment - Shock and vibration tests, Cat 1, Classe B Vibration resistance, frequency range $f = 5 \div 150$ Hz ⁽¹⁾
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components HL3: Cat E10 (R26 requirement)
ASTM E162, E662, E1354	Fire behavior – Standard test method
BSS7239	Fire behavior - Toxicity Test

(1) At de-energized relay: no contact opening > 3ms

CONFIGURATIONS - OPTIONS



TROPICALIZATION	Surface treatment of the coil with protective coating for use with RH 95%.
GOLD PLATING	Surface treatment of the contacts, blades and output terminals with gold-cobalt alloy $\geq 2\mu$. This treatment ensures long-term capacity of the contact to conduct lower currents.
LOW TEMPERATURE	Minimum operating temperature -40°C, only for rolling stock version (option "L").



ORDERING SCHEME

PRODUCT CODE	APPLICATION ⁽¹⁾	CONFIGURATION A	CONFIGURATION B	TYPE OF POWER SUPPLY	NOMINAL VOLTAGE (V) ⁽²⁾	FINISH ⁽³⁾
RGK	E: Energy R: Railway, Rolling Stock	1: Standard 4: Gold plating	7X: 4 SPDT contacts with magnetic arc blow-out	T: Vdc + Vac 50Hz	024 - 036 - 048 072 - 096 - 110 125 - 230	T: Tropicalized coil L: Low temperature

Example

RGK	E	1	7X	T	048	T
RGKE17X-T048/T = ENERGY series standard relay and 48Vdc tropicalized coil.						
RGK	R	4	7X	T	110	
RGKR47X-T110 = ROLLING STOCK railway series relay, gold-plated contacts and 110Vdc coil.						

(1) **ENERGY:** all applications except for rolling stock applications.

RAILWAYS, ROLLING STOCK: application on board rolling stock (wire-rail-tramway vehicles).
Electrical characteristics according to EN60077.

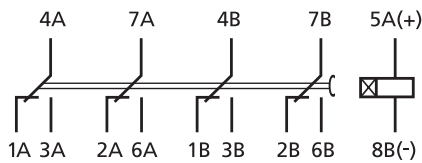
(2) Other values on request.

(3) Optional value.

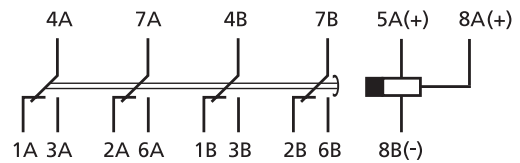


WIRING DIAGRAM

Pick-up diagram

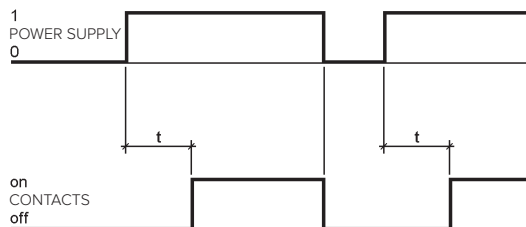


Drop-out diagram

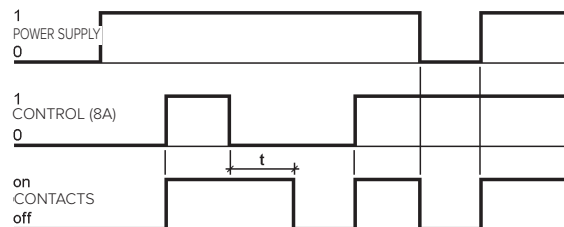


FUNCTIONAL DIAGRAM

Pick-up delay



Drop-out delay





Time setting	By means of DIP switches and selectors
Time setting range	100ms...990min
Intermediate scales	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 the beginning of scale - ±0.5 % at full scale time
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

Time lag and function are set through a 4-bit DIP switch and two rotary selectors located on the front of the relay (see "FRONT"). These are accessible by removing the relay identification plate.

SETTINGS – Removing the plate

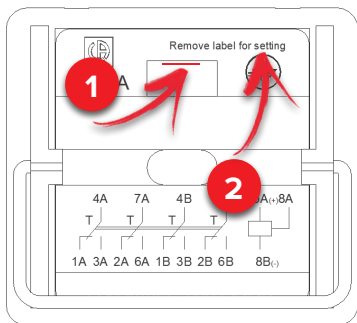
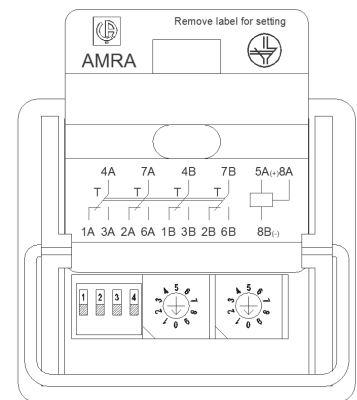
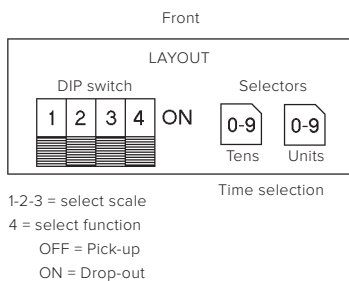


Plate is placed on the front of the cover.
To remove the plate:
1. slightly lift the plate, by acting on the point shown in picture
2. push upwards the plate.



SETTINGS – Time lag and function



SCALES / SETTING RANGE			SWITCH POSITION		
Min	Max	Unit of measure	1	2	3
10	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

Function: acts on DIP switch no. 4.

- OFF: Pick-up function
- ON: Drop-out function

Time lag:

Settings are possible from 100 ms up to 990 minutes.

1. Selects the RANGE: acts on DIP switch no. 1, 2, 3.
2. Selects the TIME LAG: acts on rotary selectors

Selects the RANGE: 6 ranges are available. Move DIP switches 1, 2, 3 to "ON" or "OFF" position to obtain the desired range, as shown in TABLE

1. The range should be the next higher than the value of the required time lag.

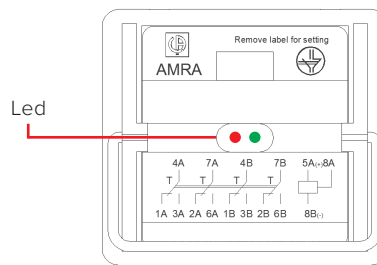
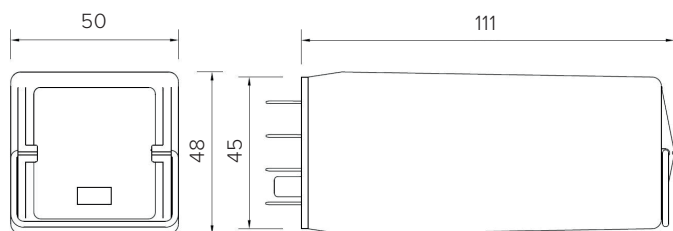
E.g. Time lag: 1'14" = 74 seconds. Closest range: 99 seconds.

Selects the TIME LAG: time lag could be set by step of 1% of the selected range. Move rotary selectors to obtain the desired time.

E.g. Time lag: 1'14" = 74 seconds. "TENS" selector on "7" + "UNIT" selector on "4".

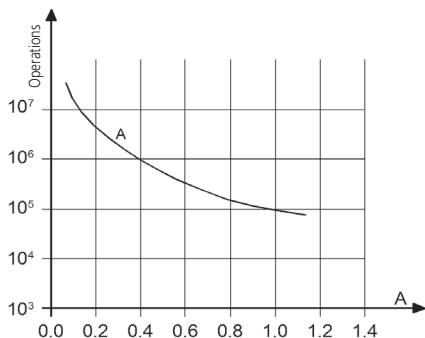


DIMENSIONS



ELECTRICAL LIFE EXPECTANCY

Some examples of electrical life expectancy



Contact loading: 110Vdc, L/R 40 ms

RGK.X7X

U	I (A)	L/R (ms)	Operations
24Vdc	1	0	7,000,000
24Vdc	1	40	3,000,000
24Vdc	2	40	2,000,000
24Vdc	5	0	3,000,000
24Vdc	5	40	200,000
24Vdc	9	0	800,000
48Vdc	5	20	200,000
110Vdc	0.4	40	1,000,000
110Vdc	1	40	100,000
110Vdc	1	40	350,000 ⁽¹⁾
110Vdc	10	0	100,000
U	I (A)	L/R (ms)	Operations
220Vac	5	0.5	100,000
220Vac	10	1	100,000
230Vac	1	0.7	2,500,000
230Vac	3	0.7	1,200,000

⁽¹⁾ 2 series contacts

Switching frequency: 1,200 operations/hour



SOCKETS AND RETAINING CLIPS

RETAINING CLIP

Type of installation	Type of outputs	Model	
Wall or DIN rail mounting	Screw	48BIP20-I DIN	RGL48
	Spring clamp	PAIR160	
Flush mounting	Double faston	PRIR160	
	Double faston (4.8 x 0.8 mm)	ADF2	



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.

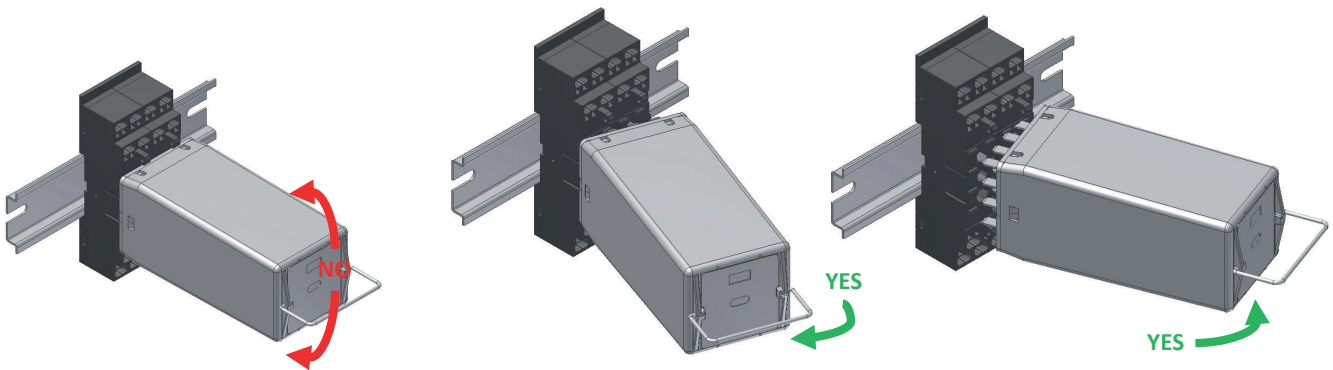
Condensation is possible inside the relay when energized and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. Plastic materials of relay do not possess hygroscopic properties.

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.

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 -40 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.