Relay with time delay on drop-out, capacitor type

RDTE15-16 · RGTO SERIES

RDTE161

RGTO233

OVERVIEW

- Plug-in relay with time delay on drop-out
- Time settings up to 60s, no auxiliary power supply required
- Self-cleaning knurled contacts
- High performance, compact dimensions
- Solid and rugged construction for heavy or intensive duty
- Very high electrical life expectancy and exceptional endurance
- 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

APPLICATIONS

| Shipbuilding | Petroleum industry | Heavy industry | Power generation | Power distribution | Railway equipment |

DESCRIPTION

Timer relays of the RDT.15 / RDT.16 and RGTO series are delay-on-drop-out devices using a capacitor wired in parallel with the coil. They require no auxiliary power supply during the timing step. The delay can be fixed (RDT.15), or adjustable (RDT.16, RGTO), from 0.1s to 60s. The delay capacitor is fitted internally on all versions.

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.

The contacts used for relays of the RDT.15 and RDT.16 series are of a type able to give good levels of performance both with high and strongly inductive d.c. loads, and with particularly low loads such as interface signals. 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.

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.15-16 and RGTO 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.

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Models	Number of timed contacts	Nominal current	Time delay	Time settings range
RDT.15x	4	10A	On drop-out, fixed	0.1…1s
RDT.161	4	10A	On drop-out, adjustable	0.1…6s
RGTO23x	1	10A	On drop-out, adjustable	3…60s

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

Coil data	RDT.15x	RDT.161	RGTO23x
Nominal voltages Un [1]	DC: 24-48-110-125-220	DC: 48-110-125-220	AC: 24-48-110-125-220
Consumption at Un (DC/AC)	3.5W		1.5W
Operating range	DC: 80…120% Un AC: 85…110% Un		
Type of duty	Continuous		
Drop-out voltage [2]	DC: > 5% Un AC: > 15% Un		

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

Contact data		RDT.15x, RDT.161	RGTO23x
Number and type		4 SPDT, form C	2 SPDT, form C
Current	Nominal [1]	10A	10A
	Maximum peak [2]	13A for 1min - 20A for 1s	-
	Maximum pulse [2]	100A for 10ms	-
Example of electrical life expectancy [3]		0.2A - 110Vdc - L/R 40ms - 10^5 operations - 1,800 operations/hour	0.2A - 110Vdc - L/R 40ms - 10^5 operations - 1,200 operations/hour
Minimum load		200mW (10V, 10mA)	
Maximum breaking voltage		250 Vdc / 300 Vac	

(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.

Insulation	RDT.15x - RDT.161	RGTO23x
Insulation resistance (at 500Vdc)		
between electrically independent circuits and between these circuits and ground	> 10,000 MΩ	> 10,000 MΩ
between open contact parts	> 10,000 MΩ	> 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)	2 kV (1 min.) - 2.2kV (1 s)
between open contact parts	2 kV (1 min.) - 2.2kV (1 s)	1 kV (1 min.) - 1.1kV (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	2.5 kV
between open contact parts	2.5 kV	2 kV

Mechanical specifications	RDT.15x	RDT.161	RGTO23x
Mechanical life expectancy	$20x10^6$ operations		
Maximum switching rate Mechanical	3600 operations/hour		
Degree of protection	IP40		
Dimensions (mm)	40x40x75 [1]	40x40x82 [1]	50x45x112 [1]
Weight (g)	130	130	260

1. Output terminals excluded.

Environmental specifications	
Operating temperature	-25 to 55°C
Storage and shipping temperature	-25 to 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.

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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, products are designed and manufactured according to the requirements of the European and International standards indicated above.

In accordance with EN 61810-1, all items of technical data are referred to ambient temperature 23 °C, atmospheric pressure 96kPa and 50% humidity.

Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

Configurations - Options

TROPICALIZATION	Surface treatment of the coil with protective coating for use with RH 95%.

Ordering scheme

Product code	Application [1]	Configuration A	Configuration B	Type of power supply	Type of input supply (V) [2]	Finish [3]	Keying position code [4]
RDT	**E:** Energy **F:** Railway Fixed Equipment	15: fixed duration	1: Fixed duration 0.1s 2: Fixed duration 0.2s 3: Fixed duration 0.5s 4: Fixed duration 1s	C: Vdc A: Vac 50 Hz H: Vac 60 Hz	024 - 048 - 110 125 - 220	T: Tropicalized coil	xx
		16: adjustable duration	1: Adjustable from 0.1 to 6s		048 - 110 125 - 220		
RGTO	-	23: adjustable duration	3: Adjustable from 3 to 10s 4: Adjustable from 10 to 30s 5: Adjustable from 20 to 60s		024 - 048 - 110 125 - 220		

Example

RDT	E	16	1	C	110	T	

RDTE161-C110/T = ENERGY series relay, with 4 SPDT contacts, time delay on drop-out adjustable from 0.1 to 6s, and 110Vdc tropicalized coil.

RGTO		23	3	C	024		

RGTO233-C024 = Relay with 2 contacts: 1 SPDT instantaneous, 1 SPDT time delay on drop-out adjustable from 3 to 10 seconds, 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 approved and conforming 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".
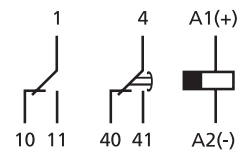
[2] Other values on request.

[3] Optional value.

[4] Optional value. Positive mechanical keying is applied according to the manufacturer's model.

## Wiring diagram
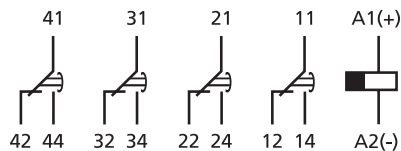
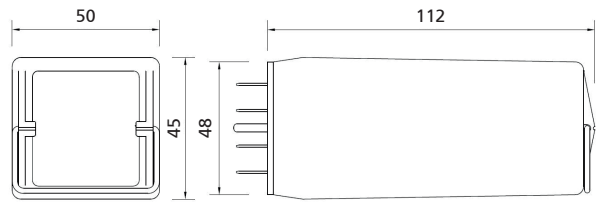RDT.15x, RDT.161   RGTO23x

Time delay – Switching time setting

Time delay – Switching time setting	RDT.15x	RDT.161	RGTO23x		
Time setting	Fixed duration	By way of potentiometer, with slotted head screw	By way of potentiometer		
Full scale times available	0.1s - 0.2s - 0.5s - 1s	6s	10s	30s	60s
Time setting range	-	0.1 - 6s [1]	3...10s	10...30s	30...60s
Operating accuracy (0.8...1.1 Un, t=20°C)	±10 % at high end of scale				
Accuracy, repeatability	± 2 %				
Reset	<200ms				

[1] The setting controls are accessible by opening the flap on the cover of the relay.
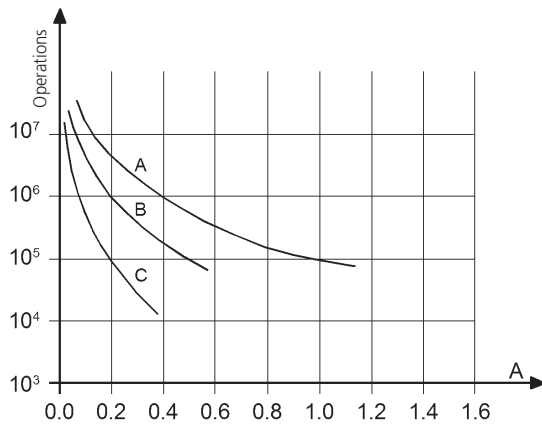
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Dimensions
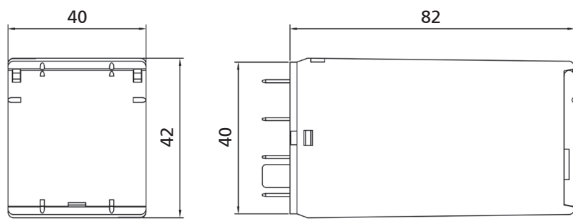
RDT.15x / RDT.161

RGTO23x

Electrical life expectancy

Contact loading: 110Vdc, L/R 40 ms
(Except RGTO)

RDT_15x, RDT_161			
U	I (A)	L/R (ms)	Operations
110Vdc	0.2	40	1,000,000
110Vdc	0.5	40	150,000
110Vdc	1	10	100,000 (*)
220Vdc	0.2	10	100,000
U	I (A)	cosφ	Operations
110Vac	1	1	2,000,000
110Vac	1	0.5	1,500,000
110Vac	5	1	950,000
110Vac	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
220Vac	0.5	1	2,000,000
220Vac	5	1	500,000

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

Sockets and retaining clips		RDTE15x, RDTE161			RGTO23x	
Type of installation	Type of outputs	Socket	Clip for RDTE15x	Clip for RDTE161	Socket	Clip
Wall or DIN H35 rail mounting	Screw	PAVD161	VM1823	VM1823	PAVG161	VM1222
Flush mounting	Double faston (4.8 x 0.8 mm)	-	-	-	PRDG161	VM1222
	Screw	PRVD161	-	-	PRVG161	VM1222
PCB-mount	Solder	PRCD161	-	-	-	-

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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 adiacent 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.
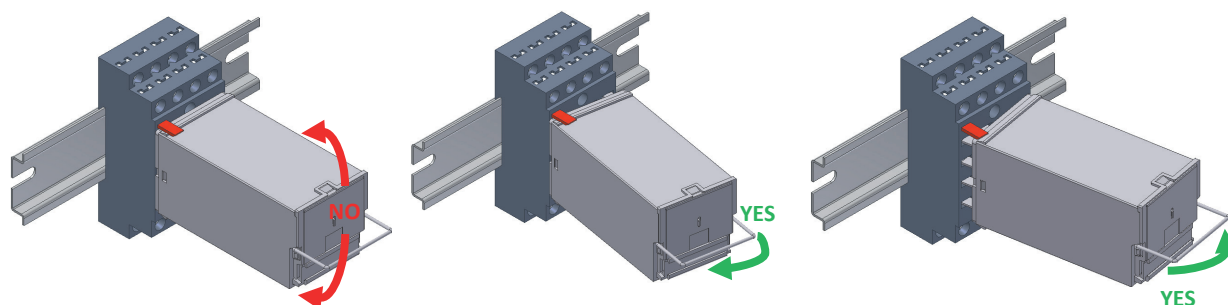
Often the malfunctions are caused by power supply with inverted polarity, by external events or by use with loads exceeding the contact performance.

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.