

# Current-monitoring relay

## 4 contacts

2.13

## TD SERIES



TD2003

### OVERVIEW

- Plug-in instantaneous monostable relay, current-monitoring
- High performance, compact dimensions
- Self-cleaning knurled contacts
- Relay coupled automatically to socket, with no need for a retaining clip
- 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

### APPLICATIONS



Shipbuilding



Petroleum industry



Heavy industry



Power generation



Power distribution



Railway equipment




### DESCRIPTION

The TD series comprises current-monitoring relays having 4 change-over contacts, which are derived from the RDME series and offer the same mechanical specifications and benefits. These relays can be wired in series with a circuit and used to detect the status of a load when under power. One specific application for this series of relays is the control of obstruction warning lights (obstructions on land, in the air, in the sea, navigation lights) where high levels of reliability and efficiency are indispensable factors in ensuring safety. These components are suitable both for general current monitoring purposes, and for specific types of warning light signals having different electrical specifications and response characteristics, such as filament, strobe and halogen lamps (courtesy of certain design stratagems and adjustment features).

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 are of a type designed to give good levels of performance both with high and strongly inductive 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.

Like all AMRA relays, models of the TD 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.

| Models | Type of lamp                                                                      |                                                                                   |                                                                                     |
|--------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|        | Filament                                                                          | Strobe                                                                            | Halogen                                                                             |
|        |  |  |  |
| TD2001 |                                                                                   | •                                                                                 |                                                                                     |
| TD2002 | • $\geq 1A$                                                                       |                                                                                   |                                                                                     |
| TD2003 | • $< 1A$                                                                          |                                                                                   |                                                                                     |
| TD2004 |                                                                                   |                                                                                   | •                                                                                   |



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



#### Coil data

|                           |                                                            |
|---------------------------|------------------------------------------------------------|
| Input current             | According to type of lamp (from 40mA to 5A) <sup>(1)</sup> |
| Consumption at Un (DC/AC) | 1 W                                                        |
| Operating range           | 80...110% Un                                               |
| Type of duty              | Continuous                                                 |

(1) It may be necessary to provide us with a sample of the lamp to be monitored, in order to ensure correct sizing of the relay.



#### Contact data

|                                                      |                                                                               |
|------------------------------------------------------|-------------------------------------------------------------------------------|
| Number and type                                      | 4 SPDT, form C                                                                |
| Current                                              | 10A                                                                           |
| Nominal <sup>(1)</sup>                               | 13A for 1min - 20A for 1s                                                     |
| Maximum peak <sup>(2)</sup>                          | 100A for 10ms                                                                 |
| Maximum pulse <sup>(2)</sup>                         |                                                                               |
| Example of electrical life expectancy <sup>(3)</sup> | 0.2A - 110Vdc - L/R 40ms - 10 <sup>5</sup> operations - 1,800 operations/hour |
| Minimum load                                         | 200mW (10V, 10mA)                                                             |
| Maximum breaking voltage                             | 250 Vdc / 300 Vac                                                             |
| Contact material                                     | AgCdO (moving contacts) - AgNi (fixed contacts)                               |

(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) 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                                                      | 3 kV                        |



#### Mechanical specifications

|                            |                               |
|----------------------------|-------------------------------|
| Mechanical life expectancy | 20x10 <sup>6</sup> operations |
| Maximum switching rate     | 3600 operations/hour          |
| Degree of protection       | IP40                          |
| Dimensions (mm)            | 40x40x75 <sup>(1)</sup>       |
| Weight (g)                 | 130                           |

(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.

## Standards and reference values

|                                    |                                             |
|------------------------------------|---------------------------------------------|
| EN 61810-1, EN 61810-2, EN 61810-7 | Electromechanical elementary relays         |
| EN 60695-2-10                      | Fire behaviour                              |
| EN 50082-2                         | 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  $\pm 7\%$ .

## Configurations - Options

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

## Ordering scheme

| Product code | Application <sup>(1)</sup>                                                                                 | Type of power supply | Nominal voltage (A) <sup>(1)</sup> | Finish <sup>(2)</sup> | Keying position code <sup>(3)</sup> |
|--------------|------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------|-----------------------|-------------------------------------|
| TD200        | 1: Strobe lamps<br>2: Filament lamps ( $I \geq 1A$ )<br>3: Filament lamps ( $I < 1A$ )<br>4: Halogen lamps | U: I dc/ac           | 0.04 - 5.0 <sup>(4)</sup>          | T: Tropicalized coil  | xx                                  |

|         |                                                                                       |   |   |     |  |
|---------|---------------------------------------------------------------------------------------|---|---|-----|--|
| Example | TD200                                                                                 | 1 | U | 070 |  |
|         | Example: TD2001-U070/T = ENERGY series relay with 4 standard SPDT contacts, 70mA coil |   |   |     |  |

(1) Value depending on the lamp (model, power, input voltage, etc.).




(2) Optional value.

(3) Optional value. Positive mechanical keying is defined according to the manufacturer's model.

(4) For currents < 1A the power input to the coil is expressed in mA (e.g. 40mA = U040).

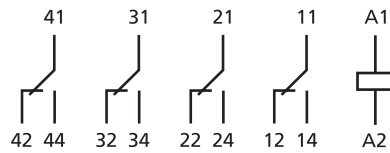
For currents  $\geq 1A$  the power input to the coil is expressed in A (e.g. 2A = U2.0 - 1.7A = U1.7).

## Available values (others on request)

| Relay type | Circuit power input | Filament                                                                            |      |      |      |      |      |      |      | Halogen                                                                               | Strobe                                                                                |
|------------|---------------------|-------------------------------------------------------------------------------------|------|------|------|------|------|------|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|            |                     |  |      |      |      |      |      |      |      |  |  |
|            | U                   | 15                                                                                  | 25   | 40   | 50   | 60   | 65   | 100  | 300  | 50                                                                                    | 2                                                                                     |
|            |                     | Relay power input (symbol)                                                          |      |      |      |      |      |      |      |                                                                                       |                                                                                       |
| TD2001     | 12-24               | -                                                                                   | -    | -    | -    | -    | -    | -    | -    | -                                                                                     | U450                                                                                  |
|            | 110                 | -                                                                                   | -    | -    | -    | -    | -    | -    | -    | -                                                                                     | U070                                                                                  |
|            | 230                 | -                                                                                   | -    | -    | -    | -    | -    | -    | -    | -                                                                                     | U040                                                                                  |
| TD2002     | 24                  | -                                                                                   | -    | U1.6 | -    | U2.5 | -    | U4.1 | -    | -                                                                                     | -                                                                                     |
|            | 220                 | -                                                                                   | -    | -    | -    | -    | -    | -    | U1.4 | -                                                                                     | -                                                                                     |
| TD2003     | 110                 | -                                                                                   | -    | U360 | U450 | U540 | -    | U900 | -    | -                                                                                     | -                                                                                     |
|            | 220                 | U070                                                                                | U110 | U180 | U225 | U270 | U300 | U450 | -    | -                                                                                     | -                                                                                     |
| TD2004     | 24                  | -                                                                                   | -    | -    | -    | -    | -    | -    | -    | U2.1                                                                                  | -                                                                                     |

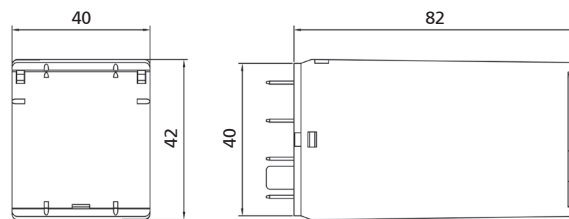
Note: contact us for other values.

## Schema elettrico



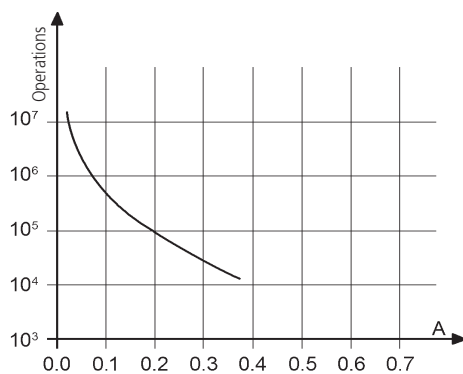
TD200x

## Dimensions



TD200x

## Electrical life expectancy



Contact loading: 110Vdc, L/R 40 ms

| 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    |

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 H35 rail mounting | Screw           | PAVD161 | VM1823         |
| Flush mounting                | Screw           | PRVD161 | -              |
| PCB-mount                     |                 | PRCD161 | -              |

## 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.

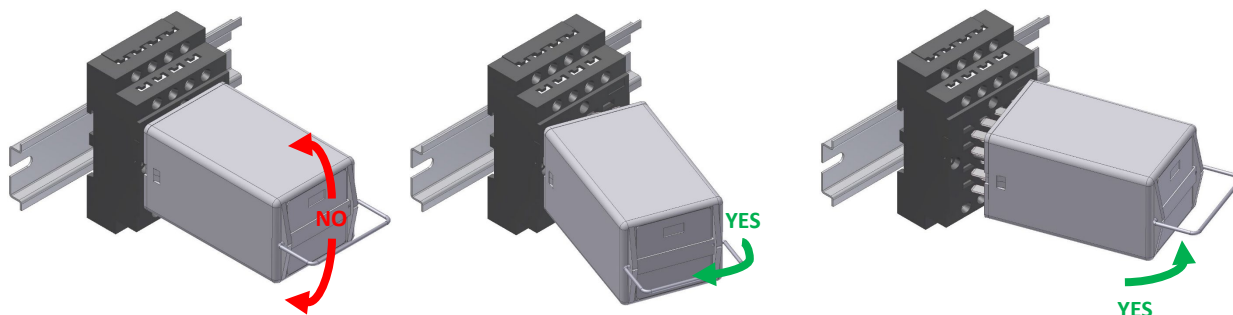
The possible formation of condensation inside the relay, when it is powered and the external ambient temperature is cold, is a normal phenomenon that has no effect on the electrical safety of the relay. In case of polluted or saline atmosphere, any condensation deposits on the contacts can degrade their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