# Bistable miniature relay TRK 15, TRK 16


- **Small dimensions 15.6 x 10.2 x 11.5 mm**
- **Coil energizing by DC voltage impulse**
- **Non-flammable material V- 0**
- **Max. contact current 1.25 A or 3 A**
- **Direct instalation on PCB**
- **Ambient temperature up to +70°C**
- **Washable version Qc/2**
- **Plastic bars packing**

## Application

TRK 15, TRK 16 are neutral, bistable, remanent, electromagnetic relays for DC coil energizing with one contact system. The great advantage of the bistable relays over monostable lies in continuous operating without energizing. Bistable relays shall be energized with a brief DC voltage impulse, this saves coil energy and reduces operating costs. The self-heating of this relays no longer needs to be taken into consideration, what also enables high density of electronics components on PC board. Furthermore, if the power supply voltage fails, the switching status is maintained.
As a switching element with ability of galvanic separation it is designed to control devices with medium power consumption. It can be soldered directly into the printed circuit board used in industrial equipment, bureau appliances, data processing, automotive industry, safety devices and for general purposes.
In case of full load on contacts and operating with max. switching rate and max. ambient temperature it is recomended to open the vent hole provided for this purpose after the relay is mounted on the PCB and the cleaning process is completed.

## Technical Data

### Operating

The remanent relay has a core with high-retentivity remanence material. When the operating voltage is applied to the coil of relay the remanent core becomes magnetic saturated what causes picking-up the armature and closing the normally-open contact. After the energizing voltage fails, the residual magnetism in the core attracts the armature forward and holds the normally-open contact closed. When the core is demagnetized with the voltage of opposite polarity, the continual forse of the contact spring releases the relay armature and closes the normally-close contact again. The voltage for demagnetization must be approximately one third as great as the voltage for operating. Connecting of this relay is possibile in several different ways, examples are shown in the drawing of recommended drive circuit.

### Contact data

| | | |
|---|---|---|
| Form | 1 Change-over , 1 Make , 1 Break | |
| Contact material | AgNi10 | Ag Ni10+AuAg8 |
| Rated current | 3 A | 1.25 A |
| Max. operating voltage | 120 VAC, DC | |
| Max.switching power | 250 VA, 70 W(s.d) | 150 VA, 60 W (s.d) |
| Min.switching load | 5 VDC , 100 mA | 10 mVDC, 10 μA |
| Contact resistance: (New relay) | ≤ 100 mΩ 100mA,24 VDC | ≤ 50 mΩ 10 mA, 30 mV |
| Capacitance cont.-cont. | ≤ 1,5 pF | |
| Max.operating frequency rated load min. load | 600 oper./ h 36000 oper./ h | 1800 oper./ h 36000 oper./ h |
| Mechanical life | > 2 X $10^7$ operations | |
| Electrical life | CO contact at 70˚C (s.d) see diagrams | |

### Coils data for continuous energizing

| Coil rated voltage | Coil resistance at 20°C | Operative voltage range at 20°C | | | Resistor for release E12 / 0.5W |
|---|---|---|---|---|---|
| | | Must operate | Non release | Must release | |
| Un (VDC ) | Rn(Ω) ± 10% | Uop ≤ (VDC) | Unr ≥ (VDC) | Ure ~ (VDC) | R(Ω) ± 5% |
| 1.5 | 2.2 | 1.13 | - 0.045 | - 0.37 | 3.9 |
| 3 | 9 | 2.25 | - 0.09 | - 0.75 | 15 |
| 5 | 25 | 3.75 | - 0.15 | - 1.25 | 47 |
| 6 | 36 | 4.5 | - 0.18 | - 1.5 | 68 |
| 9 | 81 | 6.75 | - 0.27 | - 2.25 | 150 |
| 12 | 144 | 9 | - 0.36 | - 3 | 330 |
| 24 | 570 | 18 | - 0.72 | - 6 | 1000 |
| 48 | 2100 | 36 | - 1.44 | - 12 | 3900 |
| 60 | 3300 | 45 | - 1.8 | - 15 | 6800 |

### Coil data for energizing at 20°C

| | |
|---|---|
| Rated power: | abt. 1W |
| Thermal resistance: | abt. 100 K/W |
| Max.coil temperature: | 155° C |
| Operate voltage (cold coil): | Uop ≤ 75% Un |
| Non release voltage: | Unr ≥ 3% (- Un) |
| Release voltage: | Ure ~25% (-Un)<br>Ure max = 45% (-Un) |
| Operative range: | class 1, IEC 61810-1 |

### Operative voltage range at different temperatures

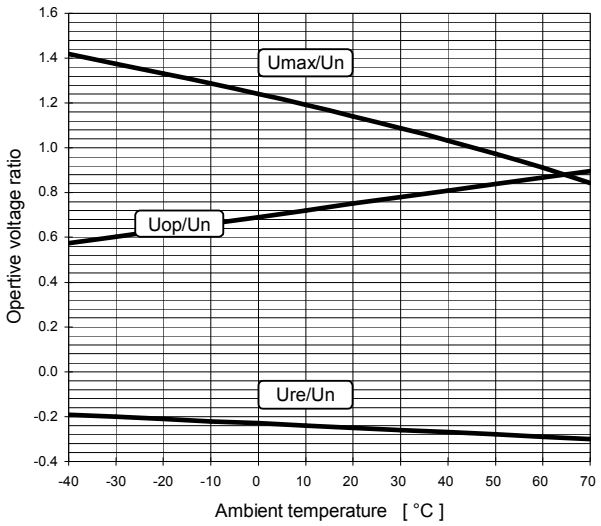
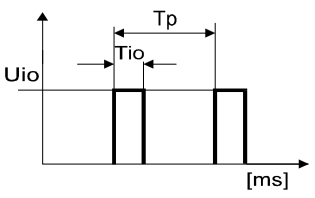



Diagram of operative voltage range shows that over 40°C of ambient temperature Umax for continuous operate duty, which still prevent overheating of the coil, becomes lower then Un. Therefore, over this temperature, impulse excitation is obligatory with impulse operate voltage Uio ≥ Un.
Impulse coil voltage must not exceed 80% of the test voltage between coil windings.

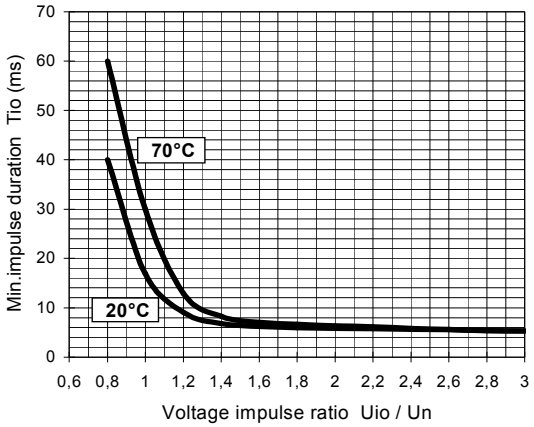
### Impulse coil energizing



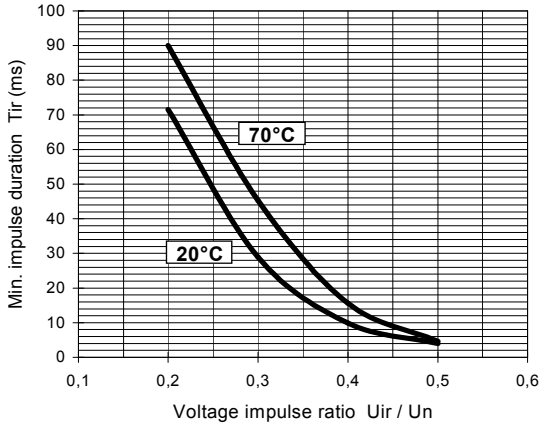

Uio - impulse operate voltage ( V )
Tio - impulse operate duration ( ms )
Tp - periode duration ( ms )

Impulse coil voltage for operating Uio can be higher then rated voltage Un, but duration of the operate impulse Tio should be choosed from the following diagram. The best energizing is achieved with rectangular impulse in duration of 20 ms.
Impulse coil voltage for releasing Uir must be opposite polarity as operate coil voltage and can be higher then 45%Un, but duration of release impulse Tir, should be choosed from the following diagram, to avoid re-operate of the relay.
When the relay shall be released with rated coil voltage Un one external resistor R (see coil energizing data and driving circuits) must be included in release circuit.

### Minimum impulse duration for operating

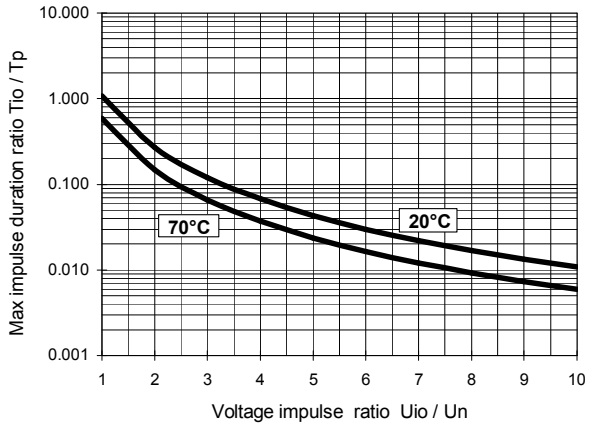



### Minimum impulse duration for releasing




To prevent overheating of the coil at impulse energizing, the operate impulse duration ratio Tio/Tp must not exceed limit regarding to the operate voltage ratio Uio/Un - see the following diagram.
Min. periode duration Tp =2s (1.25 A) and 6s (3A)

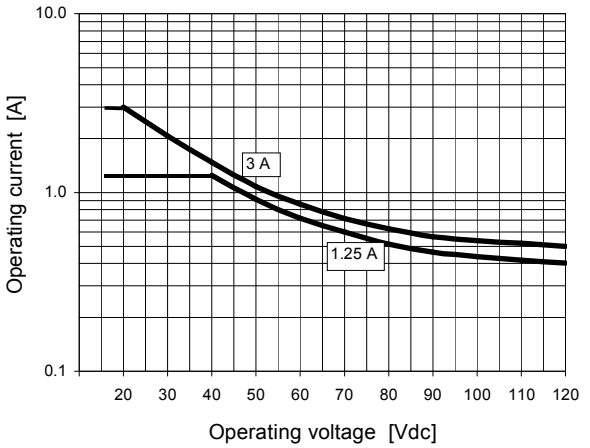
### Maximum impulse duration ratio for operating



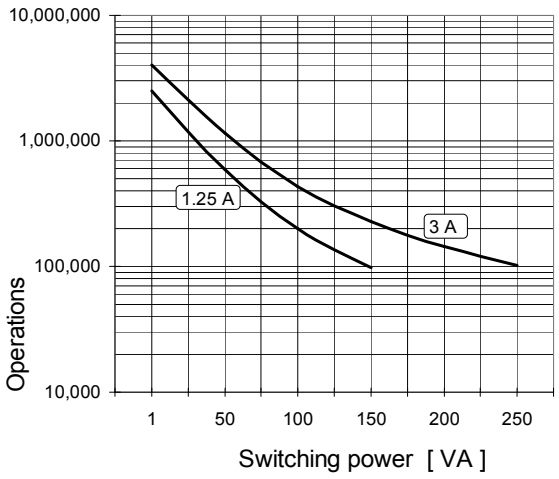

### Other data

| | |
|---|---|
| Test voltage (1min) | |
| coil-contact: | 1000 $V_{rms}$, 50 Hz |
| contact-contact: | 750 $V_{rms}$, 50 Hz |
| Rated impulse voltage (1,2/50)μs: | 1500 $V_{imp}$ (coil-contact) |
| Overvoltage category: | II, IEC 60664-1 |
| Degree of polution: | 2, IEC 60664-1 |
| Operate time: | abt. 5 ms |
| Release time: | abt. 4 ms |
| Bouncing time: abt. 3 ms-make; abt. 8 ms-break | |
| Insulation resistance (500 VDC): | > $10^3$ MΩ |
| Vibration resistance (10-55Hz): | 10g, IEC60068-2-6 |
| Shock resistance (11 ms) | |
| functional: | 10g, IEC60068-2-27 |
| destructive: | 100g |
| Ambient temperature | |
| for operating: | - 40°C to + 70°C |
| for storage: | - 40°C to + 85°C |
| Protection degree: | IP 67, IEC 529 |
| Seal test: (1min) | Qc/2, IEC 60068-2-17 |
| Flammability class: | V-0, UL 94 |
| Mounting position: | optional |
| Relay weight: | 4.5 gr |

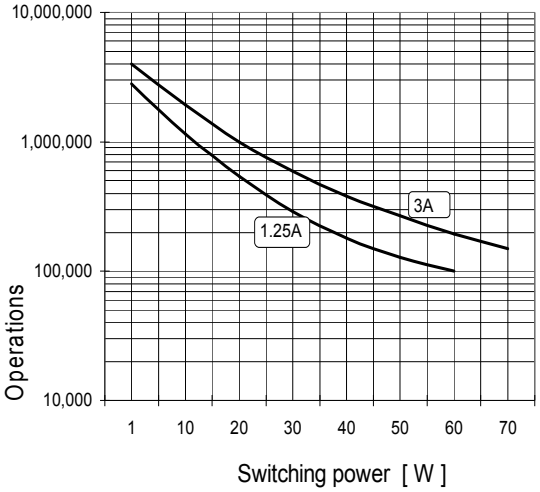
### Max. switching capacity, resistive DC load



### Electrical life at resistive AC load




### Electrical life at resistive DC load




### Ordering data

**TRK 1 X X X XX** DC

Basic designation

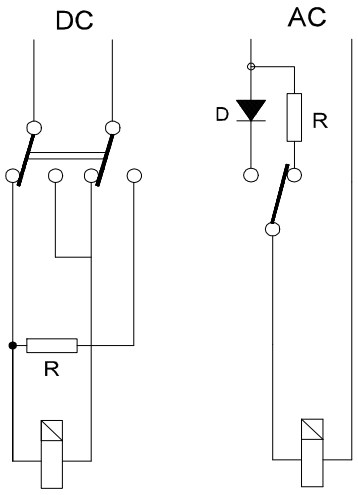
Terminals layout:
5 - Asymmetrical
6 - Symmetrical

Contact material:
0 - AgNi10 (3 A)
4 - AgNi10 + AuAg8 (1,25 A)

Contact form:
1 - Make (NO)
2 - Break (NC)
3 - Change over (CO)

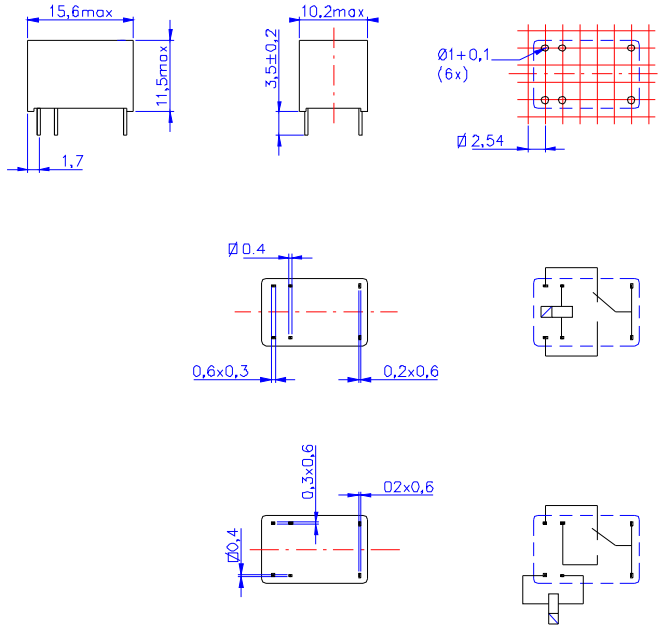
Coil rated voltage

### Recommended driving circuit




R - resistor
D - diode

### Dimensions and terminals layout




### Packing information

Relays supplied in re-usable and PVC free bar packing.
Bar length: 420 mm.
Contents: 25 relays.

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