



- **Star-Delta start-up with independently controlled times T1 and T2 (1 time function; 7 time ranges)**
- Cadmium - free contacts • AC/DC input voltages
- Cover - installation module, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to PN-EN 60715
- Application: in low-voltage systems
- Compliance with standard PN-EN 61812-1
- Recognitions, certifications, directives:

## Output circuits - contact data

Number and type of contacts	2 x 1 C/O
Contact material	AgNi
Max. switching voltage	400 V AC / 300 V DC
Rated load	AC1 10 A / 250 V AC DC1 10 A / 24 V DC
Rated current	10 A / 250 V AC
Min. breaking capacity	0,3 W 5 V, 5 mA
Contact resistance	≤ 100 mΩ
Max. operating frequency • at rated load	600 cycles/hour

## Input control circuit

Rated voltage	AC: 50/60 Hz AC/DC	12...240 V	terminals (+)A1 – (-)A2
Operating range of supply voltage		0,9...1,1 U <sub>n</sub>	
Rated power consumption	AC	≤ 4,5 VA AC: 50 Hz	
	DC	≤ 1,5 W	
Range of supply frequency	AC	48...63 Hz	

## Insulation according to PN-EN 60664-1

Insulation rated voltage	250 V AC
Rated surge voltage	2 500 V 1,2 / 50 μs
Overvoltage category	II
Insulation pollution degree	1
Flammability degree	V-0 UL94
Dielectric strength	• input - outputs 2 500 V AC • contact clearance 1 000 V AC
	type of insulation: basic type of clearance: micro-disconnection

## General data

Electrical life	• resistive AC1	≥ 0,5 x 10 <sup>5</sup>	10 A, 250 V AC
Mechanical life (cycles)		≥ 3 x 10 <sup>7</sup>	
Dimensions (L x W x H)		90 ① x 17,5 x 63,5 mm	
Weight		84 g	
Ambient temperature	• storage • operating	-40...+70 °C -20...+45 °C	
Cover protection category		IP 20	PN-EN 60529
Relative humidity		up to 85%	
Shock resistance		15 g	
Vibration resistance		0,35 mm 10...55 Hz	

## Time module data

Functions	SD
Time ranges (start-up for the star) T1	10 s; 30 s; 1 min.; 3 min.; 10 min.; 30 min.; 1 h
Timing adjustment T1	smooth - (0,05...1) x time range
Transit time (adjustable) ② T2	smoothly within the range 0,05...1 s (linear adjustment of time)
Setting accuracy	± 5% ③
Repeatability	± 3%
Values affecting the timing adjustment	• temperature • humidity
	± 0,05% / °C ± 0,05% / %HR
Recovery time	≤ 50 ms
LED indicator	green LED U ON - indication of supply voltage U green LED U flashing - measurement of T time yellow LEDs ON/OFF - contactors switching signal

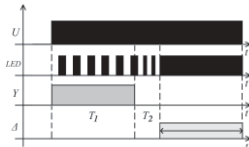
① Length with 35 mm rail taps: 98,8 mm.

② Pause time between switching off the star contactor and switching on the delta contactor.

③ Calculated from the final range values, for the setting direction from minimum to maximum.

## Time functions

### SD - Star-Delta start-up



When the supply voltage  $U$  is applied, the operating star-contact becomes closed, which is signaled with illumination of the yellow LED. Measurement of the set time  $T_1$  starts, and the green LED flashes at 500 ms. After the  $T_1$  time has lapsed, the star contact is disconnected and the relay begins measuring the  $T_2$  time, which is signaled with the green LED flashing at 250 ms. After the  $T_2$  time has lapsed, the delta contact is switched on together with the yellow LED, and the green LED remains illuminated.

$U$  - supply voltage;  $T_1$ ,  $T_2$  - measured times

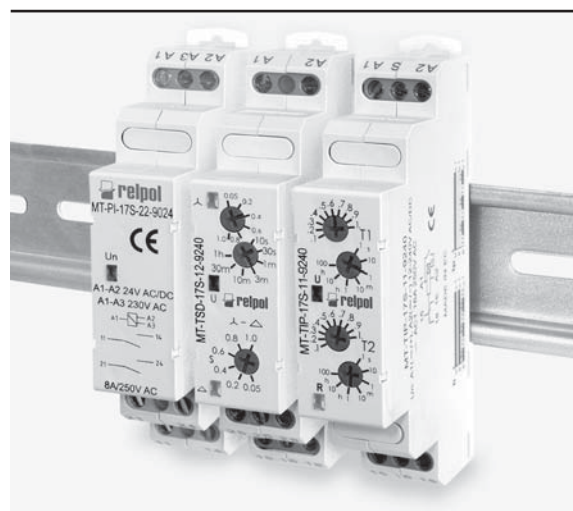
## Additional functions

**Supply diode:** it is lit permanently when the time is not being measured. In course of the  $T_1$  time measurement, it flashes at 500 ms period where it is lit for 80% of the time, and off for 20% of the time. For the  $T_2$  time, the period is 250 ms.

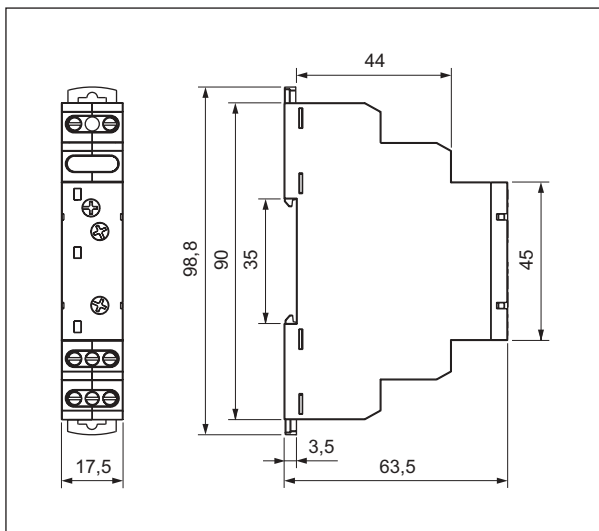
**Adjustment of the set values:** the values of time and range are read in the course of the relay's operation. The set values may be modified at any moment.

**Release:** the relay is released with the supply voltage.

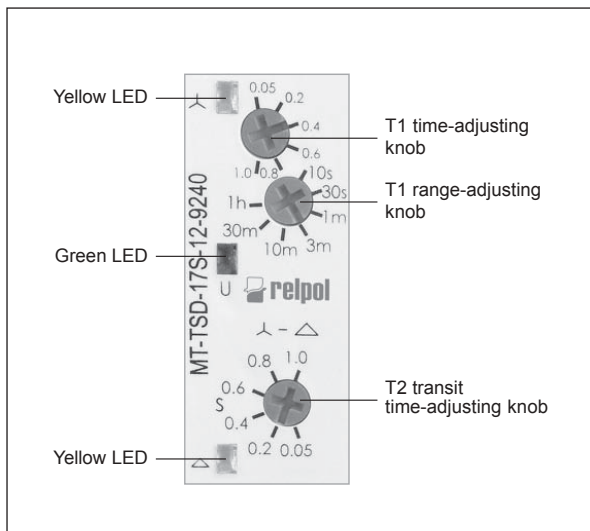
**Supply:** the relay may be supplied with DC voltage or AC voltage 48...63 Hz of 10.8...250 V. A programmed control of the supply voltage has been applied so the processor shall not start operation if the voltage is lower than approximately 10 V. The supply voltage is permanently monitored in course of the operation of the relay. When the voltage drops below 9 V for more than 50 ms, the relay shall be reset. Owing to this, the regeneration time is programmed to 50 ms, and it does not depend on the tolerance of the elements.



## Dimensions



## Front panel description



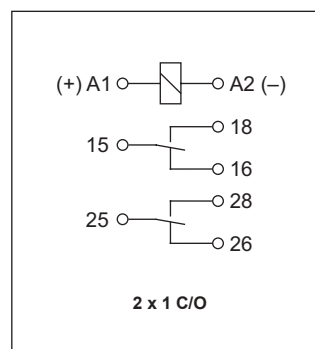
## Mounting

Relays **MT-TSD-...** are designed for direct mounting on 35 mm rail mount acc. to PN-EN 60715. Operational position - any. Maximum size of wires 1 x 2,5 mm<sup>2</sup> (1 x 14 AWG). Rated cross-sectional area of conductors 2 x 1,5 mm<sup>2</sup> (2 x 16 AWG). Maximum screw torque: 0,6 Nm.

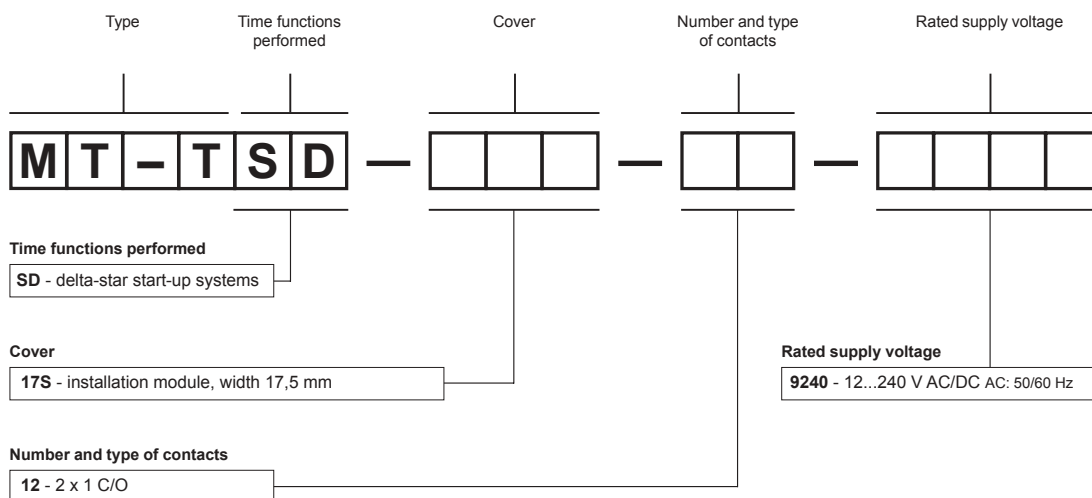


**Two taps:**  
easy assembly on 35 mm rail,  
firm tapping (top and bottom).

## Connection diagram



## Ordering codes



Example of ordering code:

**MT-TSD-17S-12-9240**

time relay **MT-TSD-...**, single-function (relay perform function SD), cover - installation module, width 17,5 mm, with two changeover contacts, rated input voltage 12...240 V AC/DC 50/60 Hz, contact material AgNi