



# TECHNICAL MANUAL

## Time relay TM-24 multifunctional with display EKF



## 1 DESCRIPTION

Multifunctional time relay with display TM-24 EKF is a two-channel electromechanical switching device designed to create an independent time delay and to ensure a certain sequence of operations in controlled circuits.

The product complies with IEC 60947-5-1.

## 2 TECHNICAL DATA

Table 1 - Technical data

Characteristics	Values
Rated supply voltage (Un), V	AC/DC 24-264
Rated frequency, Hz	50 / 60
Time delay range	0-9999 s, 0-9999 min
Max. time error, s/day	±3 (at 25°C)
Data storage	10 years
Contacts	1 CO + 1 NO
Rated current, A	8 (AC1)
Contact capacity	2A (AC-15)
Electrical life, cycles	100 000
Mechanical life, cycles	1 000 000
Max. altitude above sea level, m	2000
Degree of protection	IP20
Pollution degree	3
Operating temperature, °C	- 5 ... 40
Storage temperature, °C	-25 ... 75

Table 1 continued

Characteristics	Values
Position in space	Arbitrary
Mounting	35mm DIN rail
Conductor cross-section, mm <sup>2</sup>	0,5-1

The product must be operated under the following environmental conditions:

- non-explosive environment;
- no corrosive gases and vapors in concentrations damaging to metals and insulation;
- no saturation with conductive dust and vapors;
- no direct exposure to ultraviolet radiation (for the relay).

The product housing is made of flame retardant ABS plastic.

The general drawings of the relay and the front panel are shown in Figures 1 and 2.

Function of control buttons:

Table 2

<i>Menu</i> 	<ul style="list-style-type: none"> <li>• Enter menu</li> <li>• Return to main menu</li> </ul>	<i>ok</i> 	<ul style="list-style-type: none"> <li>• Confirm selection</li> </ul>
	<ul style="list-style-type: none"> <li>• Browse menu</li> <li>• Increase value</li> </ul>		<ul style="list-style-type: none"> <li>• Browse menu</li> <li>• Decrease value</li> </ul>

Integrated microprocessor enables execution of 24 preprogrammed control scenarios via each of the two independent channels. The relay will perform switching based on the selected scenario.

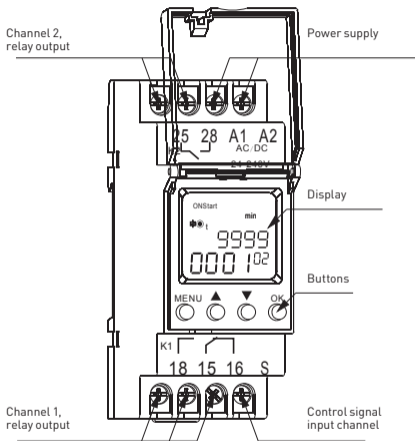
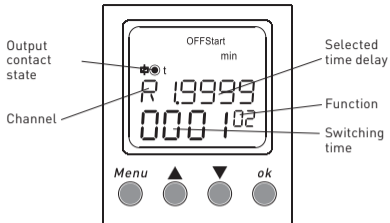


Fig. 1 - Time relay TM-24



\*If scenarios 9, 13, 14 are selected (see Table 3), information will not be shown on display.

Fig. 2 - Front panel

#### Display symbols:

$\odot$	Relay contact on	$\llcorner$	Tailing edge trigger
$\circ$	Relay contact off	min	Timer setpoint, minutes
R 1	R1 – channel 1	sec	Time setpoint, seconds
R 2	R2 – channel 2	T	Time delay T
SET	Settings mode active	T1	Time delay T1
ONStart	Contact initial position ON	T2	Time delay T2
OFFStart	Contact initial position OFF	start	Operation using additional control signal S
$\lrcorner$	Leading edge trigger		

The operation of the second channel contacts (25-28) is similar to the operation of contacts 15-18 described in Table 3.

Table 3

1		<p><b>On-delay.</b> After the relay is energized, a countdown (T) is started. Once the countdown is finished, relay is switched on (contacts 15-18 close) and remains on as long as the relay is energized.</p>
2		<p><b>One-shot (NO)</b> After the relay is energized, it is immediately switched on (contacts 15-18 close) and a countdown (T) is started. Once the countdown is finished, contacts 15-18 open, contacts 15-16 close and remain closed until the relay is de-energized.</p>
3		<p><b>Recycle (NO)</b> After the relay is energized, a countdown (T) is started. Relay contacts 15-16 remain closed and contacts 15-18 remain open. Once the countdown is finished, contacts 15-16 open, and contacts 15-18 close for the period of T; the cycle repeats as long as the relay is energized.</p>
4		<p><b>Recycle (NC)</b> After the relay is energized, contacts 15-16 open, contacts 15-18 close, and a countdown (T) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close for the period of T; the cycle repeats as long as the relay is energized.</p>
5		<p><b>On-delay One-shot (0,5s).</b> After the relay is energized, a countdown (T) is started. Relay contacts 15-16 remain closed and contacts 15-18 remain open. Once the countdown is finished, contacts 15-16 open, and contacts 15-18 close for 0,5 s and then open again, remaining open for as long as the relay is energized.</p>

Table 3 continued

6		<p><b>Delay Off (Leading edge)</b> After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, contacts 15-16 open, contacts 15-18 close, and the countdown timer (T) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. The cycle will repeat when the S signal reappears. The duration of the S pulse is not taken into the account.</p>
7		<p><b>Delay Off (Trailing edge)</b> After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal S disappears, contacts 15-16 open, contacts 15-18 close, and the countdown (T) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. The cycle will repeat when the S signal appears and disappears. The appearance and disappearance of the S pulse during the countdown T does not affect the operation of the relay.</p>
8		<p><b>Delay On (Leading edge) / Delay Off (Trailing edge).</b> After relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, a countdown (T) is started. After the countdown is finished, contacts 15-16 open, and contacts 15-18 close; the relay will remain in this state as long as the signal (s) is detected. As soon as the signal disappears, a countdown (T) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. The cycle repeats when the signal (S) reappears. <b>WARNING!</b> If the signal (S) is shorter than the time delay (T), relay will function as if Scenario 3 (Recycle) was selected, switching on at the signal (S) detection.</p>

Table 3 continued

9		<p><b>One-shot Bi-stable.</b> After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, contacts 15-16 open, contacts 15-18 close, and relay remains in this state.</p> <p>As soon as the second signal is detected, contacts 15-18 open, and contacts 15-16 close. Therefore, after detecting each signal pulse the contacts will switch over from open to closed and vice versa. In this scenario T1 and T2 settings are not applicable.</p>
10		<p><b>Leading edge On / Delay Off (Trailing edge, countdown recycle)</b> After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, contacts 15-16 open, contacts 15-18 close, and relay remains in this state as long as the signal (S) is detected. As soon as the signal disappears, a countdown (T) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. The cycle repeats when the signal (S) reappears.</p>
11		<p><b>Leading edge On / Delay Off (Trailing edge, no countdown recycle)</b> After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, contacts 15-16 open, contacts 15-18 close, and relay remains in this state as long as the signal (S) is detected. As soon as the signal disappears, a countdown (T) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. The appearance and disappearance of the signal (S) during the countdown (T) does not affect the operation of the relay.</p>



Table 3 continued

12		<p><b>Delay On (Leading edge)</b> After relay is energized, it remains in a steady state until a signal (S) is detected and disappears. As soon as the signal disappears, contacts 15-16 open, contacts 15-18 close, and relay remains in this state. Appearance/disappearance of the signal (S) does not affect the relay operation.</p>
13		<p><b>Interface relay.</b> After the relay is energized, contacts 15-16 open, and contacts 15-18 close and remain in this state as long as the relay is energized. Appearance/disappearance of the signal (S) does not affect the relay operation. In this scenario T1 and T2 settings are not applicable.</p>
14		<p><b>Relay Off.</b> After the relay is energized, it remains in a steady state. Appearance/disappearance of the signal (S) does not affect the relay operation. In this scenario T1 and T2 settings are not applicable.</p>
15		<p><b>Delay On One-shot (T2)</b> After the relay is energized, it remains in a steady state and a countdown (T1) is started. Once the countdown (T1) is finished, contacts 15-18 close, and contacts 15-16 open and will remain in this state for the countdown duration of T2. Once the countdown (T2) is finished, contacts 15-18 open, and contacts 15-16 close. Relay will re-cycle at the coil being de/re-energized.</p>

Table 3 continued




16		<p><b>One-shot (T1) / Delay On (T2)</b> After the relay is energized, contacts 15-18 close, and contacts 15-16 open and remain in this state for the duration of countdown (T1). Once the countdown (T1) is finished, contacts 15-18 open, contacts 15-16 close, and a new countdown (T2) is started. Once the countdown (T2) is finished, contacts 15-18 close, contacts 15-16 open and relay will remain in this state until de-energized.</p>
17		<p><b>Recycle (Delay On T1 / Delay Off T2).</b> After the relay is energized, it remains in a steady state and a countdown (T1) is started. Once the countdown (T1) is finished, contacts 15-18 close, and contacts 15-16 open and will remain in this state for the countdown duration of T2. Once the countdown (T2) is finished, contacts 15-18 close, contacts 15-16 open and the cycle repeats. Relay will recycle until the it is de-energized.</p>
18		<p><b>Recycle (Delay Off T1 / Delay On T2).</b> After the relay is energized, contacts 15-18 close, and contacts 15-16 open and remain in this state for the duration of countdown (T1). Once the countdown (T1) is finished, contacts 15-18 open, contacts 15-16 close, and a new countdown (T2) is started. Once the countdown (T2) is finished, contacts 15-18 close, contacts 15-16 open and the cycle repeats. Relay will recycle until the it is de-energized.</p>



Table 3 continued

19		<p><b>Delay On (Leading edge, <math>\geq T1</math>) / Delay Off (Trailing edge, repeat countdown).</b></p> <p>After the relay is energized, it remains in a steady state until a signal (S) is detected.. After the signal S is detected, the countdown (T1) begins. Once the countdown (T1) is finished, contacts 15-16 open, contacts 15-18 close and the relay remains in this state until the signal (S) disappears.As soon as the signal (S) disappears, a countdown (T2) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. If the signal (S) duration is shorter than the countdown (T1), relay will remain in the steady state. Repeat appearance/disappearance of the signal (S) will initiate repeat countdown.</p>
20		<p><b>Delay On (Leading edge, <math>\geq T1</math>) / Delay Off (Trailing edge, no repeat countdown).</b></p> <p>After the relay is energized, it remains in a steady state until a signal (S) is detected.. After the signal S is detected, the countdown (T1) begins. Once the countdown (T1) is finished, contacts 15-16 open, contacts 15-18 close and the relay remains in this state until the signal (S) disappears.As soon as the signal (S) disappears, a countdown (T2) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. If the signal (S) duration is shorter than the countdown (T1), relay will remain in the steady state. Repeat appearance/disappearance of the signal (S) does not affect the relay operation.</p>

Table 3 continued

21		<p><b>Alternating pulse generation.</b></p> <p>After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, contacts 15-16 open, contacts 15-18 close, and the countdown timer (T1) is started. Once the countdown (T1) is finished, contacts 15-18 open, and contacts 15-16 close. As soon as the signal (S) reappears, contacts 15-16 open, contacts 15-18 close, and the countdown (T2) is started. Once the countdown (T2) is finished, contacts 15-18 open, and contacts 15-16 close. At the next signal (S) the cycle repeats. Duration of the signal (S) does not affect the execution of the relay scenario.</p>
22		<p><b>Delay Off (T1, Trailing edge) / Delay On (T2).</b></p> <p>After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, contacts 15-16 open, contacts 15-18 close and, as long as the signal (S) is detected, will remain in this position. As soon as the signal disappears, a countdown (T1) is started. Once the countdown (T1) is finished, contacts 15-18 open, contacts 15-16 close, and a new countdown (T2) is started. During countdown (T2) the signal (S) does not affect the relay scenario execution. Once the countdown (T2) is finished, and repeat signal (S) is received contacts 15-16 open, contacts 15-18 close and the cycle repeats.</p>

Table 3 continued

23	 <p>The diagram shows three signals: U (power supply), S (input signal), and a relay coil (represented by a square with a diagonal line). U is a constant high signal. S is a pulse. The relay coil is energized at the rising edge of S. Two time intervals, t1, are marked from the rising edge of S to the falling edge of the relay coil. A time interval, t2, is marked from the falling edge of the relay coil to the falling edge of S.</p>	<p><b>Delayed On T2 Leading Edge <math>\geq T1</math></b>        After the relay is energized, it remains in a steady state until a signal (S) is detected. After the signal S is detected, the countdown (T1) begins. Once the countdown (T1) is finished, contacts 15-16 open, contacts 15-18 close, and a new countdown (T2) is started. Once the countdown is finished, contacts 15-18 open, and contacts 15-16 close. If the signal (S) duration is shorter than the countdown (T1), relay will remain in the steady state. Repeat appearance/disappearance of the signal (S) does not affect the relay operation.</p>
24	 <p>The diagram shows three signals: U (power supply), S (input signal), and a relay coil (represented by a square with a diagonal line). U is a constant high signal. S is a pulse. The relay coil is energized at the rising edge of S. Two time intervals, t1, are marked from the rising edge of S to the falling edge of the relay coil. Two time intervals, t2, are marked from the falling edge of the relay coil to the falling edge of S.</p>	<p><b>One-shot (Leading edge, T1) / One-shot (Trailing edge, T2).</b>        After the relay is energized, it remains in a steady state until a signal (S) is detected. As soon as the signal is detected, contacts 15-16 open, contacts 15-18 close, and the countdown timer (T1) is started. Once the countdown (T1) is finished, contacts 15-18 open, and contacts 15-16 close. As soon as the signal disappears, contacts 15-16 open, contacts 15-18 close, and the countdown (T2) is started. Once the countdown (T2) is finished, contacts 15-18 open, and contacts 15-16 close. At the next signal (S) the cycle repeats. Reappearance of the signal (S) while the countdown is running does not affect the execution of the relay scenario.</p>

### 3 INSTALLATION AND OPERATION

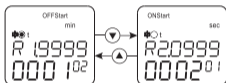
The device is installed onto a 35 mm DIN rail in the distribution enclosure.

To avoid interference, false tripping, or malfunctioning of the relay, do not route the relay power supply wires along the power circuit wiring. If necessary, use a shielded cable.

Screw terminals support copper and aluminium conductors with max. cross-section of 1 mm<sup>2</sup>

### 4 SETUP AND PROGRAMMING

#### Channel information (R1/R2)



## Settings/Main menu

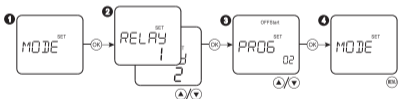


❶	Scenario selection (1-24)
❷	T1/T setup
❸	T2 setup
❹	End

Press the MENU button to begin setting the parameters. The SET symbol will appear on the display.

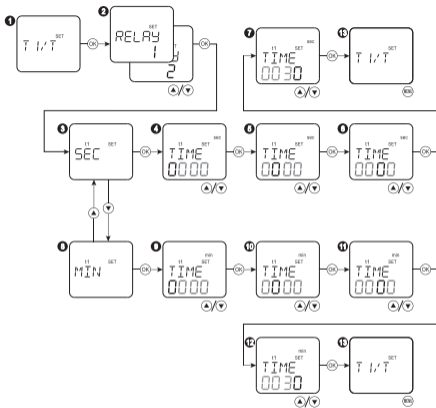
If no buttons are pressed for 2 minutes, the device will return to the main menu.

## Scenario selection



❶	Select the MODE menu item and press OK to confirm.
❷	Select a channel and press OK to confirm.
❸	Select the desired scenario (1-24, see Table 3) and press OK to confirm.
❹	To return to the previous menu, press the MENU button.

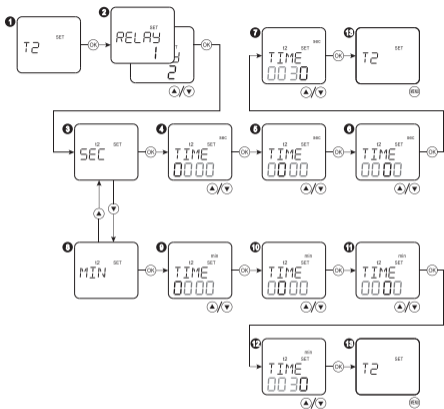
## T1/T setup





<b>1</b>	Select the T1/T menu item and press OK to confirm.
<b>2</b>	Select a channel and press OK to confirm.
<b>3</b>	Select the desired unit of measurement. SEC-seconds (0-9999s), MIN-minutes (see p.8).
<b>4</b>	Select and set thousands (0-9), press OK to confirm.
<b>5</b>	Select and set hundreds (0-9), press OK to confirm.
<b>6</b>	Select and set tens (0-9), press OK to confirm.
<b>7</b>	Select and set single units (0-9), press OK to confirm.
<b>8</b>	Select the desired unit of measurement: MIN minutes (0-9999 min).
<b>9</b>	Select and set thousands (0-9), press OK to confirm.
<b>10</b>	Select and set hundreds (0-9), press OK to confirm.
<b>11</b>	Select and set tens (0-9), press OK to confirm.
<b>12</b>	Select and set single units (0-9), press OK to confirm.
<b>13</b>	To return to the previous menu, press the MENU button.

## T2 setup



<b>1</b>	Select menu item T2 and press OK to confirm.
<b>2</b>	Select a channel and press OK to confirm.
<b>3</b>	Select the desired unit of measurement. SEC-seconds (0-9999s), MIN-minutes (see p.8).
<b>4</b>	Select and set thousands (0-9), press OK to confirm.
<b>5</b>	Select and set hundreds (0-9), press OK to confirm.
<b>6</b>	Select and set tens (0-9), press OK to confirm.
<b>7</b>	Select and set single units (0-9), press OK to confirm.
<b>8</b>	Select the desired unit of measurement: MIN minutes (0-9999 min).
<b>9</b>	Select and set thousands (0-9), press OK to confirm.
<b>10</b>	Select and set hundreds (0-9), press OK to confirm.
<b>11</b>	Select and set tens (0-9), press OK to confirm.
<b>12</b>	Select and set single units (0-9), press OK to confirm.
<b>13</b>	To return to the previous menu, press the MENU button.

## 5 WIRING DIAGRAM

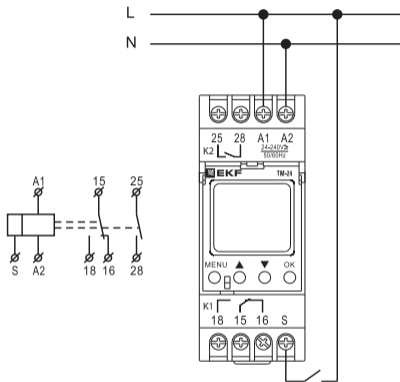


Fig. 3 - Wiring diagram

## 6 OVERALL AND INSTALLATION DIMENSIONS

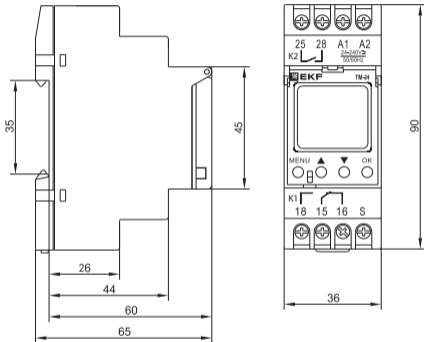


Fig. 4 - Overall and installation dimensions

## **7 DELIVERY SCOPE**

1. Time relay TM-24 multifunctional with display EKF – 1 pc.

## **8 SAFETY REQUIREMENTS**

**WARNING!** Hazardous voltage

The device conforms to IEC 61140 Class 0 for protection against electrical shock.

The device shall be installed and serviced only by qualified electrical personnel.

Do not operate relays with visible mechanical damage.

For maintenance, follow national safety rules for operation of electrical installations.

Do not operate the relays with damaged housing.

Failure to comply with the instructions may lead to product malfunction, electrical shock or fire.

## **9 TRANSPORTATION AND STORAGE**

9.1 Relays can be transported by any means of enclosed transport that protects the packaged goods from mechanical impact and weather exposure.

9.2 Relays shall be stored indoors, in their original packaging, at the ambient temperatures from  $-40^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  and max. relative humidity of 80% at  $+25^{\circ}\text{C}$ .

## **10 MANUFACTURER'S WARRANTY**

The manufacturer guarantees the relays comply with the declared characteristics, provided that the consumer follows the operation, transportation and storage conditions and requirements.

10.2 Warranty period: 7 years from the date of sale.

10.3 Shelf life: 7 years from the date of manufacture.

10.4 Service life: 10 years.

**Manufacturer:** for information, refer to the product packaging.

**Importer and EKF trademark service representative:** EKF ELECTRICAL SOLUTION – FZCO, Dubai Silicon Oasis, DDP, Building A2, Dubai, United Arab Emirates.

**Importer and EKF trademark service representative on the territory of the Russian Federation:**

000 «Electroresheniya», Otradnaya st., 2b bld. 9, 5th floor, 127273, Moscow, Russia. Tel.: +7 (495) 788-88-15.

**Importer and EKF trademark service representative on the territory of the Republic of Kazakhstan:**

TOO «Energoresheniya Kazakhstan», Kazakhstan, Almaty, Bostandyk district, Turgut Ozal st., 247, apt 4.

## **11 CERTIFICATE OF ACCEPTANCE**

The relay has been manufactured in compliance with the effective laws and regulations and has been approved for operation.

**Date of manufacture:** for information, refer to the product package.

Quality control stamp



EAC



v3

[ekfgroup.com](http://ekfgroup.com)

EF  
K  
E