



TECHNICAL MANUAL

Multifunctional digital timer with display TM-24 EKF

1 DESCRIPTION

Multifunctional digital timer with display TM-24 EKF is a relay with two independent groups of contacts, that performs switching based on time setpoints and selected function.

The product complies with IEC 61000-4-4, IEC 60947-5-1.

2 TECHNICAL DATA

Table 1 - Technical data

Characteristics	Values
Rated supply voltage U_n , 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 C/O + 1 NO
Rated current, A	8 (AC-1)
Contact capacity	2A (AC-15)
Electrical endurance, cycles	100 000
Mechanical endurance, cycles	1 000 000
Max. altitude above sea level, m	2000
Degree of protection	IP20
Pollution degree	3
Operating temperature, °C	- 5 to 50
Storage temperature, °C	-25 ... 75

Table 1 continued

Characteristics	Values
Position in space	Arbitrary
Mounting	35mm DIN rail
Conductor cross-section, mm ²	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> 	• Enter menu • Return to main menu	<i>ok</i> 	• Confirm selection
	• Browse menu • Increase value		• Browse menu • Decrease value

An integrated microprocessor supports 24 control programs via each of the two independent channels. The timer will perform switching according to the selected function.

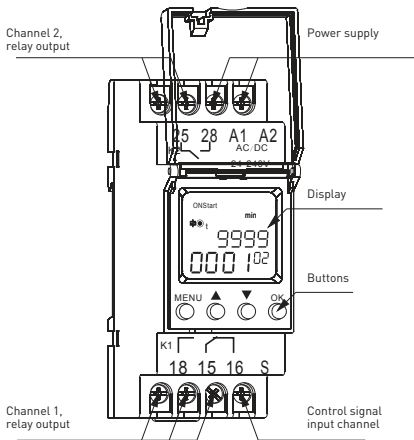
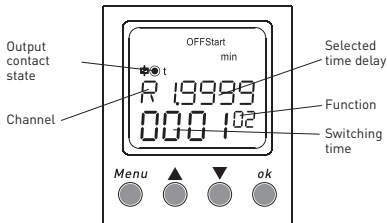


Fig. 1 - Timer TM-24



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

Fig. 2 - Front panel

Display symbols:

	Relay contact on		Trailing edge trigger
	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
	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		Delay on. 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.
2		One-shot (NO). 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 as long as the relay is energized.
3		Recycle (NO). 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.
4		Delay Off Recycle. 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.
5		Delay on One-shot (0,5s). 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.

Table 3 continued

6		Delay Off (Leading edge). 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 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. The scenario is signal duration independent.
7		Delay Off (Trailing edge). After the 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 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) appears and disappears. Reappearance and disappearance of the signal (S) while the countdown (T) is running, does not affect the execution of the scenario.
8		Delay On (Leading edge) / Delay Off (Trailing edge). 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. 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.

Table 3 continued

9		One-shot Bi-stable. 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 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 irrelevant.
10		Leading edge On / Delay Off (Trailing edge, countdown recycle). 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.
11		Leading edge On / Delay Off (Trailing edge, no countdown recycle). 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 relay scenario execution.

Table 3 continued

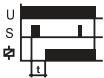
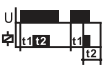
12		Delay On (Leading edge). After relay is energized, it remains in a steady state until a signal (S) is detected and disappears. As soon as the signal disappears, contacts 15-16 open, contacts 15-18 close, and relay remains in this state. Appearance/disappearance of the signal (S) does not affect relay scenario execution.
13		Interface relay. 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 relay scenario execution. T1 and T2 settings are irrelevant.
14		Relay Off. After the relay is energized, it remains in a steady state. Appearance/disappearance of the signal (S) does not affect relay scenario execution. T1 and T2 settings are irrelevant.
15		Delay On One-shot (T2). 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.

Table 3 continued

16		One-shot (T1) / Delay On (T2). 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 it is de-energized.
17		Recycle (Delay On T1 / Delay Off T2). 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 it is de-energized.
18		Recycle (Delay Off T1 / Delay On T2). 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 it is de-energized.

Table 3 continued

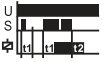
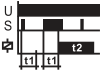
19		Delay On (Leading edge, $\geq T1$) / Delay Off (Trailing edge, repeat countdown). After the relay is energized, it remains in a steady state until a signal (S) is detected. After the signal (S) is detected, a countdown (T1) is started. Once the countdown (T1) is finished, contacts 15-16 open, contacts 15-18 close and the relay remains in this state until the signal (S) disappears. As soon as the signal 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. Reappearance/disappearance of the signal (S) will initiate repeat countdown.
20		Delay On (Leading edge, $\geq T1$) / Delay Off (Trailing edge, no repeat countdown). After the relay is energized, it remains in a steady state until a signal (S) is detected. After the signal (S) is detected, a countdown (T1) is started. 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 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. Reappearance/disappearance of the signal (S) does not affect relay scenario execution.

Table 3 continued

21		Alternating pulse generation. 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 a countdown (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 a new 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.
22		Delay Off (T1, Trailing edge) / Delay On (T2). 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 the steady state while the signal (S) is detected. 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.

Table 3 continued

23		Delayed On T2 Leading Edge $\geq T1$ After the relay is energized, it remains in a steady state until a signal (S) is detected. After the signal (S) is detected, a countdown (T1) is started. 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. Reappearance/disappearance of the signal (S) does not affect relay scenario execution.
24		One-shot (Leading edge, T1) / One-shot (Trailing edge, T2). 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 a countdown (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 a new 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.

3 INSTALLATION AND OPERATION

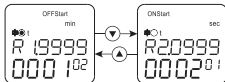
The device is installed onto a 35 mm DIN rail in a distribution enclosure.

To avoid interference, false tripping, or malfunctioning of the relay, do not route the timer 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 mm².

4 SETUP AND PROGRAMMING

Channel information (R1/R2)



Settings/Main menu

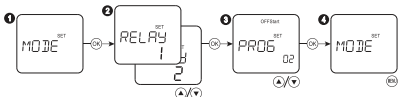


1	Scenario selection (1-24)
2	T1/T setup
3	T2 setup
4	End

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

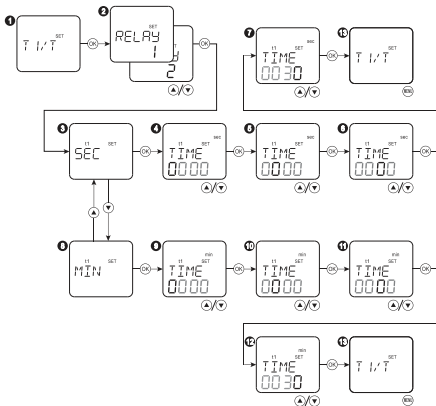
If no buttons are pressed for 2 minutes, the device will return to the main menu.

Scenario selection



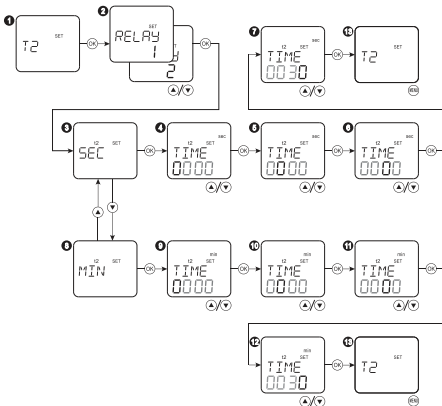
1	Select the MODE menu item and press OK to confirm
2	Select a channel and press OK to confirm
3	Select the desired scenario (1-24, see Table 3) and press OK to confirm
4	To return to the previous menu, press the MENU button

T1/T setup



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

T2 setup



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

5 WIRING DIAGRAM

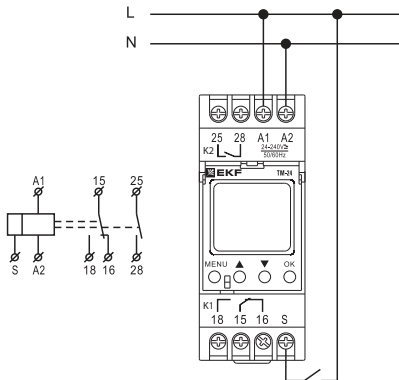


Fig. 3 - Wiring diagram

6 OVERALL AND INSTALLATION DIMENSIONS

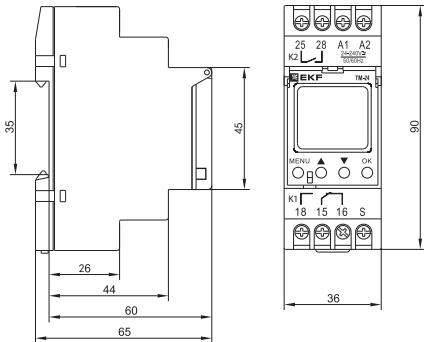


Fig. 4 - Overall and installation dimensions

7 DELIVERY SCOPE

The timers are supplied in individual and group package. For all available documentation, scan the QR-code on the insert or on the inside of the package.

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 timers with visible mechanical damage.

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

Do not operate the timers with damaged housing.

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

9 TRANSPORTATION AND STORAGE

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

Timers shall be stored indoors, in their original packaging, at the ambient temperatures from -40°C to +55°C and max. relative humidity of 80% at +25°C.

10 MANUFACTURER'S WARRANTY

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

Warranty period: 7 years from the date of sale specified in the sales receipt.

Shelf life: 7 years from the date of manufacture specified on the product package or housing.

Service life: 10 years.

Manufacturer: 000 Electroresheniya, Otradnaya st., 2b/9, 127273, Moscow, Russia, tel. +7 [495] 788-88-15.

Importer and EKF trademark service representative:

EKF ELECTRICAL SOLUTION – FZCO, Dubai Silicon Oasis, DDP, Building A2, Dubai, United Arab Emirates, tel. +971-4-547-06-18.

**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 multifunctional digital timer TM-24 EKF 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

EHF



v3

ekfgroup.com

EKF