Time-Delayed Safety Relay ESM-TE3..

User Information

Correct Use

The ESM-TE3... is an expansion module that can be operated with any basic device from the EUCHNER ESM series, e.g. ESM-BA2.. or ESM-BAS.. in order to permit delayed switch-off of machine parts. This could be the case if it is safer to return a tool to its initial position first instead of stopping operation immediately, for example. The ESM-TE3.. was developed as a component for a modular system.

Any combination of ESM-TE3 units and non-time-delayed ESM-ES3.. expansion blocks can be interconnected with just a few lines, permitting realization of an overall system with different times and the specific number of safety contacts required.

Features

• 3 safe, redundant, time-delayed relay outputs
• 1 auxiliary contact (fault monitoring)
• Activation via basic device from the EUCHNER ESM series
• Continuously adjustable delay, 1 to 30s or fixed time delay (ESM-TE3..-05S)
• Modular, freely configurable safety system
• Corresponds to STOP category 1
• Fault monitoring by basic device
• Indication of the switching state via LED
• Up to PL d, category 3, SIL CL 2

Function

The time-delayed emergency stop safety switching device ESM-TE3.. in combination with a basic device from the EUCHNER ESM series is designed for safe isolation of safety circuits according to EN 60204-1 and can be used up to safety category 3, PL d according to EN ISO 13849-1. The ESM-TE3.. provides a control voltage of DC 24V at terminal S11. In order for the ESM-TE3.. to switch together with the connected basic device, the control voltage at S11 is connected to terminals S15 and S16 of the ESM-TE3.. via one of the safety contacts of the basic device (see Wiring section on page 2).

The safety contacts of the basic device close when the basic device is activated, and the DC 24V control voltage at terminal S11 is then connected with terminals S15 and S16 of the ESM-TE3.. The safety contacts of the ESM-TE3.. switch immediately.

The basic device disconnects the control voltage when the safety switch is operated, and the safety contacts of the ESM-TE3.. open after the time set on the ESM-TE3.. elapses (the power supply must be present during the time sequence).

If a fault occurs in the ESM-TE3.. this is detected by the ESM-TE3.. open after the time set on the ESM-TE3.. elapses (the power supply must be present during the time sequence).

Installation

As per EN 60204-1, the device is intended for installation in control cabinets with a minimum degree of protection of IP54. It is mounted on a 35-mm DIN rail according to DIN EN 60715 TH35.

Safety Precautions

• Installation and commissioning of the device must be performed only by authorized personnel.
• Observe the country-specific regulations when installing the device.
• The electrical connection of the device is only allowed to be made with the device isolated.
• The wiring of the device must comply with the instructions in this user information, otherwise there is a risk that the safety function will be lost.
• It is not allowed to open the device, tamper with the device or bypass the safety devices.
• All relevant safety regulations and standards are to be observed.
• The overall concept of the control system in which the device is incorporated must be validated by the user.
• Failure to observe the safety regulations can result in death, serious injury and serious damage.

Electrical Connection

• When the 24 V version is used, a safety transformer according to EN 61558-2-6 or a power supply unit with electrical isolation from the mains must be connected.
• External fusing of the safety contacts (4 A slow-blow or 6 A quick-action or 10 A gG) must be provided.
• A maximum length of the control lines of 1000 meters with a line cross section of 0.75 mm² must not be exceeded.
• The line cross section must not exceed 2.5 mm².
• If the device does not function after commissioning, it must be returned to the manufacturer unopened. Opening the device will void the warranty.
Depending on the application, the device must be wired with a EUCHNER basic device as shown in Fig. 1 to Fig. 2.

**Fig. 1: Connection of ESM-TE3.. to basic device**
Wiring of the ESM-TE3.. via only 4 lines:
A safety contact of the EUCHNER basic device (e.g. 13-14) activates the relays of the ESM-TE3.. (S11 and S15/S16). Two lines on S25 and S26 are required for feedback/fault monitoring. A fault in the ESM-TE3.. thereby prevents the entire safety chain from restarting. Earth faults in the control lines are detected in addition to internal faults.

**Fig. 2: Connection of several ESM-TE3.. units to basic device**
If further ESM-TE3.. units are to be integrated into the system, terminals S11 must be connected in parallel on all ESM-TE3.. units. This also applies to terminals S10 and terminals S15/S16.

**Notice:**
In order to activate earth fault monitoring, S10 must be connected to PE (protective earth) on the AC115/230V devices. With AC/DC 24 V, connect PE only to the power supply unit according to EN60204-1.

**Feedback Loop**
Contactors connected to the ESM-TE3.. or the basic devices are monitored via the feedback loop of the basic device. KA and KB are the positively driven contacts of the connected contactor or expansion module.

**Power supply and Safety contacts**

**Fig. 5:**
Power supply A1 and A2.
(Power supply according to techn. data)

**Fig. 6:**
Connecting load to safety contacts.
(Figure shows example. Voltage „+V“ according to techn. data)

**Commissioning Procedure**

1. **Wiring ESM-TE3..**:
Wire the ESM-TE3.. with the EUCHNER basic device according to your application (see Fig. 1 to Fig. 2).

2. **Wiring basic device**:
Wire the basic device according to the required Performance Level determined (see user information for the basic device).

3. **Wiring feedback loop**:
Wire the feedback loop as shown in Fig. 3 and Fig. 4.

4. **Wiring power supply**:
Connect the power supply to terminals A1 and A2 (Fig. 5).
**Warning:** Wiring only in de-energized state.

5. **Setting delay time**:
Set the desired time delay on the rotary knob and seal the knob with the supplied sticker.
(Not for ESM-TE3..-05S because of 0.5 seconds fixed delay time).
**Warning:**
Scale division lines should be regarded only as a setting aid. Always make sure to measure the delay time.

6. **Starting the device**:
Switch the operating voltage on.
**Warning:**
If the “Automatic start” starting behavior is set on the basic device, the safety contacts will close immediately.
If the “Monitored manual start” starting behavior is set, close the start button on the basic device to close the safety contacts.
The LEDs K1 and K2 on the basic device and on the ESM-TE3.. are lit when the safety contacts are closed.

7. **Triggering safety function**:
Open the emergency stop circuit by actuating the connected safety switch. The safety contacts of the basic device open immediately; the safety contacts of the ESM-TE3.. open after expiration of the time set on the rotary knob.
**Warning:** Measure the delay time.

8. **Reactivation**:
Close the emergency stop circuit. If “Automatic start” is selected on the basic device, the safety contacts will close immediately.
If the “Monitored manual start” starting behavior is set, close the start button on the basic device to close the safety contacts of the basic device and the ESM-TE3..
Once per month, the device must be checked for proper function and for signs of tampering and bypassing of the safety function (to do this, check the wiring of the device and activate the emergency stop function. Check the delay time).

The device is otherwise maintenance free, provided that it was installed properly.

**Device does not switch on:**
- Check the wiring of the ESM-TE3.. and the basic device by comparing it with the wiring diagrams (also see user information for the basic device).
- Check the safety switch used on the basic device for correct function and adjustment.
- Check whether the emergency stop circuit of the basic device is closed.
- Check whether the start button on the basic device (with manual start) is closed.
- Check the operating voltage at A1 and A2 on the basic device and on the ESM-TE3..
- Is the feedback loop closed?

**Device cannot be switched on again after an emergency stop:**
- Check whether the emergency stop circuit was closed again.
- Was the start button opened before closing of the emergency stop circuit (with manual start)?
- Is the feedback loop closed?
- Is the power supply present during the time sequence? If the fault still exists, perform the steps listed under “Commissioning Procedure”.
- If these steps do not remedy the fault either, return the device to the manufacturer for examination.
- Opening the device is impermissible and will void the warranty.

The device is certified according to EN ISO 13849-1 up to a Performance Level of PL e.

**Safety characteristics according to EN ISO 13849-1 for all variants of ESM-TE3**

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**Techn. Data**

- **Operating voltage**
  - ESM-TE301: AC/DC 24 V
  - ESM-TE302: AC 115V
  - ESM-TE303: AC 230V

- **Rated supply frequency**: 50-60 Hz
- **Permissible deviation**: ± / - 10%

- **Power consumption**
  - DC 24V: approx. 1.5 W
  - AC 230V: approx. 4 VA

- **Delay time**
  - ESM-TE3..: 1 to 30 s, continuously adjustable
  - ESM-TE3..-05S: 0.5 s fixed

- **Control voltage at S11**: DC 24 V
- **Control current S11...S14**: max. 40mA
- **Safety contacts**: 3 NO contacts
- **Signaling contacts**: 1 NC contact; monitoring contact for basic device

- **Max. switching voltage**: AC 250 V

- **Safety contact breaking capacity**
  - AC: 250 V, 1500 VA, 6 A for ohmic load, 250 V, 4 A for AC-15
  - DC: 24 V, 30 W, 1.25 A for ohmic load; 24 V, 30 W, 2 A for DC-13
  - Max. total current through all 3 contacts: 10.5 A

- **Minimum contact load**: 24 V, 20mA

- **Contact fuses**: 4 A slow-blow or 6 A quick-action or 10 A gG

- **Line cross section**: 0.14 - 2.5 mm²

- **Max. length of control line**: 1000 m with 0.75 mm²

- **Contact material**: AgNi

- **Contact service life**: mech. approx. 1 x 10⁷ operating cycles

- **Test voltage**: 2.5 kV (control voltage/contacts)

- **Rated impulse withstand voltage, leakage path/air gap**: 4 kV (DIN VDE 0110-1)

- **Rated insulation voltage**: 250 V

- **Degree of protection**: IP20

- **Temperature range**
  - DC 24V: -15°C to +60°C
  - AC 230V/115V/24V: -15°C to +40°C

- **Degree of contamination**: 2 (DIN VDE 0110-1)

- **Overvoltage category**: 3 (DIN VDE 0110-1)

- **Weight**: approx. 230g

- **Mounting**: DIN rail according to EN 60715TH35
Time-Delayed Safety Relay ESM-TE3..

User Information

Dimension

Drawing

<table>
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| Sicherheitsmodul | ESM-BL20x | I, II, III | a, b, c, d, e, f, g, h | 01/205/0682/09 | 1) |
| Safety module | ESM-BA20x | I, II, III | a, b, c, d, e, f, g, h | 968/EZ 397.00/09 | 2) |
| Modulo di sicurezza | ESM-BA30x | | | |
| Módulos de seguridad | ESM-ES30x | I, II, III | a, b, c, d, e, f, g, h | 968/EZ 398.00/09 | 2) |
| ESM-TE30x | I, II, III | a, b, c, d, e, f, g, h | | |

1) Zertifizierungsstelle für Maschinen: NB 0035
Notified Body: NB 0035
TÜV Rheinland Industrie Service GmbH - 10882 Berlin

2) TÜV Rheinland Industrie Service GmbH – Geschäftsfeld ASI – Arn Grauen Stein, 51105 Köln

Leinfelden, Januar 2010

Dipl.-Ing. Michael Euchner
Geschäftsführer
Managing Director
Gérant d'affaires
Direttore Generale
Director Gerente

Duc Binh Nguyen
Dokumentationsbeauftragter
Documentation manager
Preposte de documentación
Delegado della documentazione
Delegado de documentación

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