

OPERATING INSTRUCTIONS

UE49-2MM, UE49-3MM,
UE49-S001, UE49-S002



Muting Modules



GB

SICK
Sensor Intelligence.

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QUALITÄTSMANAGEMENTSYSTEM

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1

Safety

This chapter serves to ensure your safety and the safety of the equipment users.

- Please read this chapter carefully before working with UE49 muting modules in conjunction with the associated protective devices of the protected machine.

UE49 muting modules meet safety-specific requirements up to category 4 (EN 954). Connected resets and safety sensors, subsequent controls, their wiring and installation must also comply with this category as defined in EN 954.

1.1 Safety regulations

Assembly and electrical connection must be carried out only by competent persons.

Competent persons are those who have:

- Suitable technical training
- Received instructions on the operation and the valid safety guidelines by the manufacturer and user of the machine
- Access to these operating instructions

National and international legal provisions apply to the use and installation of muting modules and to commissioning and routine technical checks, in particular:

- the Machinery Directive 98/37/EEC
- the Low Voltage Directive 73/23/EEC
- the EMC Directive 89/336/EEC
- the Use of Work Equipment Directive 89/655/EEC
- Safety regulations, and
- Accident and safety rules

Manufacturers and users of a machine, on which

safety devices are used, are responsible for agreeing all current safety regulations and rules with their competent authority, and for observing them.

These operating instructions and the operating instructions of the ESPE must be observed without fail and kept so that they are accessible at all times.

The tests (see [Section 5.2 Testing instructions](#)) must be carried out by competent persons or by specifically authorised and instructed persons, and documented so that they are reproducible at any time.

These operating instructions must be made available to the user of the machine on which the muting module is used. The user of the machine must be instructed by competent persons.

1.2 Areas of application

UE49 muting modules are intended for use on:

- Electro-sensitive protective equipments (ESPE) with monitored active switching outputs (OSSD), two-channel, complying with EN61496-1,
- The following SICK devices: C2000, M2000, C4000, S3000, MSL, FGS.

They enable protective operation with or without the muting function.

In protective operation with muting, the muting module differentiates between conveyed goods and persons. The ESPE permits certain objects to penetrate into the hazardous area without the dangerous movement being switched off, whereas persons are excluded.

The operating modes are selected using a rotary switch. In all operating modes, there is detection of wire breakage at the ESPE connections, and detection, with visual signal, of over and low voltage is also available. In addition, there is a connection for a

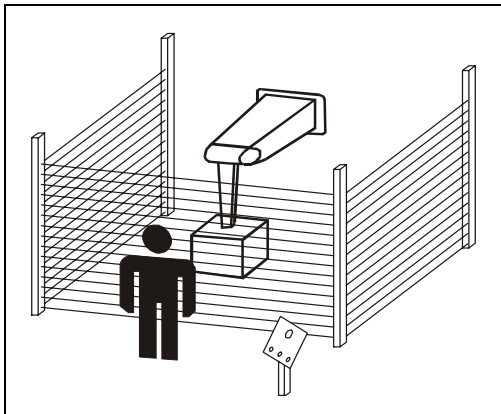
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monitored reset button.

Muting modules are not suitable for installations where it is possible to go behind the ESPE.

1.2.1 Protective operation

Fig. 1: Protective operation with three ESPE



- Two-channel connection of one, two or three ESPE
- ESPE 1 with automatic reset or manual reset as required
- ESPE 2 and ESPE 3 always with manual reset
- Instead of ESPE 2 and/or ESPE 3, a positively-guided safety switch with two-channel connection and a minimum contact load of at least 1 mA may be used.

1.2.2 Protective operation with muting

- Two-channel connection of two ESPE, and a maximum of two muting sensors, single-channel
- Two-channel connection of one ESPE, and a maximum of four muting sensors, single-channel
- Muting of ESPE 1
- ESPE 1 as required with automatic reset or manual reset
- ESPE 2 always with manual reset
- Instead of ESPE 2, a positively-guided safety switch with two-channel connection and a minimum contact load of at least 1 mA may be used.

1.3 Correct use

The UE49 muting modules must only be used for the purposes described in [Section 1.2 Areas of application](#). Any other use, or changes to the device, or opening of the device – even during mounting and installation – renders any guarantee claim against SICK AG null and void.

1.4 General safety instructions and protective measures



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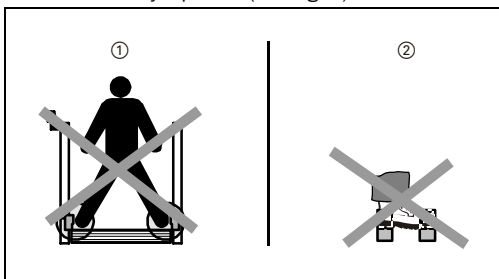
The following points must be observed to ensure correct use of the device:

1. Muting operation must never be used to convey persons into the hazardous area.
2. Connected resets must be positioned so that from them the user has a complete view of the hazardous area, and so that they cannot be operated from within the hazardous area.

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3. The muting sensors must be positioned so that, after interruption of the protective field, the hazardous area can only be reached when the dangerous condition has been eliminated. A prerequisite for this is that required safety distances as specified in EN 999 are employed.
4. Muting must only be activated for the period of time during which the object blocks access to the hazardous area
5. Muting must take place automatically, but must not be dependent on a single electrical signal.
6. The muting condition must be cancelled immediately after passage of the object so that the protective device becomes effective again.
7. The muting sensors must be positioned so that the muting function cannot be unintentionally activated by a person (see Fig. 2)

Fig. 2:
Arrangement of
muting sensors



① = It must not be possible to activate opposing sensors simultaneously.

② = It must not be possible to activate sensors mounted side by side simultaneously.

8. Before and during the activation of the override function (operating modes 6 to 9), it must be ensured that no persons are present in the danger area.

9. Before the activation of the override function, ensure that the equipment is in a proper state, especially the muting sensors (visual control).
10. Check the functional capability of the equipment and the muting arrangement when the activation of the override function is necessary several times in succession.
11. During long muting cycles > 24 h or long periods during which the machine is at a standstill, the correct function of the muting sensors must be checked.
12. On the UE49-2MM version of the device, the normally-closed contacts 31-32 must only be used for a status signal.

1.5 Environmentally-correct disposal

Unusable and irreparable units should always be disposed of in accordance with the valid waste-disposal regulations specific to the country concerned. SICK will be pleased to assist in disposing of units.

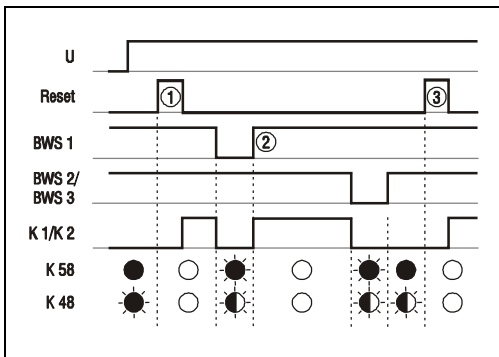
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Product Description

2.1 Automatic reset

Fig. 3: Behaviour with respect to time for an installation with two or three ESPE with automatic reset



U = supply voltage (terminals A 1/A 2)

Reset = reset button (S 43/S 44)

①, ③ = operation of reset button; ② = automatic reset

ESPE = electro-sensitive protective equipment

ESPE 1 (S 12/S 14) ESPE 2 (S 22/S 24)

ESPE 3 (S 32/S 34)

K 1/K 2 = machine released (13-14, 23-24, 33-34)

K 58 = lamp "Waiting for reset"

K 48 = muting lamp

● = illuminated ● (with lines) = blinks regularly

◐ (with lines) = blinks with fault code ○ = off

For further information on blink codes, see [Section 6.3 Faults and their correction](#).

See Appendix for terminal assignment.

With automatic reset, the safety outputs K 1 and K 2, for machine release, are activated automatically when the light path of ESPE 1 is cleared after an interruption ②.

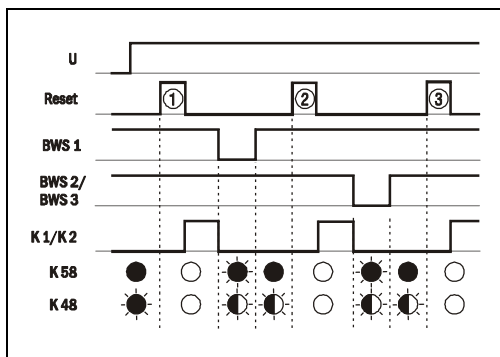
The prerequisite for automatic reset is that ESPE 2 and, where present, ESPE 3 are not interrupted. In the following cases, the reset button must be pressed although automatic reset is active:

- After restoration of the power supply ①
- After interruption of ESPE 2 or ESPE 3 ②
- For the enabling after a muting error.

The reset button must not be pressed for longer than 3 seconds.

2.2 Manual reset

Fig. 4: Behaviour with respect to time for an installation with two or three ESPE with manual reset



For legend, see Fig. 3

①, ②, ③ = operation of reset button

With manual reset, the safety outputs K 1 and K 2, for machine release, are activated when the light path of ESPE 1, ESPE 2 or ESPE 3 is clear again after an interruption and the reset button has been pressed (② and ③). The reset button must be pressed after restoration of the power supply ①.

Both conditions are indicated by the lamp "Waiting for reset" (connected at terminal 58) being continuously

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illuminated. The lamp blinks when a light beam of one of the ESPE is interrupted.

The reset button must not be pressed for longer than 3 seconds.

2.3 Muting operation

The muting function is employed when certain objects, e.g. material pallets, are permitted to pass into the hazardous area. For the duration of this transport through the safety light beams, it suppresses monitoring by the ESPE.

For the period during which the material is being transported, muting sensors detect its presence. By careful choice of the type of sensors and their arrangement, it is possible to distinguish between objects and persons. To this end, two or four muting sensors can be connected to the muting module.

As it interacts with the muting sensors and ESPE, the conveyed object produces a precisely-defined signal sequence as it passes the hazardous area. So as to ensure that the entry of a person to the ESPE will always result in the dangerous movement being switched off, it must not be possible for a person to generate the same signal sequence as a conveyed object.

Note The signal levels of the muting signals with respect to the muting sensor pairs are dependent on the selected operating mode: As the trigger for the muting state, the muting modules expect a 0 V signal in the operating modes 2 to 5 and a 24 V signal in the operating modes 6 to 9. For the planning and application of muting sensors, care is to be taken that the output signals of the muting sensors correspond to the operating mode for the intended operation.

During the muting condition, the muting lamp, which is monitored by the device, is illuminated. The maximum permitted duration of the muting condition can be set in steps between 10 seconds and 8 hours, or be completely deactivated (see [Section 5 Commissioning](#)).

2.3.1 Simultaneous monitoring

The simultaneous monitoring controls the muting operation by means of time interval monitoring of the individual muting sensor pairs. The monitoring times for the activation or deactivation of the muting sensor pairs are dependent on the operating mode selected.

*Tab. 1:
Simultaneous
monitoring for
various operating
modes*

Operating Modes 6 and 9	Operating Modes 2 to 5	Operating Modes 7 and 8
Activation of M 1 and M 2 in a time interval between 0 and 3 s	Activation of M 1 and M 2 in a time interval between 30 ms and 3 s	Without monitoring of simultaneity
Activation of M 3 and M 4 in a time interval between 0 and 3 s	Deactivation of M 3 and M 4 in a time interval between 30 ms and 3 s after activation	

2.3.2 Resetting after a sequence error

An error in the muting sequence or the exceeding of the allowable muting duration leads to the switching off of the release relay and to a corresponding error message (see [Section 6 Troubleshooting](#)). The clearing of the error and thereby the enabling of the ESPE is dependent on the operating mode selected:

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Tab. 2: Muting errors and enabling of the ESPE for various operating modes

Operating Modes 2 to 5	Operating Modes 6 to 9
Switch-off of the release relay and display of error 4. Clearing: All muting sensors must be inactive and ESPE must be free. Enable by the Reset button.	Switch-off of the release relay by interruption of the ESPE and then display of the "Override Required" message by fast blinking of the muting lamp. Clearing: Activation of the function override by one-time actuation of the reset button.

Note As opposed to enable by resetting, the system can be enabled with the override function also in the blocked condition.

The maximum number of override cycles is limited from 5 cycles to a maximum of 255 cycles. The available number is dependent on the muting time selected.

2.3.3 Arrangement of muting sensors



ATTENTION

The muting sensors must always be so arranged that material is recognised with certainty and a person cannot trigger the muting function. Besides the general safety instructions in Section 1.4, we recommend that the following principles are followed:

1. The material (pallet, conveyor belt, vehicle, ...) must be detected by the muting sensors over its entire length, i.e. there must be no interruption of the sensor output signals. This is particularly important when material is displaced on a pallet, or when the reference height for the sensors changes due to different goods being transported.

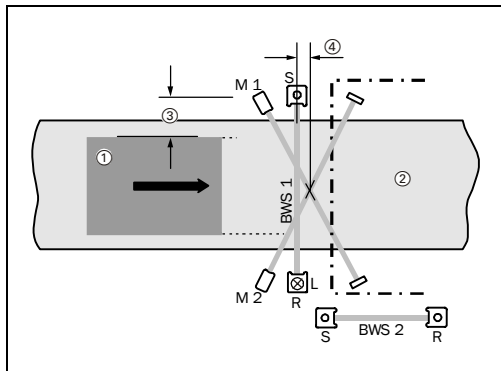
2. The entire arrangement of ESPE and muting sensors must be chosen so that, before new material reaches the first sensors, the previous material will have passed the last muting sensor, and so that all muting sensors are not activated.
3. The sensors should only detect the material, not transport aids (pallets or vehicles), so that a person cannot ride on a transport aid into the hazardous area.
4. Since internal evaluation of the sensor signals requires a certain amount of time, the material must not be detected too short a distance in front of the ESPE – a minimum distance must be maintained.

2.3.4 Use of two muting sensors

On a safety installation with two muting sensors, the muting sensors are installed so that their axes cross. In such a case, the distance between the edge of the object and the muting sensors ③ and between the safety light beam and the crossing point of the muting light beams ④ must be kept as small as possible (see Fig. 5).

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Fig. 5: Distances when installing two muting sensors



S = sender

R = receiver

L = muting lamp

M 1, M 2 = muting sensors

ESPE = electro-sensitive protective equipment

① = conveyed goods ② = hazardous area

③ = distance from object edge to muting sensor as small as possible

④ = distance from safety light beam to crossing point as small as possible

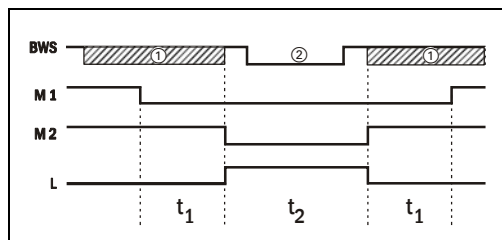
Table 3 and Fig. 6 show the signal sequence depending on the operating mode selected and the behaviour over time of an arrangement with two crossed muting sensors. In operating modes 2 to 5, the signal sequences are compulsory. In operating modes 6 to 9, the sequences of muting sensor 1 and muting sensor 2 are not compulsory. For operation with 2 sensors, the inputs of muting sensors M1 and M3, and those of M2 and M4 must be bridged.

Tab. 3: Signal sequence with two muting sensors

1	2	3	4	5	6
M 1 ↓	M 2 ↓	ESPE ↓	ESPE ↑	M 2 ↑	M 1 ↑

↓ = signal interrupted ↑ = signal present

Fig. 6:
Behaviour with respect to time for two crossed muting sensors (operating modes 2 and 3)



ESPE = electro-sensitive protective equipment

L = muting lamp

M 1, M 2 = muting sensors

① = monitored area

② = light path interrupted

Tab. 4:
Limits for time parameters with 2 muting sensors

Operating Modes 2 and 3

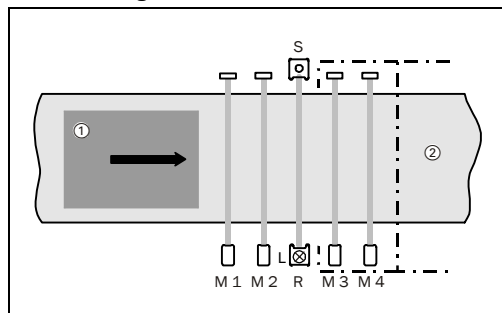
$$30 \text{ ms} \leq t_1 < 3 \text{ s}$$

$$t_2 < \text{muting-time setting}$$

2.3.5 Use of four muting sensors

The muting sensors are arranged one after the other as shown in Fig. 7:

Fig. 7:
Installation of four muting sensors



S = sender

R = receiver

L = muting lamp

M 1, M 2, M 3, M 4 = muting sensors

① = conveyed goods

② = hazardous area

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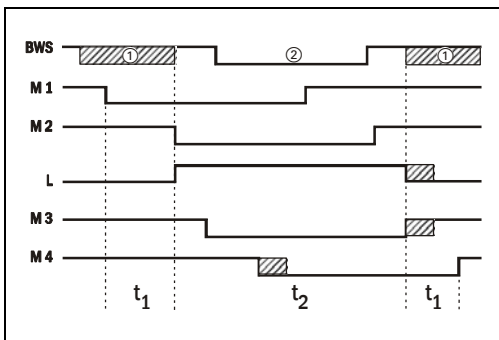
Table 5 as well as Figures 8 and 9 show the signal sequence as well as the signal sequence dependent on the operating mode selected and the behaviour over time of an arrangement with four muting sensors. In operating modes 2 to 5, the signal sequences are compulsory. In operating modes 6 to 9, the sequences of muting sensors 1 and 2 or those of muting sensors 3 and 4 are not compulsory.

Tab. 5: Signal sequence with four muting sensors

1	2	3	4	5
M 1 ↓	M 2 ↓	ESPE ↓	M 3 ↓	M 4 ↓
6	7	8	9	10
M 1 ↑	M 2 ↑	ESPE ↑	M 3 ↑	M 4 ↑

↓ = signal interrupted ↑ = signal present

Fig. 8: Behaviour with respect to time for four muting sensors (operating modes 4 and 5)



ESPE = electro-sensitive protective equipment

L = muting lamp

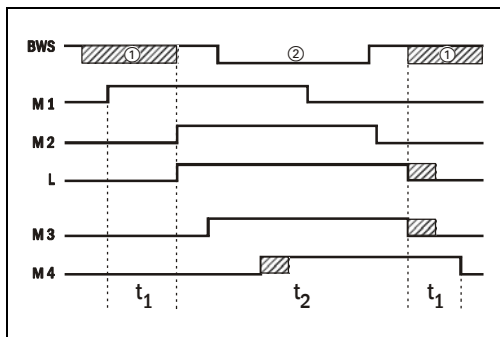
M 1, M 2, M 3, M 4 = muting sensors

① = monitored area ② = light path interrupted

Tab. 6:
Limits for time
parameters with
4 muting sensors

Operating Modes 4 and 5
$30 \text{ ms} \leq t_1 < 3 \text{ s}$
$t_2 < \text{muting-time setting}$

Fig. 9: Behaviour
with respect to
time for four
muting sensors
(operating
modes 6 and 9)



ESPE = electro-sensitive protective equipment

L = muting lamp

M 1, M 2, M 3, M 4 = muting sensors

① = monitored area

② = light path interrupted

Tab. 7:
Limits for time
parameters with
4 muting sensors

Operating Modes 6 and 9	Operating Modes 7 and 8
$t_1 < 3 \text{ s}$	$t_1 < \infty$
$t_2 < \text{muting-time setting}$	$t_2 < \text{muting-time setting}$

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2.3.6 Bi-directional muting with 4 sensors

Muting, independent of direction, which is effective both from M1 to M4 and from M4 to M1.



WARNING

- **With this type of four-sensor muting, 4 sensors are connected to one input. When making connections, it is important that the muting sensors M1 to M4 are always grouped together.**
- **With this type of four-sensor muting, it is essential that only "high-side" switching sensors are used. Make sure that "high" always overwrites a "low". This type of muting must only be used after thorough risk analysis/fault assessment.**

2.4 Display elements

2.4.1 LEDs

On the front panel, four LEDs indicate status and diagnosis information (see [Fig. 13](#)).

Tab. 8: Meaning of LEDs

Display	Meaning/function
LEDs K 1, K 2 green (lower lights)	Illuminate when current is applied to relays K 1 and K 2.
LED Run 1, yellow (upper lights)	Continuously illuminated when function is fault free. Blinks regularly and slowly, when unit is waiting for the reset button to be operated. Conditions for release of the relay were met when device was switched on. Operating modes 6 to 9: Blinks regularly and fast when the unit is waiting for the activation of the override function ("Override Required"). Special blinking sequences indicate function or system faults (see Section 6 Troubleshooting).
LED Run 2, yellow (upper lights)	Continuously illuminated when function is fault free Special blink sequences indicate function or system faults (see Section 6 Troubleshooting).

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2.4.2 Externally connected indication

Tab. 9: Meaning of externally connected indication

Display	Meaning/function
Signal output 48 (muting lamp)	<ul style="list-style-type: none"> - OFF: When the relay is activated in normal protective operation. - ON: When the muting function is activated (during the muting condition, it is interrupted by short test pulses). - BLINKS regularly and slowly, when unit is waiting for the reset button to be operated. Conditions for release of the relay were met when device was switched on. - BLINKS regularly and fast when the unit is waiting for the activation of the override function ("Override Required"). - Special blink sequences indicate function or system faults (see Section 6 Troubleshooting).
Signal output 58 (lamp "Waiting for reset")	<ul style="list-style-type: none"> - OFF: When the relay is activated in normal protective operation. - ON: When there is no longer a fault and the unit is waiting for the reset button to be operated. - BLINKS regularly if there is a fault (see Section 6 Troubleshooting).

3

Mounting



ATTENTION

Only for use in a control cabinet!

UE49 muting modules are only suitable for use installed in a control cabinet with at least enclosure rating IP 54.

They are mounted by clicking on to a TS 35 (DIN EN 60715) mounting rail.

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4

Electrical installation



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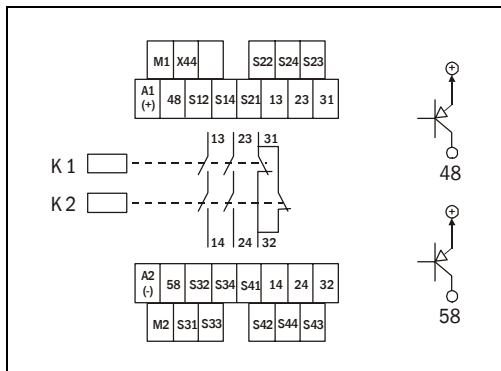
The following points must be observed when carrying out the electrical installation of the muting module:

- Make sure that no voltage is applied to the plant during electrical installation, otherwise the plant could start unintentionally while you are making electrical connections.
- If the muting module and the ESPE connected to it are supplied from different sources, a connection must be made between A 2(-) and the 0-V potential of the ESPE supply.
- If the ESPE used cannot detect cross-circuit and short-circuit a separate, protected cable run is essential.
- If ESPE 2 or ESPE 3 are not connected, the terminals S 21-S 22 and S 23-S 24 or S 31-S 32 and S 33-S 34 must be bridged.
- Wiring for contactor monitoring (signal contacts of the switching elements) must be carried out in the same control cabinet as the muting module.
- Bridging that may possibly be required is to be performed in the same control cabinet with the muting module.
- In the operating modes 2 to 9, the muting lamp monitors interruptions/shorts.
- If a capacitive or inductive load is connected in the release path, a protective circuit (spark suppression) must be provided. In such a case, it is important to take into account that, depending on the type of protective circuit, the reaction time may be extended.

- Outside the control cabinet, the wiring used for input and output signals must be installed in accordance with the specified category (EN 954), for example: protected installation, individual screened leads etc.
- The specifications given in [Section 7 Technical data](#) must be observed without fail.
- The electrical connections must be made as shown in the internal circuitry below

4.1 Version UE49-2MM and UE49-S001

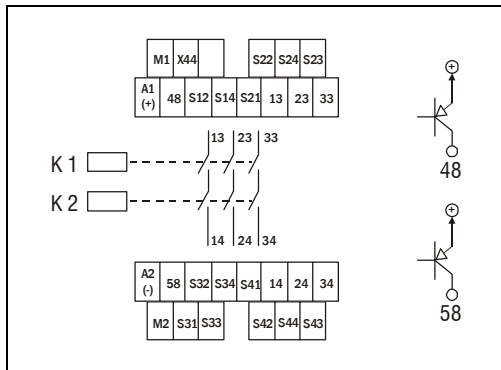
Fig. 10: Internal circuitry, version UE49-2MM and UE49-S001



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4.2 Version UE49-3MM and UE49-S002

Fig. 11: Internal circuitry, version UE49-3MM and UE49-S002



5

Commissioning



ATTENTION

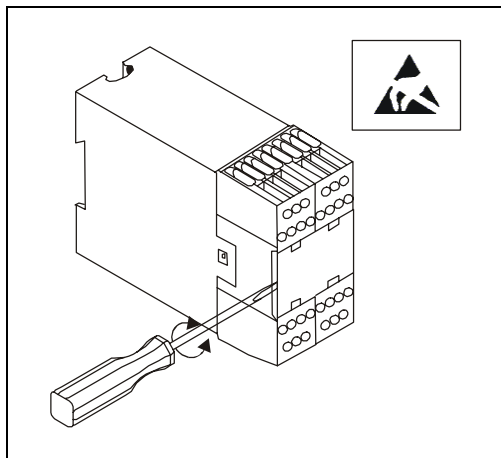
Take care when opening the unit!

The unit must only be opened by authorised, competent persons. Isolate the unit from the supply before opening it! Take precautions against electrostatic discharge! After closing the front plate, carry out a functional test as described in [Section 5.2 Testing instructions](#).

5.1 Function setting

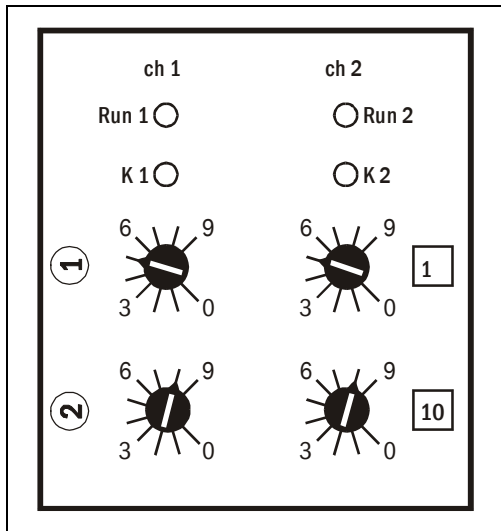
The functions of the muting module are set by means of four rotary switches located on the panel behind the front plate. To remove the front plate, insert a small screwdriver behind it and turn the screwdriver gently:

Fig. 12:
Removing the
front plate



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Fig. 13: Rotary switches behind the front plate



① = rotary switches (1) for type of operation

② = rotary switches (10) for muting time

The two rotary switches (1) are for setting the type of operation, and the two rotary switches (10) set the muting time that is to be monitored (during protective operation).

Both rotary switches (1) must be set to the same function and both the two rotary switches (10) set to the same time!

Table 7 shows an overview of the functions of the selectable operating modes 0 to 9 that are determined by the settings of the two rotary switches (1):

Tab. 10:
Functions of the individual operating modes that are selectable by the two rotary switches (1)

Operating modes (Position of rotary switch)	0	1	2	3	4	5	6	7	8 ²⁾	9 ²⁾
Protective operation without muting	X	X								
Muting, 2 sensors ¹⁾			X	X			X	X	X	X
Muting, 4 sensors					X	X	X	X	X	X
Bi-directional muting ⁴⁾							X	X		
Automatic reset	X		X		X					
Manual reset		X		X		X	X	X	X	X
Override function							X	X	X	X
Simultaneous monitoring			X	X	X	X	X			X
Low-active muting sensors ³⁾			X	X	X	X				
High-active muting sensors ³⁾							X	X	X	X

¹⁾ Muting with two sensors is possible in the operating modes 6 to 9 only when the M 1 signal is connected to the M 3 input and the M 2 signal is connected to the M 4. Allowed only by means of internal switching cabinet bridges!

²⁾ In the operating modes 8 and 9, the end of muting is not determined by the signal from M 3 and M 4 but by the signal of the ESPE.

³⁾ Switching level of muting sensors

⁴⁾ Bi-directional muting with simultaneity (see [Section 2.3.6 Bi-directional muting with 4 sensors](#))

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The maximum permissible muting time is set using the two rotary switches (10):

Tab. 11: The maximum permissible muting time and the corresponding number of override cycles is set using the rotary switches (10)

Position of rotary switch	Maximum permissible muting time	Maximum number of override cycles
0	10 seconds	255
1	20 seconds	180
2	30 seconds	120
3	1 minute	60
4	5 minutes	12
5	15 minutes	5
6	30 minutes	5
7	1 hour	5
8	8 hours	5
9	No time monitoring	5

Setting example:

Protective operation with 4 muting sensors, manual reset, maximum 30 seconds muting time.

- The two upper rotary switches (1) must be set to Position 5
- The two lower rotary switches (10) must be set to Position 2

5.2 Testing instructions



ATTENTION

Before initial commissioning, an information label must be installed on the machine to warn that regular testing is necessary.

5.2.1 Testing the protective device on the machine by a competent person before initial commissioning

1. The objective of testing before initial commissioning is to confirm compliance with the safety requirements in national/international regulations, in particular the Machinery or Work Equipment Directives.
2. Check the effectiveness of the protective device in all the machine's adjustable operating modes. Check the effectiveness of the protective device for all muting situations.
3. The operating personnel of a machine fitted with the protective device must, before they start to work on the machine, be instructed by a competent person appointed by the authority responsible for operation of the machine. This instruction is the responsibility of the authority responsible for operation of the machine.

5.2.2 Regular checking of the protective device by a competent person

1. Check the system in accordance with valid national regulations within the specified intervals.
2. After changes to the machine or protective device, the device must be checked in accordance with the above instructions for testing prior to initial commissioning.

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5.2.3 Regular checking of the protective device by authorised and instructed persons

1. Check all components of the protective system and connection cables for wear, damage and manipulation.
2. Check that the protective system is effective.

➤ **If a fault is found, stop the machine!**



ATTENTION

If a fault is discovered during checking or during operation, or if specified test results are not achieved, the machine must be shut down. The protective system must be checked by a competent person.

6 Troubleshooting

6.1 System faults

System faults block the muting module with the relay deactivated and signal outputs 48 and 58 switched off. Restarting is only possible by switching the unit off and then on again.

Fault codes are displayed by blink sequences of the yellow LEDs Run 1 and Run 2 in the upper part of the front panel (see [Fig. 13](#)). It is possible for each channel to show a different fault code.

6.2 Functional faults

Functional faults result in a defined switching off of the release relays. The release relays can be reactivated when the fault has been corrected and the system is reset.

Fault codes are displayed at the LED Run 1 and at signal output 48 (muting lamp) until the release relays are activated again. The LED Run 2 is then continuously illuminated.

In the operating modes 0 to 5, the "Waiting for Reset" lamp at signal output 58 blinks as long as the fault is present. It changes to continuously on when the fault has been corrected and the unit is waiting only for operation of the reset button for the release relays to be reactivated (continuous signal at signal output 58).

In the operating modes 6 to 9, the "Waiting for Reset" lamp at message output 58 also blinks and, in addition, the unit indicates "Override Required" by fast and regular blinking of the muting lamp and the Run 1 LED. After successful override, the muting lamp lights continuously and the "Waiting for Reset" lamp extinguishes.

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6.3 Faults and their correction

The table below describes possible system faults (blink codes 0, and 5 to 14) and functional faults (blink codes 1, 2 and 4):

Tab. 12: Blink codes for system and functional faults

No. *)	Description	Measures and instructions
0	Internal device fault (LEDs are continuously off)	If both LEDs remain off, the unit is defective and must be sent for repair.
1	Interference with the ESPE	<ol style="list-style-type: none"> 1. In manual operation: switch-off of the outputs after interruption of the ESPE. Wait for reset. 2. In automatic operation: the release relay is immediately reactivated when the light beam is cleared after an interruption of ESPE 1. 3. If less than the possible number of ESPE is connected, the unused inputs must be bridged to the corresponding test outputs (see the application examples in the Appendix).
2	Reset button fault	<ol style="list-style-type: none"> 1. The reset button must not be pressed when the unit is switched on. 2. The reset button must not be pressed for longer than 3 seconds.
3	Not used	

Tab. 12:
Blink codes for
system and
functional faults
(continued)

No. *)	Description	Measures and instructions
4	Muting fault (protective operation)	<ol style="list-style-type: none"> 1. The sequence of muting signals and the signal of the muted ESPE must correspond exactly to the muting sequence set at the device. 2. Muting signals are time-monitored – an anticipated signal change has failed to occur or was too late. 3. The muting lamp is defective or incorrectly connected. 4. Monitoring of the muting lamp is defective. Repair must be carried out by the manufacturer. 5. The entire muting procedure takes longer than the set maximum muting time (operating modes 2 to 5) 6. In the operating modes 6 to 9 with override function, a certain number of override cycles was exceeded. 7. The signal levels of the muting sensors do not match the configured operating mode.
5	Setting fault	<ol style="list-style-type: none"> 1. Rotary switch settings are not the same for both channels. 2. The selected setting is not admissible.

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Tab. 12:
Blink codes for
system and
functional faults
(continued)

No. *)	Description	Measures and instructions
6	Low voltage detected	Left LED blinks: Supply voltage below permissible level ($< \text{ca. } 0.85 V_S$)
	Overvoltage detected	Right LED blinks: Supply voltage too high ($> 1.15 V_S + 10\% \text{ ripple}$)
7	Input fault	1. Short circuit at input for reset button or machine contact (protective operation) 2. The two signals from a ESPE do not agree (short circuit, line breakage, or defective ESPE).
8	Fault at machine release relay K 1, K 2	Check switching and switched currents. Repair must be carried out by the manufacturer.
9 10 11	Internal device fault	Try to determine the events that led to this fault message, and provide this information to the manufacturer or supplier of the unit.
12 13 14	Internal device fault	Repair must be carried out by the manufacturer.

*) Number of consecutive blink impulses

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Technical specifications

Tab. 13:
Technical
specification for
UE49

General system data	
Protection class	Shielding to EN 50178
Power supply	
Output current path	
> 25 V AC/60 V DC	PELV at A 1/A 2
< 25 V AC/60 V DC	PELV or SELV at A 1/A 2
Category	Max. 4 to EN 954-1
Supply voltage V_S	24 V DC \pm 15 %
Power requirement	$P \leq 4$ W (signal outputs not loaded)
Residual ripple (within limits of V_S)	10 %
Electrical data, input	
Voltage at terminals S 12, S 14, S 22, S 24, S 32, S 34	Min. 16 V DC Max. 30 V DC
Reset time with monitored restarting (manual reset)	$t \leq 55$ ms
Reset time without monitored restarting (automatic reset)	$t \leq 65$ ms
Switching concurrency e.g. S 12/S 14	$\Delta t \leq 220$ ms
Cable length	Max. 100 m
Line resistance	Max. 25 Ω
Protection of unit	Internal with PTC
Input delay of muting sensors	UE49-2MM, UE49-3MM: 50 ms UE49-S001, UE49-S002: 20 ms

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Tab. 13:
Technical
specification
for UE49
(continued)

Electrical data, output	
Control voltage through terminals S 21, S 23, S 31, S 33, S 43, 48, 58	Min. $U_B = -1.5 \text{ V}$ Max. $U_B = -0.7 \text{ V}$
Control current through terminals S 12, S 14, S 22, S 24, S 32, S 34, S 44	$I \leq 8 \text{ mA}$
Signal outputs (terminals 48 and 58)	Transistor outputs, positive switching 24 V DC $I < 100 \text{ mA}$ continuous current $I < 400 \text{ mA}$ maximum current for 0.5 s
Output 48 (muting lamp)	Minimum-current monitoring: M 1, M 2 = 10 mA
Electrical data, relay output	
Relay contacts	UE49-3MM, UE49-S002: 3 NO UE49-2MM, UE49-S001: 2 NO, 1 NC The NC contacts must only be used as signal contacts.
Release delay time	$t \leq 70 \text{ ms}$
Type of contacts	Positively guided
Switching small loads	Switched voltage min. 100 mV
Thermal current	ITH = 5 A IS = 15 A (total current)
Output switching voltage of relay	AC: 250 V AC DC: see arcing limit curve, Section 9.1 Characteristic, Fig. 14

Tab. 13:
 Technical
 specification for
 UE49
 (continued)

Switching capacity to AC 15	For NO contact: AC 3 A / 230 V (EN 60947-5-1) For NC contact: AC 2 A / 230 V (EN 60947-5-1)
Switching capacity to DC 13	DC 8 A / 24 V at 0.1 Hz (EN 60947-5-1)
Permissible operating frequency	Max. 1200 switching cycles per second
Short-circuit resistance	Max. fuse: 6 A GL (EN 60947-5-1) Automatic circuit breaker: C 8 A
Mechanical service life	10 x 10 ⁶ switching cycles
Electrical service life	To AC 15 at 2 A, AC 230 V: 100 000 switching cycles (EN 60947-5-1)
Operating data	
Impulse withstand voltage	4 kV
Overvoltage category	III
Contamination rating	2
Enclosure rating to EN 60529	Housing: IP 40 Terminals: IP 20
Interference emission	EN 61000-6-2 EN 55011 Class B
Ambient operating temperature	0 °C ... +50 °C
Storage temperature	-20 °C ... +70 °C
Terminal cross-section	1 x 2.5 mm ² stranded with sleeve, or 1 x 4 mm ² solid, or 2 x 1.5 mm ² stranded with sleeve DIN 46 228-1/-2/-3/-4
Housing	Thermoplastic, flammability VO to UL 94

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*Tab. 13:
Technical
specification
for UE49
(continued)*

Environmental category	0/050/04 to EN 60068-1
Quick mounting	Mounting rail to DIN EN 60715
Net weight	320 g
Dimensions of unit	Width x height x depth: 45 mm x 74 mm x 121 mm

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Ordering data

Tab. 14:
Ordering data,
UE49-2MM and
UE49-3MM

UE49-2MM3D3	
Part number	6025098
Outputs	Two NO, one NC
Input delay	50 ms
UE49-3MM3D3	
Part number	6025099
Outputs	Three NO
Input delay	50 ms

Tab. 15:
Ordering data
UE49-S001 and
UE49-S002

UE49-S001	
Article number	6034109
Outputs	Two NO, one NC
Input delay	20 ms
UE49-S002	
Article number	6034110
Outputs	Three NO
Input delay	20 ms

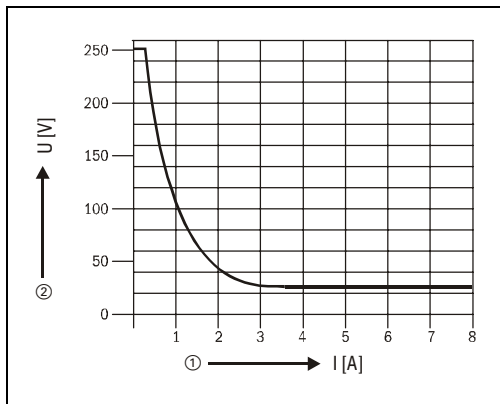
UE49

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Appendix

9.1 Characteristic

Fig. 14: Arcing
limit curve



① = switching current

② = switching voltage

Safe switching off with no standing arc below the curve,
max: 1 switching cycle per second

9.2 Application examples

The application examples in the fold-out section show possible configurations incorporating UE49 muting modules.

Figure titles of the application examples

- Fig. 15: Protective operation with three ESPE, manual or automatic reset
*) Optionally, the lamp can be connected to signal a fault message
- Fig. 16: Protective operation with two ESPE and two muting sensors (operating modes 2 and 3)
- Fig. 17: Protective operation with one ESPE and two muting sensors (operating modes 2 and 3)
- Fig. 18: Protective operation with one ESPE and two muting sensors (operating mode 6-9)
- Fig. 19: Protective operation with one ESPE and four muting sensors
- Fig. 20: Protective operation with one ESPE and muting via four muting contacts
*) When M 1, M 2, M 3, M 4 are not used, connect bridges within the control cabinet.
- Fig. 21: Protective operation with one ESPE and contactor monitoring X 44 = group terminal module
*) Optionally, the lamp can be connected to signal a fault message

Figure legends of the application examples

- S = sender R = receiver
M 1, M 2, M 3, M 4 = muting sensors
ESPE = electro-sensitive protective equipment
① = lamp "Waiting for reset"
② = safety outputs
③ = muting lamp

*) Instead of ESPE 2, and/or ESPE 3, a positively-guided safety switch with two-channel connection and a current draw of at least 1 mA may be used.

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Fig. 16

UE49

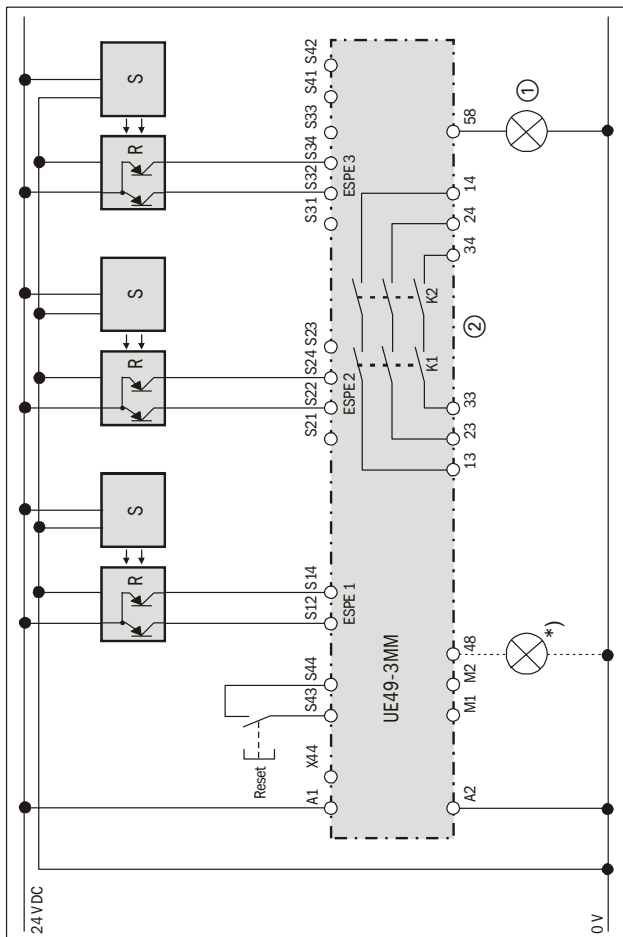


Fig. 15

UE49

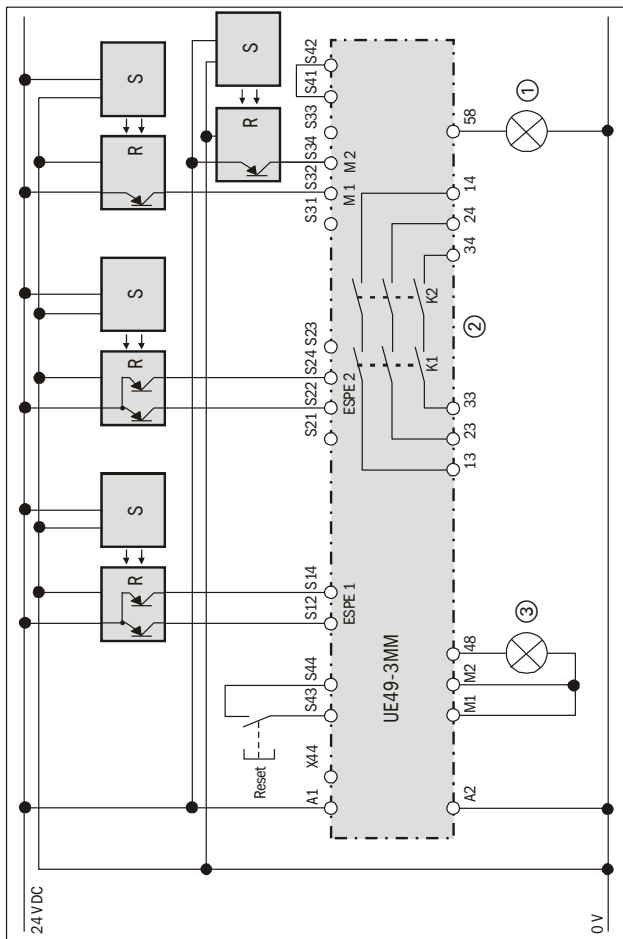


Fig. 18

UE49

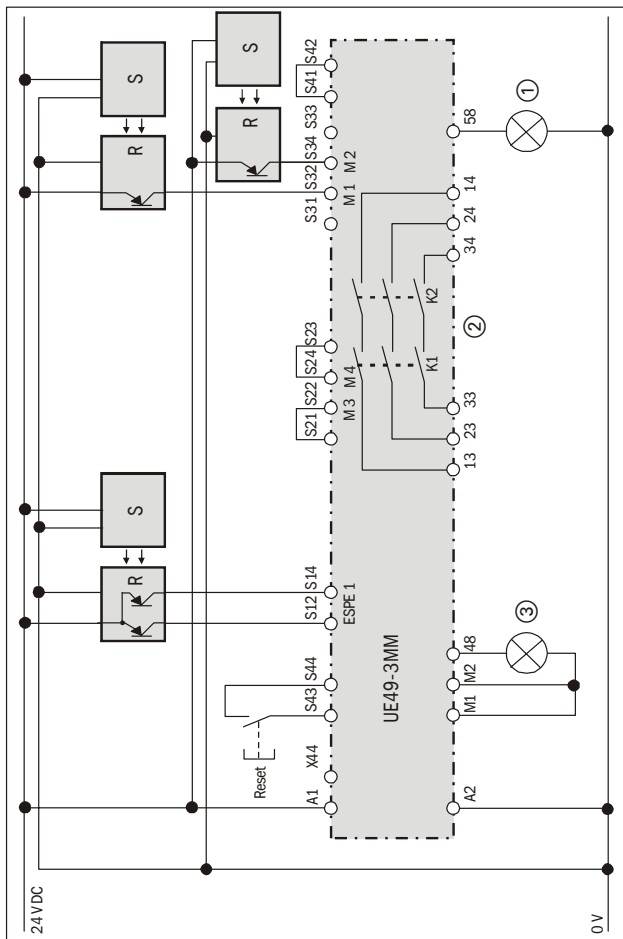


Fig. 17

UE49

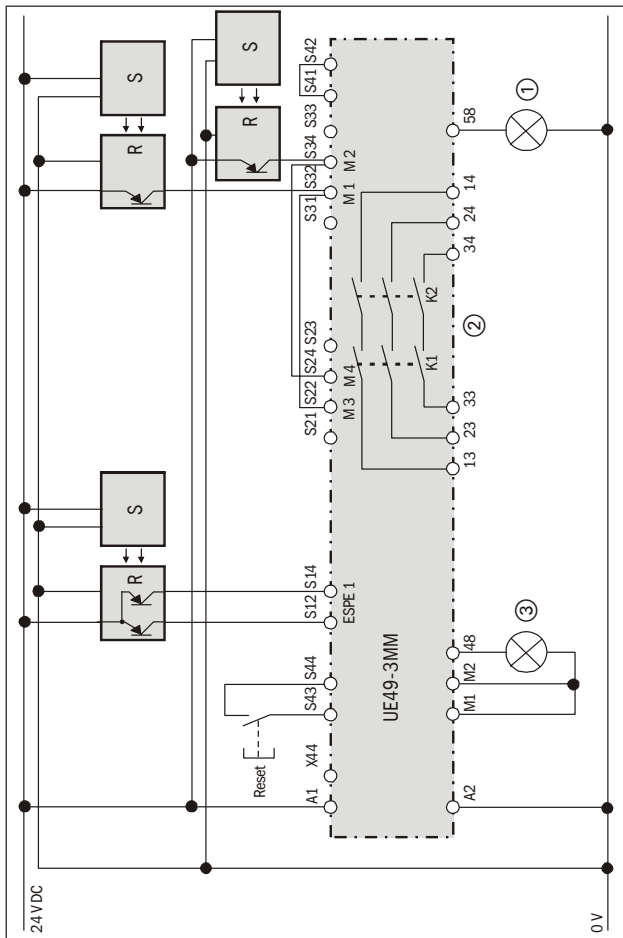


Fig. 18

UE49

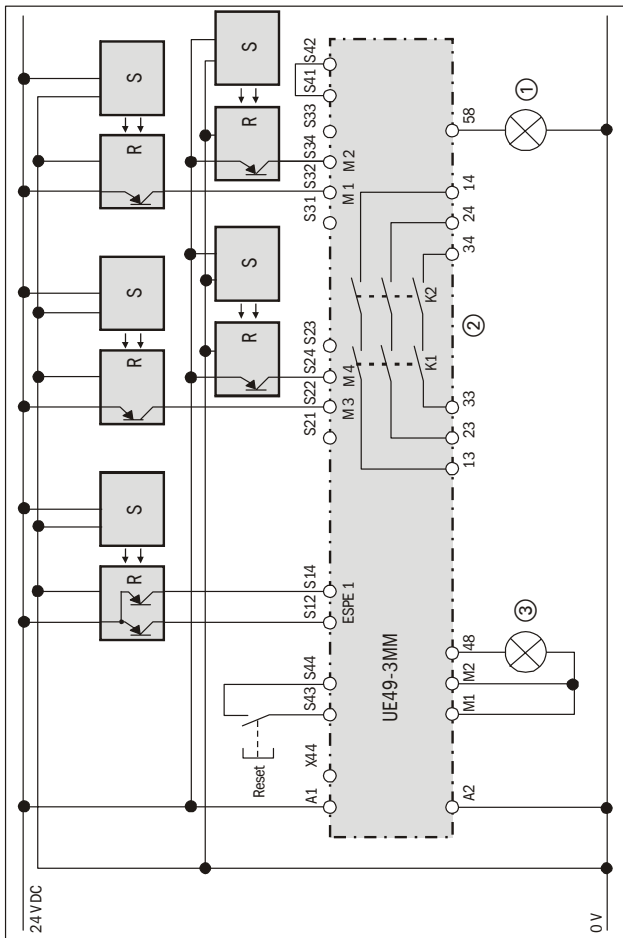
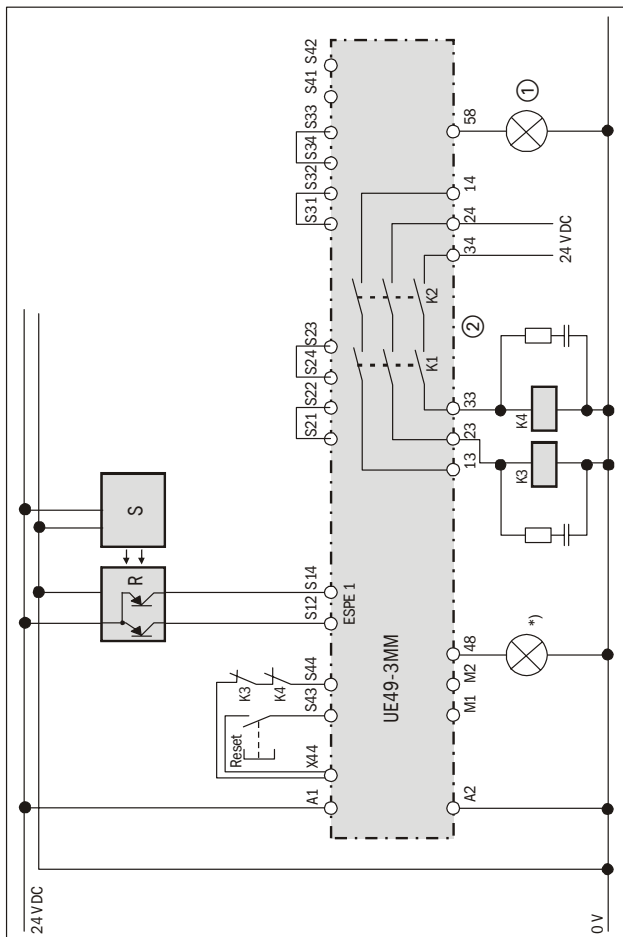


Fig. 20

UE49



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