



Safety Relay Module UE 43-3 MF range

1 Safety

The UE 43-3 MF Safety Relay modules meet safety-related requirements up to and including Safety Category 4 (EN 954).

1.1 Safety regulations

- Installation and electrical connection may only be carried out by technically qualified personnel.
- National and international legislative regulations apply to the use and installation of the Safety Relay and to the commissioning and any repetitive technical verification. These regulations embrace, in particular
 - the EU Directive 98/37 EG on machinery
 - the EU Directive 89/655 EWG on the use of work equipment
 - the EU Directive 73/23 EWG on low voltage
 - Safety regulations, as well as
 - accident prevention regulations, and
 - rules and guidelines on aspects of safety

Manufacturers and operators of the machine, to which safety devices are fitted, are responsible in ensuring that all applicable and current valid safety regulations and legislation are coordinated and observed in collaboration with the authorities concerned.

- The information and test specifications embodied in these Operating Instructions are to be unconditionally observed and applied at all times.
- Tests and checks are to be effected by technically competent personnel or by specialist personnel specifically authorised and appointed for this purpose, the tests and checks being documented on each occasion for the purposes of traceability.
- The Operating Instructions are to be made available to the operator of the machine to which the Safety Relay module is fitted. The operator of the machine must be trained by technically qualified personnel.
- The Operating Instructions are to be suitably archived for future reference and use!

1.2 Scope of application of the Safety Relay modules

1.2.1 UE 43-3 MF

The Safety Relay module UE 43-3 MF is for exclusive use on volt-free safety sensors, such as:

- Emergency-Stop-Switch (EN 418): single or dual-channel
- Safety interlocks (EN 1088): single- or dual-channel, such as safety doors.
- Safety circuits as per EN 60 204-1, such as with movable coverings.

1.3 Use in accordance with the regulations and conditions

If used in any other way than intended, or in the event that modifications have been made to the unit, or if the unit has been opened up - even during the course of assembly and installation - any claim made under the warranty upon SICK AG shall become null and void.

1.4 Environmentally compatible disposal

Unusable and irreparable units must always be disposed of in accordance with current waste disposal regulations specific to the country concerned. SICK is able to offer assistance regarding disposal of any units.

2 Product description

2.1 Construction and method of operation of the unit

Inputs of the Safety Relay modules UE 43-2 MF have been designed for connection to the respective safety sensors mentioned in the Section entitled "Scope of application". Two separate input circuits control the internal relays. The electrical output circuits serve as fail safe outputs. The alarm circuit is not a fail safe output circuit.

2.2 Functions of the units

With the input circuits closed, the output circuits are effectively opened, closing the signal circuit.

Manual resetting: Closing the input circuits does not effect an immediate closing of the output circuits or the opening of the signal circuit. This is not done until the reset button is pressed. Depending upon the switching arrangement, the resetting is accomplished with the descending or ascending edge of the pulse.

Automatic resetting: Closing the input circuits effects immediate closing of the output circuits and opening of the signal circuit. This function should be set by appropriate wiring of the relay.

Concurrence monitoring: Simultaneous activation of the input circuits is monitored. Only if the input circuit 2 closes no later than 0.5 sec after input circuit 1, will the output circuits close too. If input circuit 2 closes before input circuit 1, then no concurrence monitoring occurs, and the output circuits will not close (the signal circuit is thus closed).

Monitoring of the contactors: Contactor monitoring system monitors the contactors controlled by the output circuits (e.g. motor contactors). By wiring the normally-closed contacts of the contactors in series to the reset input, the output circuits only close (and the

signal circuit only opens) if all contactors are de-energised / opened. This monitoring system is only effective upon resetting.

Short circuit detection: a short circuit can be detected using dual-channel switching of the input circuits when different polarities are being switched.

2.3 Indicators

The LEDs, fitted in the cover of the unit, indicate the following conditions:

Description	Colour	Function
SUPPLY	Green	Supply voltage present
K 1	Green	Relay K 1 energised
K 2	Green	Relay K 2 energised

3 Assembly

Danger: Control cabinet installation only!

The UE 43-3 MF Safety Relay module is only suitable for installation into control cabinets having a minimum protective type of enclosure to Class IP 54.

Installation of the units is made by snap-clipping on to a TS 35 (EN 50 022) mounting rail.

4 Electrical installation

Danger: Switch off and electrically isolate the system from all supply voltages!

In order to prevent any inadvertent start up of the system or the creating of an electrical hazard, the system is to be switched off and electrically isolated from all voltage supplies.

Danger: Protection against electrocution to EN 50 178

In order to secure protection from electrocution in accordance with EN 50 178, observe the instructions given in the Technical Data.

Instructions

- Wiring of the monitoring system for monitoring the contactors (signal contacts of the relay module) is to be made in the same installation housing used for the Safety Switch unit.
- To prevent the final switching device contacts from welding, a fuse, rated to provide protection from short circuit to max. 6 A (Operation Class gG), is to be incorporated in the output circuitry (refer to Fig. 2, fuses F 2 / F 3 / F 4).
- In the case of switching capacitive or inductive loadings on output circuits, a spark suppression system should be used. It should be noted that some spark suppression systems can prolong the response time of the overall safety system.
- The cables for carrying the input and output signals are to be wired externally to the installation housing to correspond to the category of safety to be applied (EN 954). For example, protected wiring, single sheathed cable / wiring with a screen, etc.
- The details given in the *Technical Data* are to be observed unconditionally and without reservation.

4.1 Wiring of connections

A 1	Voltage supply (DC-version: + 24 V)
A 2	Voltage supply (DC-version: 0 V)
Y 11	+ 24 V DC (control voltage)
Y 21	+ 24 V DC (control voltage)
Y 13	Reset (Trailing edge pulse)
Y 14	Reset (Leading edge pulse)
Y 12	+ Input circuit 1 (K 2)
Y 31	+ Input circuit 2 (K 3)
Y 22	- Input circuit 2 (K 3)
13 - 14	Output circuit 1
23 - 24	Output circuit 2
33 - 34	Output circuit 3
41 - 42	Alarm circuit (non fail safe)

4.2 Operating modes

4.2.1 Single-channel operation

Wire links are to be made between Y 12 - Y 31 and Y 21 - Y 22. The safety sensor is connected between Y 11 and Y 12.

4.2.2 Dual-channel operation with cross connection detection system

A wire bridge is to be made between Y 11 - Y 31. The two volt free outputs of the safety sensor are to be connected between Y 11 - Y 12 or Y 21 - Y 22.

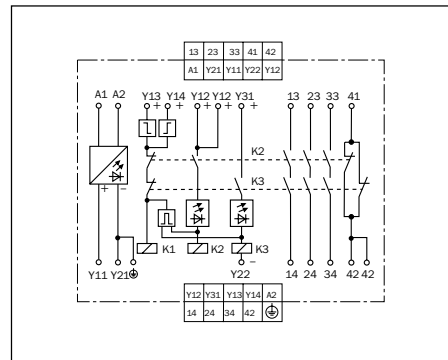


Fig. 1: Internal wiring UE 43-3

4.2.3 Resetting

Manual resetting

A reset button having a normally open contact is wired between contacts Y 12 and Y 13 (resetting with trailing edge pulse). The reset button having a normally closed contact is wired between contacts Y 12 and Y 14 (resetting with leading edge pulse). The reset button is to be installed outside the danger zone in such a manner that it cannot be activated from within the danger zone. In addition, the operator must have full visual command of the danger zone.

Automatic resetting

A wire link is to be made between Y 12 - Y 14.

4.2.4 Monitoring of the contactors

Connecting the normally closed contacts of the external relays in series with the reset button ensures static monitoring of the contactors.

5 Commissioning

Check the danger zone is clear!

Prior to commissioning, it must be ensured that the danger zone is free of personnel. The safety regulations and test instructions as described above are to be observed. The following functional tests are to be carried out during commissioning:

5.1 Manual reset, functional testing

After applying the supply voltage, the output circuits are opened. (LED SUPPLY indicator illuminates). If the connected sensor is not activated (i.e. the input circuits are closed), then the output circuits close, or the alarm circuit opens when the reset button is activated (LED K 2 and K 3 illuminate).

Activation of the sensor (opening of one or both input circuits) initiates the opening of both output circuits and the closing of the signal circuit (LED K 1 and K 2 indicator extinguished). By the closing of the input circuits and subsequent activation of the reset button, the output circuits close (and the signal circuit opens).

5.2 Automatic reset, functional testing

After applying the supply voltage (LED SUPPLY illuminates), the output circuits remain open (signal circuit closed) until the sensor closes the input circuits. The interface output circuits then close and

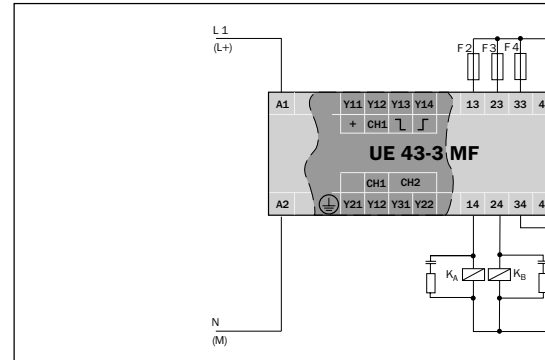


Fig. 2: Basic wiring: voltage supply, 3-channel output circuit (see *Technical Data*)

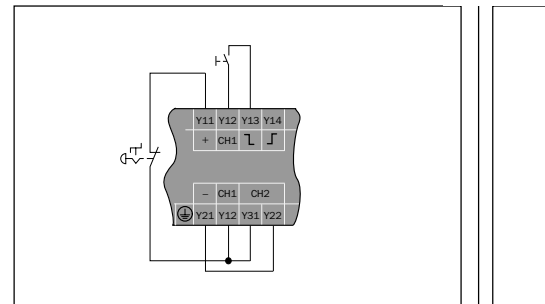


Fig. 3: Single-channel emergency-stop with manual reset

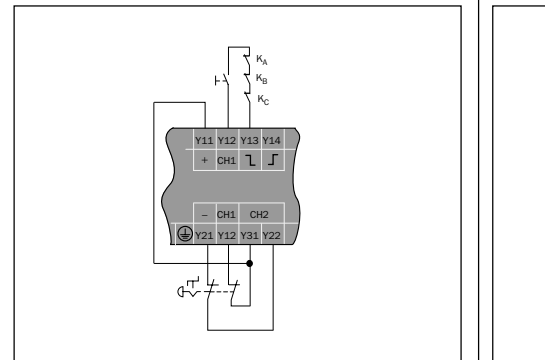


Fig. 5: Dual-channel emergency stop with crossmonitoring, manual reset, external device monitoring

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 230 V AC

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the signal circuit opens (LED K 2 and K 3 illuminate). Activation of the sensor (opening of one or both input circuits) opens the two output circuits and closes the signal circuit (LED K 2 and K 3 extinguished). After closing the input circuits both the output circuits close and the signal circuit opens.

5.3 Regular inspection / testing of the safety equipment by trained technical personnel

- Inspect / Test the system within the specified period in accordance with national applicable regulations!
- Following major modification work to the machine or the safety equipment, the system is to be tested as if being commissioned in accordance with the specification given above.

6 Maintenance

The UE 43-3 MF Safety Relay module operates consistently without the need for regular maintenance to be carried out.

7 Technical data

see Table

8 Ordering data

8.1 Ordering data

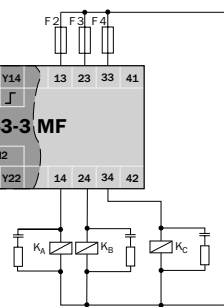
Version	Type	Order Ref. No.
With screw terminals		
24 V DC	UE 43-3 MF 2 D 3	6 024 897
24 V AC	UE 43-3 MF 2 A 0	6 024 898
115 V AC	UE 43-3 MF 2 A 1	6 024 899
120 V AC	UE 43-3 MF 2 A 2	6 024 900
230 V AC	UE 43-3 MF 2 A 3	6 024 901

9 Appendix

9.1 Approvals

BG, UL

9.2 Examples of wiring



see Technical Data)

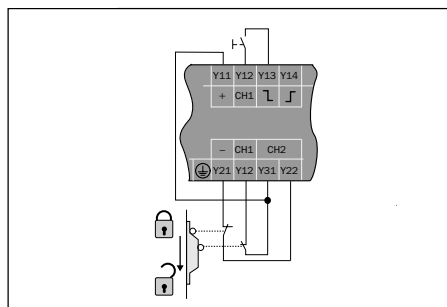


Fig. 4: Dual-channel protective door with monitoring system for cross-connection and synchronisation, manual reset

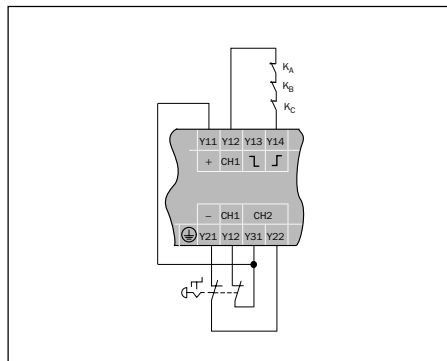


Fig. 6: Dual-channel emergency stop with crossmonitoring, automatic reset, external device monitoring

Technical Data

	min.	typ.	max.
General System Data			
Safety Classification (EN 50 178)	Protection against electrocution as per EN 50 178		
Voltage supply to A 1 / A 2 with AC units	PELV to A 1 / A 2 PELV or SELV to A 1 / A 2 Use terminal for non-fused earth conductor		
Output circuit > 25 V AC / 60 V DC			
Output circuit < 25 V AC / 60 V DC			
Voltage supply to A 1 / A 2 with AC units			
Safety category EN 954-1	4		
Supply voltage U _n			
UE 43-3 MF 2 D 3	20.4 V DC	24 V DC	26.4 V DC
UE 43-3 MF 2 A 0	20.4 V AC	24 V AC	26.4 V AC
UE 43-3 MF 2 A 1	97.75 V AC	115 V AC	126.5 V AC
UE 43-3 MF 2 A 2	102.0 V AC	120 V AC	132.0 V AC
UE 43-3 MF 2 A 3	195.5 V AC	230 V AC	253.0 V AC
Consumption AC	2.5 W / 3.2 VA		
Consumption DC	1.0 W		
AC Ripple during DC operation (within the limits of U _n)	2.4 V _{ss}		
Nominal frequency during AC operation	50 Hz	60 Hz	
Control voltage for Y 11 and Y 21			
Control voltage	24 V DC		
Control current	40 mA		
Short-circuits between Y 11 and A 2)	1000 mA		
Fuses			
AC units	short-circuit proof transformer		
DC units	PTC resistance		
Response time for cross connection (DC unit)	3 s		
Activation time upon detection of cross connection (DC unit)	2 s		
Electrical separation between A 1 / 2 and Y 11 - Y 21 - PE	AC-units only		
Input circuits (Y 12 and Y 31 - Y 22)			
Input current for Y 12 - Y 31	15 mA		
Peak input current / half life Y 12 - Y 31	360 mA / 4 ms		
Delay (response time of protective function)	50 ms		
Input current Y 13 - Y 14	40 mA		
Reset time			
Trailing edge (Y 13)	80 ms		
Leading edge (Y 14)	500 ms		
Synchronisation time	500 ms		
Activation period for reset button	50 ms		
Line resistance at inputs	< 70 Ohm		
Activation time after application of supply voltage (AC units)	100 ms		
Output circuits (13 - 14, 23 - 24, 31 - 32)			
Relay contacts	3 Output circuits (closers / make-contacts) 1 Alarm circuit (opener / break-contact)		
Contact type	positively guided		
Contact material	Silver alloy, gold-plated		
Load capability of contacts			
Switching voltage	10 V AC/DC	230 V AC / 30 V DC	
Switching current	10 mA	6 A	
Total switching current	18 A		
Application category to EN 60 947-5-1: 1991	AC-15 Ue 230 V AC, I _e 6 A (3600 c/h) DC-13 Ue 24 V DC, I _e 6 A (360 c/h) DC-13 Ue 24 V DC, I _e 3 A (3600 c/h)		
Permitted switching frequency	3600 Sch/h		
Service life, mechanical (switch clearance tolerances)	1 × 10 ⁷		
Electrical service life	2 × 10 ⁶		
Operational data			
Creepage and clearance distance between the electric circuits to DIN VDE 0110 Part 1:			
Measured transient/surge voltage (U _{max})	4 kV		
Overload voltage category	III		
Contamination rating of the unit (EN 50 178)			
external	3		
internal	2		
Measured voltage	300 V AC		
Test voltage U _{di} (50 Hz) EN 60 439-1	2.0 kV		
Type of protective enclosure			
Casing	IP 40		
Terminals	IP 20		
Interference emission to	EN 60 947-1 02/99		
Noise attenuation to	EN 60 947-1 02/99		
Ambient operating temperature	- 25 °C	+ 55 °C	
Storage temperature	- 25 °C	+ 75 °C	
Cross-sections of conductors			
Solid core wire (2x)	0.75 mm ²	2.5 mm ²	
Solid core wire (1x)	0.75 mm ²	2.5 mm ²	
Fine multi-stranded flex with terminal sleeves (2x)	0.5 mm ²	1.5 mm ²	
Fine multi-stranded flex with terminal sleeves (1x)	0.5 mm ²	1.5 mm ²	
Weight			
AC unit			0.36 kg
DC unit			0.30 kg

