SICK

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8 009 959/17-06-03 KW/KE
GA-0113
Printed in Germany (06.03)

Safety Relay
Series UE 23-2 MF

1 Safety

The UE 23-2 MF Safety Relay meets the safety-specific requirements up to Safety Category 4 (EN 954).

1.1 Safety regulations

- Assembly and electrical connection must only be carried out by competent persons.
- The national and international legal provisions apply to the use and installation of safety relays as well as to commissioning and routine technical checks, in particular
  - the Machinery Directive 98/37/EEC
  - the Provision and Use of Work Equipment Regulation 89/655/EEC
  - the Low Voltage Directive 73/23/EEC
  - the Safety Regulations, plus
  - the Accident Prevention Regulations and Safety Rules
- Manufacturers and users of the machine, on which the safety devices are used, are responsible for agreeing all current safety regulations and rules with their competent authority, and for observing them.
- The operating instructions are to be heeded and kept for future reference.
- The tests shall be carried out by competent persons or by persons specifically authorised and instructed, and they shall be documented so as they are traceable at any time.
- The operating instructions shall be made available to the user of the machine on which the safety relay is used. The user of the machine shall be instructed by competent persons.

1.2 Areas of application for the units

The Safety Relay UE 23-2 MF is used with the following safety sensors:

- Emergency Stop (EN 418): single- or dual-channel
- Safety interlocks (EN 1088): single- or dual-channel, such as safety doors
- Safety circuits according to EN 60 204-1, e. g. with moveable guards

1.3 Use in accordance with the regulations

For any other use, and in the event of modifications to the unit, or if the unit has been opened, even as part of assembly and installation, any warranty claims against SICK AG shall become null and void.

1.4 Environmentally correct disposal

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

2 Product Description

2.1 Construction and operation of the unit

The inputs of the UE 23-2 MF Safety Relay are prepared for connection to the respective safety sensors mentioned in the section entitled *Areas of application for the units*. The UE 23-2 MF is switched over its power supply. The two normally open contacts serve as safe outputs. The normally closed output is a non-failsafe output.

2.2 Functions of the unit

With the input circuits open, 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. The reset is accomplished with a trailing edge of the Reset signal.
Automatic resetting: Closing the input circuits effects the immediate closing of the output circuits and opens the alarm circuit. This function is accomplished by appropriate wiring of the switch.
Monitoring of the 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 both contactors are de-energised. This test is made by resetting the device.

2.3 Indicators

Description	Colour	Function
„SUPPLY“	Green	Supply voltage present
„K 1, K 2“	Green	Relay K 1 and K 2 energised

3 Assembly

Danger! Only use in a control cabinet!
The UE 23-2 MF Safety Relay is only suitable for assembling in control cabinets having a minimum protection of IP 54.
The units are installed by snapping onto a TS 35 (EN 50 022) mounting rail.

4 Electrical Installation

Danger! Isolate the system!
The system shall be isolated, to prevent any inadvertent system startup or electrical hazard.

Contact protection to EN 50 178
To ensure contact protection to EN 50 178, observe notes in *Technical Data*.

Instructions

- Wiring of the contactor monitoring (normally closed contacts of the switching elements) shall be performed in the same control cabinet.
- To prevent the contacts of the final switching relays welding, an overcurrent protection device(short-circuit protection (Operating Class gG)) should be selected according to the appropriate utilisation category and incorporated into the output paths (see Technical Data), Fig. 2, fuse F 2 / F 3. The fuse specification must be of a quick blow type.
- If capacitive or inductive loads are connected to the output circuits, a protective circuit (spark suppression) shall be provided. In doing so, it shall be observed that the response times increase depending on the type of protection.
- The wires for the input and output signals shall be routed outside the control cabinet, according to the safety category to be used (EN 954). For example, protected routing, single sheathed cable with screen etc.
- The details given in *Technical Data* must be observed.

4.1 Wiring of connections

A 1	Voltage supply (e. g. 24 V DC)
A 2	Voltage supply (e. g. 0 V DC)
Y 1 - Y 2	Automatic Reset
Y 1 - Y 3	Manual Reset
13 - 14	Output 1 (safe)
23 - 24	Output 2 (safe)
31 - 32	Signal circuit (non-failsafe)

4.2 Connection Options

4.2.1 Single-channel operation

The safety sensor is connected between L + and A 1 *(Fig. 3* and *4*).

4.2.2 Dual-channel operation

The two voltage-free switching elements of the safety sensor are to be connnected between L + & A 1, and A 2 & M respectively (*Fig. 5*).

4.2.3 Reset

Manual reset
A reset button **having a normally opened contact** is wired between contacts Y 1 and Y 3 (reset with a trailing edge pulse).
The reset button is to be installed outside the hazardous area in such a manner that it cannot be activated from within the hazardous area. In addition, the operator must have full visual command of the hazardous area.

Automatic reset
A wire link is to be made between Y 1 and Y 2.

4.2.4 Monitoring of the contactors

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

5 Commissioning

Safety ouputs and signal outputs have opposite logic. When the safety outputs close, the signal output opens.

Monitor the hazardous area!
Prior to commissioning, it must be ensured that nobody is in the hazardous area. The safety regulations and test notes, as described above, shall be observed.
The following functional tests are to be carried out during commissioning:

5.1 Manual reset, functional testing

With the safety sensor not in operation (e.g. Emergency Stop not pressed) and supply voltage applied, the unit is ready (“SUPPLY” LED illuminates). The output circuits close and the signal circuit opens when the reset button is activated (LED „K1, K2“ illuminates). Activation of the sensor initiates the opening of both interface output circuits (and the closing of the signal circuit): LED „K1, K2“ and LED „SUPPLY“ extinguish.

5.2 Automatic reset, functional testing

With the safety sensor not in operation (e. g. Emergency Stop not pressed) and supply voltage applied, the Output paths close and the signal path opens, resp. (“SUPPLY“ LED and “K1/K2“ LED illuminates).

Activation of the sensor initiates the opening of both interface output circuits (and the closing of the signal circuit): LED „K1, K2“ and LED „SUPPLY“ extinguish.

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

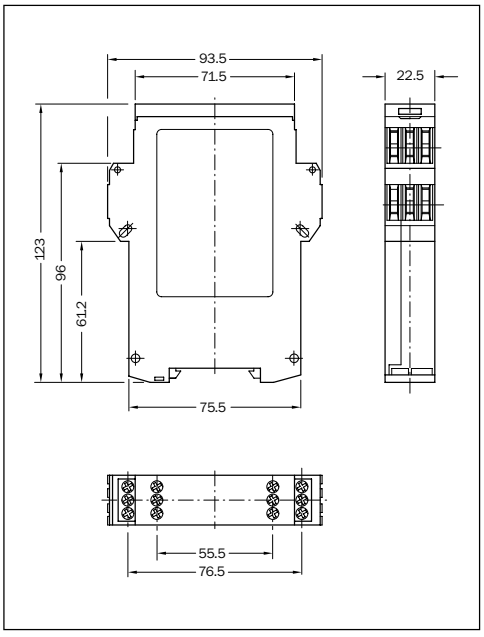
- Test the system within the specified period in accordance with current national regulations!
- Following major modifications to the machine or the safety device, the system shall be examined in accordance with the commissioning specification given above.

6 Maintenance

In operation, the UE UE 23-2 MF Safety Relay is maintenance-free.

7 Technical Data

Refer to *Table*



8 Ordering Data

Version	Type	Order No.
12 V DC screw terminals	UE 23-2 MF 2 D1	6 026 145
24 V DC screw terminals	UE 23-2 MF 2 D3	6 026 146
115-120 V AC screw terminals	UE 23-2 MF 2 A4	6 026 147
230 V AC screw terminals	UE 23-2 MF 2 A3	6 026 148

9 Appendix

9.1 Approvals

BG, UL, CSA, GS

9.2 Examples of circuits

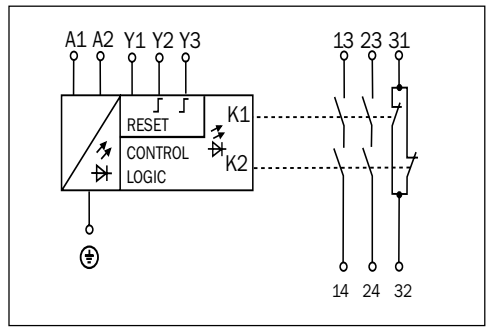


Fig. 1: Internal wiring UE 23-2 MF

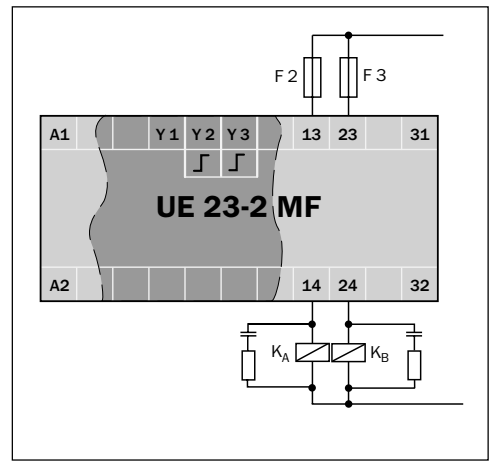


Fig. 2: Basic wiring: Voltage supply, dual-channel output circuit (refer to *Technical Data*)

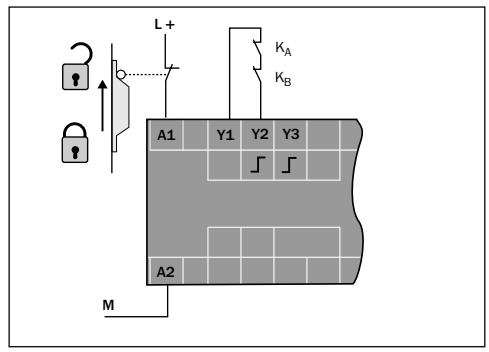


Fig. 3: Example for a single-channel safety door with automatic reset and external device monitoring

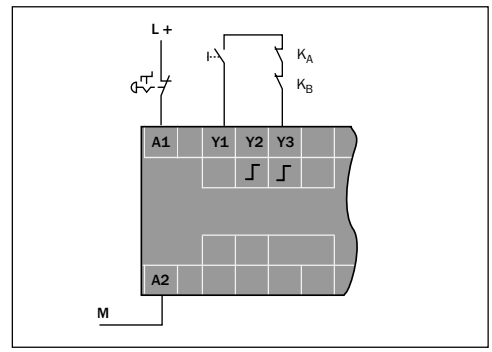


Fig. 4: Example of a single channel Emergency Stop switch with monitored reset and contactor control

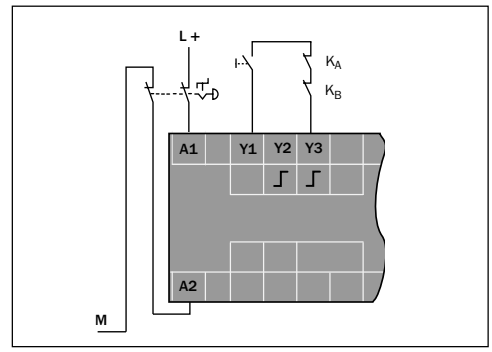


Fig. 5: Example of a Dual channel Emergency Stop switch with monitored reset and contactor control

Technical Data UE 23-2 MF

	min.	typ.	max.
General System Data			
Protection (EN 50 178) Safe separation to EN 50 178	between supply circuit/control circuit/output circuits and other output circuits		
Safety category EN 954-1			4
Supply voltage U_V (A 1 - A 2) UE 23-2 MF 2 D1 UE 23-2 MF 2 D2 UE 23-2 MF 2 A4 UE 23-2 MF 2 A3	 10,2 V DC 20,4 V DC 98 V AC 196 V AC	 12 V DC 24 V DC 115/120 V AC 230 V AC	 13,2 V DC 26,4 DC 132 V AC 253 V AC
Power consumption AC-Version DC-Version			 2.7 VA 1.6 W
AC Ripple during DC operation (within the limits of U_V)			2.4 V_{SS}
Nominal frequency, AC operation	50 Hz		60 Hz
Control voltage Y 1 - Y 2 - Y 3			
Control voltage			40 V DC
Control current			200 mA
Fuse	PTC-resistance		
Delay K 1 / K 2 (response time of protective function)		30 ms	80 ms
Reset time Manual reset Y 3 Automatic reset Y 2			 70 ms 600 ms
Electrical separation (only AC-Version)	yes		
Output circuits (13 - 14, 23 - 24, 31 - 32)			
Relay contacts	2 Output circuits (NO), safe 1 Signal circuit (NC), non-failsafe		
Contact type	positively guided		
Contact material	silver alloy; gold plated		
Load capability of contacts Switching voltage Switching current signal circuit Total current	 10 V AC/DC 10 mA		 230 V AC / 30 V DC 6 A 12 A
Application category to EN 60 947-5-1: 1991	AC-15 Ue 230 V AC, I_e 4 A (360 c/h) AC-15 Ue 230 V AC, I_e 3 A (3600 c/h) DC-13 Ue 24 V DC, I_e 4 A (360 c/h) DC-13 Ue 24 V DC, I_e 2,5 A (3600 c/h)		
Permitted switching frequency			3600 c/h
Mechanical service life (switching cycles)	1×10^7		
Electrical service life (depending on the load)	2×10^6		
Operational data			
Measured transient/surge voltage ($U_{Imp.}$)			4 kV
Overload voltage category			III
Contamination rating of the unit (EN 50 178) external internal			 3 2
Measured voltage			300 V AC
Test voltage U_{eff} (50 Hz) EN 60 439-1			2.0 kV
Type of protective enclosure Housing Terminals	 IP 40 IP 20		
Interference emission according to	EN 60 947-1 02/99		
Noise attenuation according to	EN 60 947-1 02/99		
Ambient operating temperature	– 25 °C		+ 55 °C
Storage temperature	– 25 °C		+ 75 °C
Cross-section of connections Solid core wire (2x, identical cross-section) Solid core wire (1x) Fine multi-stranded flex with terminal sleeves (2x, identical cross-section) Fine multi-stranded flex with terminal sleeves (1x)	 0.14 mm² 0.14 mm² 0.25 mm² 0.25 mm²		 0.75 mm² 2.5 mm² 0.5 mm² 2.5 mm²
Weight		270 g	