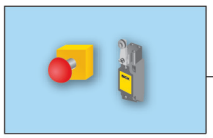
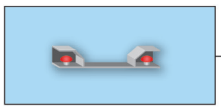
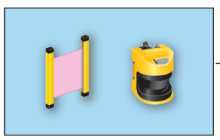
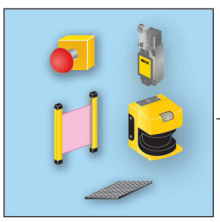
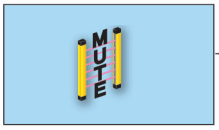
Selection table

Main Application	Mode	Features		UE-Unit	Page
	Single-channel Input		2/1	UE23-2MF	N-9
	Dual-channel Input	Stop Cat. 0	2/1	UE43-2MF	N-18
			3/1	UE43-3MF	N-23
			6/4	UE43-6MF	N-28
		Stop Cat. 1	3/0	UE45-3S1 2 3 1 Output up to 3 s Off-Delay	N-32
			3/0	UE45-3S1 2 30 1 Output up to 30 s Off-Delay	N-32
 1)	Dual-channel Input	Stop Cat. 0	3/0	UE44-3SL 2 3 1 Output up to 3 s On-Delay	N-37
			3/0	UE44-3SL 2 30 1 Output up to 30 s On-Delay	N-37
	Dual-channel Input	Stop Cat. 0	2/1	UE42-2HD	N-13
	Dual-channel Input	Stop Cat. 0	3/1	UE10-3OS	N-3
	Dual-channel Input	Stop Cat. 0	2/1	UE48-2OS	N-42
			3/0	UE48-3OS	N-48
	Muting sensor technology	Stop Cat. 0	2/1	UE49-2MM	N-53
			3/0	UE49-3MM	N-53

1) Safety switch with mechanical locking

Safety relays

Applications									Technical specifications				Type of unit			
Emergency stop	Safety switch	Two-hand controls Typ III C	Pressure sensitive mats (in 4-wire technology)	Optoelectronic protective device	Monitoring of simultaneous activation (s)	Muting	Manual reset (monitored)	Automatic reset	Category according to EN 954-1	Number of enable current paths/ signalling current paths	Input circuit (number of channels)	Housing width (mm)	Main unit	Expansion unit	Product	Page
–	–	–	–	✔	–	–	–	–	– [1]	3 / 1	1 or 2	22.5	✔	–	UE10-3OS	N-3
✔	✔	–	–	–	–	–	✔	✔	4 [2]	2 / 1	1	22.5	✔	–	UE23-2MF	N-9
–	✔	✔	–	–	0.5	–	–	✔	4	2 / 1	2	22.5	✔	–	UE42-2HD	N-13
✔	✔	–	–	–	–	–	✔	✔	4	2 / 1	1 or 2	22.5	✔	–	UE43-2MF	N-18
✔	✔	–	–	–	–	–	✔	✔	4	3 / 1	1 or 2	45.0	✔	–	UE43-3MF	N-23
✔	✔	–	–	–	–	–	✔	✔	4	6 / 4	1 or 2	90.0	✔	–	UE43-6MF	N-28
✔	✔	–	–	–	–	–	✔	✔	4	3 [3] / 0	1 or 2	22.5	✔	–	UE44-3SL	N-37
✔	✔	–	–	–	–	–	✔	✔	4	3 [4] / 0	1 or 2	22.5	✔	–	UE45-3S1	N-32
✔	✔	–	✔	✔	–	–	✔	✔	4	2 / 1	1 or 2	22.5	✔	–	UE48-2OS	N-42
✔	✔	–	✔	✔	–	–	✔	✔	4	3 / 0	1 or 2	22.5	✔	–	UE48-3OS	N-48
✔	✔	–	–	✔	0.22	✔	✔	✔	4	2 / 1 oder 3 / 0	6	45.0	✔	–	UE49	N-53
–	–	–	–	✔ [5]	–	–	✔	✔	2	2	2	100.2	✔	–	LE20	N-57
–	–	–	–	✔ [5]	3	✔	✔	✔	2	2	2	100.2	✔	–	LE20 Muting	N-64
–	–	–	–	–	–	–	–	–	– [6]	4 / 2	–	22.5	–	✔	UE10-4XT	N-71
–	–	–	–	–	–	–	–	–	– [6]	4 / 2 [7]	–	22.5	–	✔	UE11-4DX	N-74

[1] Same as protective device

[2] The wires for the input and output signals shall be routed outside the control cabinet according to the category to be used

[3] One normally open contact on-delayed

[4] One normally open contact off-delayed

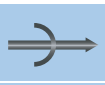
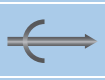
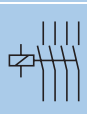
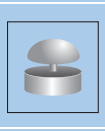
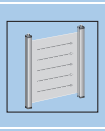
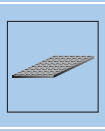
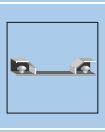
[5] Testable

[6] Same as main unit

[7] 4 normally open contacts / 2 normally closed contacts with off-delay function

N

Symbols

Function		Off-delay
		On-delay
		External device monitoring
		Expansion unit
Reset		Automatic reset
		Manual reset (monitored)
Applications		Safety switch
		Emergency stop
		Safety laser scanner
		Safety light curtain
		Pressure sensitive mat
		Two-hand controls
		Safety locking device, mechanically locked

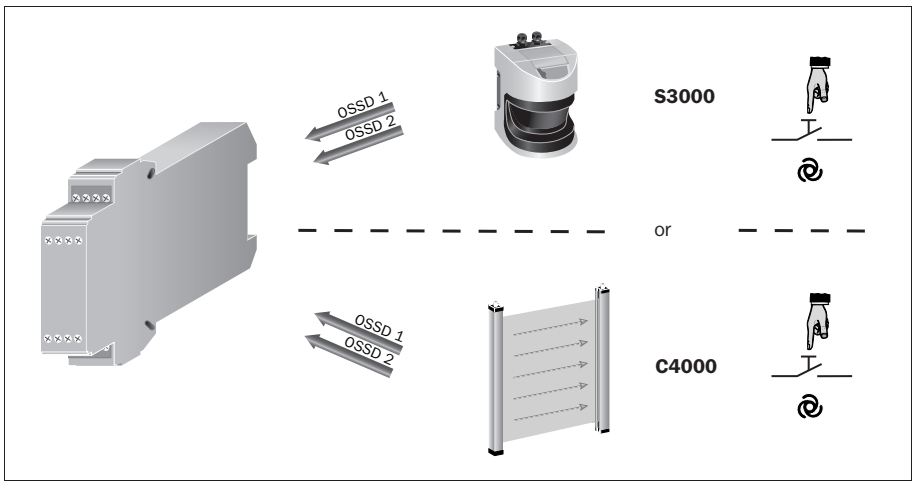
Overview of technical specifications

Category according to EN 954-1	4
Number of enable current paths/signalling current paths	3 / 1
Input circuit	Single- or dual-channel
Housing width	22.5 mm

Product description

- N/C contact for external device monitoring (EDM)
- 2 LEDs for:
  - Relay K1
  - Relay K2
- Increase in the number of outputs by way of the expansion units
  - UE10-4XT
  - UE11-4DX
- Available with plug-in terminals (key coded)

Applications



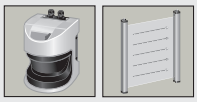
In-system added value

The safety relay UE10-3OS is a relay module for:

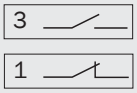
- Optoelectronic protective devices with monitored semiconductor outputs, integral external device monitoring (EDM) and restart interlock, such as
  - C4000
  - C/M2000
  - M4000
  - S3000
- Safety systems with monitored semiconductor outputs, integral external device monitoring and restart interlock, such as
  - LSI
  - LE20

Ordering information

Connection type	Type	Part number
Screw-type terminals	UE10-3OS2D0	6024917
Plug-in terminals	UE10-3OS3D0	6024918



- For safety laser scanners
- For safety light curtains



Further information	Page
→ Symbols	N-2
→ Technical specifications	N-4
→ Internal circuitry	N-5
→ Dimensional drawings	N-6
→ Connection diagrams	N-7
→ Expansion modules	N-71 N-74
→ Services	A-2

N

Detailed technical specifications

General system data

Voltage supply to B1 - B2, B3 - B4	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV

Inputs B1 ... B4

Activation time	40 ms
Switch-on voltage	24 V (15 V ... 30 V)
Switch-on current	500 mA

Output circuits (13 - 14, 23 - 24, 33 - 34, 41 - 42, Y1 - Y2)

Response time (K1 / K2)	20 ms
Relay contacts	3 N/O, enable current paths, safety relevant 1 N/C, signalling current path, not safety relevant 1 N/C, contactor monitoring
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage enable current paths/signalling current paths	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching voltage contactor monitoring	10 V DC ... 24 V DC
Switching current enable current paths	10 mA ... 6 A
Switching current signalling current paths	10 mA ... 2 A
Switching current contactor monitoring	10 mA ... 0.1 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (360 c/h) AC-15 U_e 230 V AC, I_e 3 A (3600 c/h) DC-13 U_e 24 V DC, I_e 4 A (360 c/h) DC-13 U_e 24 V DC, I_e 2.5 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

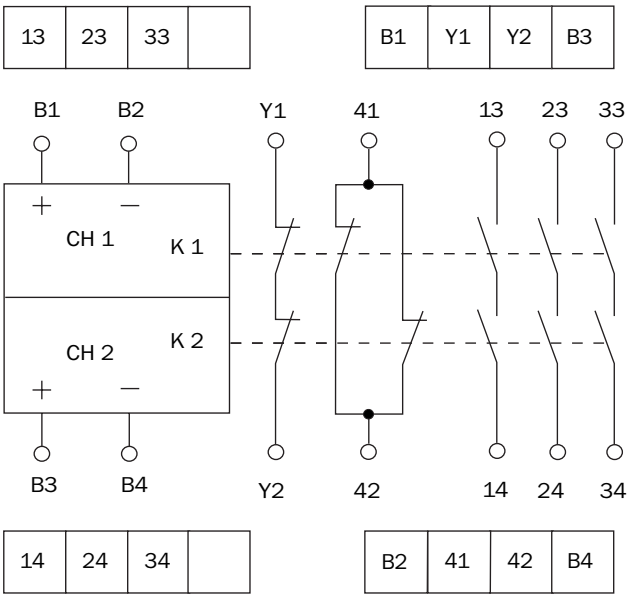
Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	DIN EN 61000-6-4
Screening against interference	DIN EN 61000-6-2
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

N

Internal circuitry



Function

If the semiconductor outputs of the installed safety device (e.g. C4000, S3000) are energised, then the safety output contacts will close.

When at least one of the semiconductor outputs of the safety device becomes de-energised, then the output contacts revert back to open circuit status.

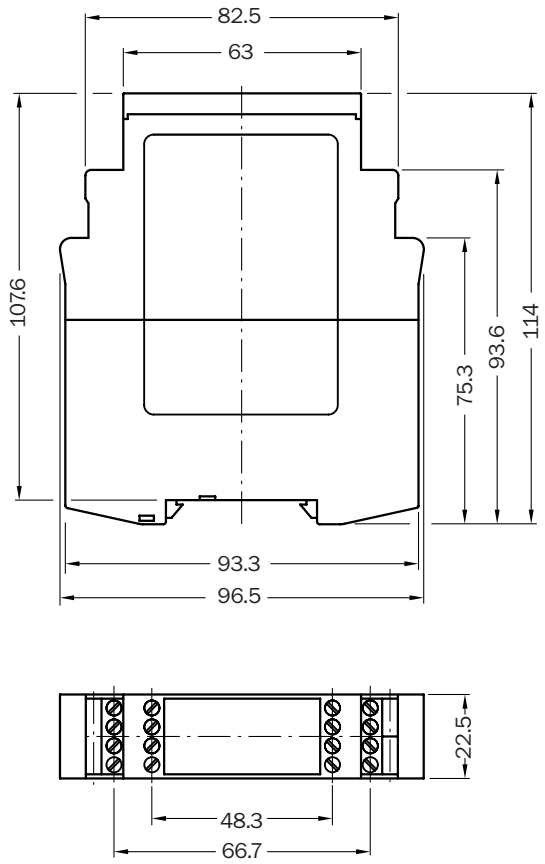
If restart interlock is needed, then this is achieved in the safety device, for example C4000 or S3000.

External device monitoring (EDM)

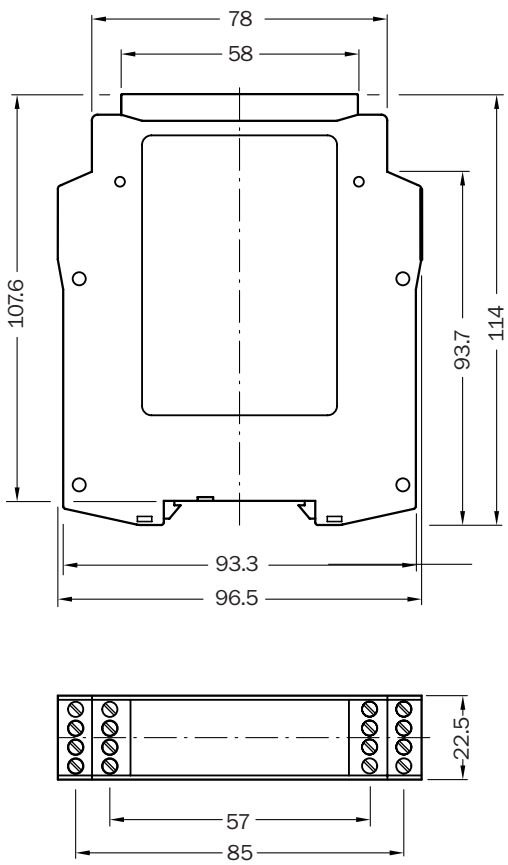
Category 3 or 4 according to EN 954-1 requires monitoring of contactors. This is provided in the connected protective device, for example in the C4000 or S3000. The normally closed contact (Y1 -Y2) in the UE10-3OS unit is, however, a part of this contactor monitoring system.

N

Dimensional drawings



Housing with screw-type terminals



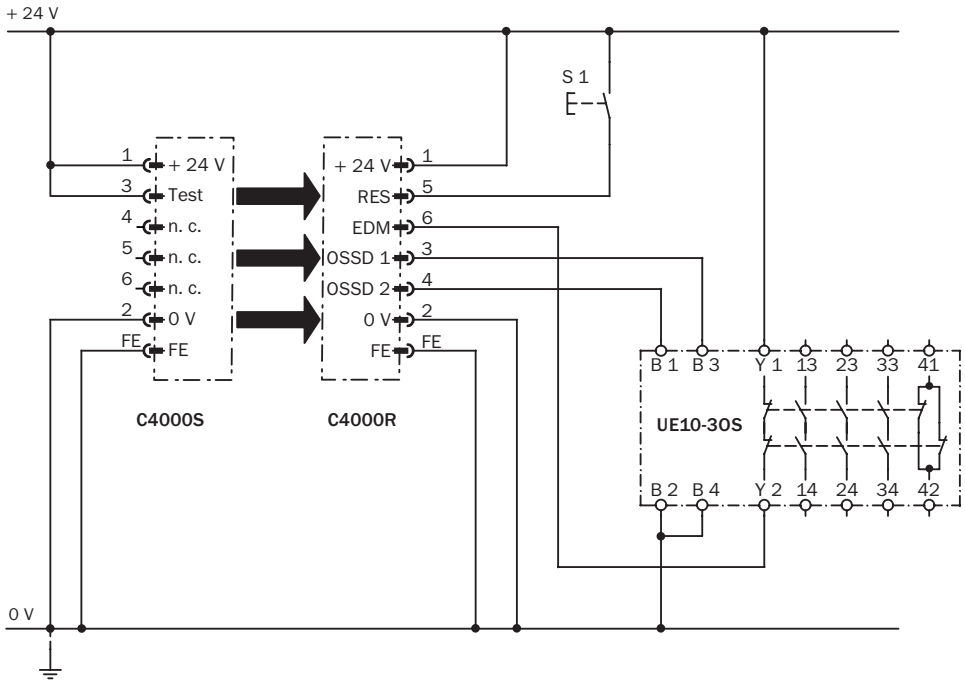
Housing with plug-in terminals

Dimensions in mm

N

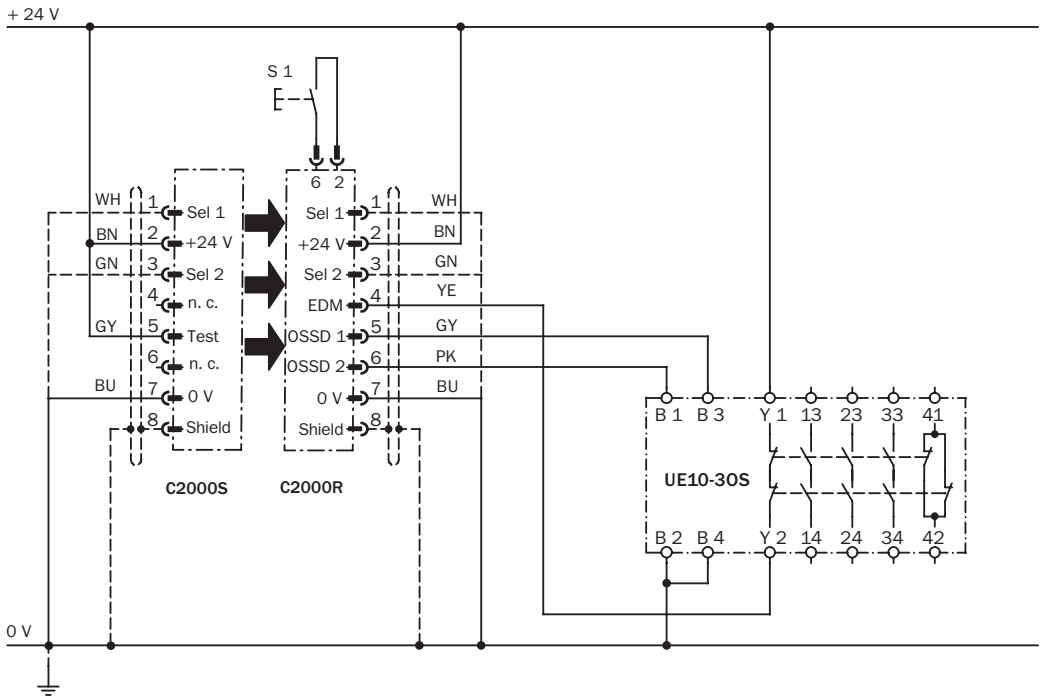
Connection diagrams

Safety light curtain C4000 Standard/Advanced connected to UE10-3OS safety relay



Operating mode: with manual reset and external device monitoring (active)

Safety light curtain C2000 (EDM/RES) connected to UE10-3OS safety relay

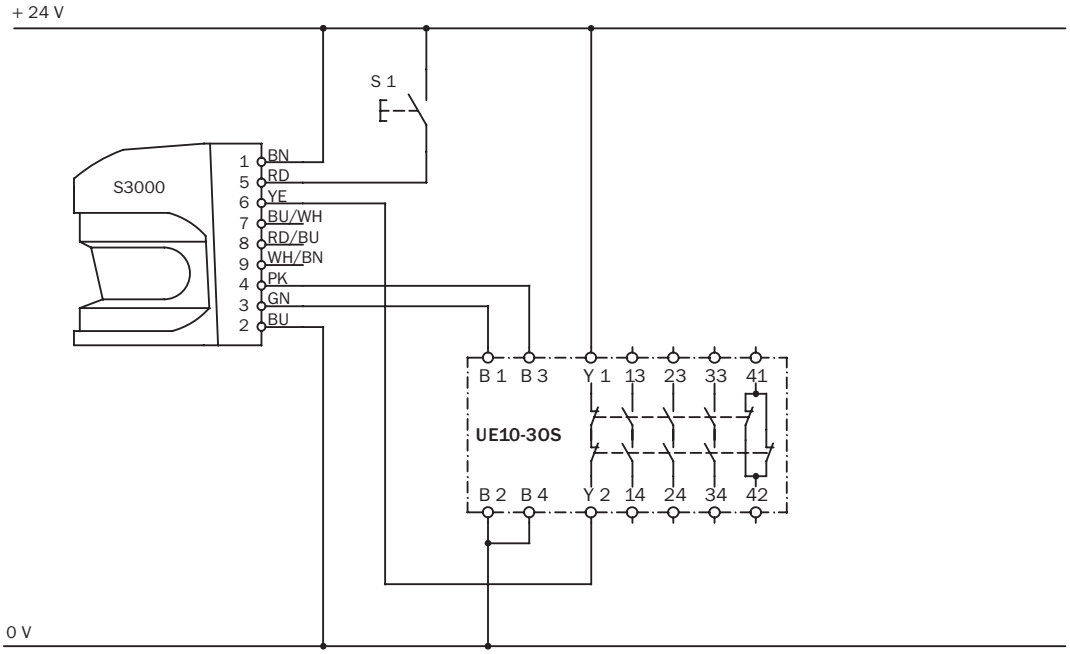


Operating mode: with manual reset and external device monitoring

Continued on next page

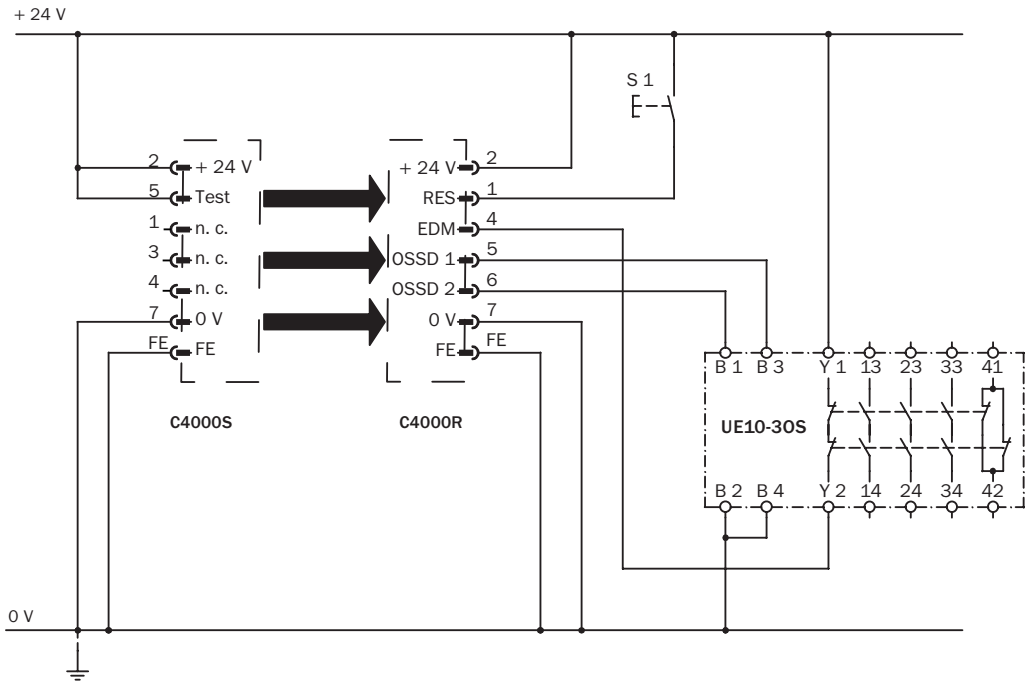
N

Safety laser scanner S3000 Standard connected to UE10-3OS safety relay



Operating mode: with manual reset and external device monitoring

Safety light curtain C4000 Micro connected to UE10-3OS safety relay



Operating mode: with manual reset and external device monitoring

N

Overview of technical specifications

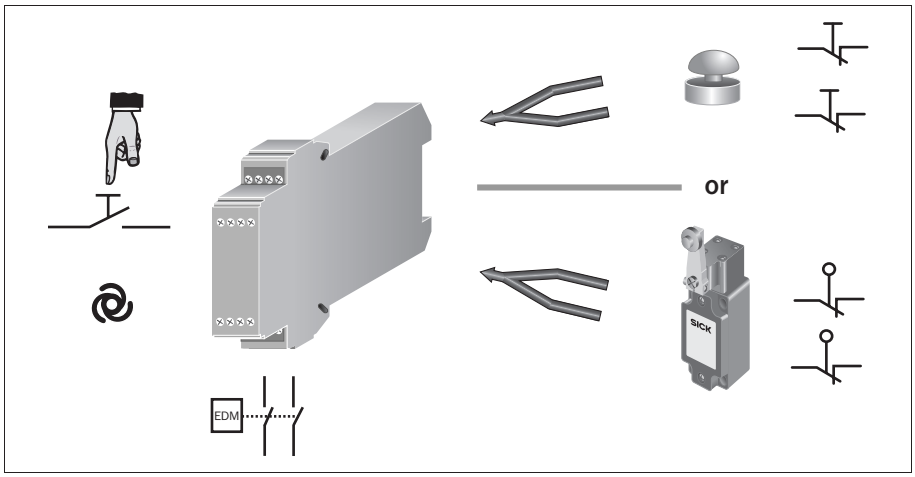
Category according to EN 954-1	4 [1]
Number of enable current paths/signalling current paths	2 / 1
Input circuit	Single-channel
Housing width	22.5 mm

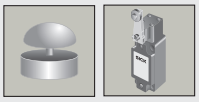
[1] The wires for the input and output signals shall be routed outside the control cabinet according to the category to be used.

Product description

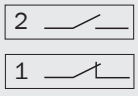
- 2 LEDs:
  - Supply voltage
  - Relay K1, K2
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion units
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)
- Screw-type terminals

Applications





- For emergency stops
- For safety switches



Ordering information

Supply voltage	Type	Part number
24 V DC	UE23-2MF2D3	6026146
115 ... 120 V AC	UE23-2MF2A4	6026147
230 V AC	UE23-2MF2A3	6026148

Further information	Page
→ Symbols	N-2
→ Technical specifications	N-10
→ Internal circuitry	N-11
→ Dimensional drawings	N-12
→ Expansion modules	N-71 N-74
→ Services	A-2

N

Detailed technical specifications

General system data

Protection class according to EN 50178	II, double insulated
Category according to EN 954-1	4 [1]
Stop category according to EN 60204	0
Supply voltage/Input circuit V_S (A1 - A2)	
UE23-2MF2D2	24 V DC (20.4 V DC ... 26.4 V DC)
UE23-2MF2A4	115/120 V AC (98 V AC ... 132 V AC)
UE23-2MF2A3	230 V AC (196 V AC ... 253 V AC)
Power consumption	
AC	2.7 VA
DC	1.6 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz

Control voltage (Y1 - Y2 - Y3)

Control voltage	40 V DC
Control current	200 mA
Fuse	PTC resistor
Reset time	
Manual (Y3)	70 ms
Automatic (Y2)	600 ms
Galvanic separation (only on AC units)	Yes

Output circuits (13 - 14, 23 - 24, 31 - 32)

Response time (K1 / K2)	30 ms ... 80 ms
Relay contacts	2 N/O, enable current paths, safety relevant 1 N/C, signalling current path, not safety relevant
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (360 c/h) AC-15 U_e 230 V AC, I_e 3 A (3600 c/h) DC-13 U_e 24 V DC, I_e 4 A (360 c/h) DC-13 U_e 24 V DC, I_e 2.5 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV

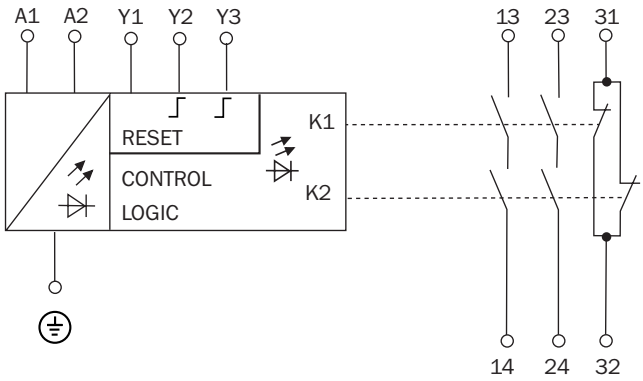
[1] The wires for the input and output signals shall be routed outside the control cabinet according to the category to be used

N

Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	DIN EN 61000-6-4
Screening against interference	DIN EN 61000-6-2
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.27 kg

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates), the normally open contacts remain in the open state. If the connected sensor is not activated (i.e. the input circuits are closed), then the normally open contacts close immediately in automatic Reset (LED “K1, K2“ illuminates). In the case of manual reset, this only occurs after pressing the reset button.

External device monitoring (EDM)

The unit can take over the function of external device monitoring. The contactor monitoring system monitors the external relays through their normally closed contacts.

Manual reset

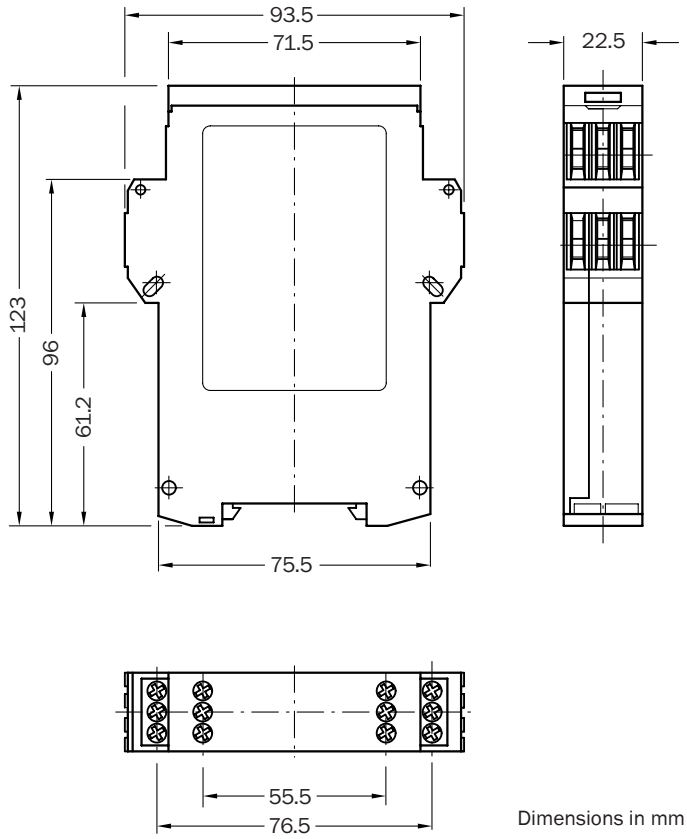
For manual resetting a pushbutton must be connected to terminals Y1 and Y3. This reset is monitored.

Automatic reset

For automatic resetting, Y1 - Y2 must be linked.

N

Dimensional drawings



Dimensions in mm

Housing with screw-type terminals

N

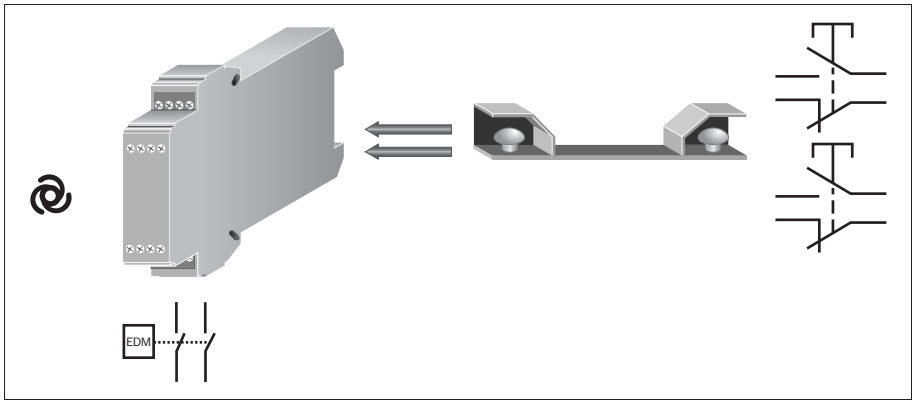
Overview of technical specifications

Category according to EN 954-1	4
Requirements in accordance with EN 574	Type III C
Number of enable current paths/signalling current paths	2 / 1
Input circuit	Dual-channel
Housing width	22.5 mm

Product description

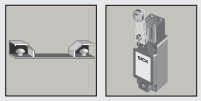
- 3 LEDs for:
  - Supply voltage
  - Relay K1
  - Relay K2
- Automatic start
- Increase in the number of outputs by way of the expansion unit UE10-4XT
- External device monitoring (EDM)
- Available with plug-in terminals (key coded)

Applications

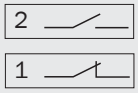


Ordering information

Connection type	Type	Part number
Screw-type terminals	UE42-2HD2D2	6024878
Plug-in terminals	UE42-2HD3D2	6024881



- For two-hand controls Typ III C in accordance with EN 574
- For safety switches



Further information	Page
→ Symbols	N-2
→ Technical specifications	N-14
→ Internal circuitry	N-15
→ Dimensional drawings	N-16
→ Connection diagrams	N-17
→ Expansion modules	N-71 N-74
→ Services	A-2

N

Detailed technical specifications

General system data

Voltage supply to A1 / A2	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Category according to EN 954-1	4
Supply voltage V_S (A1 / A2)	24 V AC/DC (20.4 V AC/DC ... 26.4 V AC/DC)
Power consumption	
AC	2.7 VA
DC	1.5 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz

Control voltage (Y11 - Y21)

Control voltage	24 V DC
Control current	60 mA
Short-circuit current between Y11 and A2	1000 mA
Fuse	PTC resistor
Galvanic separation between A1 / A2 and Y11 / Y21	No

Input circuits (Y12 - Y14 and Y22 - Y23)

Input current	60 mA
Reset time	40 ms
Activation time tolerance between the two start buttons	500 ms
Minimum switch-off time	250 ms
Line resistance at the input circuit	< 70 Ω
Switch-on time (upon applying the supply voltage)	250 ms

Output circuits (13 - 14, 23 - 24, 31 - 32)

Response time (K1 / K2)	50 ms
Relay contacts	2 N/O, enable current paths, safety relevant 1 N/C, signalling current path, not safety relevant
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (360 c/h) AC-15 U_e 230 V AC, I_e 3 A (3600 c/h) DC-13 U_e 24 V DC, I_e 4 A (360 c/h) DC-13 U_e 24 V DC, I_e 2.5 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

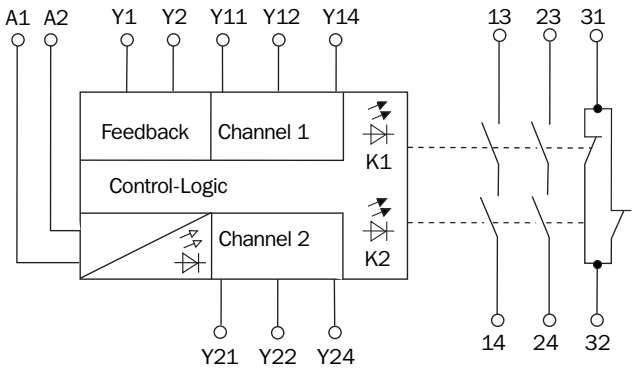
N

Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	EN 60947-1 02/99
Screening against interference	EN 60947-1 02/99
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

Internal circuitry



Function

The UE42-2HD unit corresponds to EN 574 Type III C. A prerequisite for the release of the outputs is that the two inputs (e.g. two-hand pushbuttons) are actuated within 0.5 sec.

After applying the supply voltage to the terminals A1 - A2 the LED SUPPLY illuminates to indicate that electrical power is present. Pressing the two-hand pushbuttons S1 and S2 at the same time (see page N-17 – connection diagrams) closes the two normally open contacts. Releasing even one of the buttons will cause the circuits to adopt the open circuit status.

A renewed attempt to initiate starting is only possible if both start buttons are set to their nominal start position (for two-hand pushbuttons units: if both have been released) and the normally closed contact is closed.

External device monitoring (EDM)

The UE42-2HD can take over the function of external device monitoring. The normally closed contacts of the external relays are switched in series, connected to the terminals Y1 - Y2.

Automatic start

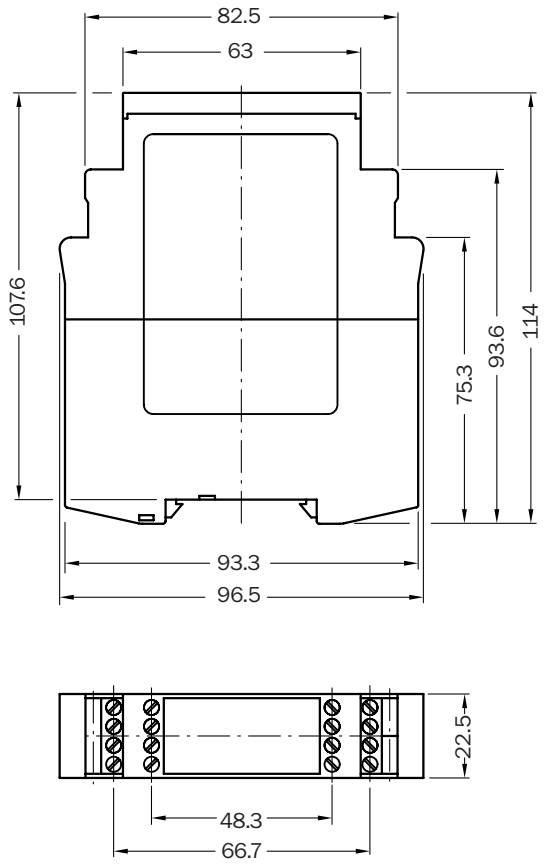
The UE42-2HD has an automatic start facility.

Monitoring of simultaneous activation

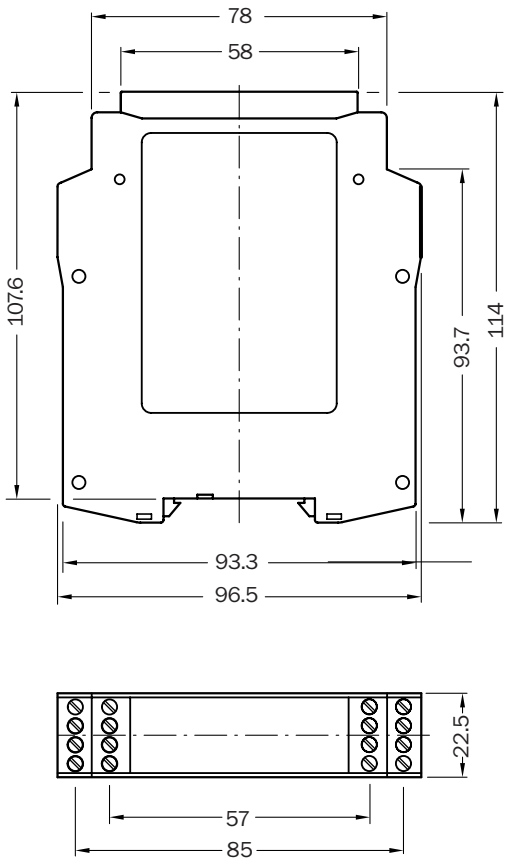
The pressing of the start buttons at the same time is monitored. Only when both start buttons are activated within 0.5 sec do normally open contacts close and the normally closed contact opens.

N

Dimensional drawings



Housing with screw-type terminals



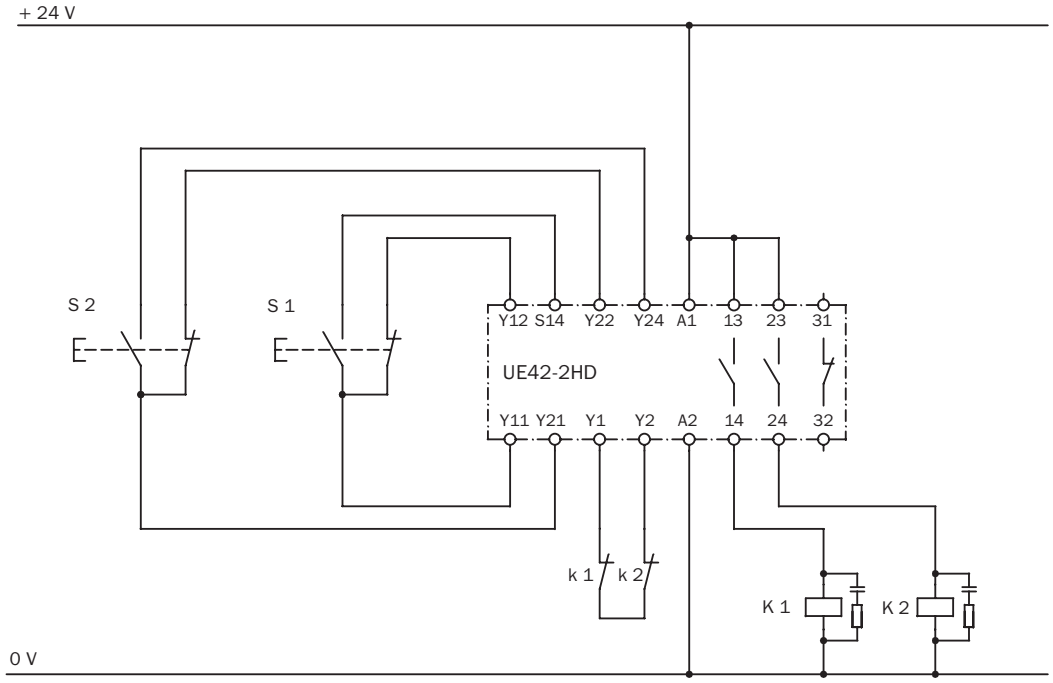
Housing with plug-in terminals

Dimensions in mm

N

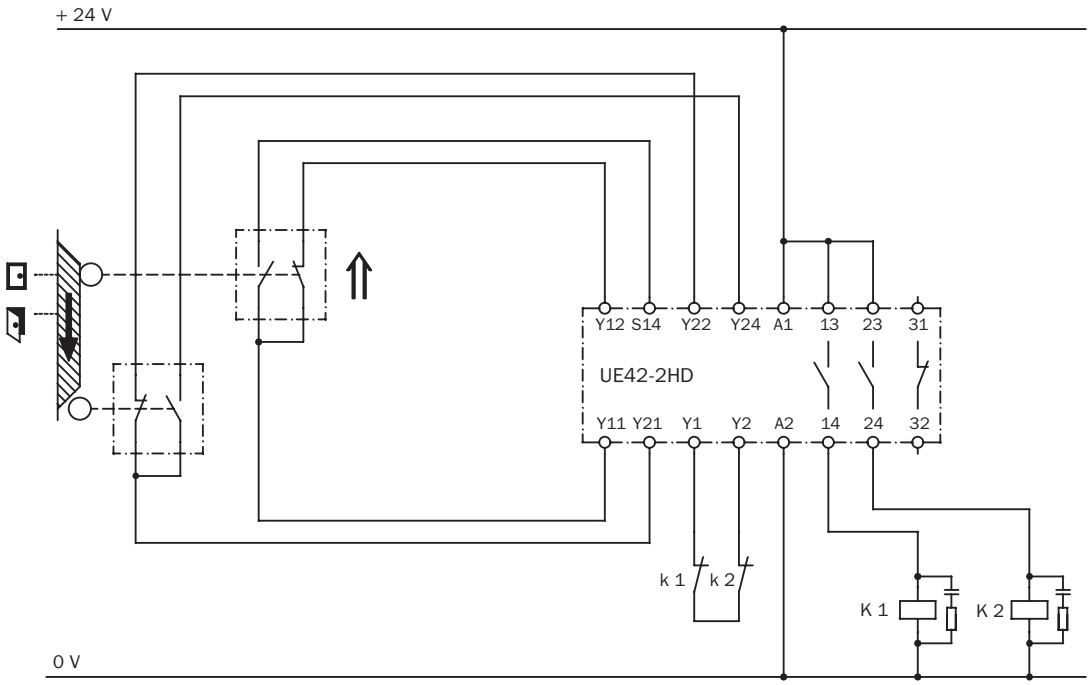
Connection diagrams

Two-hand control with UE42-2HD safety relay, dual-channel system



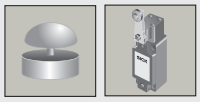
Operating mode: with automatic start and external device monitoring (EDM)

Two saftey switches connected to UE42-2HD safety relay, dual-channel system

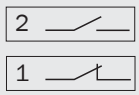


Operating mode: with automatic reset and external device monitoring (EDM)

N



- For emergency stops
- For safety switches



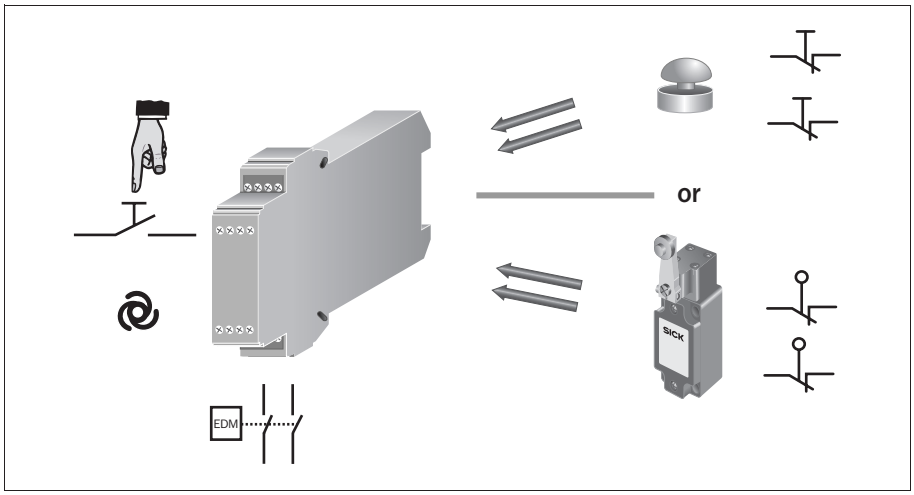
Overview of technical specifications

Category according to EN 954-1	4
Number of enable current paths/signalling current paths	2 / 1
Input circuit	Dual-channel
Housing width	22.5 mm

Product description

- Cross circuit detection on dual-channel wired systems
- 3 LEDs:
  - Supply voltage
  - Relay K1
  - Relay K2
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion units
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)
- Available with plug-in terminals (key coded)

Applications



Ordering information

Connection type	Type	Part number
Screw-type terminals	UE43-2MF2D2	6024893
Plug-in terminals	UE43-2MF3D2	6024894

N

Detailed technical specifications

General system data

Voltage supply to A1 / A2	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Category according to EN 954	4
Stop category according to EN 60204	0
Supply voltage V_S (A1 / A2)	24 V AC/DC (20.4 V AC/DC ... 26.4 V AC/DC)
Power consumption	
AC	4.6 VA
DC	2.1 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz

Control voltage S33 / S11 and S21

Control voltage	17.4 V DC ... 22 V DC
Control current	40 mA ... 100 mA
Short-circuit current between S33 / S11 and S21	2000 mA
Fuse	PTC resistor
Reaction time by cross connection	3 s
Activation time upon detection of cross connection	3 s
Galvanic separation between A1 / A2 and S21, S11, S33	No

Input circuits (S12, S31, S22, S34, S35)

Input current S12 and S31 / S22	40 mA ... 100 mA
Input current S34 / S35	5 mA ... 50 mA
Reset time	
Manual (S34)	40 ms
Automatic (S35)	200 ms ... 500 ms
Activation time of reset button	50 ms
Line resistance at the input circuit	< 35 Ω
Synchronisation time	500 ms

Output circuits (13 - 14, 23 - 24, 31 - 32)

Response time (K1 / K2)	25 ms
Minimum time outputs will stay off	40 ms
Relay contacts	2 N/O, enable current paths, safety relevant 1 N/C, signalling current path, not safety relevant
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (360 c/h) AC-15 U_e 230 V AC, I_e 3 A (3600 c/h) DC-13 U_e 24 V DC, I_e 4 A (360 c/h) DC-13 U_e 24 V DC, I_e 2.5 A (3600 c/h)
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	1 x 10^5 switching cycles

Continued on next page

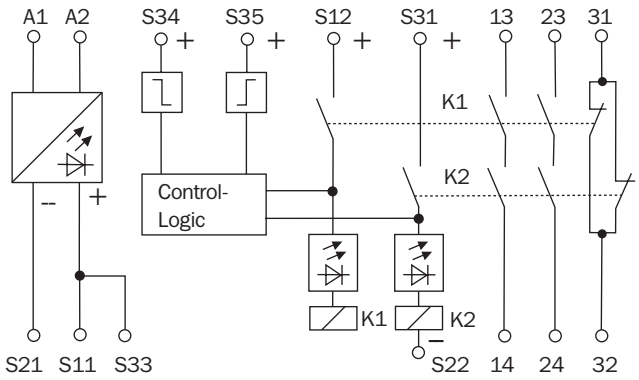
N

Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	DIN EN 61000-6-4
Screening against interference	DIN EN 61000-6-2
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates), the normally open contacts remain in the opened state. If the connected sensor is not activated (i.e. the input circuits are closed), then the normally open contacts close immediately in automatic reset (LED K1 and K2 illuminate). In the case of manual reset, this only occurs after pressing and releasing the reset button. Activation of the sensor (opening of one or both input circuits) effects the opening of the normally open outputs.

External device monitoring (EDM)

The UE43-2MF unit can take over the function of external device monitoring. The contactor monitoring system monitors the external relays by means of their normally closed contacts.

Manual reset

For manual resetting a pushbutton must be connected to terminals S33 - S34. Reset is monitored.

Automatic reset

For automatic resetting, S12 - S35 must be linked.

Cross circuit detection

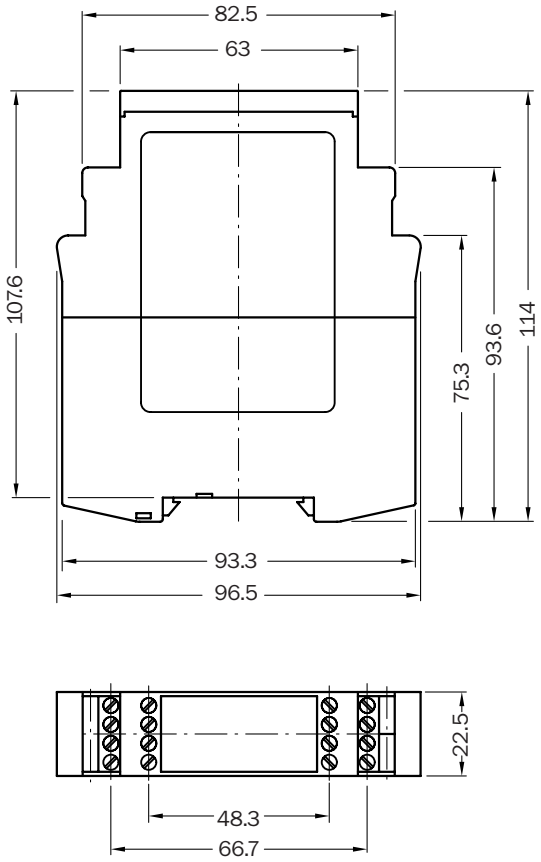
Cross circuit is detected on dual-channel wired systems if these are wired with opposing polarity.

Monitoring of synchronisation

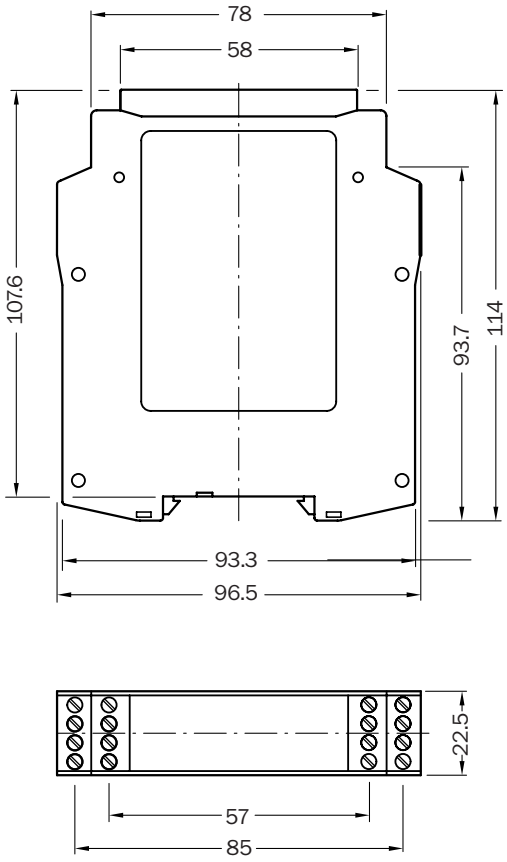
Only if input 2 closes by no later than 0.5 sec after input 1 do the output circuits close. If input 2 closes before input 1, the monitoring of synchronisation will not be effected, and the output circuits will close. This monitoring only takes place in automatic reset.

N

Dimensional drawings



Housing with screw-type terminals



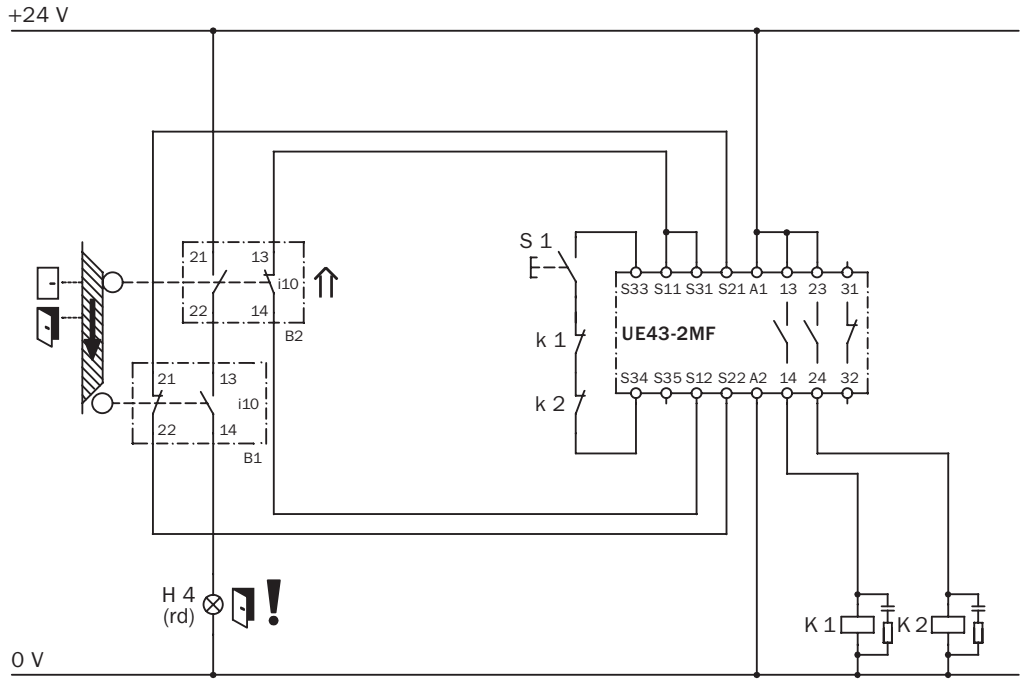
Housing with plug-in terminals

Dimensions in mm

N

Connection diagram

Two safety switches i10 to UE43-2MF safety relay, dual-channel system



Operating mode: with manual reset and external device monitoring (EDM)

N

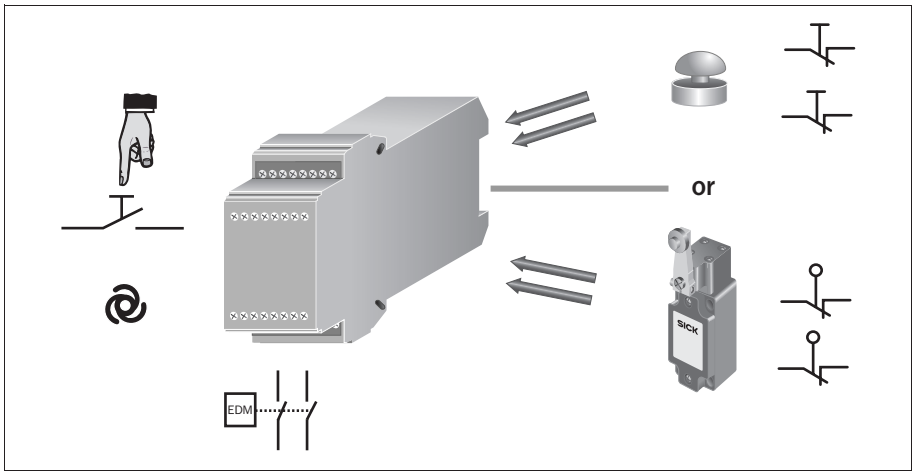
Overview of technical specifications

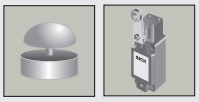
Category according to EN 954-1	4
Number of enable current paths/signalling current paths	3 / 1
Input circuit	Single- or dual-channel
Housing width	45 mm

Product description

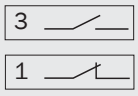
- Cross circuit detection on dual-channel wired systems
- 3 LEDs:
  - Supply voltage
  - Relay K2
  - Relay K3
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion units
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)

Applications





- For emergency stops
- For safety switches



Ordering information

Supply voltage	Type	Part number
24 V DC	UE43-3MF2D3	6024897
24 V AC	UE43-3MF2A0	6024898
115 V AC	UE43-3MF2A1	6024899
120 V AC	UE43-3MF2A2	6024900
230 V AC	UE43-3MF2A3	6024901

Further information	Page
→ Symbols	N-2
→ Technical specifications	N-24
→ Internal circuitry	N-26
→ Dimensional drawings	N-27
→ Connection diagram	N-27
→ Expansion modules	N-71 N-74
→ Services	A-2

N

Detailed technical specifications

General system data

Voltage supply to A1 / A2 for DC units	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Voltage supply to A1 / A2 for AC units	Use of earth conductor terminal
Category according to EN 954-1	4
Stop category according to EN 60204	0
Supply voltage V_S	
UE43-3MF2D3	24 V DC (20.4 V DC ... 26.4 V DC)
UE43-3MF2A0	24 V AC (20.4 V AC ... 26.4 V AC)
UE43-3MF2A1	115 V AC (97.75 V AC ... 126.5 V AC)
UE43-3MF2A2	120 V AC (102.0 V AC ... 132.0 V AC)
UE43-3MF2A3	230 V AC (195.5 V AC ... 253.0 V AC)
Power consumption	
AC	2.5 W / 3.2 VA
DC	1.0 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz

Control voltage Y11 and Y21

Control voltage	24 V DC
Control current	40 mA
Short-circuit current between Y11 and A2	1000 mA
Fuse	
AC units	Short circuit resistant transformer
DC units	PTC resistor
Reaction time by cross connection	3 s
Galvanic separation between A1 / A2 and Y11 - Y21 - PE (only on AC units)	Yes

Input circuits (Y12 and Y31 - Y22)

Input current Y12 and Y31	15 mA
Input current Y13 and Y14 (reset circuit)	40 mA
Reset time	
Manual (Y13)	150 ms ... 250 ms
Automatic (Y14)	0.8 s ... 1.2 s
Synchronisation time	500 ms
Line resistance at the input circuit	< 70 Ω
Input time upon applying supply voltage	100 ms

Output circuits (13 - 14, 23 - 24, 33 - 34, 41 - 42)

Response time (K2 / K3)	50 ms
Relay contacts	3 N/O, enable current paths, safety relevant 1 N/C, signalling current path, not safety relevant
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	18 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 6 A (3600 c/h) DC-13 U_e 24 V DC, I_e 6 A (360 c/h) DC-13 U_e 24 V DC, I_e 3 A (3600 c/h)

N

Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

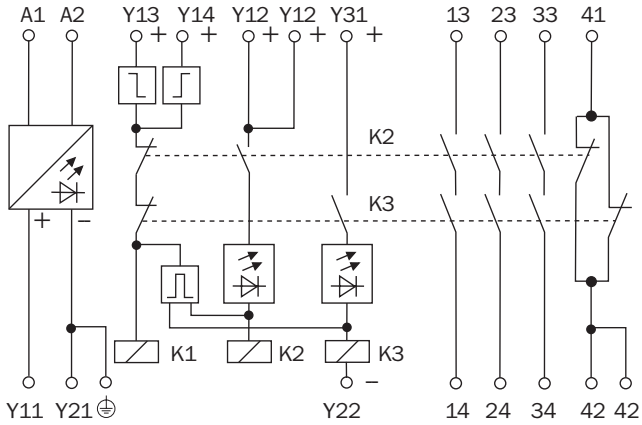
Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	DIN EN 61000-6-4
Screening against interference	DIN EN 61000-6-2
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.75 mm^2 ... 2.5 mm^2
Single strand wire (1 x)	0.75 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.5 mm^2 ... 1.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.5 mm^2 ... 1.5 mm^2

Weight	
AC units	0.36 kg
DC units	0.30 kg

N

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates) the normally open contacts remain open. If the connected sensor is not activated (i.e. the input circuits are closed), the normally open contacts close immediately in automatic reset (LED K2 and K3 illuminate). In the case of manual resetting, this is only effected upon pressing and releasing the reset button.

Activation of the sensor (opening of one or both input circuits) effects the opening of the normally open contacts (LED K2 and K3 off).

External device monitoring (EDM)

The UE43-3MF unit can take over the external device monitoring. The contactor monitoring system monitors the external relays by way of their normally closed contacts.

Manual reset

For manual resetting a pushbutton must be connected to terminals Y12 and Y13. Reset is monitored.

Automatic reset

For automatic resetting Y12 - Y14 must be linked.

Cross circuit detection

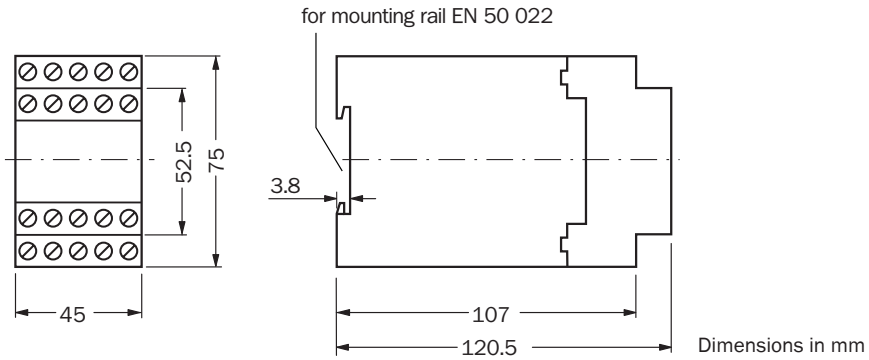
Cross circuit is detected on dual-channel wired systems, if these are wired with opposing polarity.

Monitoring of synchronisation

Only if input 2 closes by no later than 0.5 sec after input 1 do the output circuits close. If input 2 closes before input 1, the monitoring of synchronisation will not be effected, and the output circuits will close. This monitoring only takes place in automatic reset.

N

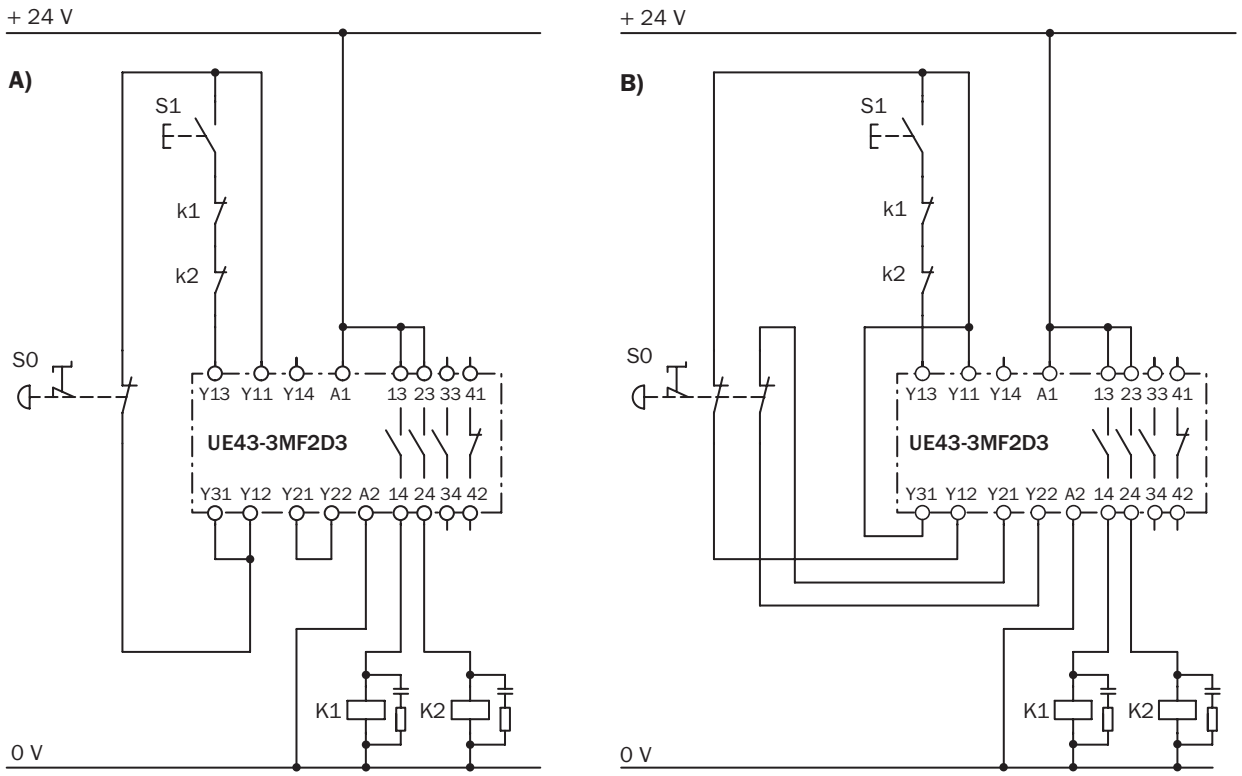
Dimensional drawings



Housing with screw-type terminals

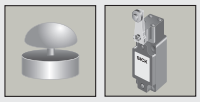
Connection diagram

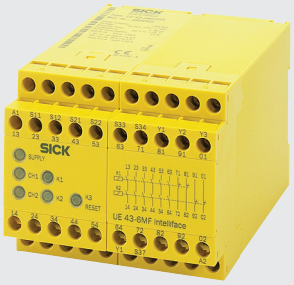
Emergency stop switch connected to UE43-3MF2D3 safety relay



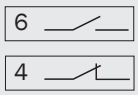
Operating mode: with manual reset and external device monitoring
A) single-channel system
B) dual-channel system

N





- For emergency stops
- For safety switches



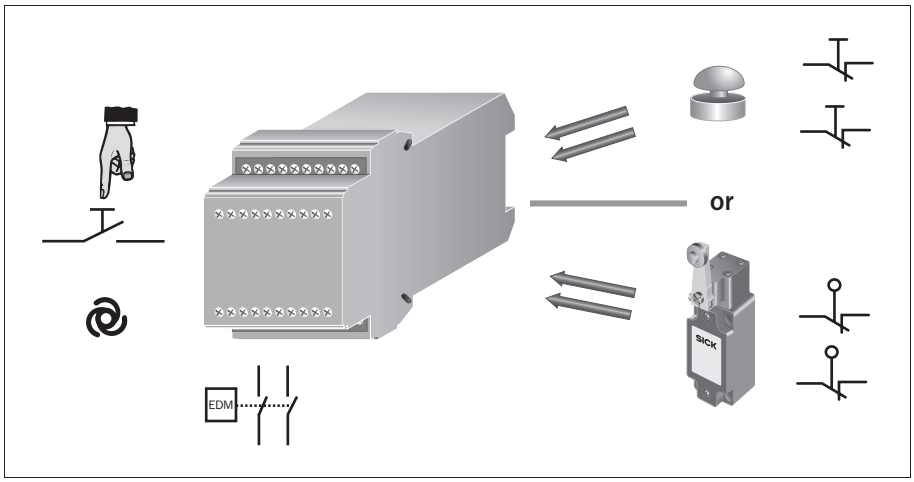
Overview of technical specifications

Category according to EN 954-1	4
Number of enable current paths/signalling current paths	6 / 4
Input circuit	Single- or dual-channel
Housing width	90 mm

Product description

- Cross circuit detection on dual-channel wired systems
- 6 LEDs:
  - Supply voltage
  - Input circuit CH1
  - Input circuit CH2
  - Relay K1
  - Relay K2
  - Relay K3 RESET
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion modules
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)

Applications



Ordering information

Supply voltage	Type	Part number
24 V DC	UE43-6MF2D3	6024902
120 V AC	UE43-6MF2A2	6024905
230 V AC	UE43-6MF2A3	6024906

N

Further information	Page
→ Symbols	N-2
→ Internal circuitry	N-31
→ Dimensional drawings	N-31
→ Expansion modules	N-71 N-74
→ Services	A-2

Detailed technical specifications

General system data

Voltage supply to A1 / A2 for DC units	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Voltage supply to A1 / A2 for AC units	Use of earth conductor terminal
Category according to EN 954-1	4
Stop category according to EN 60204	0
Supply voltage V_S (A1 / A2)	
UE43-6MF2D3	24 V DC (20.4 V DC ... 26.4 V DC)
UE43-6MF2A2	120 V AC (102.0 V AC ... 132.0 V AC)
UE43-6MF2A3	230 V AC (195.5 V AC ... 253.0 V AC)
Power consumption	
AC	4.2 W / 4.5 VA
DC	2.4 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz

Control voltage S11 and S21

Control voltage	24 V DC
Control current	40 mA
Short circuit current (between Y11 and A2)	1000 mA
Fuse	
AC units	Short-circuit resistant transformer
DC units	PTC resistor
Reaction time by cross connection (DC unit)	3 s
Galvanic separation between A1 - 2 and Y11 - Y21 - PE (only on AC units)	Yes

Input circuits (S12 - S22 and Y3 - S22)

Input current	40 mA
Reset time	
Manual	350 ms
Automatic	500 ms
Synchronisation time	500 ms
Line resistance at the input circuit	< 85 Ω
Switch-on time upon applying the supply voltage (AC units)	100 ms

Output circuits (13 - 14, 23 - 24, 33 - 34, 43 - 44, 53 - 54, 63 - 64, 71 - 72, 81 - 82, 91 - 92, 01 - 02)

Response time (K1 / K2)	60 ms
Relay contacts	6 N/O, enable current paths, safety relevant 4 N/C, signalling current paths, not safety relevant
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	24 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 3 A (3600 c/h) DC-13 U_e 24 V DC, I_e 6 A (360 c/h) DC-13 U_e 24 V DC, I_e 2 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

Continued on next page

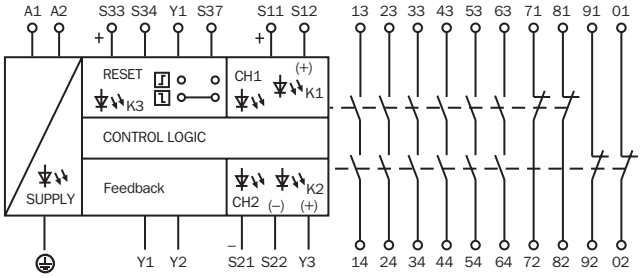
Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	DIN EN 61000-6-4
Screening against interference	DIN EN 61000-6-2
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.75 mm^2 ... 2.5 mm^2
Single strand wire (1 x)	0.75 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.5 mm^2 ... 1.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.5 mm^2 ... 1.5 mm^2

Weight	0.8 kg

N

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates), the normally open contacts remain open. If the connected sensor is not activated, the LEDs CH1 and CH2 illuminate. In the case of automatic resetting, the normally open contacts close immediately (LEDs K1 and K2 illuminate). With manual resetting the normally open contacts only close upon pressing and releasing the reset button.

The activation of the sensor (opening of one or both input circuits) effects the opening of the normally open contacts (LEDs K1 and K2 off).

External device monitoring (EDM)

The UE43-6MF unit can take over the external device monitoring. The contactor monitoring system monitors the external relays by way of their normally closed contacts.

Manual reset

For manual reset a pushbutton is to be connected between contacts S12 and S34 and Y1 - S37 must be jumpered. This reset is monitored.

Automatic reset

S12 - S34 must be jumpered. Y1 - Y37 is not jumpered.

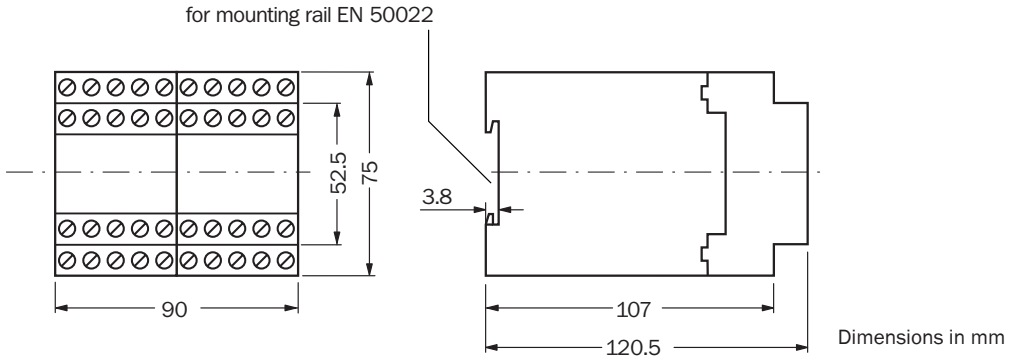
Cross circuit detection

Cross circuit is detected on dual-channel wired systems, if these are wired with opposing polarity.

Monitoring of synchronisation

Only if input 2 closes by no later than 0.5 sec after input 1 do the output circuits close. If input 2 closes before input 1, the monitoring of synchronisation will not be effected, and the output circuits will close. This monitoring only takes place in automatic reset.

Dimensional drawings



Housing with screw-type terminals

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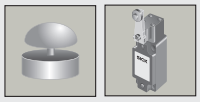
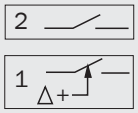


- For emergency stops
- For safety switches



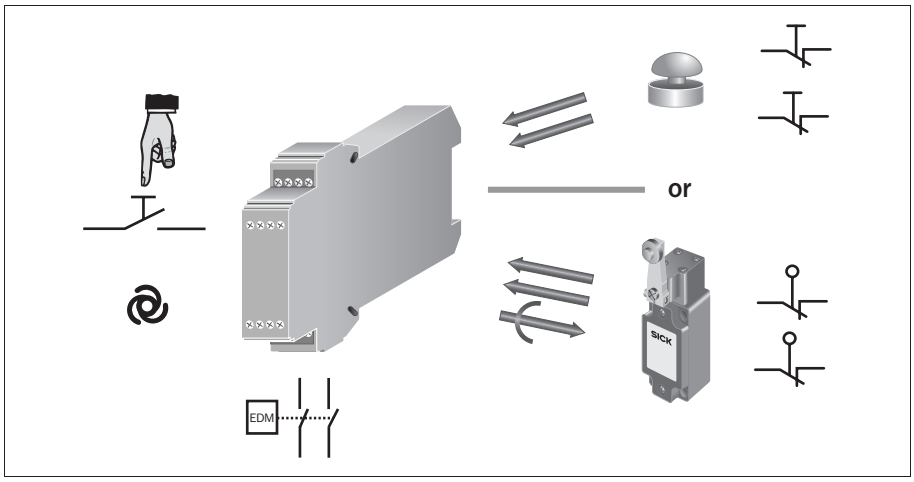
Overview of technical specifications

Category according to EN 954-1	4
Number of enable current paths/signalling current paths	2 / 0
Number of off-delayed normally open contacts	1
Input circuit	Single- or dual-channel
Housing width	22.5 mm

Product description

- Cross circuit detection on dual-channel wired systems
- Outputs:
  - 2 normally open contacts
  - 1 normally open contact with off-delay, adjustable from 0.15 ... 3 s or 1.5 ... 30 s
- 3 LEDs:
  - Supply voltage
  - Relay K1 / K2 (without delay)
  - Relay K3 / K4 (delayed)
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion modules
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)
- Available with plug-in terminals (key coded)

Applications



Ordering information

Off-delay time	Connection type	Type	Part number
0.15 s ... 3 s	Screw-type terminals	UE45-3S12D33	6024911
	Plug-in terminals	UE45-3S13D33	6024912
1.5 s ... 30 s	Screw-type terminals	UE45-3S12D330	6024913
	Plug-in terminals	UE45-3S13D330	6024914

N

Detailed technical specifications

General system data

Voltage supply to A1 / A2	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Category according to EN 954-1	4
Stop category according to EN 60204	0/1
Supply voltage V_S	24 V DC (20.4 V DC ... 26.4 V DC)
Power consumption	2.6 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}

Control voltage S11 / S33 and S21

Control voltage	24 V DC
Control current	60 mA
Short-circuit current between S11 and A2	2200 mA
Fuse	PTC resistor
Reaction time by cross connection	2 s
Galvanic separation between A1 / A2 and S11 / S21	No

Input circuits (S12 and S31)

Input current S12 and S31	25 mA ... 100 mA
Input current S34 / S35 (reset circuit)	40 mA ... 50 mA
Reset time	
Manual (S34)	30 ms
Automatic (S35)	600 ms
Synchronisation time	500 ms
Activation time of reset button	200 ms
Line resistance at the input circuit	< 85 Ω

Output circuits (13 - 14, 23 - 24, 37 - 38)

Response time (K1 / K2)	25 ms
Off-delay time (K3 / K4)	
UE45-3S1 xD3 3	0.15 s ... 3 s
UE45-3S1 xD3 30	1.5 s ... 30 s
Relay contacts	2 N/O, enable current paths, Category 4 1 N/O, enable current path, off-delayed, Category 3
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (3600 c/h) DC-13 U_e 24 V DC, I_e 5 A (360 c/h) DC-13 U_e 24 V DC, I_e 3 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	5 x 10^6 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

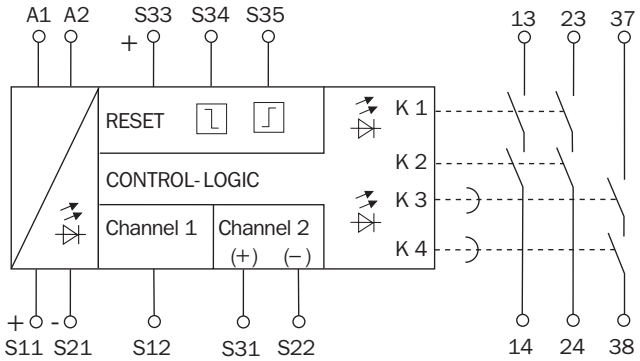
N

Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	EN 60947-1 02/99
Screening against interference	EN 60947-1 02/99
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates), the normally open contacts remain open. If the connected sensor is not activated (i.e. the input circuits are closed), the normally open contacts close immediately during automatic resetting, LED K1 / K2 and K3 / K4 illuminate. In the case of manual resetting, this only occurs after pressing and releasing the reset button.

The activation of the sensor (opening of one or both input circuits) effects the opening of both normally open contacts (13 - 14 / 23 - 24) immediately, and a time delayed closing of the third circuit (37 - 38), with LED K1 / K2 immediately going off and K3 / K4 going off later.

External device monitoring (EDM)

The unit can take over external device monitoring. The contactor monitoring system monitors the external relays by way of their normally closed contacts.

Manual reset

For manual resetting, a pushbutton must be connected to terminals S33 - S34. This reset is monitored.

Automatic reset

For automatic resetting S33 - S35 must be linked.

Cross circuit detection

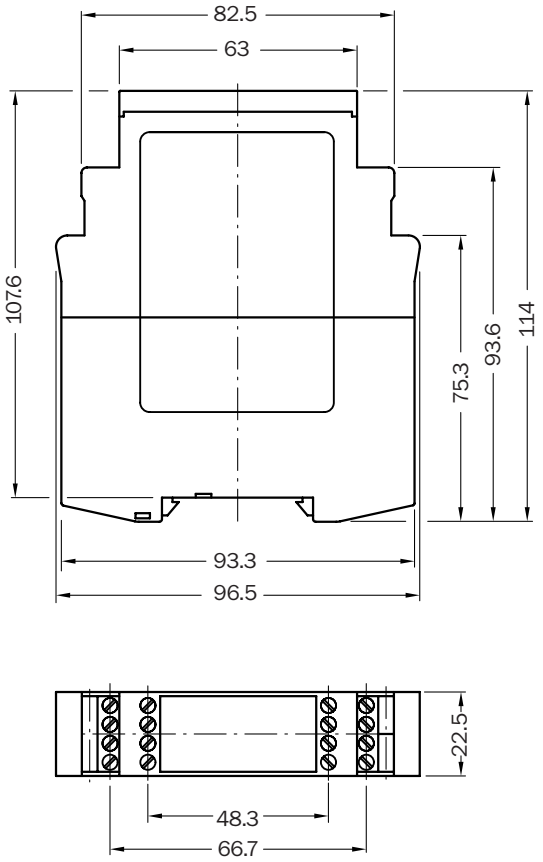
Cross circuit is detected on dual-channel wired systems, if these are wired with opposing polarity.

Monitoring of synchronisation

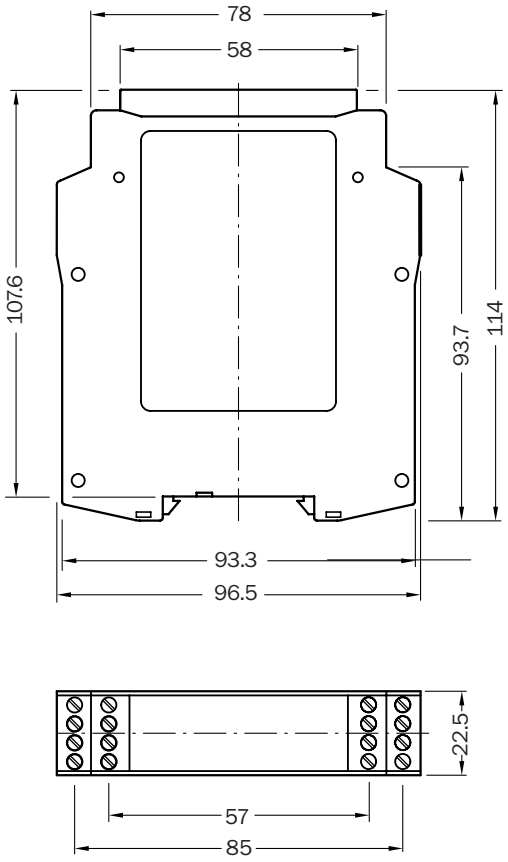
Only if input 2 closes by no later than 0.5 sec after input 1 do the output circuits close. If input 2 closes before input 1, the monitoring of synchronisation will not be effected, and the output circuits will close. This monitoring only takes place in automatic reset.

N

Dimensional drawings



Housing with screw-type terminals



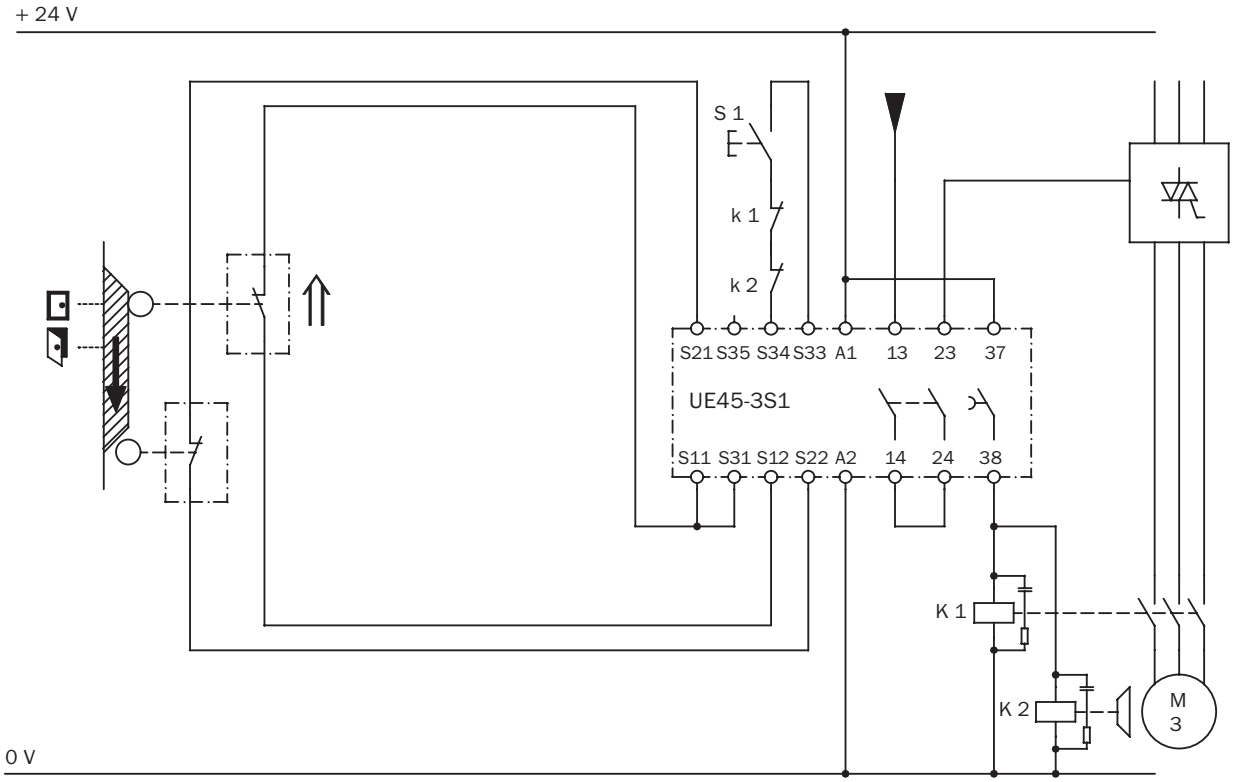
Housing with plug-in terminals

Dimensions in mm

N

Connection diagram

Two safety switches connected to UE45-3S1 safety relay



Operating mode: with manual reset and external device monitoring (EDM)

N

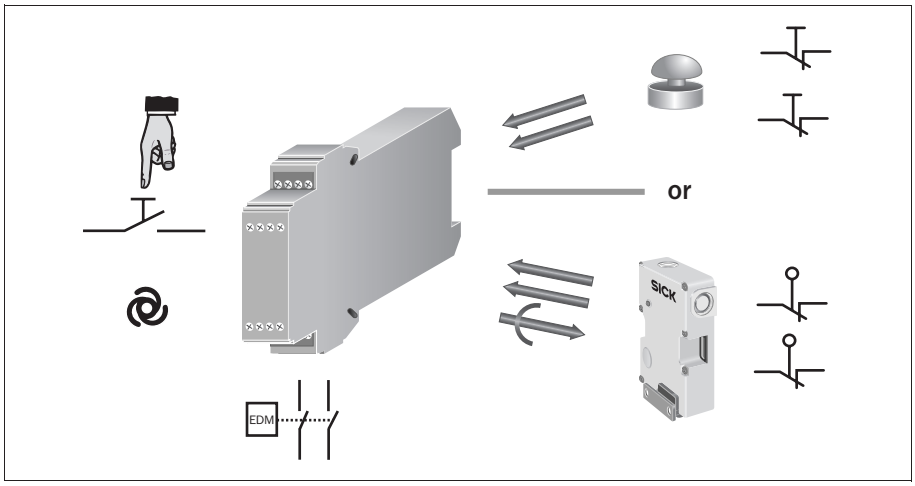
Overview of technical specifications

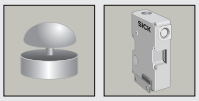
Category according to EN 954-1	4
Number of enable current paths/signalling current paths	2 / 0
Number of on-delayed response time enable current paths	1
Input circuit	Single- or dual-channel
Housing width	22.5 mm

Product description

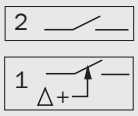
- Cross circuit detection on dual-channel wired systems
- Outputs:
  - 2 normally open contacts
  - 1 on-delayed response time enable current path, adjustable from 0.15 ... 3 s or 1.5 ... 30 s
- 3 LEDs:
  - Supply voltage
  - Relay K1 / K2 (without delay)
  - Relay K3 / K4 (delayed)
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion modules
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)
- Available with plug-in terminals (key coded)

Applications





- For emergency stops
- For safety switches
- For safety switches with mechanical locking



Ordering information

On-delay time	Connection type	Type	Part number
0.15 s ... 3 s	Screw-type terminals	UE44-3SL2D33	6024907
	Plug-in terminals	UE44-3SL3D33	6024908
1.5 s ... 30 s	Screw-type terminals	UE44-3SL2D330	6024909
	Plug-in terminals	UE44-3SL3D330	6024910

Further information	Page
→ Symbols	N-2
→ Internal circuitry	N-39
→ Dimensional drawings	N-40
→ Connection diagram	N-41
→ Expansion modules	N-71 N-74
→ Services	A-2

N

Detailed technical specifications

General system data

Voltage supply to A1 / A2 for DC units	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Category according to EN 954-1	4
Stop category according to EN 60204	0
Supply voltage V_S	24 V DC (20.4 V DC ... 26.4 V DC)
Power consumption	1.8 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}

Control voltage S 11 - S33 and S21

Control voltage	22 V DC
Control current	60 mA
Short-circuit current between S 11 and A2	2200 mA
Fuse	PTC resistor
Reaction time by cross connection	2 s
Galvanic separation between A1 / A2 and S 11 - S21	No

Input circuits (S 12 and S31)

Input current S 12 and S31	25 mA ... 100 mA
Input current S34 / S35 (reset circuit)	40 mA ... 50 mA
Reset time	
Manual (S34)	30 ms
Automatic (S35)	750 ms
Synchronisation time	500 ms
Activation time of reset button	250 ms
Line resistance at the input circuit	< 85 Ω

Output circuits (13 - 14, 23 - 24, 37 - 38)

Response time (K1 / K2)	25 ms
On-delay time (K3 / K4)	
UE44-3SL xD3 3	0.15 s ... 3 s
UE44-3SL xD3 30	1.5 s ... 30 s
Relay contacts	2 N/O, enable current paths, Category 4 1 N/O, enable current path, on-delayed, Category 3
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (3600 c/h) DC-13 U_e 24 V DC, I_e 5 A (360 c/h) DC-13 U_e 24 V DC, I_e 3 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	5 x 10^6 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III

Continued on next page

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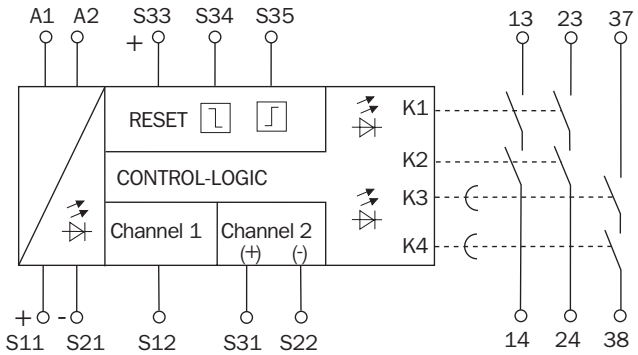
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	EN 60947-1 02/99
Screening against interference	EN 60947-1 02/99
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates), the normally open contacts (13 - 14 / 23 - 24) remain open. After completion of the on-delay set on the relay, the delay circuit (37 - 38) closes, and the LED K3 / K4 illuminates. If the connected sensor is not activated (i.e. the input circuits are closed), the normally open contacts (13 - 14 / 23 - 24) close immedi-ately during automatic reset, the LED K1 / K2 illuminates, and the delay circuit (37 - 38) opens (LED K3 / K4 off). In the case of manual reset, this only occurs after pressing and releasing the reset button.

The activation of the sensor (opening of one or both input circuits) effects the opening of both normally open contacts (13 - 14 / 23 - 24), with LED K1 / K2 being off, and a time delayed closing of the third circuit (37 - 38), with LED K3 / K4 illuminating.

External device monitoring (EDM)

The unit can take over external device monitoring. The contactor monitoring system monitors the external relays by way of their normally closed contacts.

Manual reset

For manual resetting, a pushbutton is to be connected between 24 V DC supply and terminal S34. This reset is monitored. For applications with mechanical locking safety switches, only channel 2 must be closed during manual reset.

Automatic reset

For automatic resetting S 12 - S35 must be linked. For applications with mechanical locking safety switches, only channel 1 must be closed during automatic reset.

Cross circuit detection

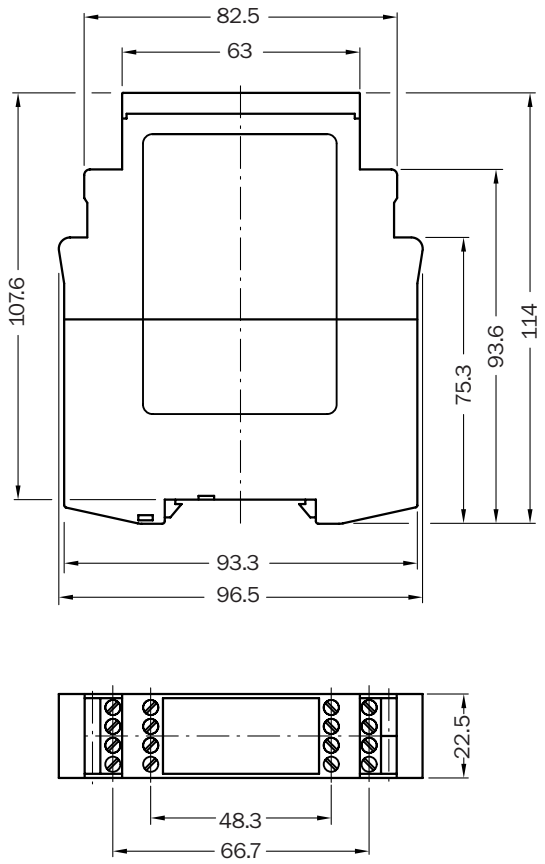
Cross circuit is detected on dual-channel wired systems, if these are wired with opposing polarity.

Monitoring of synchronisation

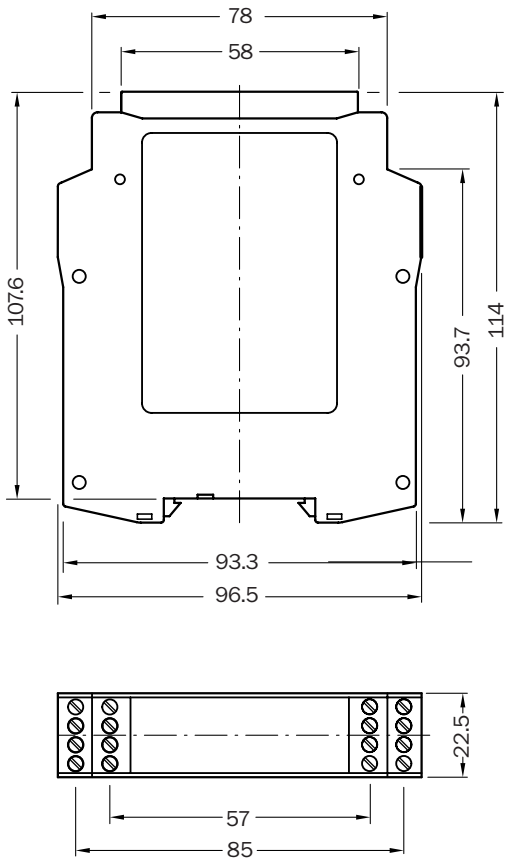
Only if input 2 closes by no later than 0.5 sec after input 1 do the output circuits close. If input 2 closes before input 1, the monitoring of synchronisation will not be effected, and the output circuits will close. This monitoring only takes place in automatic reset.

N

Dimensional drawings



Housing with screw-type terminals



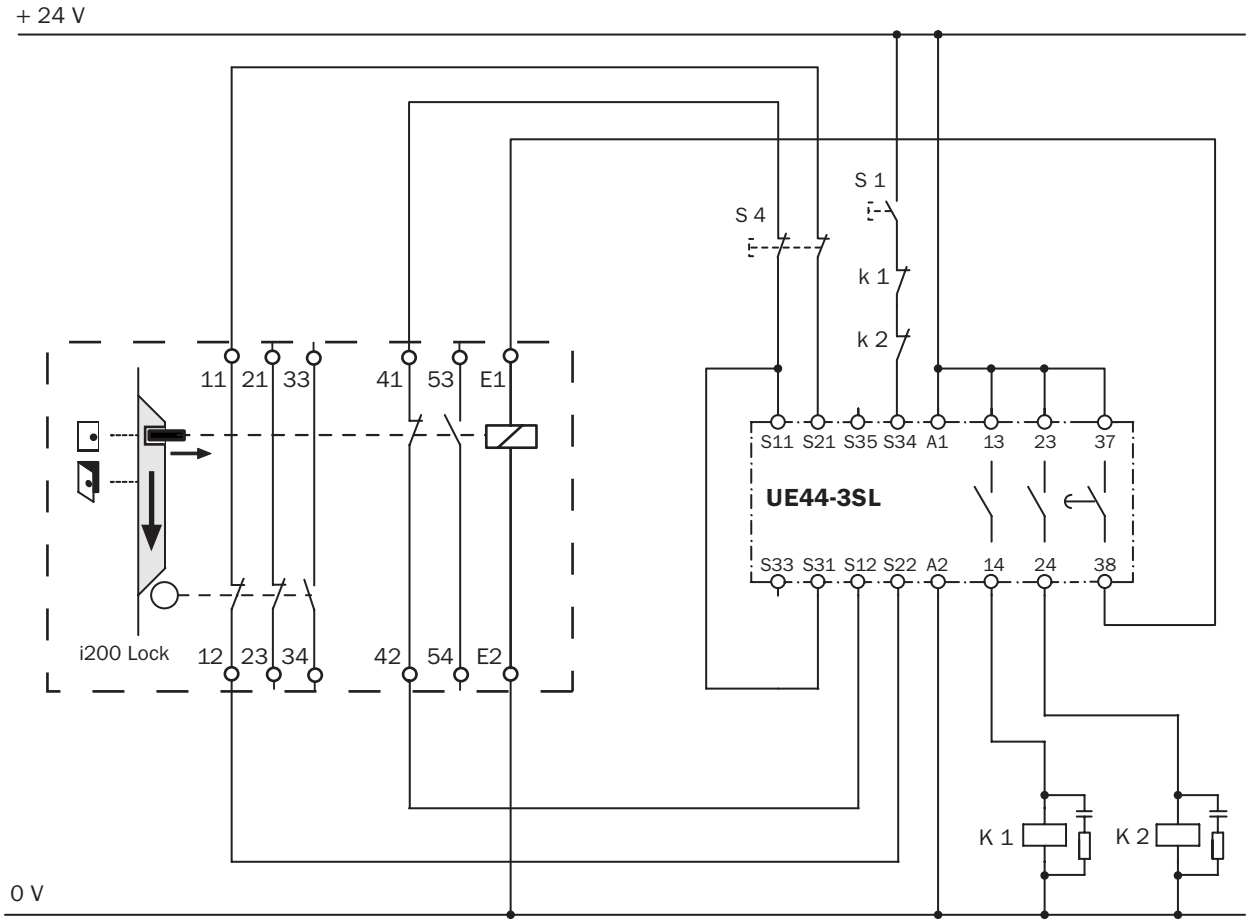
Housing with plug-in terminals

Dimensions in mm

N

Connection diagram

i200 Lock safety switch (with mechanical locking) connected to UE44-3SL safety relay



Operating mode: with manual reset and external device monitoring (EDM)

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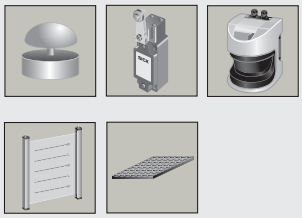
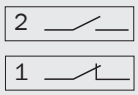


- For emergency stops
- For safety switches
- For safety laser scanners
- For safety light curtains
- For non-contact safety switches
- For pressure sensitive mats in accordance with EN 1760 using 4-wire technology



N

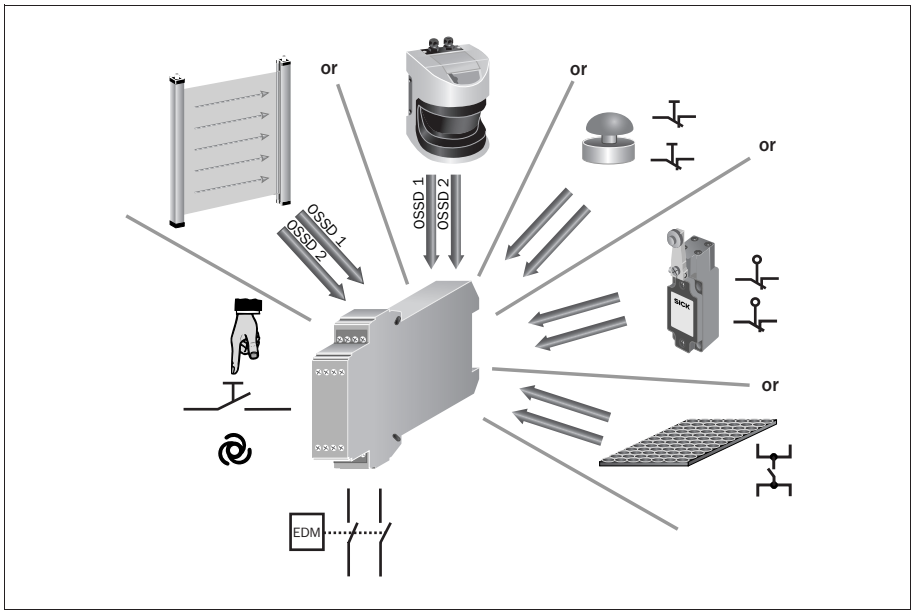
Overview of technical specifications

Category according to EN 954-1	4
Number of enable current paths/signalling current paths	2 / 1
Input circuit	Single- or dual-channel
Housing width	22.5 mm

Product description

- Cross circuit detection on dual-channel wired systems
- 3 LEDs:
  - Supply voltage
  - Relay K1
  - Relay K2
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion modules
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)
- Available with plug-in terminals (key coded)

Applications



In-system added value

Units employing monitored semiconductor outputs (OSSD), such as

- FGS
- PLS
- C2000
- M2000
- C4000
- S3000
- LSI
- M4000
- T4000 Compact

Ordering information

Connection type	Type	Part number
Screw-type terminals	UE48-20S2D2	6024915
Plug-in terminals	UE48-20S3D2	6024916

Detailed technical specifications

General system data

Voltage supply to A1 / A2	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Category according to EN 954	4
Stop category according to EN 60204	0
Supply voltage V_S (A1 / A2)	24 V AC/DC (20.4 V AC/DC ... 26.4 V AC/DC)
Power consumption	
AC mode	4.6 VA
DC mode	2.1 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz

Control voltage S33 / S11 and S21

Control voltage	17.4 V DC ... 22 V DC
Control current	40 mA ... 100 mA
Short-circuit current between S33 / S11 and S21	300 mA
Fuse	Electronic fuse
Reaction time by cross connection	50 ms
Activation time upon detection of cross connection	50 ms
Galvanic separation between A1 / A2 and S21, S11, S33	No

Input circuits (S12, S31, S22, S34, S35)

Input voltage (S12 and S31)	
HIGH	17.4 V DC ... 26.4 V DC
LOW	–3 V DC ... +5 V DC
Input current S12 and S31 / S22	40 mA ... 100 mA
Input current S34 / S35	5 mA ... 50 mA
Reset time	
Manual (S34)	40 ms
Automatic (S35)	80 ms
Activation time of reset button	50 ms
Minimum switch-off time/minimum switch-on time	7 ms
Permitted test pulse time/test frequency	1000 µs / 10 s^{-1}
Line resistance at the input circuit	< 35 Ω

Output circuits (13 - 14, 23 - 24, 31 - 32 / 33 - 34)

Response time (K1 / K2)	25 ms
Minimum time outputs will stay off	70 ms ... 130 ms
Relay contacts	2 N/O, enable current paths, safety relevant 1 N/C, signalling current path, not safety relevant
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (360 c/h) AC-15 U_e 230 V AC, I_e 3 A (3600 c/h) DC-13 U_e 24 V DC, I_e 4 A (360 c/h) DC-13 U_e 24 V DC, I_e 2.5 A (3600 c/h)

Continued on next page

N

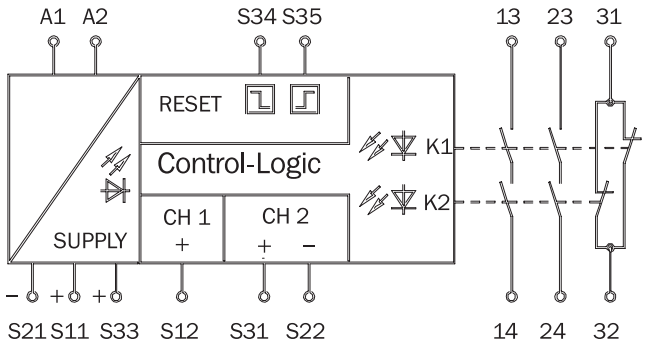
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	DIN EN 61000-6-4
Screening against interference	DIN EN 61000-6-2
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates), the normally open contacts remain open. If the connected sensor is not activated or the protective field of the connected optoelectronic protective device is not broken (i.e. the input circuits are closed), then the normally open contacts close immediately in automatic reset, LED K1 and K2 illuminate. In the case of manual resetting, this only occurs after pressing and releasing the reset button. The activation of the sensor or incursion into the protective field of the non-contact safety device (open state of one of the two input circuits) effects the opening of the normally open contacts (LED K1 and K2 off).

External device monitoring (EDM)

The unit can take over external device monitoring. The contactor monitoring system monitors the external relays by way of their normally closed contacts.

Manual reset

For manual resetting, a pushbutton must be connected to terminals S33 - S34. This reset is monitored.

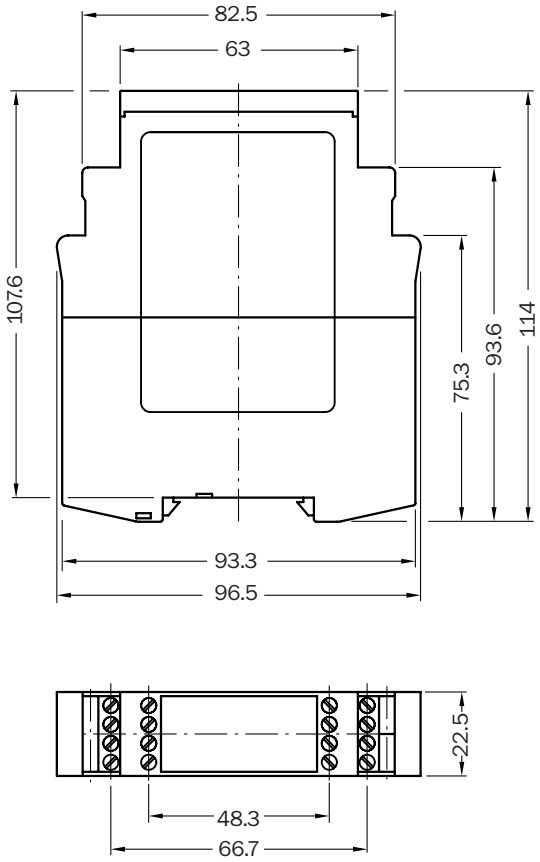
Automatic reset

- For ESPEs: S33 - S35 must be linked
- For applications with potential free contacts on the input circuit S12 - S35 must be linked.

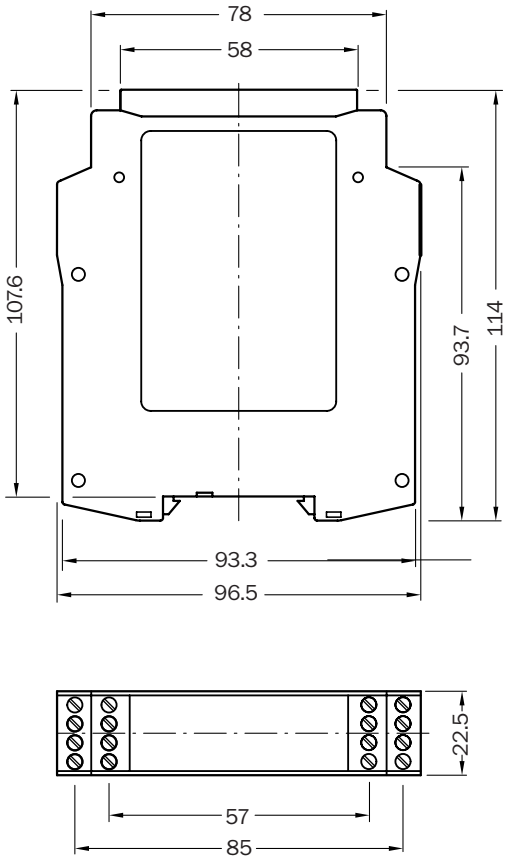
Cross circuit detection

Cross circuit is detected on dual-channel wired systems, if these are wired with opposing polarity.

Dimensional drawings



Housing with screw-type terminals



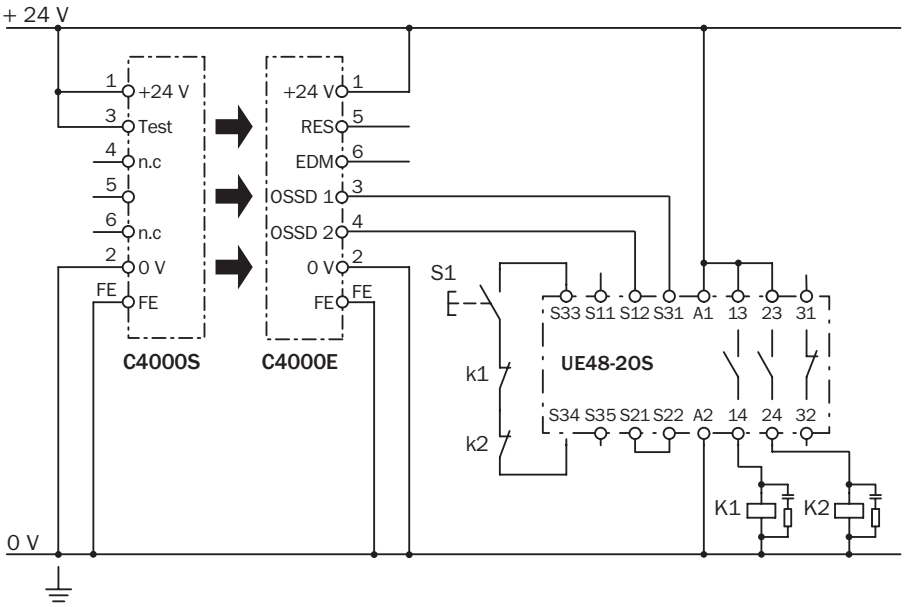
Housing with plug-in terminals

Dimensions in mm

N

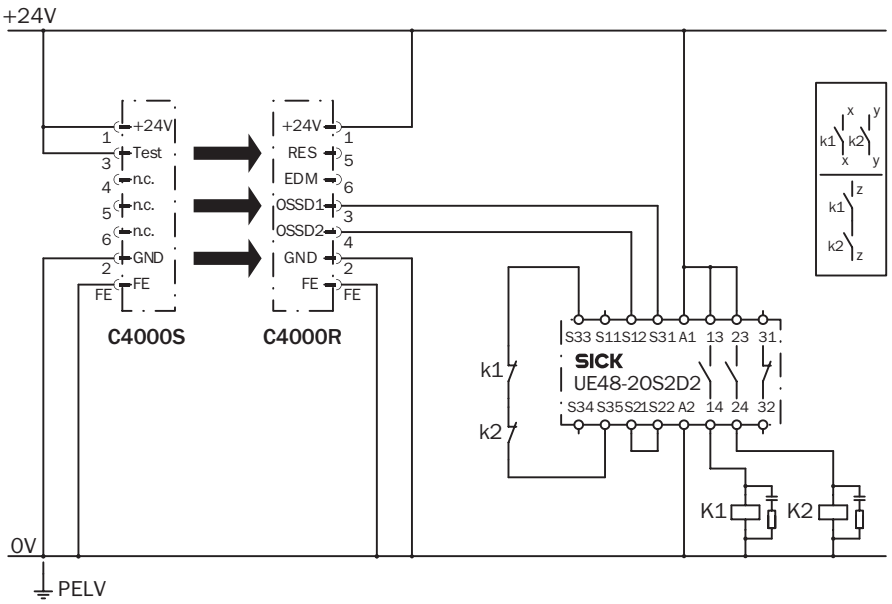
Connection diagrams

Safety light curtain C4000 Basic to UE48-20S safety relay



Operating mode: with manual reset and external device monitoring (EDM)

Safety light curtain C4000 Standard / Advanced light curtain connected to UE48-20S safety relay



Operating mode: with manual reset and external device monitoring (EDM)

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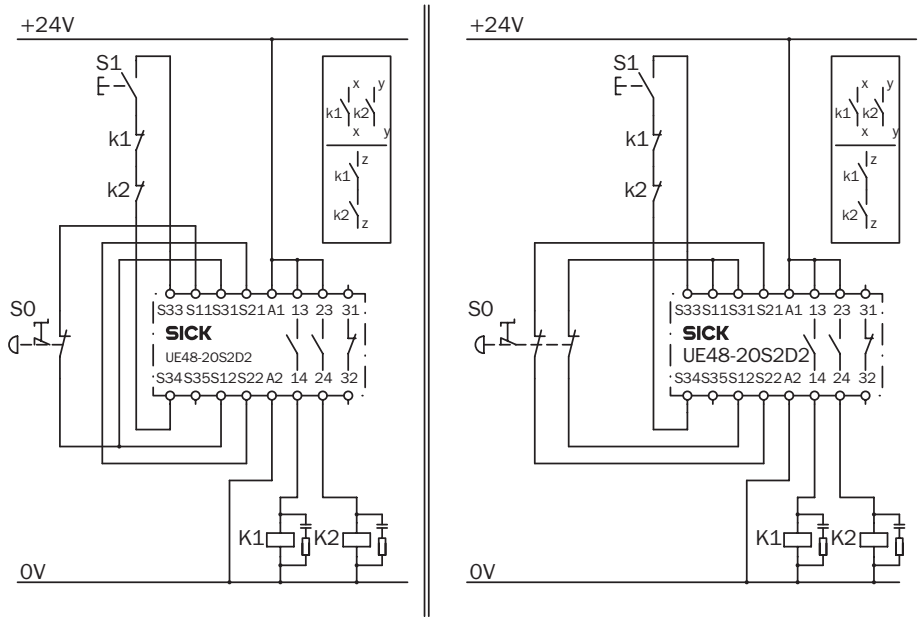
Emergency stop circuit with UE48-20S safety relay



Operating mode: with manual reset and external device monitoring (EDM)

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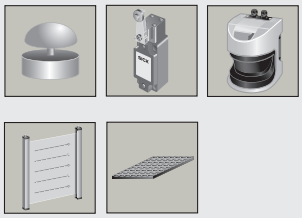


- For emergency stops
- For safety switches
- For safety laser scanners
- For safety light curtains
- For non-contact safety switches
- For pressure sensitive mats in accordance with EN 1760 using 4-wire technology

3

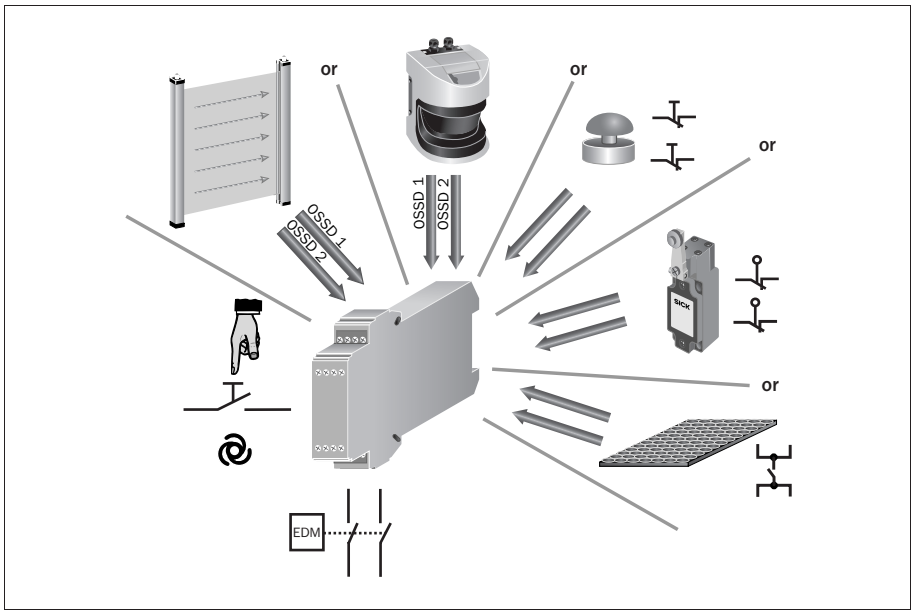
Overview of technical specifications

Category according to EN 954-1	4
Number of enable current paths/signalling current paths	3 / 0
Input circuit	Single- or dual-channel
Housing width	22.5 mm

Product description

- Cross circuit detection on dual-channel wired systems
- 3 LEDs:
  - Supply voltage
  - Relay K1
  - Relay K2
- Manual reset
- Automatic reset
- Increase in the number of outputs by way of the expansion modules
  - UE10-4XT
  - UE11-4DX
- External device monitoring (EDM)
- Available with plug-in terminals (key coded)

Applications



In-system added value

Units employing monitored semiconductor outputs (OSSD), such as

- FGS
- PLS
- C2000
- M2000
- C4000
- S3000
- LSI
- M4000
- T4000 Compact

N

Ordering information

Connection type	Type	Part number
Screw-type terminals	UE48-3OS2D2	6025089
Plug-in terminals	UE48-3OS3D2	6025097

Detailed technical specifications

General system data

Voltage supply to A1 / A2	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Category according to EN 954	4
Stop category according to EN 60204	0
Supply voltage V_S (A1 / A2)	24 V AC/DC (20.4 V AC/DC ... 26.4 V AC/DC)
Power consumption	
AC mode	4.6 VA
DC mode	2.1 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz

Control voltage S33 / S11 and S21

Control voltage	17.4 V DC ... 22 V DC
Control current	40 mA ... 100 mA
Short-circuit current between S33 / S11 and S21	300 mA
Fuse	Electronic fuse
Reaction time by cross connection	50 ms
Activation time upon detection of cross connection	50 ms
Galvanic separation between A1 / A2 and S21, S11, S33	No

Input circuits (S12, S31, S22, S34, S35)

Input voltage (S12 and S31)	
HIGH	17.4 V DC ... 26.4 V DC
LOW	–3 V DC ... +5 V DC
Input current S12 and S31 / S22	40 mA ... 100 mA
Input current S34 / S35	5 mA ... 50 mA
Reset time	
Manual (S34)	40 ms
Automatic (S35)	80 ms
Activation time of reset button	50 ms
Minimum switch-off time/minimum switch-on time	7 ms
Permitted test pulse time/test frequency	1000 µs / 10 s^{-1}
Line resistance at the input circuit	< 35 Ω

Continued on next page

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Output circuits (13 - 14, 23 - 24, 31 - 32 / 33 - 34)

Response time (K1 / K2)	25 ms
Minimum time outputs will stay off	70 ms ... 130 ms
Relay contacts	3 N/O, enable current paths, safety relevant
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching current	10 mA ... 6 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 4 A (360 c/h) AC-15 U_e 230 V AC, I_e 3 A (3600 c/h) DC-13 U_e 24 V DC, I_e 4 A (360 c/h) DC-13 U_e 24 V DC, I_e 2.5 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

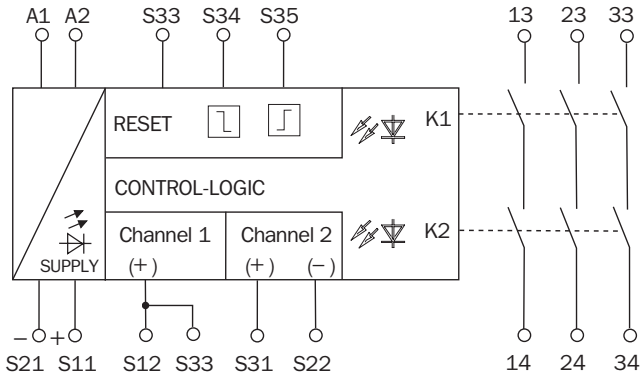
Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	DIN EN 61000-6-4
Screening against interference	DIN EN 61000-6-2
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

N

Internal circuitry



Function

After applying the supply voltage (LED SUPPLY illuminates), the normally open contacts remain open. If the connected sensor is not activated or the protective field of the connected optoelectronic protective device is not broken (i.e. the input circuits are closed), then the normally open contacts close immediately in automatic reset, LED K1 and K2 illuminate. In the case of manual resetting, this only occurs after pressing and releasing the reset button. The activation of the sensor or incursion into the protective field of the non-contact safety device (open state of one of the two input circuits) effects the opening of the normally open contacts (LED K1 and K2 off).

External device monitoring (EDM)

The unit can take over external device monitoring. The contactor monitoring system monitors the external relays by way of their normally closed contacts.

Manual reset

For manual resetting, a pushbutton must be connected to terminals S33 - S34. This reset is monitored.

Automatic reset

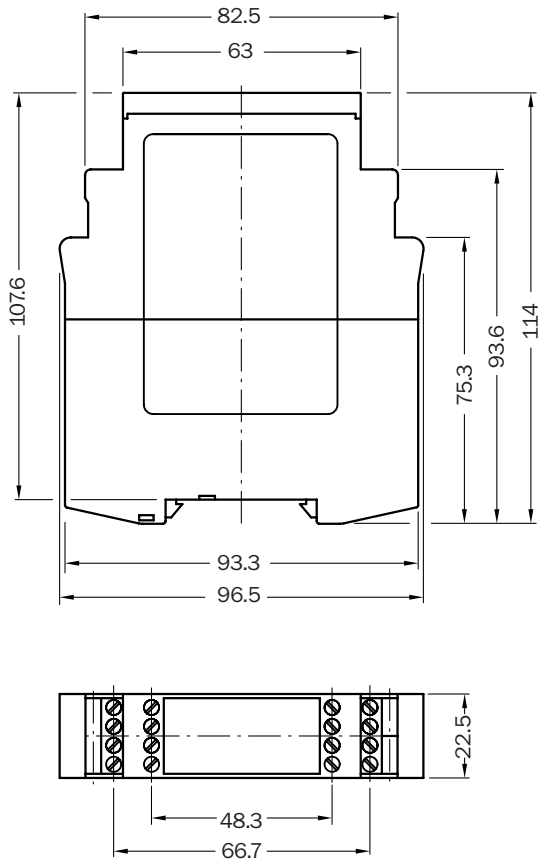
- For ESPEs: S33 - S35 must be linked.
- For applications with potential free contacts on the input circuit S12 - S35 must be linked.

Cross circuit detection

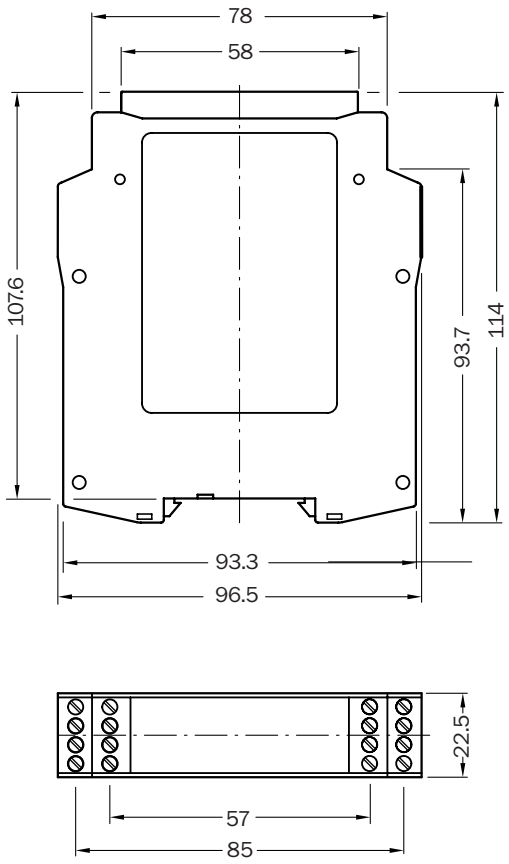
Cross circuit is detected on dual-channel wired systems, if these are wired with opposing polarity.

N

Dimensional drawings



Housing with screw-type terminals



Housing with plug-in terminals

Dimensions in mm

Connection diagrams

➜ Connection diagrams see safety relay UE48-2OS starting on page N-46

N

Overview of technical specifications

Category	4 (EN 954-1)
Number of enable current paths (depending on type)	2 / 3
Number of signalling current paths	1 / 0
Muting	✔
Number of muting sensors	2, 4
Supply voltage	24 V DC
Enclosure rating	IP 20

- Muting module for electrosensitive protective equipment (ESPE)
- Meets requirements up to category 4 according to EN 954-1
- Connection of 2 resp. 4 muting sensors
- Integrated override function
- Automatic reset
- Manual reset
- Muting functions by operating mode selector switch

Product description

UE49 muting modules are intended for use on: Electrosensitive protective equipments (ESPE) with monitored active switching outputs (OSSD), two-channel, complying with EN 61496-1.
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 monitored reset button.

In-system added value

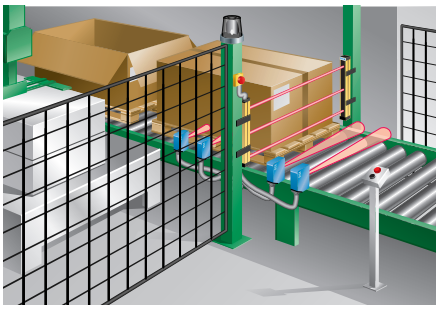
Devices employing monitored semiconductor outputs (OSSD), such as

- M2000
- MSL
- C4000
- C2000
- FGS
- S3000

Applications

➜ You can find more applications using the application finder at www.sickusa.com/applications

- Automotive industry
- Robotic
- Machining centres
- Palletizers
- Packaging machinery
- Stone setting machinery
- Stackers
- Timber industry
- Textile industry



Access protection with differentiation between man and material (muting)

N

Further information	Page
➜ Ordering information	N-54
➜ Technical specifications	N-54
➜ Internal circuitry	N-55
➜ Dimensional drawings	N-56

Ordering information

Number of enable current paths	Number of signalling current paths	Model Name	Part number
2	1	UE49-2MM3D3	6025098
3	–	UE49-3MM3D3	6025099

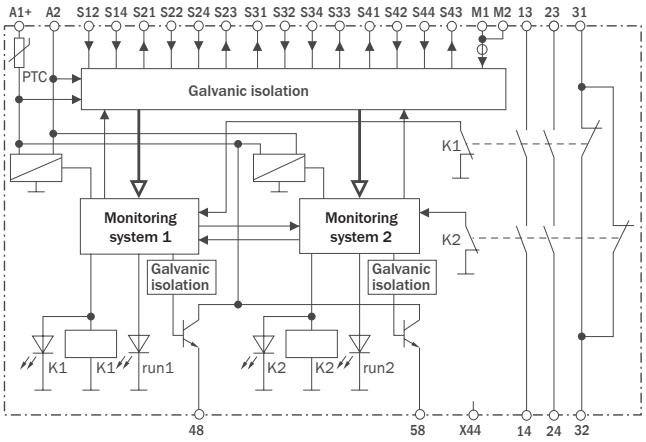
Detailed technical specifications

	UE49-2MM3D3	UE49-3MM3D3
Category	4 (EN 954-1)	
Voltage supply to A1 / A2 **Output circuit > 25 V AC / 60 V DC** **Output circuit < 25 V AC / 60 V DC**	 PELV PELV or SELV	
Supply voltage V_S	24 V DC (20.4 V DC ... 27.6 V DC)	
Ripple	±10 % (within limits of V_S)	
Maximum power consumption	4 W (signal outputs not loaded)	
Reset time (manual reset)	Max. 55 ms	
Reset time (automatic reset)	Max. 65 ms	
Concurrence monitoring time	Max. 220 ms	
Maximum cable length	100 m	
Maximum cable resistance	25 Ω	
Number of enable current paths	2	3
Number of signalling current paths	1	–
Maximum response time	70 ms	
Maximum switching current	5 A	
Maximum total current	15 A	
Usage category	AC-15/DC-13	
Rated operating current (voltage) **N/C contacts** **N/O contacts**	 2 A (230 V AC), 8 A (24 V DC) 0.1 Hz 3 A (230 V AC), 8 A (24 V DC) 0.1 Hz	 – 3 A (230 V AC), 8 A (24 V DC) 0.1 Hz
Maximum switching sequence	1200 switching cycles/h	
Short-circuit protection	6A GL (EN 60947-5-1), C 8 A	
Mechanical life (relay contacts)	1 x 10^7 switching cycles	
Electrical life (relay contacts)	1 x 10^5 switching cycles (to AC 15 at 2 A, 230 V AC)	
Overvoltage category	III	
Enclosure rating **terminals** **housing**	 IP 20 IP 40	
Interference emission	EN 61000-6-2	
Interference resistance	EN 55011, Class B	
Ambient operating temperature from ... to	0 °C ... +50 °C	
Storage temperature from ... to	–20 °C ... +70 °C	
Connection type	Screw-terminal connector	
Dimensions (W x H x D)	45 mm x 74 mm x 121 mm	

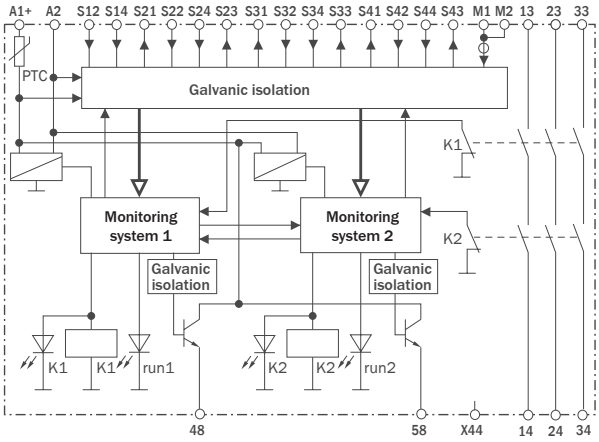
N

Internal circuitry

UE49-2MM3D3



UE49-3MM3D3



Function

UE49-2MM and UE49-3MM muting modules meet safety-specific requirements up to category 4 (EN 954). Connected command units and safety sensors, subsequent controls, their wiring and installation must also comply with this category as defined in EN 954.

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.

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. During the muting cycle, an error in the sequence of muting signals or exceeding the permissible muting duration results in a FAULT. A release by pressing the reset button is only permitted when the muting sensors are quiescent, the muting lamp is not defective, and the ESPE that is to be bypassed is free.

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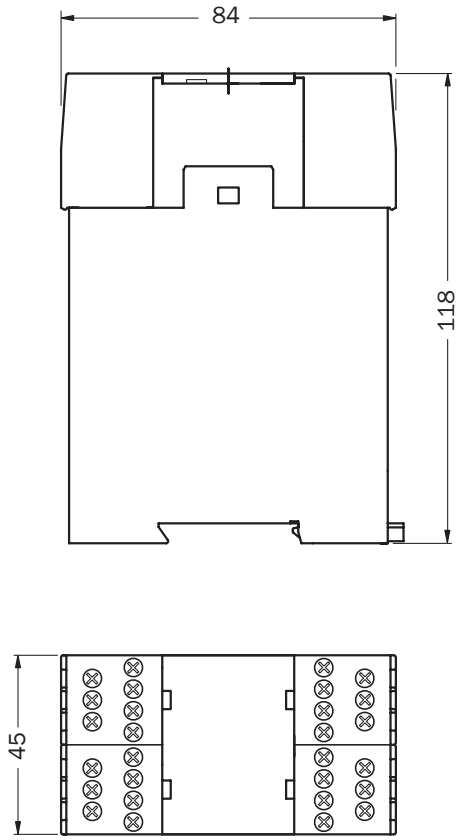
Dimensional drawings



Dimensions in mm

N

Overview of technical specifications

Category according to EN 954-1	2
Type of connectable optoelectronic protective devices	C2000, M2000, single-beam photoelectric safety switches
Number of connectable C2000, M2000 systems	3 (cascaded)
Number of connectable single-beam photoelectric safety switches	1 ... 6
Number of safe outputs (OSSDs)	2
Maximum switching current	500 mA
Response time	14 ms

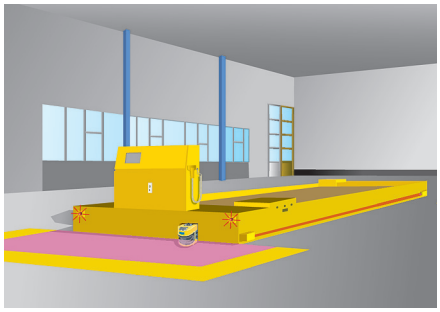
Product description

- 2 OSSDs, PNP, monitored and short-circuit protected
- External test pulse not required
- Functions individually selectable

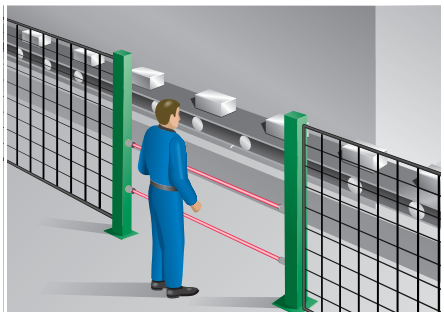
In-system added value

Evaluation unit for:
- C2000
- M2000
- Up to 6 testable single-beam photoelectric safety switch pairs

Applications



Hazardous area protection using the VS/VE18 and the LE20 on an automated guided vehicle (AGV)



Access protection with VS/VE18 and LE20

Ordering information

Connection type	Enclosure rating	Type	Part number
Screw terminal connector	IP 20	LE20-2612	1016503
	IP 65	LE20-1612	1016500
Spring clamp terminal connector	IP 20	LE20-2614	1016505
	IP 65	LE20-1614	1016499

- Restart interlock
- External device monitoring (EDM)
- Self testing
- 7-segment diagnostic display

N

Further information	Page
→ Technical specifications	N-58
→ Internal circuitry	N-59
→ Dimensional drawings	N-60
→ Connection diagrams	N-62
→ Accessories	N-63
→ Services	A-2

Detailed technical specifications

Electrical data

Supply voltage V_S	24 V DC –30 %/+20 %, 5 % ripple [1)]
Power-up delay (after power On)	2 s approx.
Current consumption I_{max}	100 mA
Power consumption	4 W
Response time	5 ms
Response time of entire system (dependent on system configuration)	To be calculated from the following values: ▪ C2000/M2000: approx. 7 ms to 25 ms, dependent on protective field height and resolution ▪ Single-beam photoelectric safety switches: max. 9 ms ▪ LE20: 5 ms ▪ Relay module: 5 ms
Response time for test input	Max. 30 ms
Reset time	Max. 50 ms
Connecting cables	0.5 mm^2, length max. 30 m 2.5 mm^2, length max. 150 m
Inputs: signal level on/off	HIGH: 15 V ... V_S LOW: 0 V ... 10 V
Test extern	HIGH: external test inactive LOW: external test active Pulse duration > 30 ms
Self-test cycle time	2 s

Outputs

Outputs OSSD 1, OSSD 2 (the levels refer to connection to the system connector)	PNP, monitored and short-circuit-proof
Switching current I_{max}	500 mA
Switching voltage V_{max}	V_S – 2.0 V at 500 mA
Switching capacity P_{max}	13.2 W
Inductive switching capacity $P_{max\ ind}$	1 VA
Protective field free V	V_{max}
Protective field interrupted V	0 V
Residual current at signal level "0" I	0.1 mA
Max. capacitive load	200 nF at I: 50 mA 2.5 µF at I: 500 mA
Test period test rate	2 s
Test pulse width	150 µs approx.
Test A, Test B (inactive/active)	V_S – 2.65 V/0 V Total current Test A + Test B < 10 mA Max. capacitive load 10 µF

N

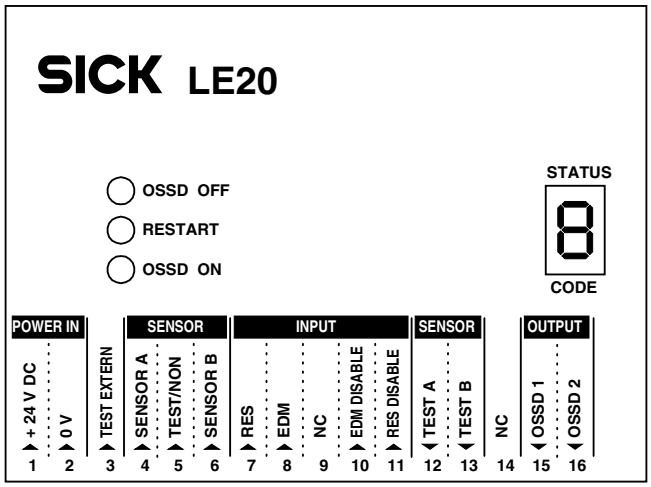
Operating data

Protection class	III [2]
Enclosure rating	IP 20, IP 65 optional
Type according to EN 61496	Type 2
Ambient operating temperature	–20 °C ... +60 °C
Storage temperature	–25 °C ... +75 °C
Air humidity (non condensing)	15 % ... 95 %
Vibration resistance	5g, 10 Hz ... 55 Hz according to IEC 60068-2-6
Shock resistance	10 g, 16 ms according to IEC 60068-2-29

[1] The upper and lower supply voltage limits must not be infringed.
The external voltage supply to the devices must be capable of withstanding a short-term power failure of 20 ms in accordance with EN 60204.
Suitable power supply units are available from SICK as accessories

[2] The circuits connected to the inputs and outputs must conform to the creepage and clearance distances specified in the relevant standards with regard to safe isolation in accordance with PELV (EN 60204, 6.4)

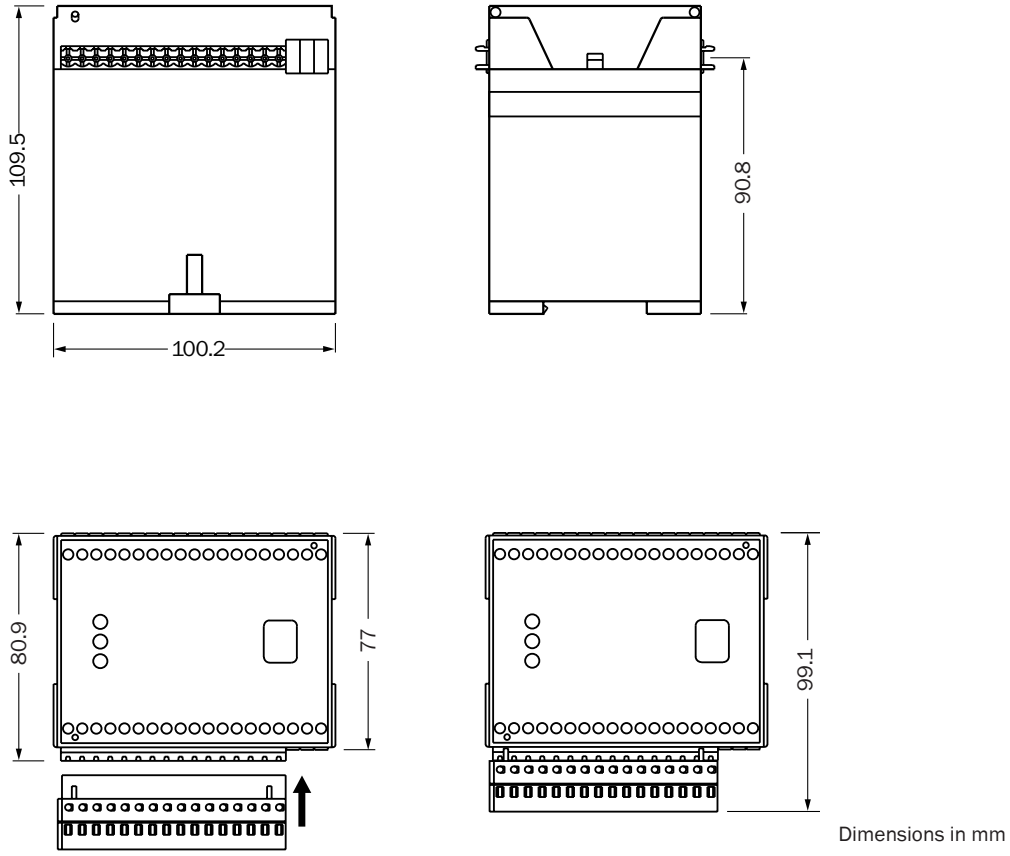
Internal circuitry



The LE20 safety evaluation unit is able to carry out a periodic safety test of the connected photoelectric switches, and provides the photoelectric switch system with the additional reset interlock and external device monitoring safety functions.

N

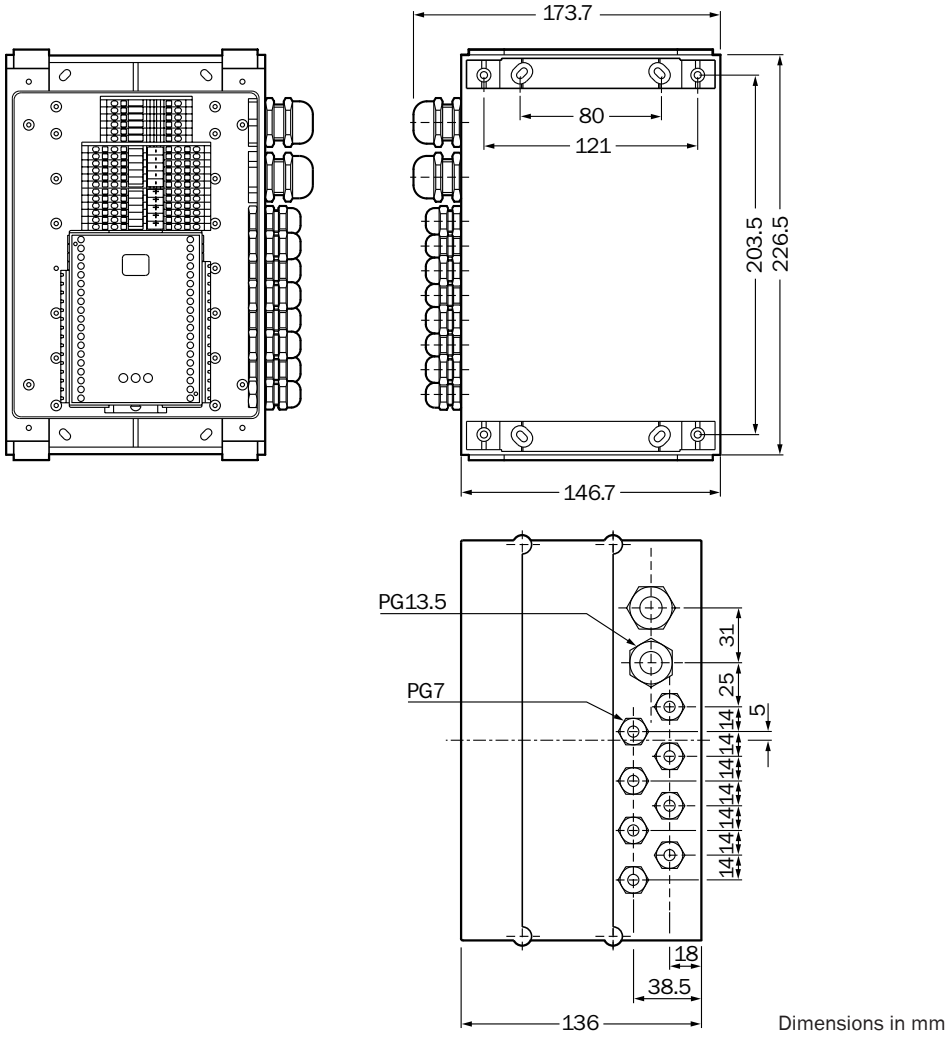
Dimensional drawings



Dimensions in mm

Mechanical dimensions, LE20 with screw clamps, IP 20

N



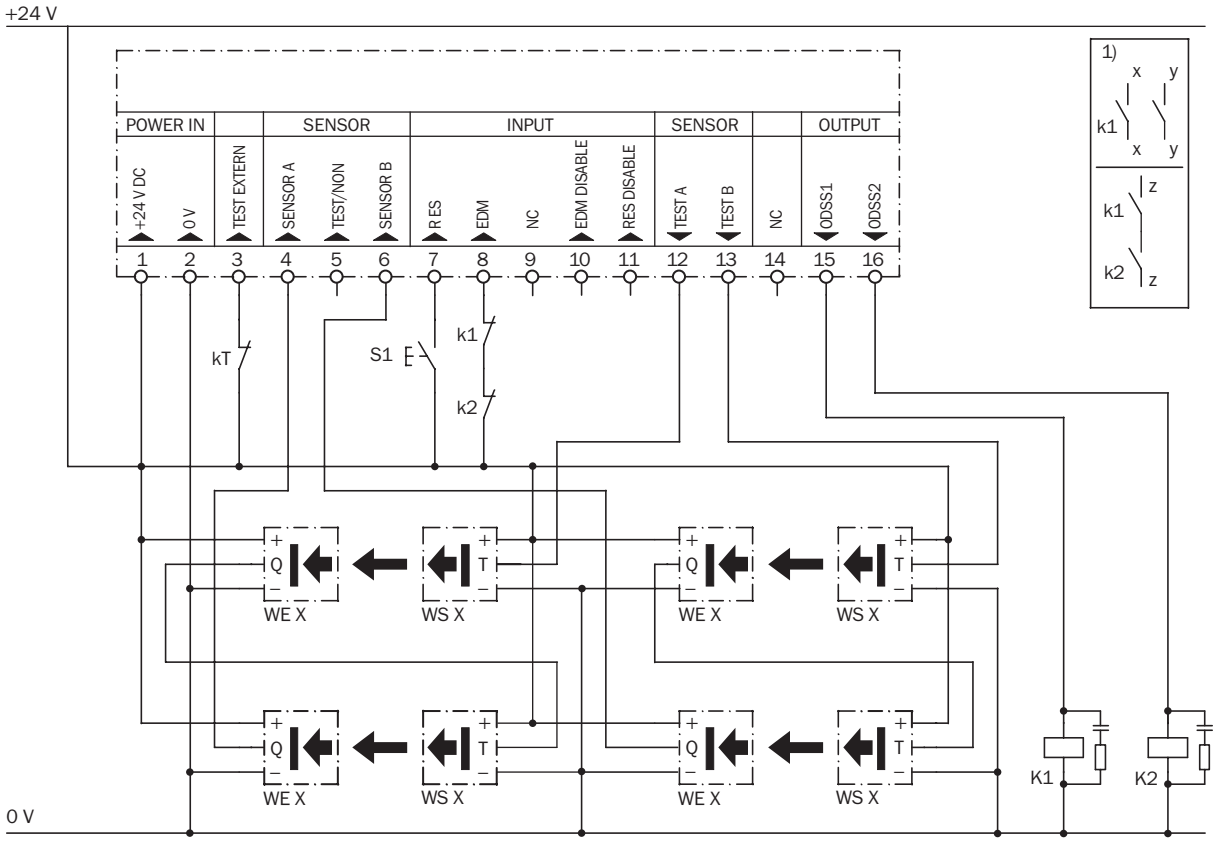
Dimensions in mm

Mechanical dimensions, IP 65 housing for LE20

N

Connection diagrams

Safety relay LE20 with 4 single-beam photoelectric safety switches WS/WE27-2, WS/WE18-2 or WS/WE12-2

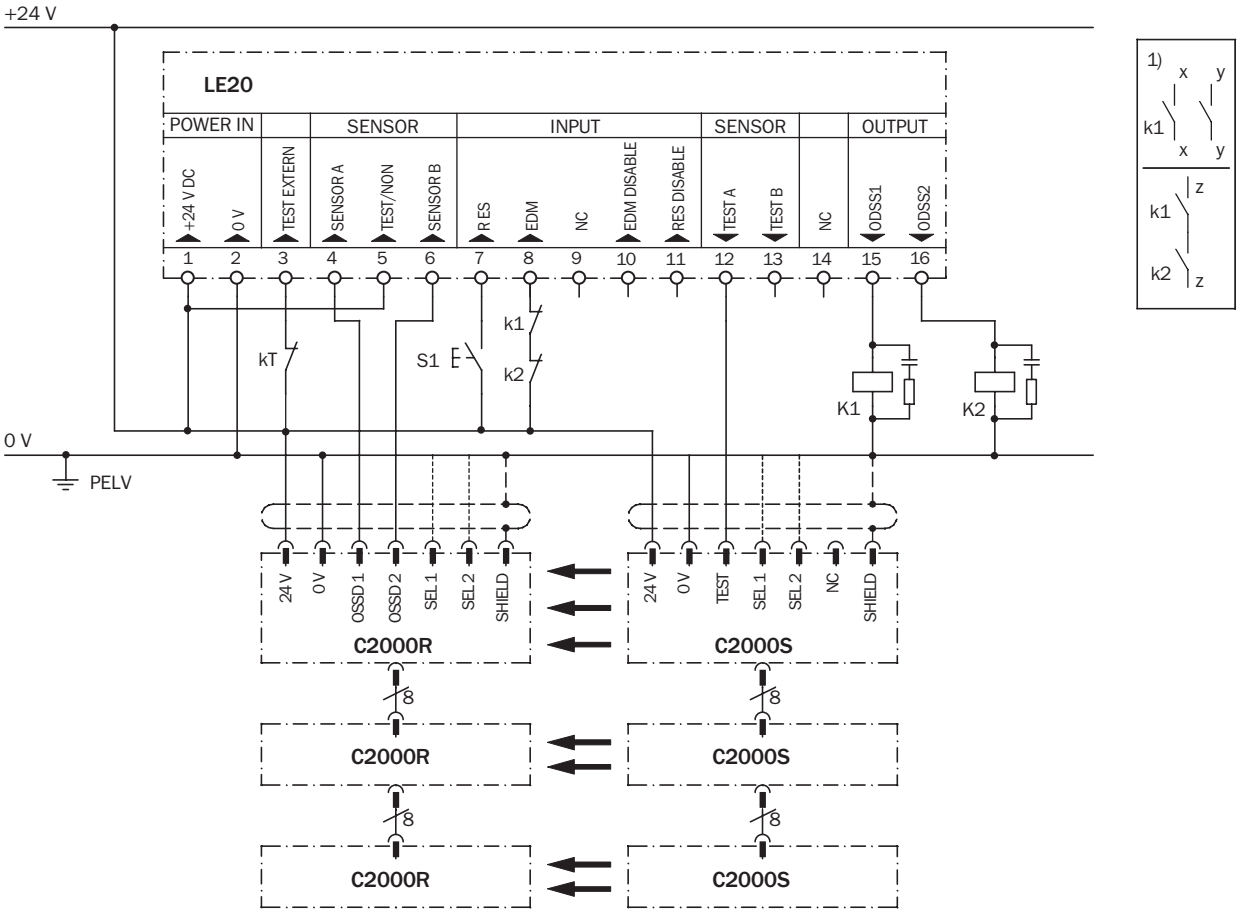


These contacts must be integrated into the control system such that when the output circuit is open the hazardous state is eliminated.

In safety categories 4 and 3 they must be integrated in two-channel configuration (x, y paths). Single-channel insertion into the control system (z path) is only possible with single-channel control and taking account of the risk analysis.

N

Safety relay LE20 with a cascade: C2000 - C2000 - C2000



These contacts must be integrated into the control system such that when the output circuit is open the hazardous state is eliminated.

In safety categories 4 and 3 they must be integrated in two-channel configuration (x, y paths). Single-channel insertion into the control system (z path) is only possible with single-channel control and taking account of the risk analysis.

Ordering information accessories

Interfaces

Description	Connection type	Type	Part number
Safety relay UE10-2OS	With screw terminal connector	UE10-2OS2D0	2019772
	With spring clamp terminal connector	UE10-2OS4D0	2019771

N

- Muting
- Restart interlock
- External device monitoring (EDM)
- Self testing
- 7-segment diagnostic display

Overview of technical specifications

Category according to EN 954-1	2
Type of connectable optoelectronic protective devices	C2000, M2000, single-beam photoelectric safety switches
Number of connectable C2000, M2000 systems	3 (cascaded)
Number of connectable single-beam photoelectric safety switches	1 ... 6
Number of safe outputs (OSSDs)	2
Maximum switching current	500 mA
Response time	14 ms

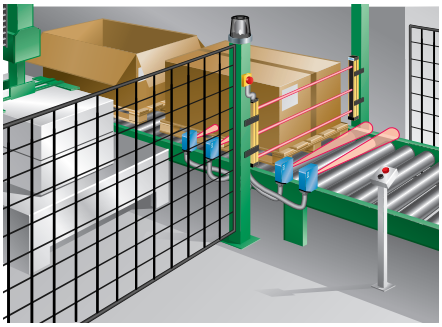
Product description

- 2 OSSDs, PNP, monitored and short-circuit protected
- External test pulse not required
- Functions individually selectable
- Up to 4 muting inputs, sensor or PLC signals possible
- Muting monitoring functions: sequence and concurrence operation possible
- Integrated override function

In-system added value

Evaluation unit for:
- C2000
- M2000
- Up to 6 testable single-beam photoelectric safety switch pairs

Applications



Access protection with differentiation between man and material (muting)

Ordering information

Connection type	Enclosure rating	Type	Part number
Screw terminal connector	IP 20	LE20-2622	1016502
	IP 65	LE20-1622	1016498
Spring clamp terminal connector	IP 20	LE20-2624	1016501
	IP 65	LE20-1624	1016497

N

Detailed technical specifications

Electrical data

Supply voltage V_S	24 V DC –30 %/+20 %, 5 % ripple [1)]
Power-up delay (after power On)	2 s approx.
Current consumption I_{max}	150 mA
Power consumption	4 W (without muting and override lamps)
Response time	5 ms
Response time of entire system (dependent on system configuration)	To be calculated from the following constants: ▪ C2000/M2000: approx. 7 ms to 25 ms, dependent on protective field height and resolution ▪ Single-beam photoelectric safety switches: max. 9 ms ▪ LE20: 5 ms ▪ Relay module: 5 ms
Response time for test input	Max. 30 ms
Reset time	Max. 50 ms
Connecting cables	0.5 mm^2, length max. 30 m 2.5 mm^2, length max. 150 m
Inputs: signal level on/off	HIGH: 15 V ... V_S LOW: 0 V ... 10 V
Test extern	HIGH: external test inactive LOW: external test active Pulse duration > 30 ms
Concurrence monitoring	Time window selectable: 3 s or ∞
Self-test cycle time	2 s

Outputs

Outputs OSSD 1, OSSD 2 (the levels refer to connection to the system connector)	PNP, monitored and short-circuit-proof
Switching current I_{max}	500 mA
Switching voltage V_{max}	V_S – 2.0 V at 500 mA
Switching capacity P_{max}	13.2 W
Inductive switching capacity $P_{max\ ind}$	1 VA
Protective field free V	U_{max}
Protective field interrupted V	0 V
Residual current at signal level "0" I	0.1 mA
Max. capacitive load	200 nF bei I = 50 mA 2.5 µF bei I = 500 mA
Test period test rate	2 s
Test pulse width	150 µs approx.
Test A, Test B (inactive/active)	V_S – 2.65 V/0 V Total current Test A + Test B < 10 mA Max. capacitive load 10 µF
Override lamp	24 V DC, 1 ... 10 W
Lamp 1, 2	24 V DC, 1 ... 10 W

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N

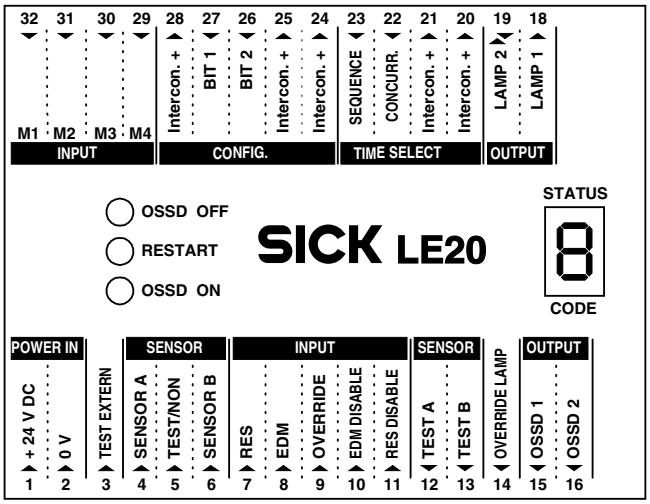
Operating data

Protection class	III [2]
Enclosure rating	IP 20, IP 65 optional
Type according to EN 61496	Type 2
Ambient operating temperature	–20 °C ... +60 °C
Storage temperature	–25 °C ... +75 °C
Air humidity (non condensing)	15 % ... 95 %
Vibration resistance	5g, 10 Hz ... 55 Hz according to IEC 60068-2-6
Shock resistance	10 g, 16 ms according to IEC 60068-2-29

[1] The upper and lower supply voltage limits must not be infringed.
The external voltage supply to the devices must be capable of withstanding a short-term power failure of 20 ms in accordance with EN 60204.
Suitable power supply units are available from SICK as accessories

[2] The circuits connected to the inputs and outputs must conform to the creepage and clearance distances specified in the relevant standards with regard to safe isolation in accordance with PELV (EN 60204, 6.4)

Internal circuitry

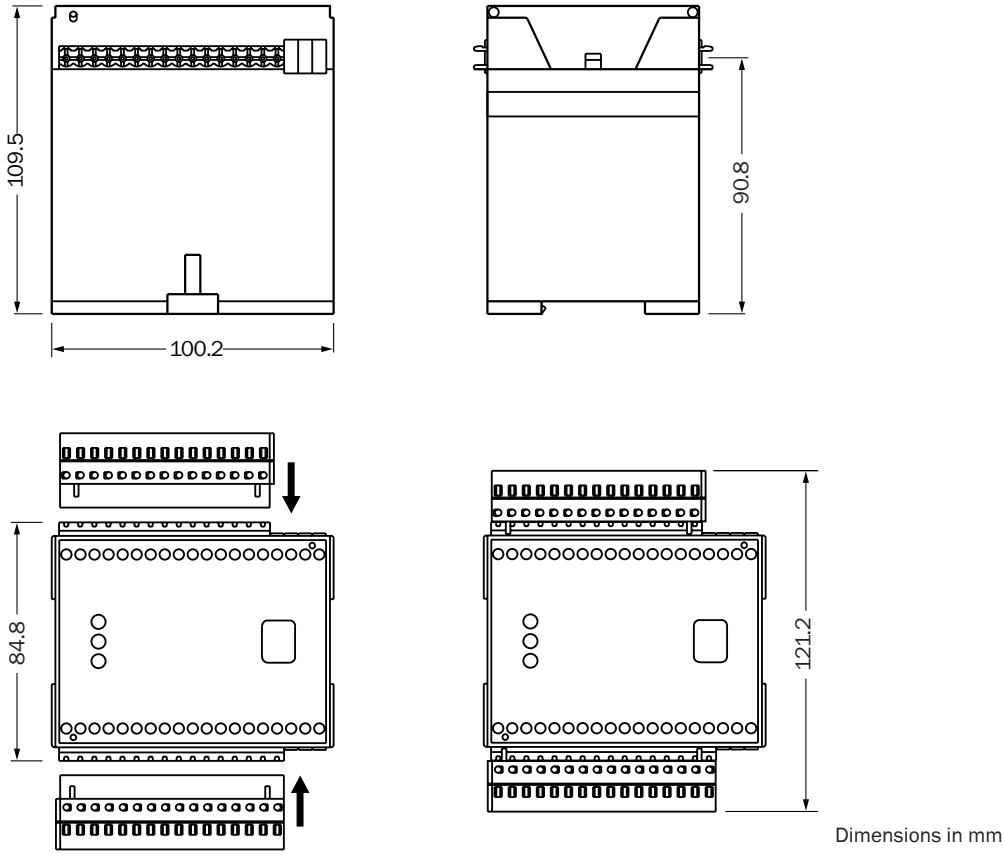


The LE20 safety evaluation unit is able to carry out a periodic safety test of the connected photoelectric switches, and provides the photoelectric switch system with the additional reset interlock and external device monitoring safety functions.

The expanded LE20 Muting version uses additional muting sensors to distinguish objects entering the hazardous area past the photoelectric switches from human beings, and allows the objects to pass without stopping the machine.

N

Dimensional drawings



Dimensions in mm

Mechanical dimensions, LE20 Muting with screw clamps, IP 20

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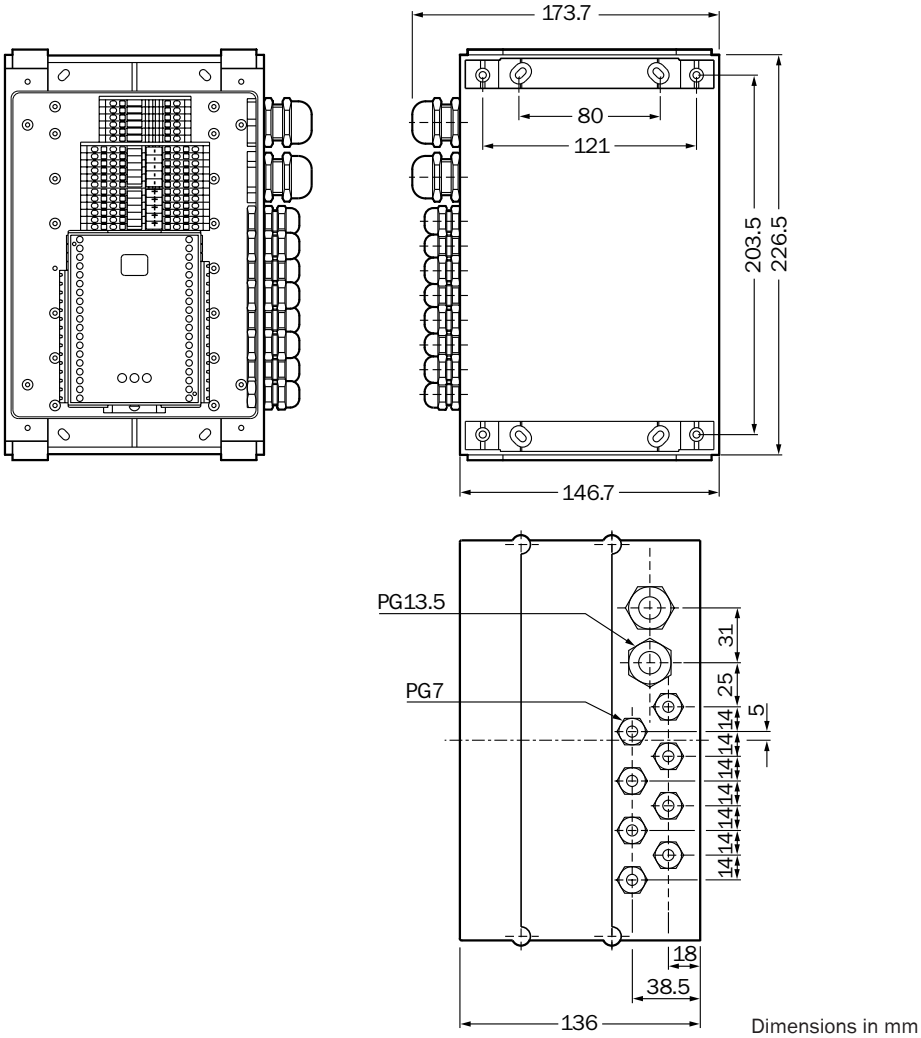


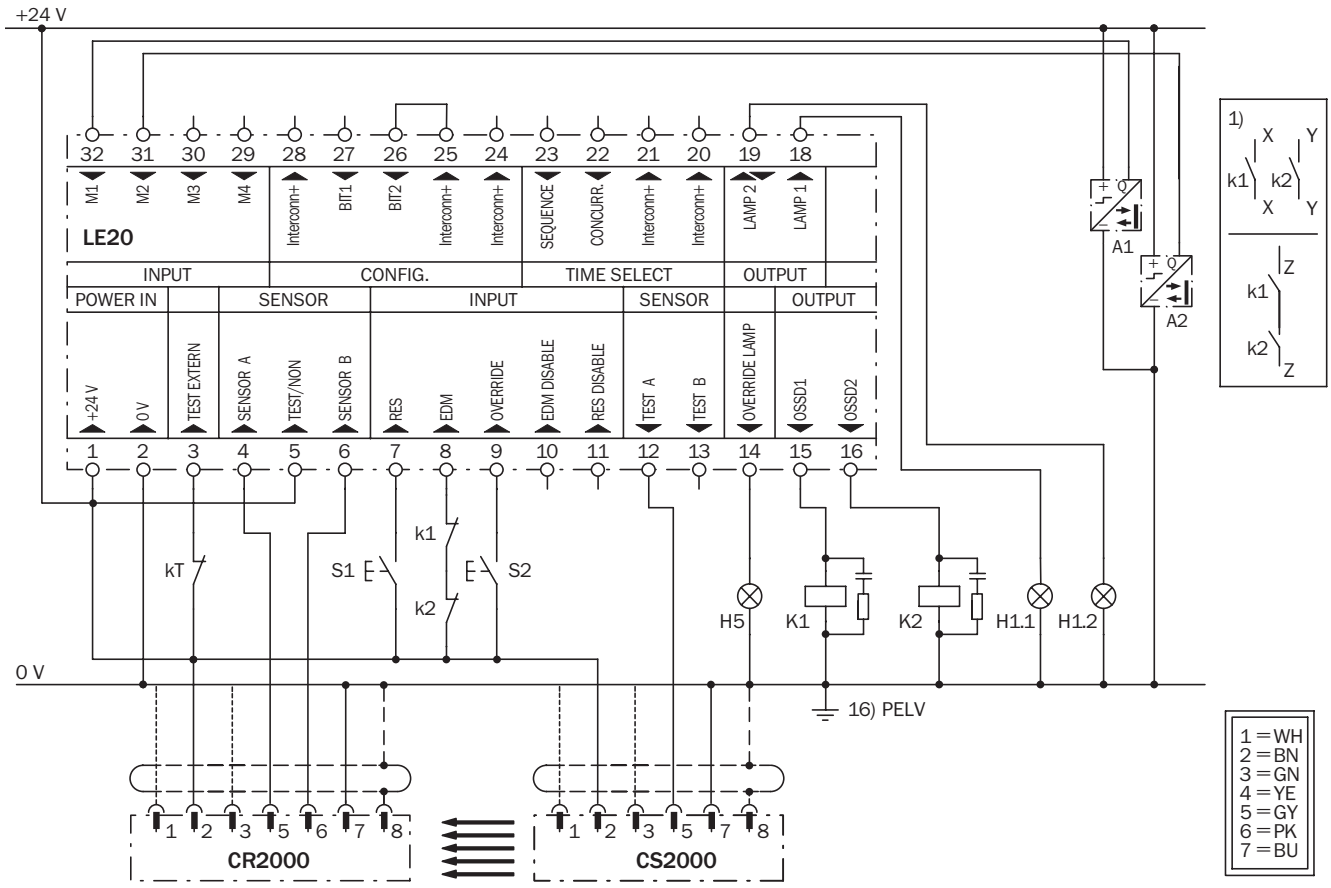
Dimensions in mm

Mechanical dimensions, IP 65 housing for LE20 Muting

N

Connection diagrams

Safety relay LE20 Muting with C2000, 2 muting sensors and 2 muting indicator lamps



These contacts must be integrated into the control system such that when the output circuit is open the hazardous state is eliminated.

In safety categories 4 and 3 they must be integrated in two-channel configuration (x, y paths). Single-channel insertion into the control system (z path) is only possible with single-channel control and taking account of the risk analysis.

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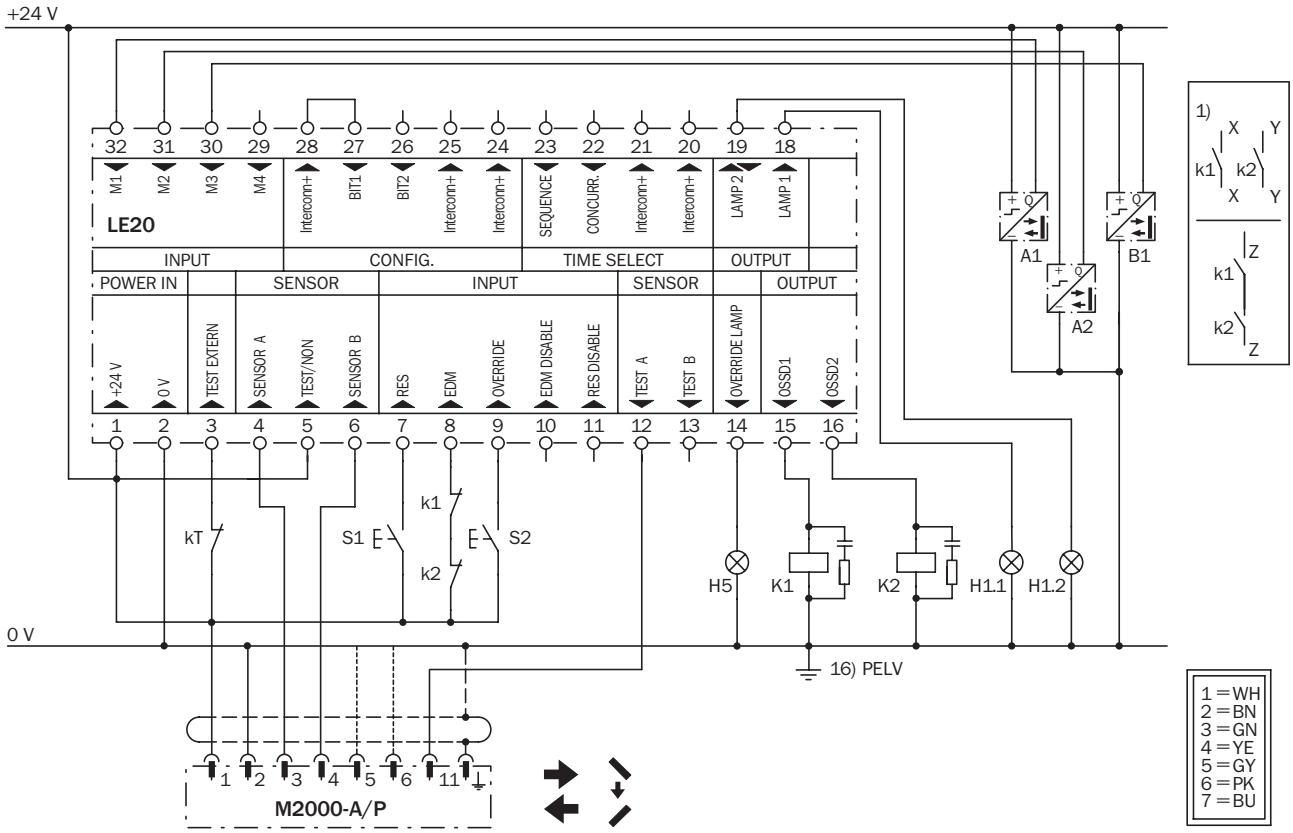
Safety relay LE20 Muting with M2000-A/P and 3 muting sensors



These contacts must be integrated into the control system such that when the output circuit is open the hazardous state is eliminated.

In safety categories 4 and 3 they must be integrated in two-channel configuration (x, y paths). Single-channel insertion into the control system (z path) is only possible with single-channel control and taking account of the risk analysis.

Ordering information accessories

Interfaces

Description	Connection type	Type	Part number
Safety relay UE10-2OS	▪ With screw terminal connector	UE10-2OS2D0	2019772
	▪ With spring clamp terminal connector	UE10-2OS4D0	2019771

Muting indicator lamps

Description	Delivery/cable length	Part number
Muting indicator lamp, bulp	▪ Including mounting kit	2020743
Muting indicator lamp, LED lamp	▪ Cable length 2 m	2019909
	▪ Cable length 10 m	2019910

N

Overview of technical specifications

Category according to EN 954-1	Same as main unit
Number of enable current paths	4
Number of signalling current paths	2
Housing width	22.5 mm

Product description

- The UE10-4XT expansion module serve to:
  - Increase the number of output contacts of a main unit
  - N/C contact for external device monitoring (EDM)
- 2 LEDs:
  - Relay K1
  - Relay K2
- Available with plug-in terminals (key coded)

In-system added value

- Applicable with UE10–UE48 units

Ordering information

Connection type	Type	Part number
Screw-type terminals	UE10-4XT2D2	6024919
Plug-in terminals	UE10-4XT3D2	6024920

- Expansion module
- External device monitoring (EDM)

4

2

N

Further information	Page
→ Symbols	N-2
→ Technical specifications	N-72
→ Internal circuitry	N-73
→ Dimensional drawings	N-73
→ Services	A-2

Detailed technical specifications

General system data

Voltage supply to A1 - A2	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Supply voltage V_S (A1 - A2)	24 V AC/DC (20.4 V AC/DC ... 26.4 V AC/DC)
Power consumption	
AC mode	2.7 VA
DC mode	1.5 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Nominal frequency in AC mode	50 Hz ... 60 Hz
Switch-on time (upon applying the supply voltage)	25 ms

Output circuits (13 - 14, 23 - 24, 33 - 34, 43 - 44, 51 - 52, 61 - 62, Y1 - Y2)

Response time (K1 / K2)	40 ms
Relay contacts	4 N/O, enable current paths, safety relevant 2 N/C, signalling current paths, not safety relevant 1 N/C, contactor monitoring
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage enable current paths	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching voltage contactor monitoring	10 V DC ... 24 V DC
Switching current enable current paths	10 mA ... 6 A
Switching current signalling current paths	10 mA ... 2 A
Switching current contactor monitoring	10 mA ... 0.1 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 6 A (3600 c/h) DC-13 U_e 24 V DC, I_e 6 A (360 c/h) DC-13 U_e 24 V DC, I_e 3 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

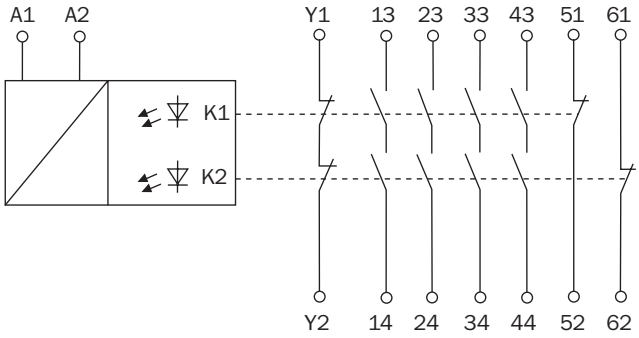
Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	EN 60947-1 02/99
Screening against interference	EN 60947-1 02/99
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

N

Internal circuitry



Function

The supply voltage of the expansion module is linked to an output contact of a main unit.

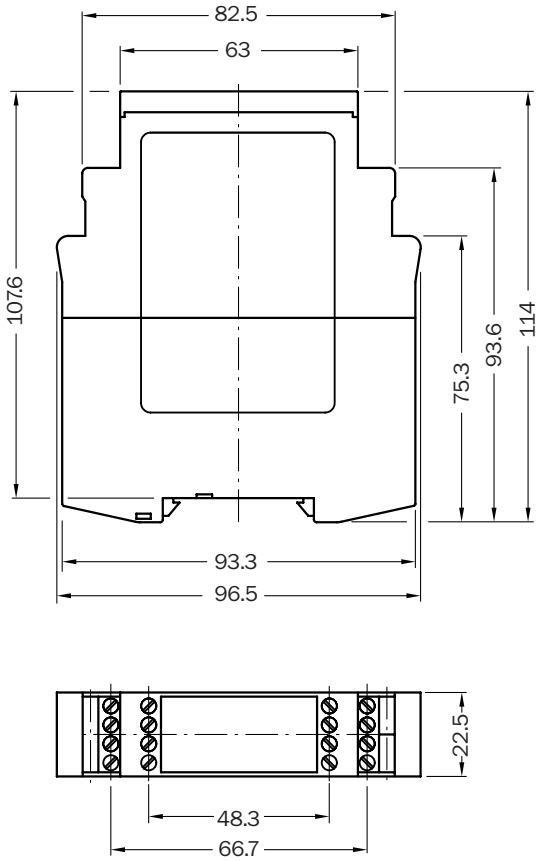
Upon applying the supply voltage to terminals A1 and A2, relays K1 and K2 are energised (the LEDs for both relays illu-minate): The 4 ouput contacts close, the two normally closed contacts and the EDM (feedback) circuit switch to open circuit status.

When the output contacts of the standard unit opens (e.g. by activation of the emergency stop), the relays K1 and K2 de-energise: The normally open contacts open, and the two normally closed contacts close.

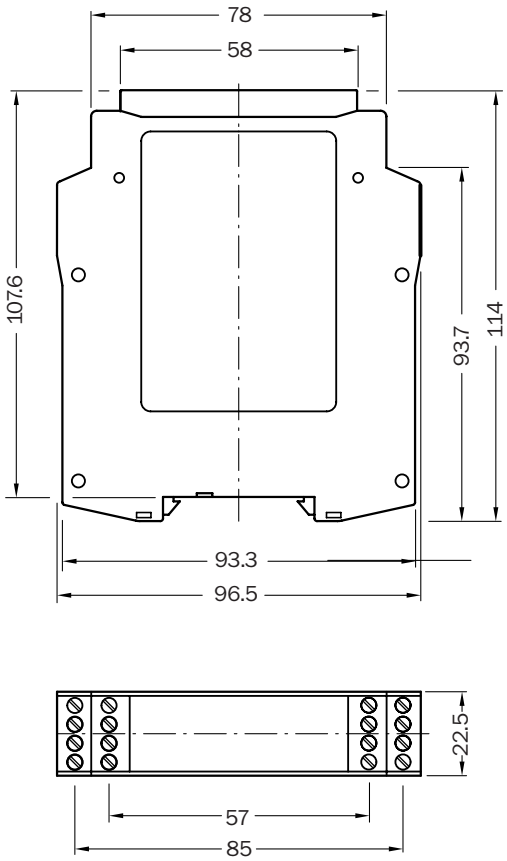
External device monitoring (EDM)

If external device monitoring is implemented in the connected main unit, then the normally closed contacts (Y1 - Y2) prevent the resetting of the main unit, when K1 and/or K2 do not de-energise.

Dimensional drawings



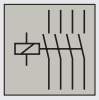
Housing with screw-type terminals



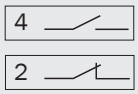
Housing with plug-in terminals

Dimensions in mm

N



- Expansion module
- External device monitoring (EDM)



Overview of technical specifications

Category according to EN 954-1	Same as main unit
Number of enable current paths	4
Number of off-delayed normally open contacts	2
Housing width	22.5 mm

Product description

- The UE11-4DX expansion module serve to:
  - Increase the number of output contacts of a main unit
  - UE11-4DX has off-delayed outputs (0.5 s, 1 s, 2 s or 3 s, depending on model)
  - N/C contact for external device monitoring (EDM)
- 2 LEDs:
  - Relay K1
  - Relay K2
- Available with plug-in terminals

In-system added value

- Applicable with UE10–UE48 units

Ordering information

Delay	Connection type	Type	Part number
0.5 s	Screw-type terminals	UE11-4DX2D30.5	6024921
	Plug-in terminals	UE11-4DX3D30.5	6024925
1 s	Screw-type terminals	UE11-4DX2D31	6024922
	Plug-in terminals	UE11-4DX3D31	6024926
2 s	Screw-type terminals	UE11-4DX2D32	6024923
	Plug-in terminals	UE11-4DX3D32	6024927
3 s	Screw-type terminals	UE11-4DX2D33	6024924
	Plug-in terminals	UE11-4DX3D33	6024928

N

Further information	Page
→ Symbols	N-2
→ Internal circuitry	N-76
→ Dimensional drawings	N-77
→ Services	A-2

Detailed technical specifications

General system data

Voltage supply to A1 - A2	
Electrical output circuit > 25 V AC / 60 V DC	PELV
Electrical output circuit < 25 V AC / 60 V DC	PELV or SELV
Supply voltage V_S (A1 - A2)	24 V DC (20.4 V DC ... 26.4 V DC)
Power consumption	2.0 W
Residual ripple in DC mode (within the limits of V_S)	2.4 V_{SS}
Switch-on time (upon applying the supply voltage)	75 ms

Output circuits (17 - 18, 27 - 28, 37 - 38, 47 - 48, 55 - 56, 65 - 66, Y1 - Y2) off-delayed

Switch-off delay time (depending on type)	0.5 s, 1 s, 2 s or 3 s
Influence of the supply voltage	0.5 (%/% ΔU_N)
Influence of ambient temperature	0.4 (%/K)
Mean value of error (% + ± 10 ms)	± 20
Dispersion (% + ± 10 ms)	± 2
Relay contacts	4 N/O, enable current paths, safety relevant 2 N/C, signalling current paths, not safety relevant 1 N/C, contactor monitoring
Contact type	Positively guided
Contact material	Silver alloy; gold-plated
Load capacity of contacts	
Switching voltage enable current paths	10 V AC ... 230 V AC / 10 V DC ... 30 V DC
Switching voltage contactor monitoring	10 V DC ... 24 V DC
Switching current enable current paths	10 mA ... 6 A
Switching current signalling current paths	10 mA ... 2 A
Switching current contactor monitoring	10 mA ... 0.1 A
Total current across all contacts	12 A
Application category according to EN 60947-5-1	AC-15 U_e 230 V AC, I_e 6 A (3600 c/h) DC-13 U_e 24 V DC, I_e 6 A (360 c/h) DC-13 U_e 24 V DC, I_e 3 A (3600 c/h)
Permitted switching frequency	3600 c/h
Service life, mechanical (relay contacts)	1 x 10^7 switching cycles
Service life, electrical (dependent on the load)	2 x 10^6 switching cycles

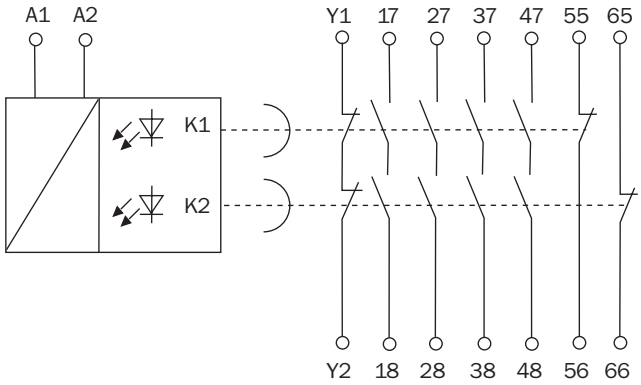
Operating data

Surge voltage rating ($U_{Imp.}$)	4 kV
Excess voltage category	III
Contamination rating of the unit (EN 50178)	
External	3
Internal	2
Voltage rating	300 V AC
Test voltage U_{eff} (50 Hz) EN 60439-1	2.0 kV
Enclosure rating	
Housing	IP 40
Terminals	IP 20
Radio interference	EN 60947-1 02/99
Screening against interference	EN 60947-1 02/99
Ambient operating temperature	–25 °C ... +55 °C
Storage temperature	–25 °C ... +75 °C
Wire cross-sections	
Single strand wire (2 x, identical cross section)	0.14 mm^2 ... 0.75 mm^2
Single strand wire (1 x)	0.14 mm^2 ... 2.5 mm^2
Fine stranded wire with terminal crimps (2 x, identical cross section)	0.25 mm^2 ... 0.5 mm^2
Fine stranded wire with terminal crimps (1 x)	0.25 mm^2 ... 2.5 mm^2

Weight	0.2 kg

N

Internal circuitry



Function

The supply voltage of the expansion module is switched by way of a output contact of a standard unit.

Upon applying the supply voltage to terminals A1 and A2, relays K1 and K2 are energised (the LEDs for both relays illu-minate): The 4 output contacts close, the two normally closed contacts and the EDM (feedback) circuit switch to open circuit status.

When the output contacts of the standard unit opens (e.g. by activation of the emergency stop switch), the relays K1 and K2 de-energise after a unit specific delay. These fixed switch-off delay times of 0.5 s, 1 s, 2 s and 3 s are according to the type.

This is achieved by means of capacitors, so that even in the event of power supply failure the off-delay runs it full duration in each instance. Only after the delay period has expired do the relays K1 and K2 return to their neutral rest position. With the combination of UE11-4DX (with off-delayed) and a standard unit, stop category 1 (EN 418) can be realised.

External device monitoring (EDM)

If external device monitoring is implemented in the upstream installed standard unit, then the normally closed contacts (Y1 - Y2) prevents the resetting of the standard unit, when K1 and/or K2 do not de-energise.

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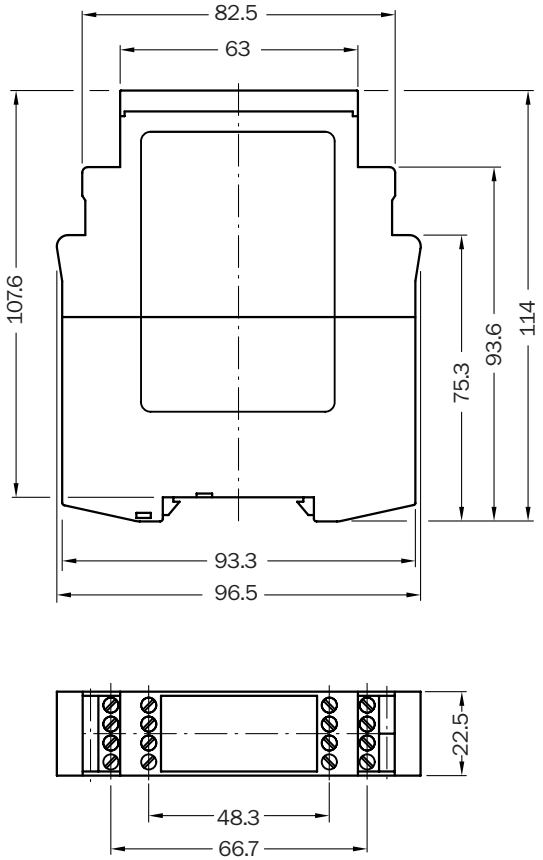
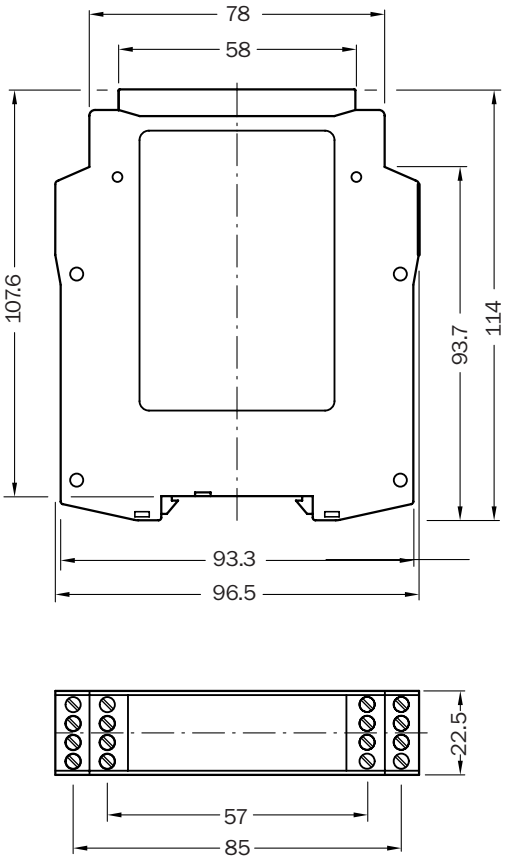
Dimensional drawings



Housing with screw-type terminals



Housing with plug-in terminals

Dimensions in mm

N