PSR-MC38

Safety relay for emergency stop, safety door and light grid monitoring

Data sheet
108206_en_02

 2026-06-08

1 Description

Intended Use

The safety relay is used to monitor 1- or 2-channel signal generators and to control actuators.

When the sensor circuit is interrupted, the safety relay initiates the safe state.

The safety relay interrupts circuits in a safety-related way.

Possible signal generators

- Emergency stop button
- Door locking mechanisms
- Light grids

Contact switching type

- 2 undelayed enabling current paths
- 1 digital signal output
- TBUS interface

The enabling current paths drop out without delay as per stop category 0 in accordance with EN 60204-1.

Control

- 1- or 2-channel
- Equivalent or non-equivalent
- Automatic or manual, monitored start

Achievable safety integrity

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Additional features

- TBUS interface for connecting the following:
  - CONTACTRON hybrid motor starters
  - QUINT4 SYS power supply unit
- Cross circuiting detection
- Optional pluggable screw or Push-in terminal blocks
- 22.5 mm housing width

Approvals

c UL us LISTED

Observe these notes

WARNING: Risk of electric shock
Observe the safety regulations and installation notes in the corresponding section.

Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.com/products.

This document is valid for the products listed in the “Ordering data” chapter.
This document meets the same requirements as the original operating instructions with respect to the contents.

2 Table of contents

3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Safety relay for emergency stop, safety doors and light grids up to SIL 3, Cat. 4, PL e, 1- or 2-channel operation, automatic or manual, monitored start, 2 enabling current paths, 1 signal output, TBUS interface, U_S = 24 V DC, pluggable screw terminal block	PSR-MC38-2NO-1DO-24DC-SC	1009831	1
Safety relay for emergency stop, safety doors and light grids up to SIL 3, Cat. 4, PL e, 1- or 2-channel operation, automatic or manual, monitored start, 2 enabling current paths, 1 signal output, TBUS interface, U_S = 24 V DC, pluggable push-in terminal	PSR-MC38-2NO-1DO-24DC-PI	1009832	1

Accessories	Type	Item no.	Pcs./Pkt.
DIN rail bus connector for safety switching devices, for supplying/controlling/monitoring (depending on the module)	PSR-TBUS	2890425	50
DIN rail bus connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos.	ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
Primary-switched power supply, QUINT POWER, screw connection, DIN rail mounting, supply of devices possible via the TBUS DIN rail connector, protective coating, input: single-phase, output: 24 V DC/2.5 A	QUINT4-SYS-PS/1AC/24DC/2.5/SC	2904614	1
Hybrid motor starter as an alternative to a conventional reversing contactor. Reverses 3~ AC motors up to 3 A, provides motor protection, ATEX, and emergency stop up to SIL 3. Group shut-down, supply, and relay extension possible via DIN rail connector.	ELR H5-IES-PT- 24DC/500AC-3-P	2909556	1
Hybrid motor starter as an alternative to a conventional reversing contactor. Reverses 3~ AC motors up to 9 A, provides motor protection, ATEX, and emergency stop up to SIL 3. Group shut-down, supply, and relay extension possible via DIN rail connector.	ELR H5-IES-PT- 24DC/500AC-9-P	2909554	1
Hybrid motor starter as an alternative to a conventional reversing contactor. Reverses 3~ AC motors up to 3 A, provides motor protection and emergency stop up to SIL 3/PL e. Group shut-down, supply, and relay extension possible via DIN rail connector.	ELR H5-IS-PT- 24DC/500AC-3-P	2909569	1
Hybrid motor starter as an alternative to a conventional reversing contactor. Reverses 3~ AC motors up to 9 A, provides motor protection and emergency stop up to SIL 3/PL e. Group shut-down, supply, and relay extension possible via DIN rail connector.	ELR H5-IS-PT- 24DC/500AC-9-P	2909567	1
Hybrid motor starter as an alternative to a conventional protective circuit. Starts 3~ AC motors up to 3 A, provides motor protection and emergency stop up to SIL 3/PL e. Group shut-down, supply, and relay extension possible via DIN rail connector.	ELR H3-IS-PT- 24DC/500AC-3-P	2909570	1

Accessories	Type	Item no.	Pcs./Pkt.
Hybrid motor starter as an alternative to a conventional protective circuit. Starts 3~ AC motors up to 9 A, provides motor protection and emergency stop up to SIL 3/ PL e. Group shut-down, supply, and relay extension possible via DIN rail connector.	ELR H3-IS-PT- 24DC/500AC-9-P	2909568	1
Special DIN rail connector only suitable for ELR H...-P and EM-...-P.	ELR-TBUS-22,5-P	2203861	10
DIN rail bus connector for safety switching devices, for supplying/controlling/monitoring (depending on the module)	PSR-TBUS - 1PCS	1326060	1
Crimping pliers, for ferrules without insulating collar according to DIN 46228 Part 1 and ferrules with insulating collar according to DIN 46228 Part 4, 0.25 mm² ... 6.0 mm², lateral entry, trapezoidal crimp	CRIMPFOX 6	1212034	1

4 Technical data

Hardware/firmware version	
Hardware/firmware version (1009831)	≥ 00/--
Hardware/firmware version (1009832)	≥ 00/--

The technical data and safety characteristics are valid as of the specified HW/FW version.

Supply: A1/A2	
Rated control circuit supply voltage U_S	24 V DC -15 % / +10 % (provide external protection)
Rated control supply current I_S	typ. 75 mA
Power consumption at U_S	typ. 1.8 W
Inrush current	< 4 A (Δt = 3 ms at U_s)
Filter time	20 ms (at A1 in the event of voltage dips at U_s)
Protective circuit	Serial protection against polarity reversal Suppressor diode

Digital inputs: Sensor circuit (S10, S12, S13, S22)	
Number of inputs	4
Description of the input	safety-related sensor inputs
Input voltage range "1" signal	20.4 V DC ... 26.4 V DC
Inrush current	< 40 mA (typ. with U_S at S10) < 300 mA (typ. with U_S at S12, Δt = 150 ms) < 3 mA (typ. with U_S at S13) > -300 mA (typ. with U_S at S22, Δt = 150 ms)
Current consumption	40 mA (typ. with U_S at S10) 45 mA (typ. with U_S at S12) 3 mA (typ. with U_S at S13) -35 mA (typ. with U_S at S22, Δt = 150 ms)
Filter time	2 ms (At S10, S12, S13; test pulse width of low test pulses) 1 s (At S10, S12, S13; test pulse rate of low test pulses) No brightness test pulses / high test pulses permitted.
Max. permissible overall conductor resistance	50 Ω
Concurrence	∞
Protective circuit	Suppressor diode

Digital inputs: Start circuit (Y1, S34, S35)	
Number of inputs	3
Description of the input	non-safety-related
Input voltage range "1" signal	20.4 V DC ... 26.4 V DC
Inrush current	< 60 mA (typ. with U_S at Y1, Δt = 150 ms) < 270 mA (typ. with U_S at S34, Δt = 15 ms) < 80 mA (typ. with U_S at S35, Δt = 25 ms)
Current consumption	typ. 10 mA (typ. with U_S at Y1) typ. 34 µA (typ. with U_S at S35)
Filter time	No darkness test pulses / low test pulses permitted. No brightness test pulses / high test pulses permitted.
Max. permissible overall conductor resistance	50 Ω
Protective circuit	Suppressor diode

Relay outputs: Enabling current path (13/14, 23/24)	
Number of outputs	2 (undelayed)
Output description	safety-related N/O contacts 2 NO contacts each in series, without delay, floating
Contact material	$AgSnO_2$
Switching voltage (see section “Relay data”)	min. 10 V AC/DC max. 250 V AC/DC (Observe the load curve)
Limiting continuous current (see section “Relay data”)	6 A
Inrush current	min. 10 mA max. 6 A
Sq. Total current $I_{TH}^2 = I_1^2 + I_2^2 + ... + I_N^2$	72 A^2 (observe derating)
Switching frequency	max. 0.5 Hz
Service life electrical	See section “Electrical service life”
Mechanical service life	10x 10^6 cycles
Switching power	min. 100 mW
Switching capacity	5 A (24 V (DC13)) 5 A (250 V (AC15))
Output fuse	10 A gL/gG 4 A gL/gG (for low-demand applications)

Alarm outputs: Y30	
Number of outputs	1
Output description	PNP non-safety-related
Voltage	approx. 23.9 V DC (U_s - 0.1 V)
Current	max. 100 mA
Maximum inrush current	500 mA (Δt = 1 ms at U_s)
Protective circuit	Suppressor diode

Times	
Typical starting time with U_s	200 ms (when controlled via A1)
Typical response time at U_s	200 ms (automatic start) 30 ms (manual, monitored start)
Typical release time with U_s	25 ms (when actuation is via the sensor circuit) 60 ms (when controlled via A1)
Restart time	< 1 s (Boot time)
Recovery time	< 500 ms

General data	
Relay type	Electromechanical relay with force-guided contacts in accordance with IEC/EN 61810-3
Nominal operating mode	100% operating factor
Degree of protection	IP20
Min. degree of protection of inst. location	IP54
Mounting type	DIN rail mounting
Mounting position	vertical or horizontal
Assembly note	See derating curve
Type of housing	PA zinc yellow (RAL 1018)
Operating voltage display	1 x LED (green)
Status display	4 x LED (green)
Rated insulation voltage	250 V
Rated surge voltage/insulation	See “Insulation coordination”
Degree of pollution	2
Overvoltage category	II, III (See the section “Insulation coordination”)
Maximum power dissipation for nominal condition	16.6 W (at U_S = 26.4 V, I_L^2 = 72 A²)
Note on power dissipation	See “Calculating the power dissipation”

Dimensions / weight	Screw connection	Push-in connection
W x H x D	22.5 x 112.2 x 114.5 mm	22.5 x 117.5 x 114.5 mm
Weight	169.38 g	170.7 g

Connection data	Screw connection	Push-in connection
Conductor cross-section rigid	0.2 mm² … 2.5 mm²	0.2 mm² … 2.5 mm²
Conductor cross-section flexible	0.2 mm² … 2.5 mm²	0.2 mm² … 2.5 mm²
Conductor cross-section AWG	24 … 12	24 … 14
Stripping length	7 mm	10 mm
Screw thread	M3	-
Tightening torque	0.5 Nm … 0.6 Nm	-

Ambient conditions	
Ambient temperature (operation)	-20 °C ... 55 °C (observe derating)
Ambient temperature (storage/transport)	-40 °C ... 70 °C
Max. permissible relative humidity (operation)	75 % (on average, 85% infrequently, non-condensing)
Max. permissible humidity (storage/transport)	75 % (on average, 85% infrequently, non-condensing)
Maximum altitude	≤ 2000 m (Above sea level)
Information on operating height	See the “Using PSR devices at altitudes greater than 2000 m above sea level” section
Shock	15g
Vibration (operation)	10 Hz ... 150 Hz, 2g

Approvals and manufacturer's declarations	
The latest documents can be found at:	www.phoenixcontact.com/product/1009831 www.phoenixcontact.com/product/1009832

Safety data	
Stop category according to IEC 60204	0

Safety parameters in accordance to IEC 61508 - high demand	
IEC 61508 - High demand	
Equipment type	Type A
HFT	1
SIL	3
PFH_D	1.00×10^{-9} (5 A DC13; 5 A AC15; 8760 switching cycles/year)
Demand rate	< 12 Months
Proof test interval	240 Months
Mission time	240 Months

Safety parameters according to IEC 61508 - low demand	
Equipment type	Type A
HFT	1
SIL	3
PFD_{avg}	8.24×10^{-5}
Proof test interval	40 Months
Mission time	240 Months

Safety parameters according to EN ISO 13849-1	
Category	4 (5 A DC13; 5 A AC15; 8760 switching cycles/year)
Performance level	e
Mission time	240 Months
For applications in PL e, the required demand rate for the safety function is once per month.	

Safety parameters according to EN IEC 62061	
SIL	3
For applications in SIL 3 the required demand rate for the safety function is once per month.	

5 Interface type (ZVEI classification)

Digital inputs : Sensor circuit (S10, S12, S13, S22)				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Destination	A	M	Source	A
Destination	C0	M	Source	C1, C2, C3

Interface type A - Destination			
Parameter	**min.**	**typ.**	**max.**
Input current I_i (in the ON-state)	29 mA (S10) 29 mA (S12) 2 mA (S13) -300 mA (S22 Δt = 150 ms)	-	40 mA (S10) 300 mA (S12 Δt = 150 ms) 3 mA (S13) -25 mA (S22)
Output voltage U_i	19 V	-	24.5 V
Input capacitance C_i	-	-	-
Additional measure M	- The inputs are not types in accordance with IEC 61131-2. - T_G is S11 for S10/S12/S13 (24 V without cycle) - T_G is A2 for S22 (0 V without cycle).		

Interface type C0 - Destination			
Parameter	**min.**	**typ.**	**max.**
Test pulse duration t_i	-	-	2 ms
Test pulse interval T	1 s	-	-
Input resistance R	700 Ω (S10) 610 Ω (S12) 9.4 kΩ (S13) 750 Ω (S22)	-	-
Input capacitance C_L	-	-	-
Inductance L_L	-	-	-
Additional measure M	- The inputs are not types in accordance with IEC 61131-2. - Switch-on pulses should be switched off for safety applications.		

Digital inputs : Start circuit (Y1, S34, S35)				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Destination	A	M	Source	A
Destination	C0	M	Source	C1, C2, C3

Interface type A - Destination			
Parameter	**min.**	**typ.**	**max.**
Input current I_i (in the ON-state)	3 mA (Y1) 29 mA (S34) 2 mA (S35)	-	60 mA (Y1 Δt = 150 ms) 270 mA (S34 Δt = 150 ms) 80 mA (S35 Δt = 150 ms)
Output voltage U_i	19 V	-	24.5 V
Input capacitance C_i	-	-	-
Additional measure M	- The inputs are not types in accordance with IEC 61131-2. - T_G is S33 (24 V without cycle).		

Interface type C0 - Destination			
Parameter	**min.**	**typ.**	**max.**
Test pulse duration t_i	-	-	-
Test pulse interval T	-	-	-
Input resistance R	500 Ω (Y1) 100 Ω (S34) 100 Ω (S35)	-	-
Input capacitance C_L	-	-	-
Inductance L_L	-	-	-
Additional measure M	- The inputs are not types in accordance with IEC 61131-2. - Switch-on pulses should be switched off for safety applications.		

Relay outputs : Enabling current path (13/14, 23/24)				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Source	A	M	Destination	A
Source	C0	M	Destination	-

Interface type A - Source			
Parameter	**min.**	**typ.**	**max.**
Switching current I_i	10 mA	-	6 A
Switching voltage U_i	10 V	-	250 V AC/DC
Internal resistance R_i (in the switched state)	Load ≥ 1 A ≤ 100 mΩ	-	Load ≥ 10 mA ≤ 20 Ω
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Electrical isolation	yes		
Additional measure M	- The outputs are not types in accordance with IEC 61131-2.		

Interface type C0 - Source			
Parameter	**min.**	**typ.**	**max.**
Test pulse duration t_i	-	-	-
Test pulse interval T	-	-	-
Nominal current I_N	-	-	6 A
Load capacitance C_L	-	-	see switching capacity
Inductive load L_L	-	-	see switching capacity
Additional measure M	- The outputs are not types in accordance with IEC 61131-2. - No test pulses are emitted at the output.		

Alarm outputs : Y30				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Source	C0	M	Destination	-

Interface type C0 - Source			
Parameter	**min.**	**typ.**	**max.**
Test pulse duration t_i	-	-	-
Test pulse interval T	-	-	-
Nominal current I_N	-	-	100 mA
Leakage current $I_{Leakage}$	-	-	-
Load capacitance C_L	-	-	-
Inductive load L_L	-	-	-
Additional measure M	- The output is not a type in accordance with IEC 61131-2. - No test pulses are emitted at the output.		

6 Notes regarding documentation

6.1 Identification of warning notes

This symbol indicates hazards that could lead to personal injury.

There are three signal words indicating the severity of a potential injury.

DANGER Indicates a hazard with a high risk level. If this hazardous situation is not avoided, it will result in death or serious injury.

WARNING Indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.

CAUTION Indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.

This symbol together with the **NOTE** signal word warns the reader of actions that might cause property damage or a malfunction.

Here you will find additional information or detailed sources of information.

6.2 Validity

This data sheet is valid for the described product(s) from the hardware/firmware version specified in the technical data.

6.3 Target group

This data sheet is therefore aimed at:

- Qualified personnel who plan and design safety equipment for machines and systems and are familiar with regulations governing occupational safety and accident prevention.
- Qualified personnel who install and operate safety equipment in machines and systems.

Qualified personnel:

Qualified personnel are people who, because of their education, experience, and instruction and their knowledge of relevant standards, regulations, accident prevention, and service conditions, have been authorized by those responsible for the safety of the system to carry out any required operations and who are able to recognize and avoid any possible dangers.

Requirements:

Knowledge of the following topics is required:

- Handling safety components
- Valid EMC regulations
- Valid regulations governing occupational safety and accident prevention

7 Safety regulations and installation notes

WARNING: Death, serious personal injury or damage to equipment

Depending on the application, incorrect handling of the device may pose serious risks for the user or cause damage to equipment.

- Observe all the safety notes and warning instructions provided in this chapter and elsewhere in this document.

Safety notes for installation and mounting in other languages:
PACKB.SAFETY NOTES INSTALLATION MOUNTING
They can be downloaded from the product page at www.phoenixcontact.com/products.

Direct/indirect contact

- Protection against direct and indirect contact according to VDE 0100 Part 410 must be ensured for all components connected to the system.

In the event of an error, parasitic voltages must not occur (single-fault tolerance).

Power supply units for 24 V supply

- Only use power supply units with safe isolation and SELV/PELV.
- Protect the 24 V area with a suitable external fuse.
- Make sure that the power supply unit is able to supply **four times** the nominal current of the external fuse, to ensure that it trips in the event of an error.
- Make sure that the output voltage of the voltage supply does not exceed 32 V even in the event of error.

Startup, mounting, and modifications

Startup, mounting, modifications, and upgrades may only be carried out by qualified personnel.

- Before working on the device, disconnect the power.
- Ensure that the device is disconnected from the power supply.
- Carry out wiring according to the application. Refer to the “Application examples” section for this.

Reliable operation is only ensured if the device is installed in housing protected from dust and humidity.

- Install the device in housing protected from dust and humidity (min. IP54).

In operation

During operation, parts of electrical switching devices carry hazardous voltages.

- Protective covers must not be removed when operating electrical switching devices.

For emergency stop applications, automatic startup of the machine can pose serious risks for the user.

- The machine must be prevented from restarting automatically by a higher-level controller.

With the manual, monitored reset device, a machine start may not be triggered in accordance with EN ISO 13849-1.

Inductive loads can lead to welded relay contacts.

- Connect a suitable and effective protective circuit to inductive loads.
- Implement the protective circuit parallel to the load and not parallel to the switch contact.

Magnetic fields can influence the device. The magnetic field strength of the environment must not exceed 30 A/m.

- Do not use the device in the vicinity of strong magnetic fields (e.g., caused by transformers or magnetic iron).

EMC notes

Noise emission may occur when operating relay modules. Wireless reception may be disrupted in residential areas.

The device is a Class A product.

- Observe the requirements for noise emission for electrical and electronic equipment (EN 61000-6-4).
- Implement appropriate precautions against noise emission.

Faulty devices

The devices may be damaged following an error. Correct operation can no longer be ensured.

- Replace any defective devices.

Only the manufacturer or their authorized representative may perform the following activities. Otherwise the warranty is invalidated.

– Repairs to the device
– Opening the housing

Replacing the device

- Dispose of the device in the following circumstances:

– At the end of its mission time

See “Technical data” section.

– At the end of its electrical service life

See section “Electrical service life”.

– In the event of a fault

7.1 Safety of machines or systems

Draw up and implement a safety concept

The machine or system manufacturer and the operator are responsible for the safety of the machine or system and the application in which the machine or system is used. In order to use the device described in this document, you must have drawn up an appropriate safety concept for your machine or system. This includes a risk assessment in accordance with the directives and standards specified in the EC Declaration of Conformity, as well as other standards.

Risk assessment, validation and function test

- Before using the device, perform a risk assessment on the machine or system.
- Validate your entire safety system.
- Carry out a new validation every time you make a safety-related modification.
- Perform function tests on a regular basis.

Achievable safety integrity

The functional safety is ensured for the device as a single component. However, this does not guarantee functional safety for the entire machine or system. In order to be able to achieve the desired safety level for the entire machine or system, define the safety requirements for the machine or system as well as how to implement them from both a technological and an organizational perspective.

8 Transport, storage, and unpacking

8.1 Transport

The device is delivered in cardboard packaging.

- Observe the instructions on how to handle the package indicated on the packaging.

Suitable transport packaging

- Only transport the device in its original packaging or in packaging suitable for transport.

Technical data and environmental conditions

- For transport, observe the humidity and air pressure specifications, and the temperature range.
  See Section “Technical data”.

8.2 Storage

Suitable storage location

The storage location must meet the following requirements:

– Dry
– Protected against unauthorized access
– Protected against harmful environmental influences such as UV light

Technical data and environmental conditions

- For storage, observe the humidity and air pressure specifications, and the temperature range.
  See Section “Technical data”.

8.3 Unpacking

The device is delivered in packaging together with a packing slip.

Observing the packing slip

- Read the entire packing slip carefully.
- Retain the packing slip.

Checking the delivery

- Check the delivery for damage and completeness.
- Submit any claims for transport damage immediately.

Scope of supply

Refer to the ordering data for the standard scope of supply for the product.
See Section “Ordering data”.

9 Function description

9.1 Single-channel sensor circuit

The sensor circuit is not designed with redundancy.

The safety relay does not detect short and cross-circuits in the sensor circuit.

9.2 Two-channel sensor circuit

The connection of the 2-channel sensor circuit can be equivalent or non-equivalent.

With the corresponding wiring, the safety relay detects short and cross-circuits in the sensor circuit.

See section "Signal generator connection versions".

9.3 Automatic start

The device starts automatically after the sensor circuit has been closed.

9.4 Manual, monitored start

The device starts with closed sensor circuit once the start circuit has been closed by pressing the reset button.

A connected reset button is monitored.

See section "Start and feedback circuit connection versions".

9.5 Safe shutdown

When the sensor circuit opens, the enabling current paths open without delay.

When the enabling current paths are open, the device is in the safe state.

In a safe state, the enable signal is switched off at the TBUS interface.

Signal output Y30 is not active.

Signal output Y30 transmits non-safety-related status information. Feedback of signal output Y30 to external basic devices for reasons of functional safety is therefore not required.

9.6 TBUS interface

The device is equipped with a TBUS interface for connecting hybrid motor starters and power supplies.

Refer to the “Application examples” section for this.

Suitable DIN rail connectors:

For the safety relay module, use the yellow PSR-TBUS DIN rail connector.

For hybrid motor starters, use the green ELR-TBUS-22,5-P DIN rail connector.

For the power supply, use the green ME 17,5 TBUS 1,5/ 5-ST-3,81 GN DIN rail connector.

See ordering data

9.6.1 Use of hybrid motor starters

The TBUS interface enables connection of hybrid motor starters from the CONTACTRON product range.

When using safety relays, use hybrid motor starters of the following types:

– ELR-H3-IS-...-P
– ELR-H5-IES-...-P
– ELR-H5-IS-...-P

Maximum number:

Connect **max. 10** hybrid motor starters to the safety relay module.

The approved ELR types can be found in the section "Ordering data".

Observe the product documentation valid for the devices you are using.

9.6.2 Use of a power supply

The TBUS interface enables power supply to the safety relay via a Quint4-SYS-PS-... power supply.

The approved power supplies can be found in the section "Ordering data".

Observe the product documentation valid for the devices you are using.

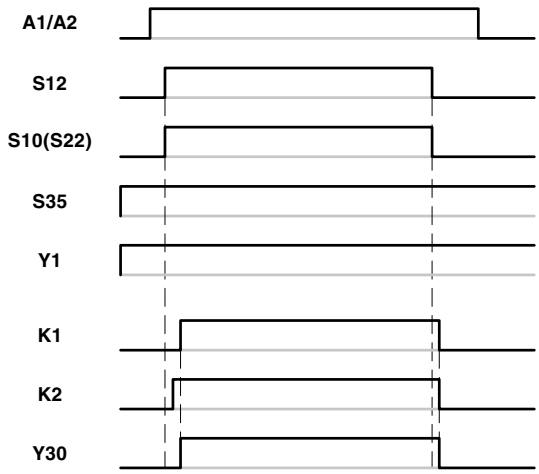
10 Function and time diagrams

10.1 Time diagram for automatic start

10.1.1 Continuous autostart

– Permanent high signal at S35

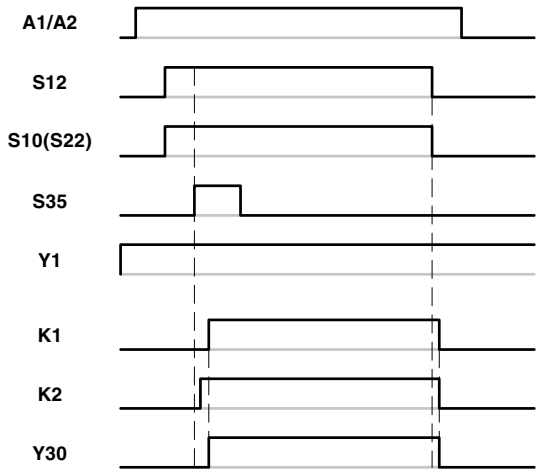
Figure 1 Time diagram for automatic start



10.1.2 Autostart pulse

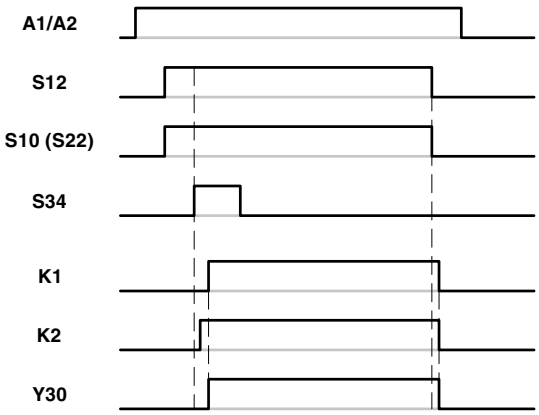
– Start on rising edge at S35

Figure 2 Time diagram for automatic start



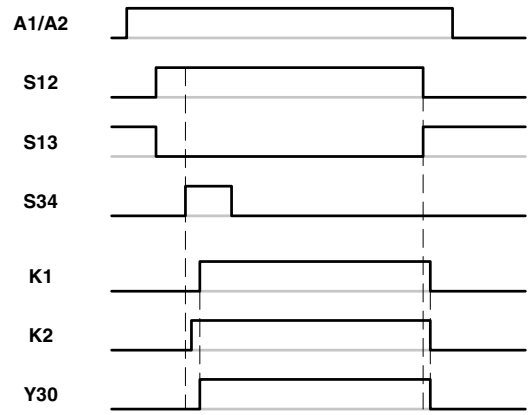
10.2 Time diagram for manual, monitored start

Figure 3 Time diagram for manual, monitored start



10.3 Time diagram for non-equivalent wiring

Figure 4 Time diagram for non-equivalent wiring (manual, monitored start)

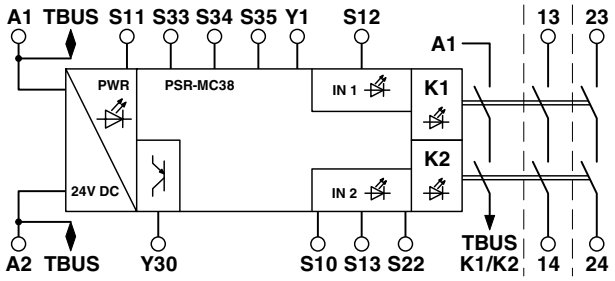


Key:

S12	Sensor circuit channel 1
S10(S22), S13	Sensor circuit channel 2
S34	Input manual, monitored start
S35	Input automatic start
Y1	Activating circuit
K1/K2	Internal, force-guided N/O contacts
Y30	Digital alarm output

11 Block diagram

Figure 5 Block diagram



Key:

A1	24 V DC power supply
A2	0 V power supply
TBUS	Interface for power supply via DIN rail connectors
S10/S12/S13	Input sensor circuit (from external or from S11)
S11	24 V output for cross-circuit detection
S22	Input sensor circuit (A2/0 V)
S33/S34	Start circuit for manual, monitored start
S33/S35/Y1	Start circuit for autostart
Y30	Digital alarm output
K1/K2	Internal, force-guided N/O contacts
TBUS K1/K2	Enable signal at the TBUS interface
13/14 **23/24**	Undelayed enabling current paths

11.1 Insulation coordination

The following table shows the device-specific insulation values:

	Logic	13/14	23/24	Housing
Logic	-	6 kV	6 kV	4 kV
13/14	-	-	4 kV	4 kV
23/24	-	-	-	4 kV
Housing	-	-	-	-

Interpretation

The selection of the suitable insulation method (basic insulation or safe isolation) depends largely on the overvoltage category of the application.
The following table shows the dependencies between insulation method and overvoltage category:

Overvoltage category	Insulation type	
	Basic insulation	**Safe isolation**
II	2,5 kV	4 kV
III	4 kV	6 kV

Basic insulation

A mixture of SELV/PELV and low voltage is strictly prohibited. Only switch 250 V AC at one of the enable contacts if the adjacent contact/enabling current path carries the same potential.

Safe isolation/reinforced insulation

Reinforced insulation (e.g., thanks to greater air clearances and creepage distances between conductive paths) is designed for one overvoltage category higher than basic insulation. This means that SELV/PELV circuits of $U \leq 25$ V AC or $U \leq 60$ V DC and circuits with higher voltages can be mixed.

12 Derating

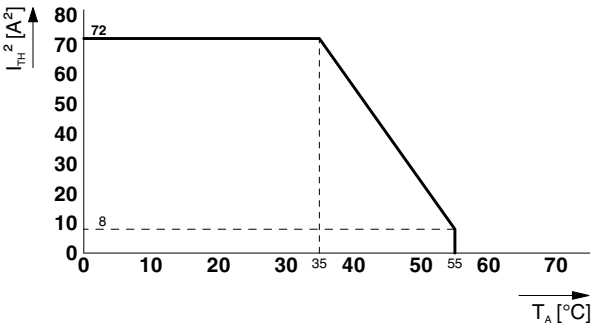
The temperature is measured at a 5 cm clearance below or to the side of the device.

12.1 Vertical or horizontal mounting position

The derating curve applies for the following conditions:

– Mounting on a vertical or horizontal DIN rail
– Devices mounted next to each other without spacing
– at U_S up to max. 26.4 V DC

Figure 6 Derating curve

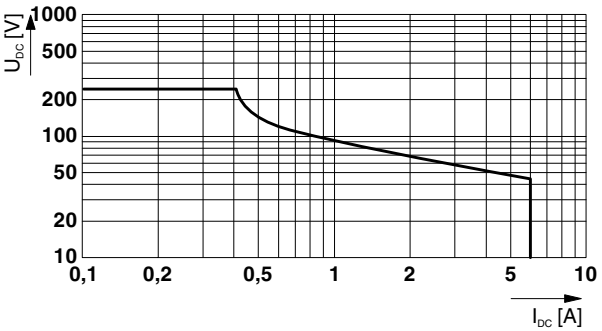


13 Relay data

13.1 Load limit curve

Ohmic load

Figure 7 Relay load limit curve – resistive load



13.2 Electrical service life

Figure 8 Number of switching cycles for AC-1

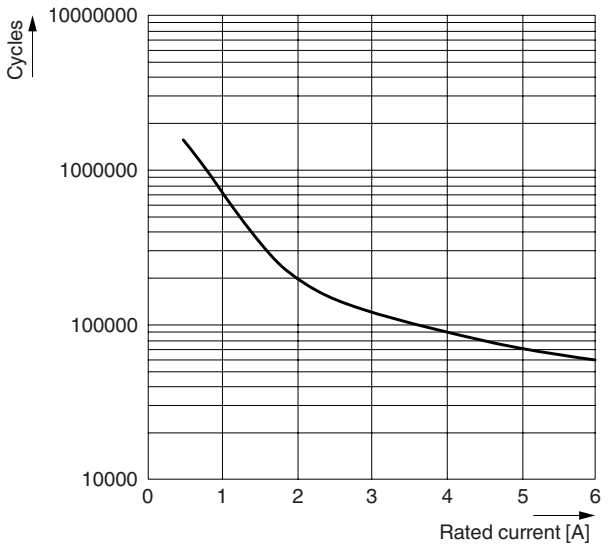


Figure 9 Number of switching cycles for AC-15

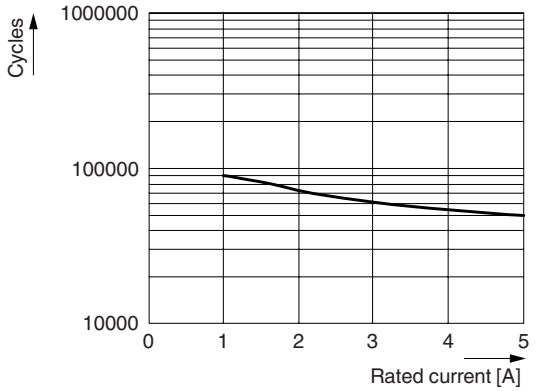


Figure 10 Number of switching cycles for DC-1

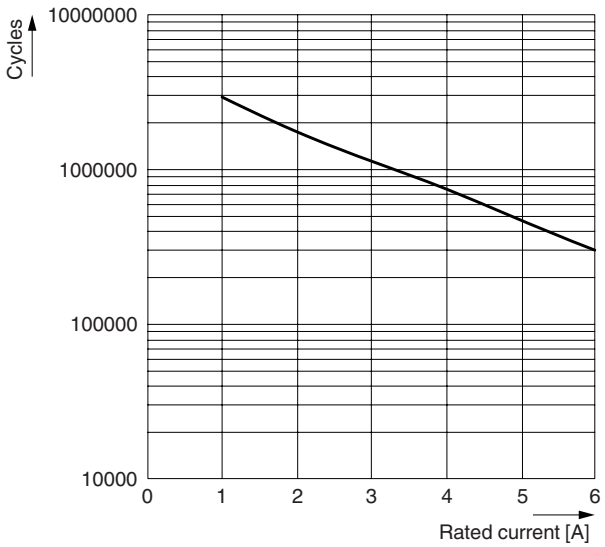
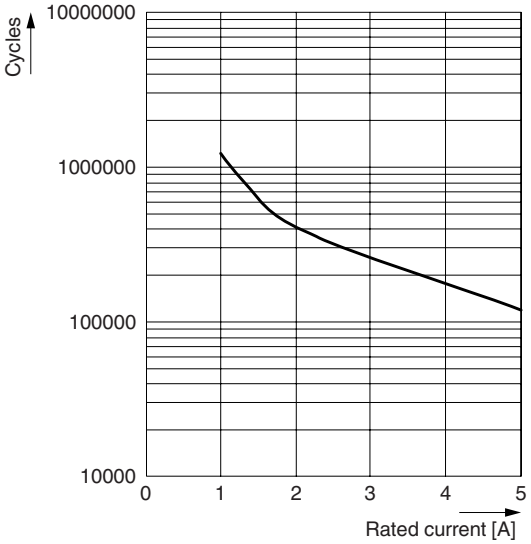


Figure 11 Number of switching cycles for DC-13



Behavior of the electrical service life

The service life curves indicate the number of switching cycles after which wear-related failures must be expected.

They depend on the utilization category and the expected load current.

Example:

Let's assume:

– Inductive load = 1 A
– Utilization category = AC15

This results in a contact service life of 90000 switching cycles.

WARNING: Loss of functional safety

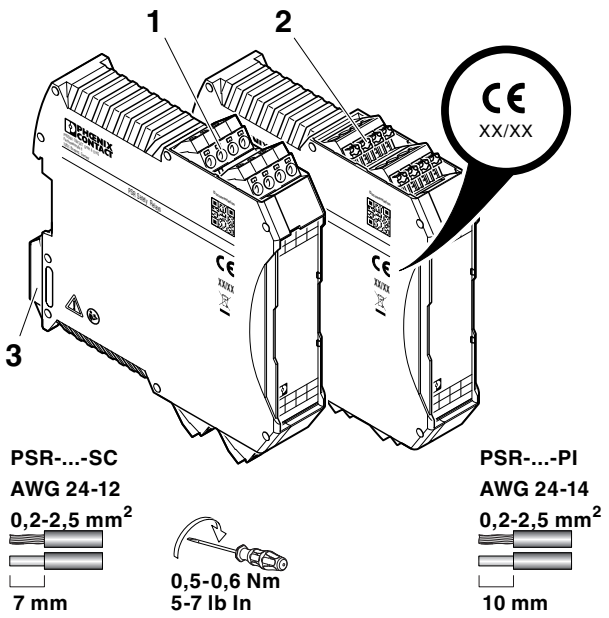
At the end of the electrical service life, there is an increased risk of loss of functional safety.

- Replace the device in good time before the end of the electrical service life.

14 Operating and indication elements

14.1 Connection versions

Figure 12 Connection versions

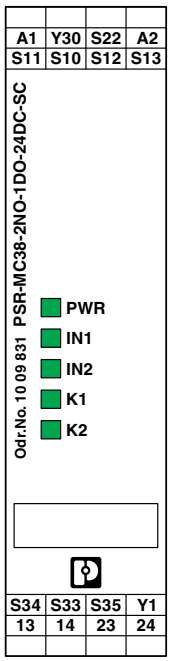


1 COMBICON plug-in screw terminal block
2 Pluggable COMBICON Push-in terminal block
3 Metal lock for fixing to DIN rail

The year the device was constructed can be found underneath the CE designation on the housing.

XX/XX = Calendar week / year

14.2 Connection assignment



A1	24 V DC power supply
A2	0 V power supply
Y30	Digital alarm output
S11	24 V output for cross-circuit detection
S10/S12/S13	Input sensor circuit (from external or from S11)
S22	Input sensor circuit (A2/0 V)
PWR	Power, LED (green)
IN1 **IN2**	Status indicator sensor circuit; LED (green)
K1 **K2**	Status indicator safety circuit, LED (green)
S33/S34	Start circuit for manual, monitored start
S33/S35/Y1	Start circuit for autostart
Y1	Activating circuit
13/14 **23/24**	Undelayed enabling current paths

15 Mounting and removing

- Mount the device on a 35 mm DIN rail in accordance with EN 60715.
- To remove the device, use a screwdriver to release the snap-on foot.

When using the DIN rail connector:

- Plug the required number of DIN rail connectors together and push them onto the DIN rail.
- Then place the device onto the DIN rail.

NOTE: device defect

Using an incorrect DIN rail connector or a dummy plug can cause the module to become faulty.

For the safety relay, use only the yellow PSR-TBUS DIN rail connector. See ordering data.

Never use the PSR-TBUS-TP dummy plug.

NOTE: Damage to the connectors

When using DIN rail connectors, make sure that the contact opening in the base of the device is aligned correctly over the contact block of the DIN rail connector.

Note the snap-on direction of devices and DIN rail connectors:
- PSR TBUS plug component left
- Device snap-on foot downwards

NOTE: Wear on the connectors

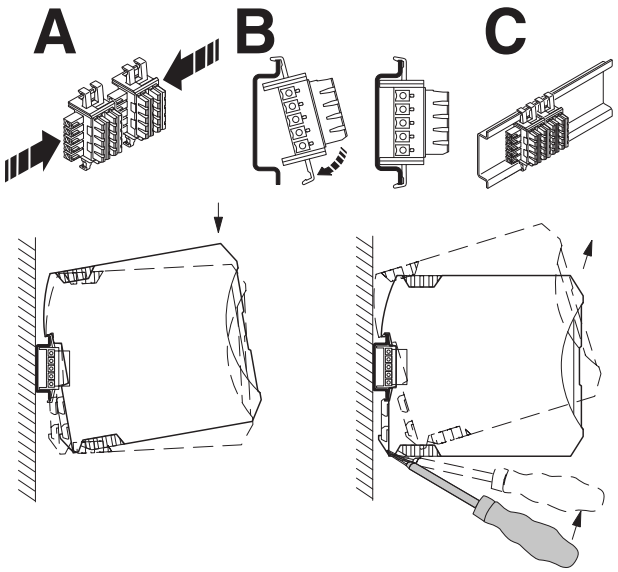
Up to **eight** insertion cycles are permitted for connecting the devices by means of the DIN rail connector.

For hybrid motor starters, use the green ELR-TBUS-22,5-P DIN rail connector.

Observe the product documentation valid for the devices you are using.

For the power supply, use the green ME 17,5 TBUS 1,5/ 5-ST-3,81 GN DIN rail connector.

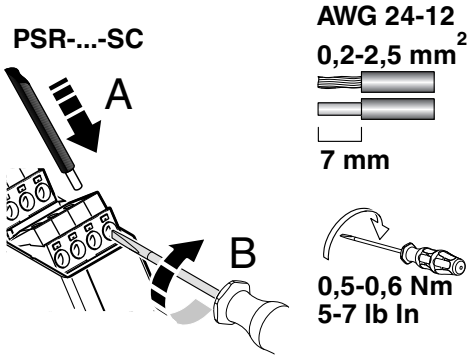
Figure 13 Mounting and removing



16 Wiring

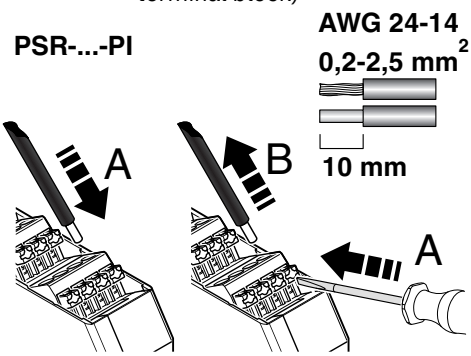
- Connect the cables to the connection terminal blocks using a screwdriver.

Figure 14 Connecting the cables for PSR-...-SC (screw terminal block)



- First open the springs using the pressure switch before connecting stranded conductors or disconnecting the cables for Push-in terminal blocks.

Figure 15 Connecting the cables for PSR-...-PI (Push-in terminal block)



It is recommended that ferrules are used to connect stranded cables.

Use the CRIMPFOX 6 crimping tool from Phoenix Contact.

The tool enables the reliable processing of ferrules and easy removal of conductors with ferrules from the connection terminal blocks.

For compliance with UL approval, use copper wire that is approved up to 60°C/75°C.

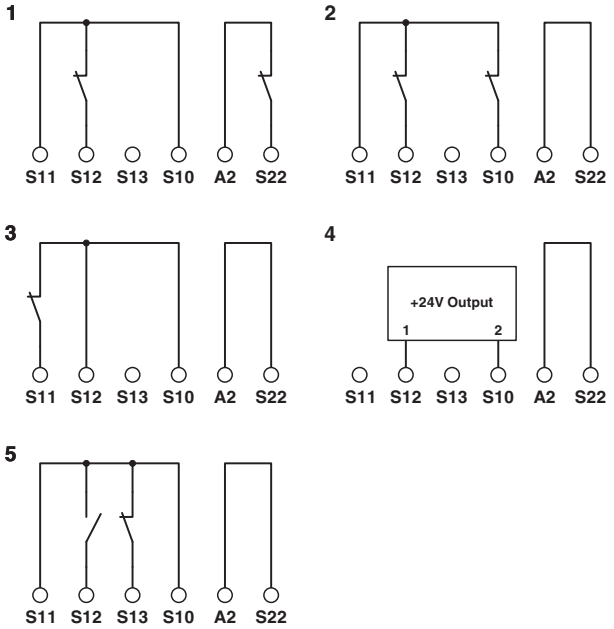
16.1 Supply voltage connection variants

- Connect the supply voltage via A1/A2.
- **Alternative:** Use a Quint4-SYS-PS... power supply and connect it to the safety relay using the DIN rail connector.

16.2 Signal generator connection versions

- Connect suitable signal generators to S10/S11/S12/S13 and S22/A2.

Figure 16 Signal generator connection versions



1 2-channel connection with cross-circuit monitoring

2 2-channel connection without cross-circuit monitoring

3 1-channel connection

4 2-channel connection with **external** cross-circuit detection by the signal generator

5 2-channel, non-equivalent connection

16.3 Start and feedback circuit connection variants

Automatic start

- Bridge the contacts Y1/S33/S35.

Manual, monitored start

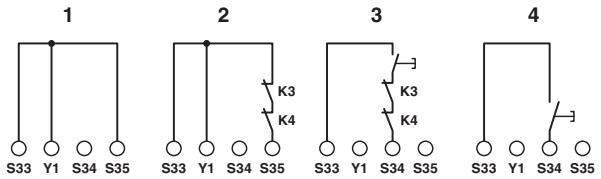
- Connect a reset button to S33/S34.

A connected reset button is monitored.

Start and feedback circuit

- Place the relevant N/C contact in path S33/S34 or S33/S35 to monitor external contactors or extension devices with force-guided contacts.

Figure 17 Start and feedback circuit connection variants



1 Automatic start

2 Automatic start with monitored contact extension

3 Manual, monitored start with monitored contact extension

4 Manual, monitored start

17 Startup

- Apply the rated control circuit supply voltage (24 V DC) at terminal blocks A1/A2.

The Power LED lights up.

- Close the sensor circuit at S10/S11/S12/S13 and S22/A2 as per the wiring.

The IN1 and IN2 LEDs light up.

1- or 2-channel sensor circuit: see section “Signal generator connection versions”.

Automatic start

The enabling current paths 13/14 and 23/24 close.

The K1 and K2 LEDs light up.

Signal output Y30 is active.

Manual, monitored start

- Press the reset button.

The enabling current paths 13/14 and 23/24 close.

The K1 and K2 LEDs light up.

Signal output Y30 is active.

18 Calculating the power dissipation

The total power dissipation of the safety relay is based on the input power dissipation and the contact power dissipation for the same and for different load currents.

Input power dissipation

$P_{Input} = U_B^2 / (U_S/I_S)$

Contact power dissipation

$P_{Contact} = (I_{L1}^2 + I_{L2}^2 + ... + I_{Ln}^2) \bullet 200\ m\Omega$

Total power dissipation

$P_{Total} = P_{Input} + P_{Contact}$

therefore

$P_{Total} = U_B^2 / (U_S/I_S) + (I_{L1}^2 + I_{L2}^2 + ... + I_{Ln}^2) \bullet 200\ m\Omega$

Key:

P	Power dissipation
U_B	Applied operating voltage
U_S	Rated control circuit supply voltage
I_S	Rated control supply current
n	Number of enabling current paths used
I_L	Contact load current

19 Function test/proof test

To verify the device function, proceed as follows:

- Demand the safety function by actuating the corresponding safety equipment.
- Check whether the safety function was executed correctly by switching the device on again.

If the device does not switch on again, the proof test failed.

WARNING: Loss of functional safety due to malfunction

If the proof test contains errors, the device no longer functions correctly.

- Replace the device.

20 Diagnostics

Plausibility errors are deleted when the supply voltage is switched off (power down reset).

In the event of an error or fault that is not listed, please contact Phoenix Contact.

20.1 General states

Key:

○ LED OFF
● LED ON

LED					State	Notes
PWR	IN1	IN2	K1	K2		
●	○	○	○	○	No relay has picked up. The sensor circuit is inactive.	-
●	●	○	○	○	Sensor circuit channel 1 is active.	-
●	○	●	○	○	Sensor circuit channel 2 is active.	-
●	●	●	○	○	The sensor circuit is active. Relays K1 and K2 are ready to start and await reset/start command (S34 or S35).	Possible error see error messages
●	●	●	●	●	The sensor circuit is active. All relays are picked up.	-

20.2 Error messages

Key:

○ LED OFF
● LED ON

LED					State	Possible cause	Corrective
PWR	IN1	IN2	K1	K2			
●	○	○	○	○	The sensor circuit is actively controlled, but no input LEDs are lit up.	Internal cross-circuit detection is active: potential cross-circuit in the sensor circuit between S11/S12/S10 and S22/A2.	Switch off the operating voltage and rectify the cross-circuit. Then perform a function test.
●	●	●	○	○	The sensor circuit is active. The reset/start circuit (S34 or S35) is/was activated. The safety circuit (K1 and K2) is not picking up.	External error: the readback contact (external actuator) is open in the reset circuit.	Check the actuator.
						Internal error.	Perform a power down reset with subsequent function test. **If the error occurs again after the function test, replace the device.**
●	●	○	●	○		Possible short circuit in the sensor circuit between S11 and S13 or between S10 and S12.	Switch off the operating voltage and remove the short circuit. Then perform a function test.
●	●	●	○	○ / ●	The sensor circuit is active. The reset/start circuit (S34) is/was activated. The safety circuit (K1 and K2) is not picking up.	Error during manual reset S34 (stuck-at at the input).	Remove the error in the reset/start circuit. Then perform a function test.
●	●	●	○	●	The sensor circuit is active. The reset/start circuit (S34 or S35) is/was activated. The safety circuit (K1) is not picking up.	External error: Both channels of the sensor circuit were not opened or requested.	Check whether the second channel opens when the sensor is requested.
						Internal error.	Perform a power down reset with subsequent function test. **If the error occurs again after the function test, replace the device.**
					The sensor circuit is active.	1. No supply voltage at A1/A 2. Over- or undervoltage at A1	Check the supply voltage.
●	●	●	●	○	The sensor circuit is active. The reset/start circuit (S34 or S35) is/was activated. The safety circuit (K2) is not picking up.	External error: Both channels of the sensor circuit were not opened or requested.	Check whether the second channel opens when the sensor is requested.
						Internal error.	Perform a power down reset with subsequent function test. **If the error occurs again after the function test, replace the device.**
○	○	○	○	○	The sensor circuit is active.	1. No supply voltage at A1/A 2. Over- or undervoltage at A1	Check the supply voltage.

21 Application examples

21.1 Emergency stop monitoring/automatic start

Application description:

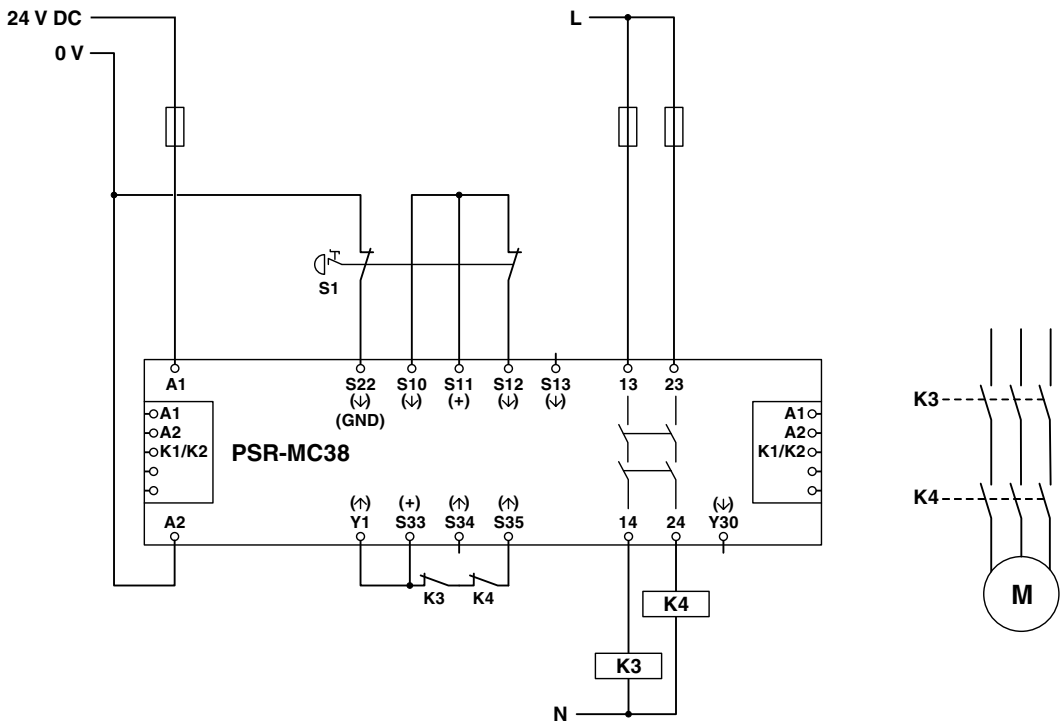
- 2-channel emergency stop monitoring
- Automatic start
- Monitoring of external, force-guided contactors

Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

Figure 18 Emergency stop monitoring/automatic start



Key:

S1	Emergency stop button
K3/K4	Force-guided contactors

21.2 Emergency stop monitoring/manual, monitored start

Application description:

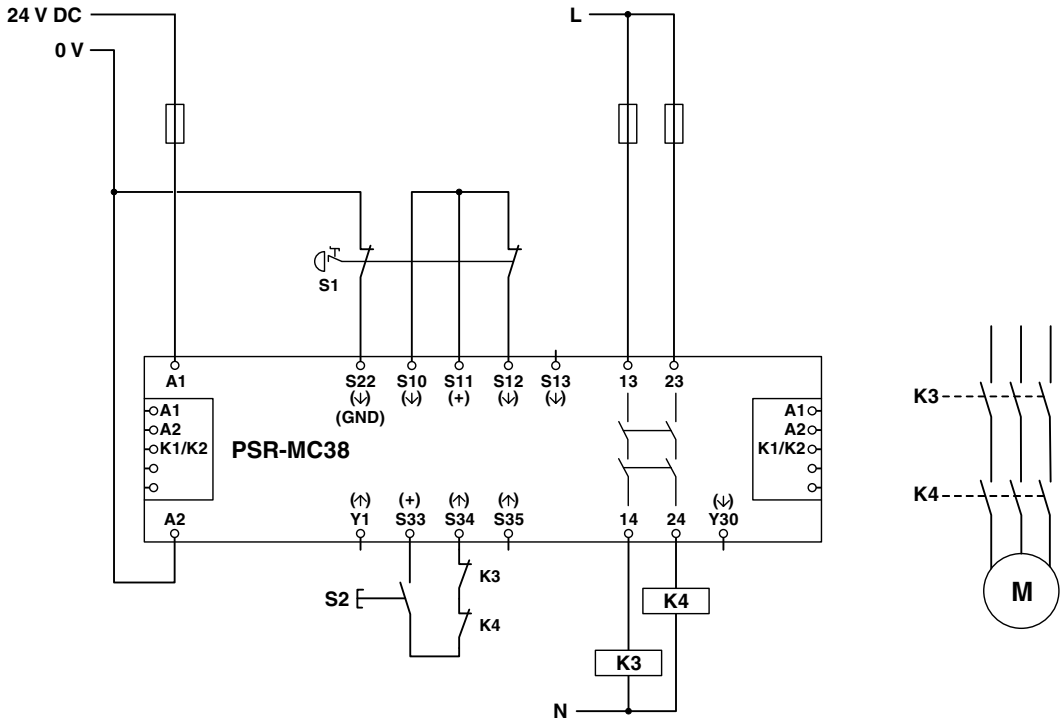
- 2-channel emergency stop monitoring
- Manual, monitored start
- Monitoring of external, force-guided contactors

Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

Figure 19 Emergency stop monitoring/manual, monitored start



Key:

S1	Emergency stop button
S2	Manual reset device
K3/K4	Force-guided contactors

21.3 Magnetic switch monitoring/automatic start

Application description:

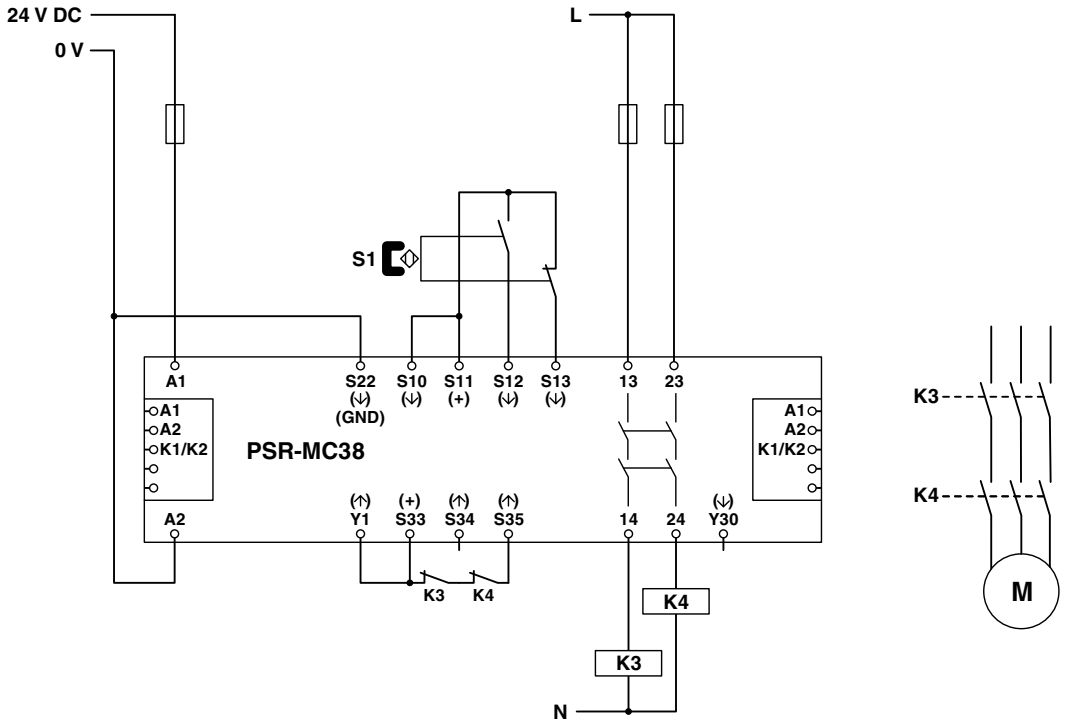
- 2-channel, non-equivalent magnetic switch monitoring
- Automatic start
- Monitoring of external, force-guided contactors

Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

Figure 20 Magnetic switch monitoring/automatic start



Key:

S1	Magnetic switch
K3/K4	Force-guided contactors

21.4 Magnetic switch monitoring/manual, monitored start

Application description:

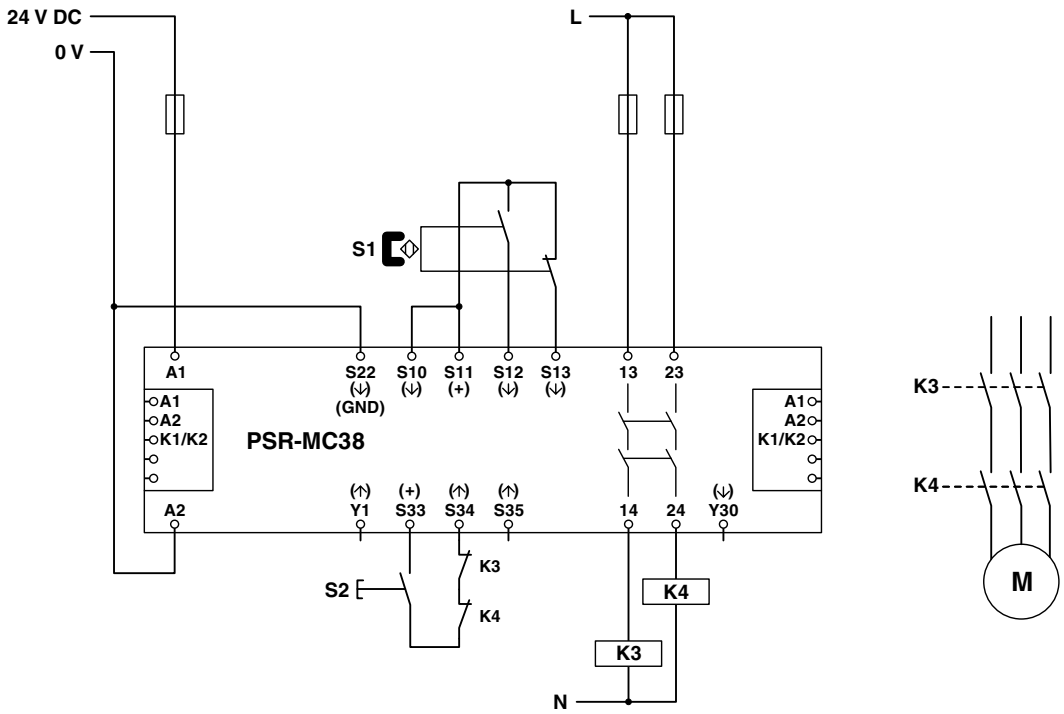
- 2-channel, non-equivalent magnetic switch monitoring
- Manual, monitored start
- Monitoring of external, force-guided contactors

Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

Figure 21 Magnetic switch monitoring/manual, monitored start



Key:

S1	Magnetic switch
S2	Manual reset device
K3/K4	Force-guided contactors

21.5 Light grid monitoring/automatic start

Application description:

- 2-channel light grid monitoring
- Automatic start
- Monitoring of external, force-guided contactors

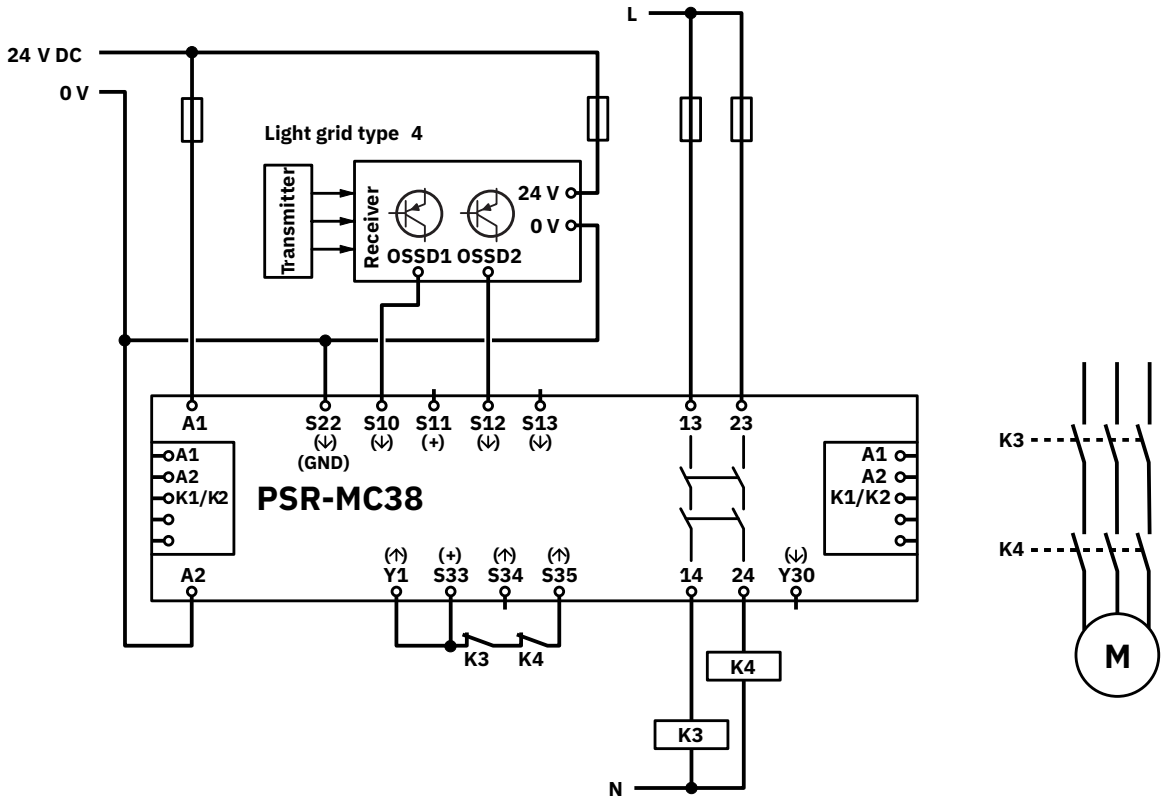
Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

WARNING: Loss of functional safety
Make sure that the signal generator and the safety relay have the same ground potential.

Figure 22 Light grid monitoring/automatic start



Key:

OSSD	Output Signal Switching Device
K3/K4	Force-guided contactors

21.6 Light grid monitoring/manual, monitored start

Application description:

- 2-channel light grid monitoring
- Manual, monitored start
- Monitoring of external, force-guided contactors

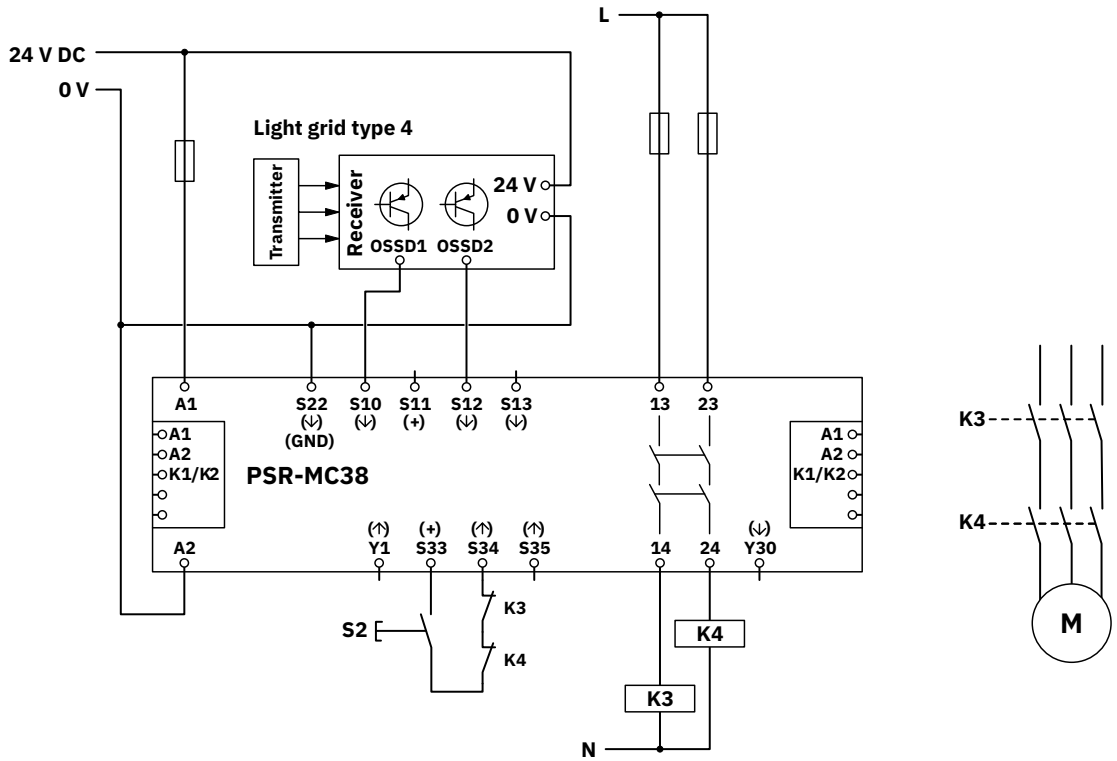
Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

WARNING: Loss of functional safety
Make sure that the signal generator and the safety relay have the same ground potential.

Figure 23 Light grid monitoring/manual, monitored start



Key:

S2	Manual reset device
OSSD	Output Signal Switching Device
K3/K4	Force-guided contactors

21.7 Non-contact safety door switch monitoring / manual, monitored start

Application description:

- 2-channel safety door switch monitoring
- Manual, monitored start
- Monitoring of external, force-guided contactors
- Cross-circuit detection in the sensor circuit using PSR-CT safety switch

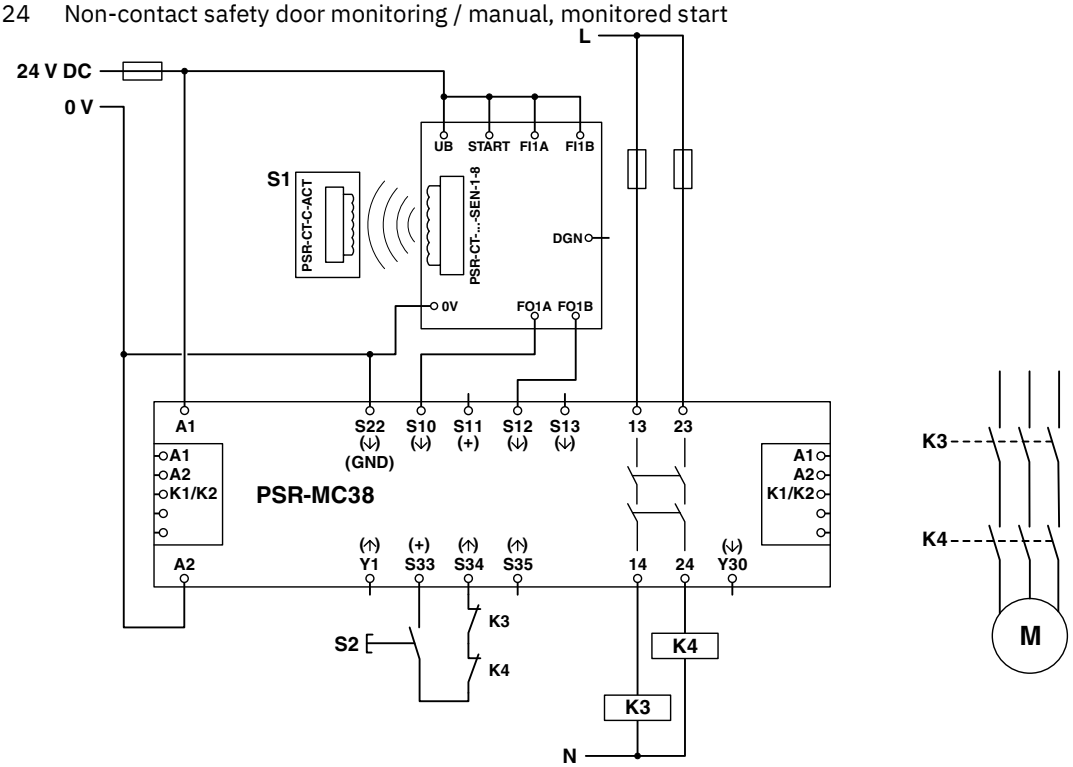
Achievable safety integrity:

- Suitable up to category 4, PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Cross-circuits in the cable installation can be ruled out in the same electrical installation space or through mechanically protected cable installation.

WARNING: Loss of functional safety
Make sure that the signal generator and the safety relay have the same ground potential.

Figure 24 Non-contact safety door monitoring / manual, monitored start



Key:

S1	Contact-free safety switch
S2	Manual reset device
K3/K4	Force-guided contactors

21.8 PSR-MC38 with QUINT4-SYS-PS... and CONTACTRON ELR-H3-...

Application description:

- 2-channel emergency stop monitoring
- Automatic start
- Supply via a QUINT4-SYS-PS-... power supply
- Connection of ELR H3-IS-...-P hybrid motor starter

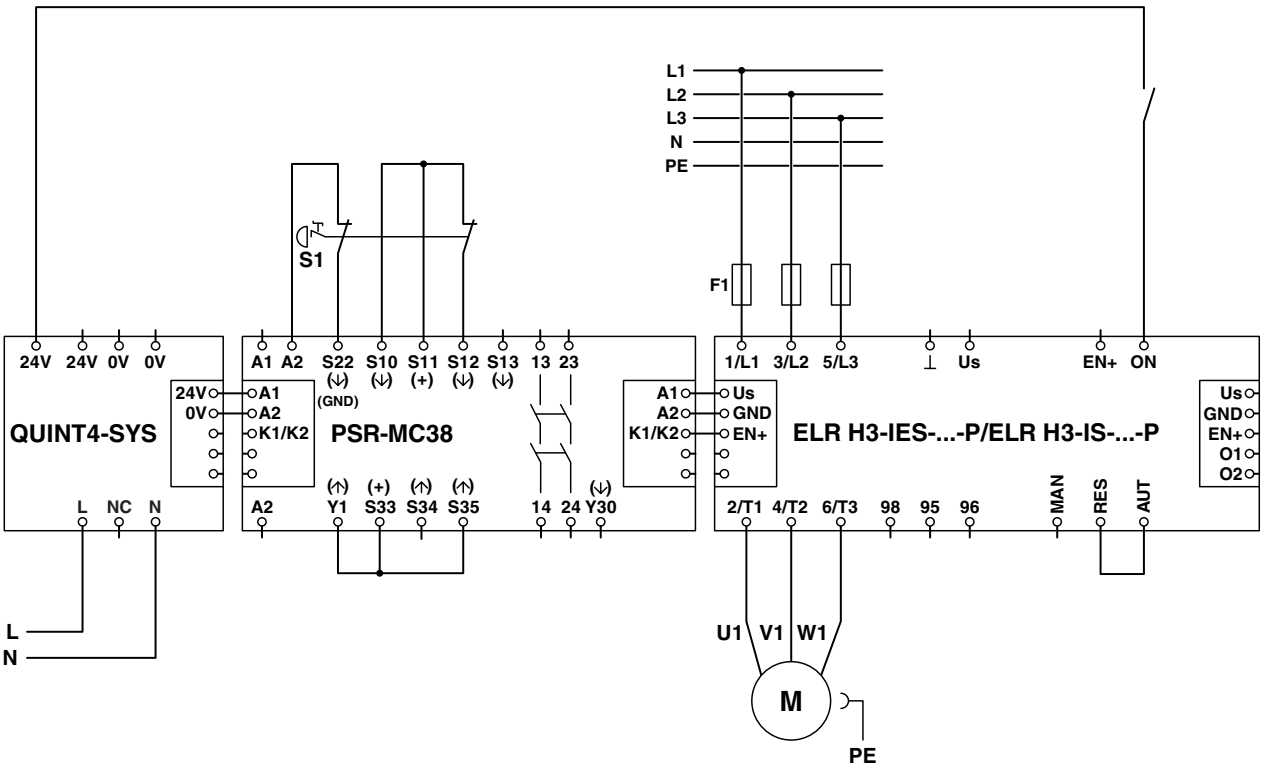
Achievable safety integrity:

- Suitable up to PL e (EN ISO 13849-1), SIL 3 (EN IEC 62061)

Observe the product documentation valid for the devices you are using.
- QUINT4-SYS-PS...
- ELR H3-IS-...-P

Use of the TBUS male connector is guaranteed to prevent faults for the safety-related enable signal (K1/K2-EN+).

Figure 25 PSR-MC38 with QUINT4-SYS-PS... and CONTACTRON ELR-H3-...



Key

S1	Emergency stop button

22 Device replacement, device defect, and repair

22.1 Device replacement

The device can be replaced, if necessary.

If you need to replace the device, proceed as described in the following section:

– Mounting and removal
– Wiring

Observe the device type and version

The new device must meet the following requirements:

– Same device type
– Same or later version

22.2 Device defect and repair

Do not open the housing

Repairs may only be carried out by Phoenix Contact. Do not open the housing. If the housing is opened, the function of the device can no longer be ensured.

Faulty devices

- Please contact Phoenix Contact.

23 Maintenance, decommissioning, and disposal

23.1 Maintenance

The device requires no maintenance during the permissible mission time. Refer to the technical data for the mission time of the device.

If necessary, carry out proof tests within the specified proof test interval.

See “Technical data” section.

Depending on the application and connected I/O devices, you should test the function of the I/O devices and the safety chain regularly.

Observe the relevant manufacturer specifications for carrying out maintenance on connected I/O devices.

23.2 Decommissioning and disposal

Carry out decommissioning according to the requirements of the machine or system manufacturer.

When decommissioning the system or parts of the system, ensure the following for the devices used.

The device continues to be used only as intended:

- Observe the storage and transport requirements.

See “Transport, storage, and unpacking” section.

The device is not used any more:

The symbol with the crossed-out trash can indicates that this item must be collected and disposed of separately from other waste.
Phoenix Contact or public collection sites will take the item back for free disposal. For information on the available disposal options, visit www.phoenixcontact.com.

Packaging disposal

- Dispose of packaging materials that are no longer needed (cardboard packaging, paper, bubble wrap sheets, pillow bags, etc.) with household waste in accordance with the currently applicable national regulations.

24 Attachment

24.1 Using PSR devices at altitudes > 2000 m amsl

The following section describes the special conditions for using PSR devices at altitudes > 2000 m amsl.
Observe the relevant device-specific data (technical data, derating, etc.) according to the product documentation for the individual device.

Using the device at altitudes **> 2000 m amsl up to max. 4500 m amsl** is possible under the following conditions:

1. Limit the rated control circuit supply voltage (U_S) in accordance with the table below. Observe the technical data for the device.

U_S according to the technical data for the device	U_S when used at altitudes > 2000 m amsl
< 150 V AC/DC	U_S according to the technical data for the device still valid
> 150 V AC/DC	Limited to max. 150 V AC/DC

2. Limit the maximum switching voltage in accordance with the table below. Observe the technical data for the device.

Max. switching voltage according to the technical data for the device	Max. switching voltage when used at altitudes > 2000 m amsl
< 150 V AC/DC	Max. switching voltage according to the technical data for the device still valid
> 150 V AC/DC	Limited to max. 150 V AC/DC

3. Reduce the maximum ambient temperature for operation by the corresponding factor in accordance with the table below.
4. If derating is specified, offset all the points of the derating curve by the corresponding factor in accordance with the table below.

Altitude amsl	Temperature derating factor
2000 m	1
2500 m	0.953
3000 m	0.906
3500 m	0.859
4000 m	0.813
4500 m	0.766

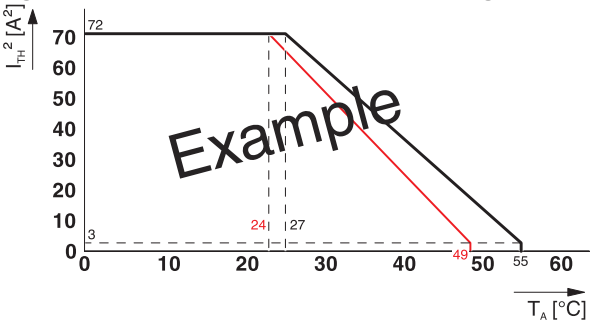
Example calculation for 3000 m

The following calculation and the illustrated derating curve are provided as examples.
Perform the actual calculation and offset the derating curve for the device used according to the technical data and the “Derating” section.

27 °C • 0.906 ≈ 24 °C

55 °C • 0.906 ≈ 49 °C

Figure 26 Example of a suspended derating curve (red)



24.2 Revision history

Version	Date	Contents
00	2018-09-03	First publication
01	2018-10-04	Chap. on technical data: Switching capacity changed i.a.w. IEC 60947-5-1, note on SILCL specification added
02	2026-06-02	EN IEC 62061 standard designation updated; EAC logo removed; accessories updated, MINI POWER power supply replaced by QUINT4-SYS-PS...; Technical data section: approvals and manufacturer's declarations updated; "Interface type (ZVEI classification)" section added; Safety regulations and installation notes section: reference to SAFETY NOTES FOR INSTALLATION AND MOUNTING added; Insulation coordination section corrected and dependency between insulation and overvoltage category shown; Relay data section added; Function test/proof test section added; Device replacement, device defects, and repairs section added; Maintenance, decommissioning, and disposal section added