PSR-MC35-EXI

Safety relay for emergency stop and safety door monitoring

Data sheet
111020_en_00

 2026-02-10

1 Description

Intended Use

Safety relay for monitoring safety sensors such as emergency stop switches.

The safety relay has intrinsically safe inputs.

Using this module, circuits are interrupted in a safety-oriented manner.

Possible signal generators

- Emergency stop button
- Door locking mechanisms
- Magnetic switch

Contact switching type

- 2 sensor circuits
- 2 undelayed enabling current paths
- 1 digital signal output

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

Control

- 2-channel
- 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

- Cross circuiting detection
- Optional pluggable screw or Push-in terminal blocks
- 17.5 mm housing width

Approvals

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 switch up to SIL 3, Cat. 4, PL e, 2 intrinsically safe inputs up to zone 0, 2 enabling current paths, automatic or manual, monitored start, plug-in screw terminal block, U_S = 24 V DC	PSR-MC35-2NO-1DO-24DC-EXI-SC	1332276	1
Safety relay for emergency stop switch up to SIL 3, Cat. 4, PL e, 2 intrinsically safe inputs up to zone 0, 2 enabling current paths, automatic or manual, monitored start, plug-in push-in terminal block, U_S = 24 V DC	PSR-MC35-2NO-1DO-24DC-EXI-SP	1332281	1

Accessories	Type	Item no.	Pcs./Pkt.
Coding profile, is inserted into the slot on the plug or inverted header, red insulating material	CP-MSTB	1734634	100
Coding section, inserted into the recess in the header or the inverted plug, red insulating material	CR-MSTB	1734401	100
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
Fuse modular terminal block, fuse type: Glass / ceramics / ..., fuse type: G / 5 x 20, nom. voltage: 24 V, nominal current: 6.3 A, connection method: Spring-cage connection, 1 level, Rated cross section: 1 mm², cross section: 0.08 mm²- 6 mm², mounting type: NS 35/7,5, NS 35/15, color: black	ST 4-HESILED 24 (5X20)	3036547	50

4 Technical data

Hardware/firmware version	
Hardware/firmware version (1332276)	≥ 00/00
Hardware/firmware version (1332281)	≥ 00/00

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 -20 % / +25 % (provide external protection)
Rated control circuit supply voltage U_S	19.2 V DC ... 30 V DC
Rated control supply current I_S	typ. 55 mA
Inrush current	typ. 6 A (Δt = 200 µs, at U_S)
Filter time	1 ms (at A1 in the event of voltage dips at U_S)
Power consumption	typ. 1.32 W
Protective circuit	Serial protection against polarity reversal Suppressor diode

Digital inputs: Sensor circuit (S12, S22)	
Number of inputs	2
Description of the input	safety-related sensor inputs
Input voltage range "1" signal	5 V ... 9 V (S12) 1 V ... 2.5 V (S22)
Inrush current	< 4 mA (Δt = 500 µs at U_S)
Current consumption	< 4 mA (typ. with U_S)
Filter time	High test pulses and low test pulses are not permitted
Max. permissible overall conductor resistance	200 Ω
Concurrence	∞
Protective circuit	Suppressor diode

Digital inputs: Start circuit (S34, S35)	
Number of inputs	2
Description of the input	non-safety-related NPN
Input voltage range "1" signal	5 V ... 9 V
Inrush current	< 4 mA (typ. with U_S, $\Delta t \leq 100$ ms)
Current consumption	< 4 mA (typ. with U_S)
Filter time	High test pulses and low test pulses are not permitted
Max. permissible overall conductor resistance	200 Ω
Concurrence	∞
Protective circuit	Suppressor diode

Relay outputs: Enabling current path (13/14, 23/24)	
Number of outputs	2 (undelayed)
Output description	2 N/O contacts each in series, safety-related, floating
Contact material	$AgSnO_2$
Switching voltage (see section “Relay data”)	min. 12 V max. 250 V AC (See section “Relay data”)
Limiting continuous current (see section “Relay data”)	6 A
Inrush current	min. 3 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	0.1 Hz
Service life electrical	See section “Electrical service life”
Mechanical service life	10x 10^6 cycles
Switching power	min. 60 mW
Switching capacity	4 A (24 V (DC13)) 2 A (230 V (AC15))
Output fuse	6 A gL/gG 4 A gL/gG (for low-demand applications)

Alarm outputs: M1	
Number of outputs	1
Output description	PNP non-safety-related
Voltage	approx. 22 V DC (U_s - 2 V)
Current	max. 100 mA
Maximum inrush current	500 mA (Δt = 1 ms at U_s)
Ohmic load	min. 220 Ω
Protective circuit	Suppressor diode
Short-circuit protection	Yes
Output fuse	≤ 200 mA Slow-blow (For applications with requirements regarding the “ia” type of protection, see Section “Installation in potentially explosive areas”)

Intrinsically safe connections (S11, S12, S21, S22, S34, S35)/Ex i parameters	
Safety characteristics in accordance with ATEX and IECEx (IEC 60079-1)	
Max. internal inductance L_i	negligible
Max. internal capacitance C_i	200 nF
Max. output voltage U_o	11.5 V
Max. output current I_o	100 mA
Max. output power P_o	285 mW
Max. external inductivity L_o/Max. external capacitance C_o (The limit values are based on the sum of the characteristic values of all cables of the intrinsically safe circuits. They must not be exceeded. All specifications apply to the simple circuit.)	I: 0.3 mH/47.8 µF IIA: 0.25 mH/45.8 µF IIB: 0.12 mH/11 µF IIC: 0.03 mH/1.44 µF
Safety-related maximum voltage U_m	63 V AC (A1/A2, M1) / 90 V DC (A1/A2, M1)
Times	
Typical starting time with U_s	< 100 ms (when controlled via A1)
Typical response time at U_s	< 100 ms (manual, monitored start) < 100 ms (automatic start)
Typical release time with U_s	< 20 ms (on demand via the sensor circuit) < 20 ms (on demand via A1)
Restart time	< 1 s (Boot time, after switching on the supply voltage)
Recovery time	1 s (following demand of the safety function) 500 ms (Availability time after activating the sensor circuit during manual start)
Start pulse length	≥ 500 ms (manual start)

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)
Weight	155 g
Operating voltage display	1 x green LED (PWR)
Status display	4 x LED (green)
Rated insulation voltage	320 V
Rated surge voltage/insulation	See “Insulation coordination”
Degree of pollution	2
Overvoltage category	II
Maximum power dissipation for nominal condition	7.82 W (U_S = 30 V, I_{REL}^2 = 72 A², $U_{ContactVoltageDrop}$ = 0.2 V, $P_{Total\ max}$ = 1.42 W + 6.2 W)
Note on power dissipation	See “Calculating the power dissipation”

Dimensions	Screw connection	Push-in connection
W x H x D	17.5 x 112.2 x 114.5 mm	17.5 x 116.6 x 114.5 mm

Connection data	Screw connection	Push-in connection
Conductor cross-section rigid	0.2 mm² … 2.5 mm²	0.2 mm² … 1.5 mm²
Conductor cross-section flexible	0.2 mm² … 2.5 mm²	0.2 mm² … 1.5 mm²
Conductor cross-section AWG	24 … 12	24 … 16
Conductor cross-section flexible, with ferrule without plastic sleeve	-	0.25 mm² … 1.5 mm² (only together with CRIMPFOX 6)
Conductor cross-section flexible, with ferrule with plastic sleeve	-	0.25 mm² … 1.5 mm² (only together with CRIMPFOX 6)
Stripping length	7 mm	8 mm
Screw thread	M3	-
Tightening torque	0.5 Nm … 0.6 Nm	-

Ambient conditions	
Ambient temperature (operation)	-20 °C … 60 °C (observe derating)
Ambient temperature (storage/transport)	-40 °C … 85 °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, amplitude 0.15 mm, 2g

Approvals and manufacturer's declarations	
The latest documents can be found at:	www.phoenixcontact.com/product/1332276 www.phoenixcontact.com/product/1332281
IECEx (IECEx ULD 25.0025X)	Ex ec nC [ia Ga] IIC T4 Gc [Ex ia Ga] IIC [Ex ia Da] IIIC [Ex ia Ma] I
ATEX (UL 25 ATEX 3448 X)	Ⓔx II 3(1) G Ex ec nC [ia Ga] IIC T4 Gc Ⓔx II (1) G [Ex ia Ga] IIC Ⓔx II (1) D [Ex ia Da] IIIC Ⓔx I (M1) [Ex ia Ma] I
UL, USA/Canada (E140324)	cULus
UL, USA/Canada (E360692)	Class I, Zone 2, AEx ec nC IIC T4 Class I, Zone 2, Ex ec nC IIC Gc T4 X

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
Systematic Capabiltiy (SC)	3
PFH_D	1.00×10^{-9} (2 A AC15, 8760 switching cycles/year; 4 A DC13, 8760 switching cycles/year)
Demand rate	< 12 Months
Mission time	240 Months

Safety parameters according to IEC 61508 - low demand	
Equipment type	Type A
HFT	1
SIL	3
Systematic Capabiltiy (SC)	3
PFD_{avg}	3.76×10^{-5}
Proof test interval	36 Months
Mission time	240 Months

Safety parameters according to EN ISO 13849-1	
Category	4
Performance level	e (2 A AC15, 8760 switching cycles/year; 4 A DC13, 8760 switching cycles/year)
Calculation basis	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

5 Interface type (ZVEI classification)

Digital inputs : Sensor circuit (S12, S22)				
Source/destination	**Interface type**	**Additional measure**	**Source/destination**	**Suitable interface type**
Destination	A	M	Source	A

Interface type A - Destination			
Parameter	**min.**	**typ.**	**max.**
Input current I_i (in the ON-state)	1.5 mA	-	4 mA
Output voltage U_i	1 V	-	9 V
Input capacitance C_i	-	-	-
Additional measure M	- The inputs are not types in accordance with IEC 61131-2. - T_G is S11 for S12 (without cycle) - T_G is S21 for S22 (without cycle)		

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

Interface type A - Destination			
Parameter	**min.**	**typ.**	**max.**
Input current I_i (in the ON-state)	1 mA	-	4 mA
Output voltage U_i	5 V	-	9 V
Input capacitance C_i	-	-	-
Additional measure M	- The inputs are not types in accordance with IEC 61131-2. - T_G is S11 (without cycle).		

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	3 mA	-	6 A
Switching voltage U_i	12 V	-	250 V AC/DC
Internal resistance R_i (in the switched state)	Load 6 A < 50 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 : M1				
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 M1.		

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.

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).

Mismatching and polarity reversal of connections

- Take measures to prevent mismatching, polarity reversal, and manipulation of connections.

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).

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.

7.2 Intrinsic safety

- The device is approved for intrinsically safe (Ex i) circuits up to zone 0 (gas) of the Ex area. The safety-relevant values for intrinsically safe equipment and the connecting conductors must be observed during connection (IEC/EC 60079-14) and the values specified in this installation note and/or the EC examination certificate must be observed.
- When carrying out measurements on the intrinsically safe side, observe the relevant regulations regarding the connection of intrinsically safe equipment. Use only these approved measuring devices in intrinsically safe circuits.
- Make sure that the read-back contacts of the switching devices used in the field at least have the protection class required for the application.
- Make sure that no external power sources are connected to the intrinsically safe terminal blocks.
- If the device was used in circuits which are not intrinsically safe, it is forbidden to use it again in intrinsically safe circuits. Label the device clearly as being not intrinsically safe.
- The insulation between non-intrinsically safe and intrinsically safe circuits complies with IEC 60079-11, dielectric strength requirement or equivalent.

7.3 Installation in potentially explosive area

WARNING: Explosion hazard when used in potentially explosive areas

Please make sure that the following notes and instructions are observed.

- The category 3 device is designed for installation in zone 2 potentially explosive areas. It satisfies the requirements of the following standards. Comprehensive details are to be found in the EU Declaration of Conformity which is enclosed and also available on our website in the latest version:

  EN/IEC 60079-0, EN/IEC 60079-7, EN/IEC 60079-15
- If you use the device in an environment with > 45°C, it no longer fulfills the requirement for “Ex ec nC [ia Ga] IIC T4 Gc”. Check only one box of the rating plate during initial installation.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described. When installing and operating the device, the applicable regulations and safety directives (including national safety directives), as well as general technical regulations, must be observed. The safety data is listed in this document and in the certificates.
- Observe the specified conditions for use in potentially explosive areas! Also observe the requirements of EN/IEC 60079-14.
- It is not permissible to open or modify the device. Do not repair the device yourself but replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from violation.
- Do not subject the device to mechanical and/or thermal loads that exceed the specified limits.
- The device must be stopped and immediately removed from the Ex area if it is damaged or was subject to an impermissible load or stored incorrectly or if it malfunctions.
- **With nominal switching voltages greater than 60 V SELV/PELV and simultaneous load currents greater than 2 A, the electrical service life is reduced to 20000 switching cycles. Replace the device in good time before the end of the electrical service life.**
- An output fuse must be provided at M1 for use in applications with requirements regarding the “ia” type of protection.
  - Nominal current ≤200 mA
  - Breaking capacity 250 V AC/125 V DC at 100 A, minimum

7.4 Specific conditions of use

- Install the device in such a way that a degree of protection of at least IP54 is achieved in accordance with EN/IEC 60529.
  To this end, a suitable, approved housing that meets the requirements of EN/IEC 60079-0, GB/T 3836.1 must be used.
- Only devices that are designed for operation in Ex zone 2 and are suitable for the conditions at the installation location may be connected to circuits in zone 2.
- In potentially explosive areas, only connect and disconnect cables and plug-in connections (e.g., connector, SD card, DIN rail connector) when the power is disconnected.
- For safe operation, lockable plug-in connections (e.g., connector, SD card, DIN rail connector) must be fully inserted and have a functional interlock (e.g., locking clip, screw connection).
- Insert the interlock. Repair any damaged plug-in connections immediately.
- Only connect one cable to each terminal point.
- Use the device in an environment that does not exceed pollution degree 2 in accordance with EN/IEC 60664-1, GB/T 16935.1.
- Use transient protection so that short-term surge voltages do not exceed 119 V.
- The device shall only be connected to circuits which are limited to overvoltage category I or II as defined in EN 60664-1.
- The circuits are limited to overvoltage category II as defined in UL 60664-11 5.1 DV1.

7.5 Ambient temperature in potentially explosive area

- Observe the derating curves.
- Observe the special temperature conditions according to the rating plate.

Figure 1 Rating plate (laser printing)

Input A1/A2	24 V DC, 55 mA	
Output	NO-contact	DO-contact
	250 V AC, 6 A Resistive B300 R300	24 V DC, 100 mA Resistive
Ambient Temperature	-20°C to 60°C	

7.6 Installation in areas with a danger of dust explosions

WARNING: Explosion hazard

The device is not designed for use in atmospheres with a danger of dust explosions.

8 UL notes

8.1 UL Ordinary Location

– Only use copper connecting cables providing the permitted temperature range (60°C/75°C).

– Tighten the screws on the screw terminal blocks with 5 ... 7 lb in (0.5 ... 0.6 Nm).

8.2 UL Hazardous Location

– This device must be installed in an area that is no longer classified as pollution degree 2 in accordance with IEC 60664-1.

– WARNING - Do not disconnect the terminal blocks when energized!

– Device must be mounted in a **tool only accessible** enclosure certified for use in Class I, Zone 2, Groups IIC and rated IP54 in accordance with IEC 60529 when used in Class I, Zone 2 environment.

– A surge protection device must be provided outside of the device that is set to a level that does not exceed 140 % of the nominal voltage at the power supply connections of the device.

– Only use copper connecting cables providing the permitted temperature range (75°C).

9 Transport, storage, and unpacking

9.1 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”.

9.2 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”.

9.3 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”.

10 Function description

Two-channel sensor circuit

The connection of the 2-channel sensor circuit is equivalent.

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

See “Signal generator connection versions” section.

10.1 Startup behavior

Start conditions

– Both sensor circuits are closed

Automatic start

If the start conditions are met, the device starts automatically.

Manual, monitored start

When the start conditions are met, the device starts once the start circuit has been closed and opened again by pressing and releasing the reset button.

A connected reset button is monitored.

See “Start and feedback circuit connection versions” section.

10.2 Safe shutdown

If at least one sensor circuit is interrupted, the enabling current paths open without delay.

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

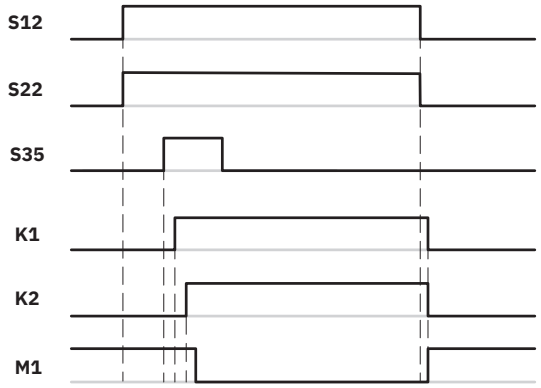
11 Function and time diagrams

11.1 Time diagram for automatic start

11.1.1 Autostart pulse

– Start on rising edge at S35

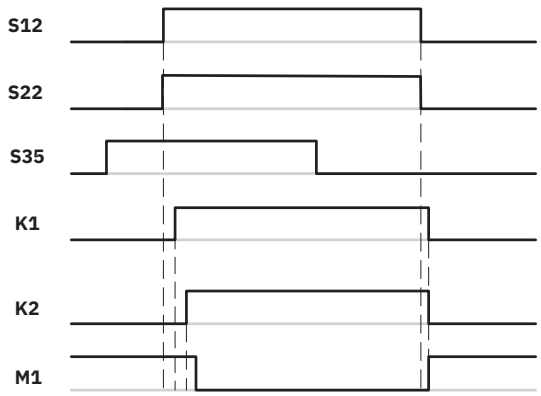
Figure 2 Time diagram for automatic start



11.1.2 Continuous autostart

– Permanent high signal at S35

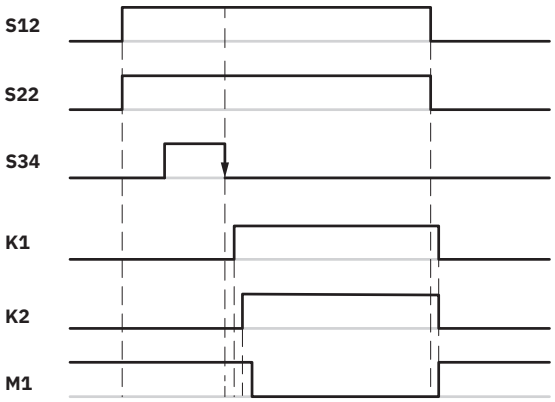
Figure 3 Time diagram for automatic start



11.2 Time diagram for manual, monitored start

– Start on falling edge at S34

Figure 4 Time diagram for manual, monitored start

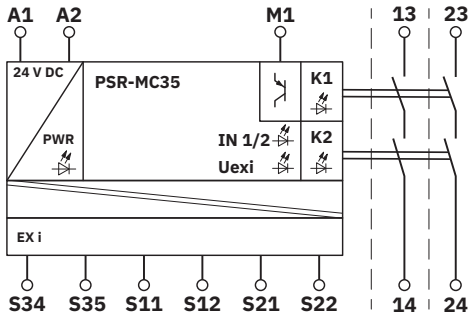


Key:

S12/S22	Sensor circuits
S34	Manual start circuit, monitored start
S35	Start circuit for autostart
K1/K2	Output circuits
M1	Digital alarm output

12 Block diagram

Figure 5 Block diagram



Key:

A1	24 V DC power supply	
A2	0 V power supply	
M1	Digital alarm output	
S34	Manual start circuit	Intrinsically safe connections
S35	Automatic start circuit	
S11	Power supply output for S12, S34, S35	
S12	Input sensor circuit 1 (channel 1)	
S21	Power supply input for S22	
S22	Input sensor circuit 2 (channel 2)	
13/14	Undelayed enabling current paths	
23/24		

12.1 Insulation coordination

	A1/A2, logic	S11, S12, S21, S22, S34, S35	13/14	23/24	Housing
A1/A2, logic	-	300 V EX ia	6 kV ST	6 kV ST	4 kV BI
S11, S12, S21, S22, S34, S35	-	-	6 kV ST	6 kV ST	4 kV BI
13/14	-	-	-	6 kV ST	4 kV BI
23/24	-	-	-	-	4 kV BI

Key:

BI	Basic insulation
ST	Safe isolation
Logic	Sensor and start circuits, signal output, diagnostic input

WARNING: Loss of electrical safety

Take measures outside the device to limit transient surge voltages to the respective value for overvoltage category II.

Basic insulation

(rated surge voltage of 4 kV)

A mixture of SELV and PELV 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

(rated surge voltage of 6 kV)

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 circuits of $U \leq 25$ V AC or $U \leq 60$ V DC and circuits with higher voltages can be mixed.

Intrinsically safe connections

(300 EX ia)

The housing of the device provides basic insulation against the neighboring devices for 300 Vrms. If several devices are installed next to each other, this must be taken into account, and additional insulation must be installed if necessary. If the neighboring device is equipped with basic insulation, no additional insulation is required.

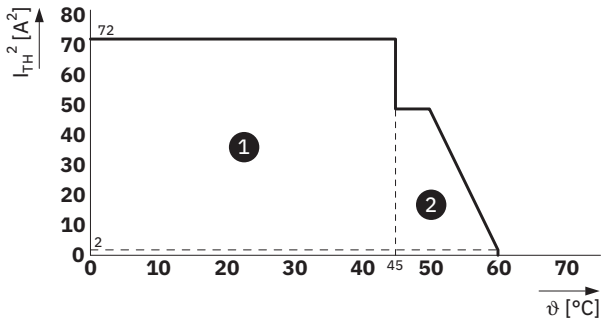
13 Derating

13.1 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. 30 V DC
– $I_{max}^2 = I_1^2 + I_2^2$

Figure 6 Derating curve



Key:

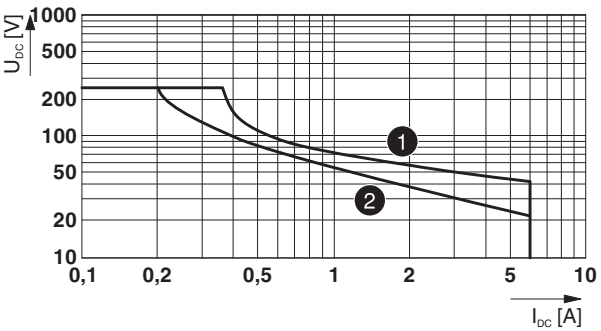
❶	[Ex ia Ma] I, [Ex ia Ga] IIC, [Ex ia Da] IIIC and Ex ec nc [ia Ga] IIC T4 Gc
❷	[Ex ia Ma] I, [Ex ia Ga] IIC, [Ex ia Da] IIIC only

14 Relay data

14.1 Load limit curve at DC load

Ohmic and inductive load

Figure 7 Load limit curve - ohmic and inductive load

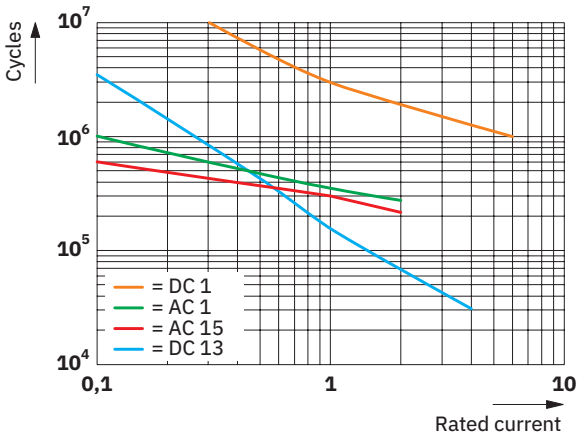


Key:

❶	Ohmic load	L/R = 0 ms
❷	Inductive load	L/R = 40 ms

14.2 Electrical service life

Figure 8 Electrical service life for high-demand applications



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 300000 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.

WARNING: Explosion hazard when used in potentially explosive areas

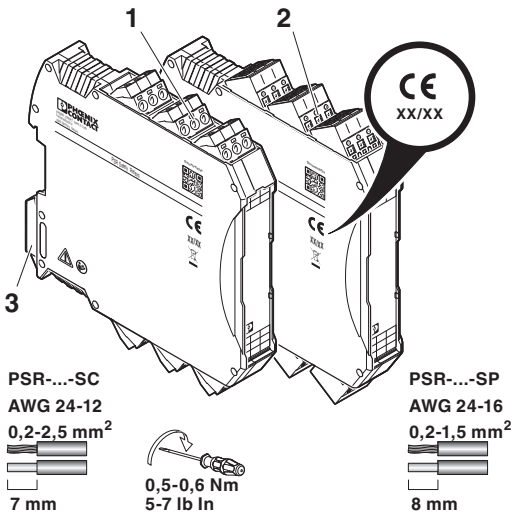
With nominal switching voltages greater than 60 V SELV/PELV and simultaneous load currents greater than 2 A, the electrical service life is reduced to 20000 switching cycles.

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

15 Operating and indication elements

15.1 Connection versions

Figure 9 Connection versions



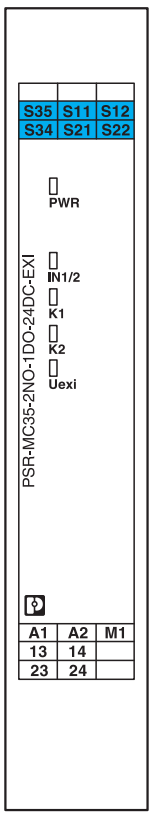
1 COMBICON plug-in screw terminal block
2 Pluggable COMBICON Push-in terminal block
3 Metal lock for fixing to DIN rail

See section "Optional terminal coding".

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

XX/XX = Calendar week / year

15.2 Connection assignment



Intrinsically safe connections

S35	Automatic start circuit
S11	Power supply output for S12, S34, S35
S12	Input sensor circuit 1 (channel 1)
S34	Manual start circuit
S21	Power supply input for S22
S22	Input sensor circuit 2 (channel 2)
PWR	Power LED (green, yellow, red)
IN1/2	Status indicator sensor circuit; LED (green)
K1	Status indicator safety circuit, LED (green)
K2	Status indicator safety circuit, LED (green)
Uexi	A voltage is applied to the intrinsically safe contacts.

A1	24 V DC power supply
A2	0 V power supply
M1	Digital alarm output
13/14	Enabling current path, undelayed
23/24	Enabling current path, undelayed

15.3 Optional terminal coding

The device connection terminal blocks are **not** coded as standard.

The optional coding accessories can provide you with increased safety against connection mismatching and reverse polarity.
See section “Ordering data”.

If you do not use the coding accessories, ensure that alternative validation measures are taken.

Coding system

The terminal blocks can be coded by using coding sections and coding profiles.

Coding sections are plugged onto the terminal block header in the device housing.

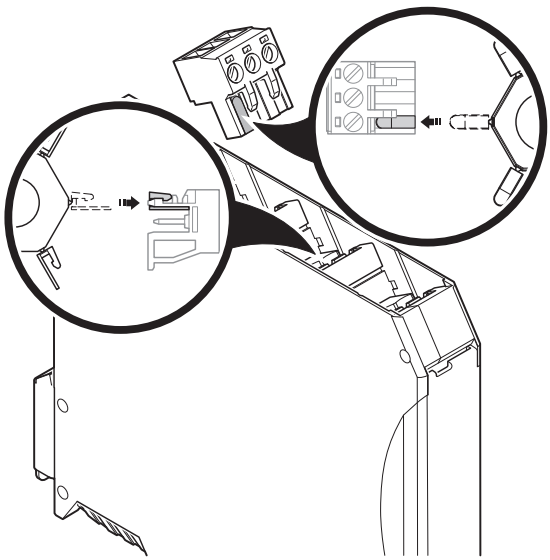
Coding profiles are plugged into the groove of the pluggable terminal block.

Various combinations can be used to create a coding system for the device terminal blocks.

Attaching coding elements

1. Push a coding section onto the terminal block header in the device housing.
   Remove the coding section from the coding star.
2. Push a coding profile into the groove of the terminal block.
   Remove the coding profile from the coding star.

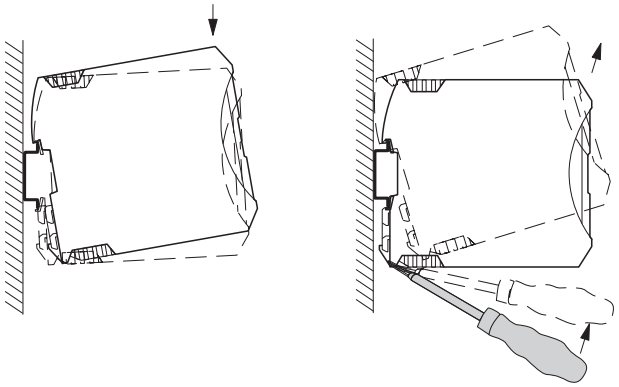
Figure 10 Attach coding elements



16 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.

Figure 11 Mounting and removing



17 Wiring

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

Figure 12 Connecting the cables for PSR-...-SC (screw terminal block)

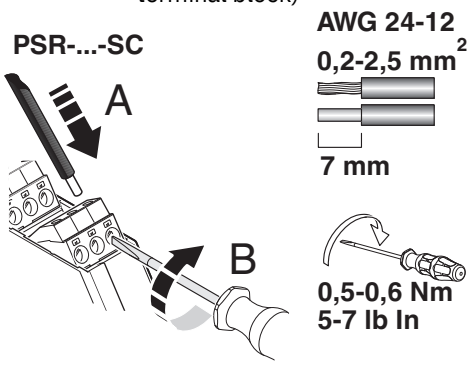
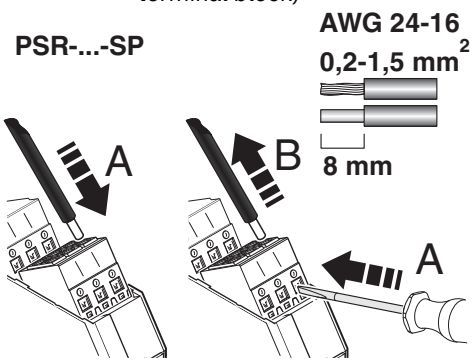


Figure 13 Connecting the cables for PSR-...-SP (Push-in terminal block)



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.

17.1 Signal generator connection versions

- Connect suitable signal generators to S11/S12 and S21/S22.

Figure 14 2-channel emergency stop monitoring with cross-circuit detection

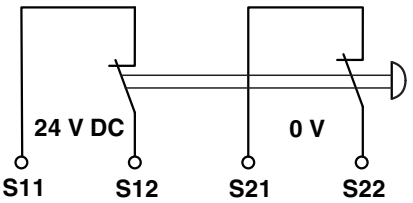
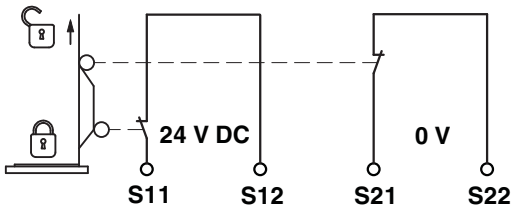


Figure 15 2-channel safety door monitoring with cross-circuit detection



17.2 Start and feedback circuit connection variants

Automatic start

- Bridge the contacts S11/S35.

Manual, monitored start

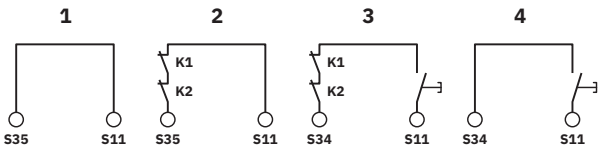
- Connect a reset button to S11/S34.

A connected reset button is monitored.

Start and feedback circuit

- Place the relevant N/C contacts in path S11/S34 or S11/S35 to monitor external contactors or extension devices with force-guided contacts.

Figure 16 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

WARNING: Explosion hazard

If the device has been used in non-intrinsically safe circuits, it must not be used again in intrinsically safe circuits.

The device must be clearly marked as non-intrinsically safe.

18 Startup

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

The PWR LED lights up green.

The U_{exi} LED lights up.

- Close the sensor circuits according to their wiring.
  See “Signal generator connection versions” section.

The IN1/2 LED lights up.

Automatic start

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

The K1 and K2 LEDs light up green.

Signal output M1 is not active.

Manual, monitored start

- Press the reset button.
- Release the reset button.

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

The K1 and K2 LEDs light up green.

Signal output M1 is not active.

19 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

$P_{Contact} = (I_{L1}^2 + I_{L2}^2) \bullet 50\ m\Omega$

Total power dissipation

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

$P_{Total} = U_B^2 / (U_S/I_S) + n \bullet I_L^2 \bullet 50\ m\Omega$

Key:

P	Power dissipation
U_B	Applied operating voltage
U_S	Rated control circuit supply voltage
I_S	Rated control supply current
I_L	Contact load current

20 Function test/proof test

To verify the device function, proceed as follows for each individual sensor circuit:

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

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.

21 Device 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.

If the Uexi LED lights up, a voltage is applied to the intrinsically safe I/Os.

Signal output M1 - not safety-related

Signal output M1 transmits non-safety-related status information. Feedback of signal output M1 to external basic devices for reasons of functional safety is therefore not required.

21.1 General states

Key:

○ LED OFF
● LED ON

LED					State	Notes
PWR	IN1/2	K1	K2	Uexi		
●	○	○	○	●	No relays are activated. The sensor circuit is inactive.	Possible error see error messages
●	●	○	○	●	Relays K1 and K2 are ready to start and await reset/start command (S34).	The sensor circuit is active.
●	●	●	●	●	All sensor circuits are active. All relays are picked up.	-

21.2 Error messages

Key:

○ LED OFF
● LED ON

LED					State	Possible cause	Corrective
PWR	IN1/2	K1	K2	Uexi			
●	○	○	○	●	The sensor circuits are actively controlled, but no input LEDs are lit up.	Internal cross-circuit detection is active: potential cross-circuit in the sensor circuit.	Switch off the operating voltage and rectify the cross-circuit. Then perform a function test.
●	●	○	○	●	The sensor circuits are active. The reset/start circuit (S34/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. Internal error: 1. The diagnostic contact is not working correctly. 2. An N/O contact is welded.	External error: 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.**
●	●	○	●	●	The sensor circuits are active. The reset/start circuit (S34) is/was activated. The safety circuit (K1) is not picking up.	External error: sensor circuit channel 1 was opened and reactivated. Internal error: diagnostic contacts are not working correctly. The reason for this may be a welded N/O contact.	External error: check the sensor circuits. 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 circuits are active. The reset/start circuit (S34) is/was activated. The safety circuit (K2) is not picking up.	External error: sensor circuit channel 2 was opened and reactivated. Internal error: the diagnostic contacts are not working correctly. The reason for this may be a welded N/O contact.	External error: check the sensor circuits. 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 circuits are active.	1. No supply voltage at A1/A 2. Over- or undervoltage at A1	Check the supply voltage.
●	○	○	○	○	The sensor circuits are active.	There is no voltage present at the intrinsically safe I/Os.	Internal error - replace the device

22 Application examples

22.1 Emergency stop monitoring/automatic start

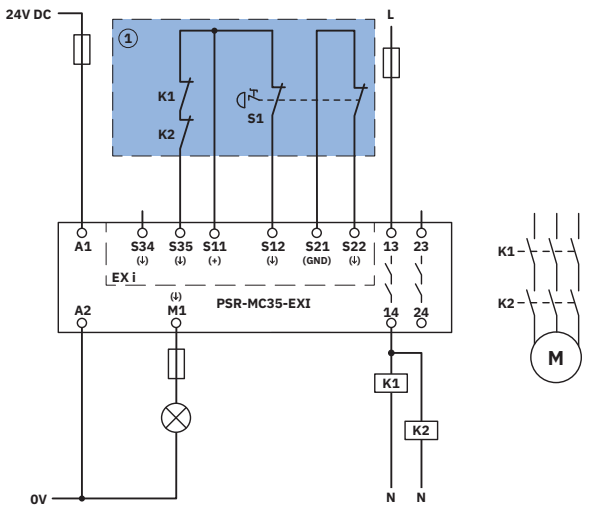
Application description:

- 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), if cross-circuits in the control to the actuator can be ruled out

Figure 17 Emergency stop monitoring/automatic start



Key:

S1	Emergency stop button
K1/K2	Force-guided contactors
①	Ex zone 0

22.2 Emergency stop monitoring/manual, monitored start

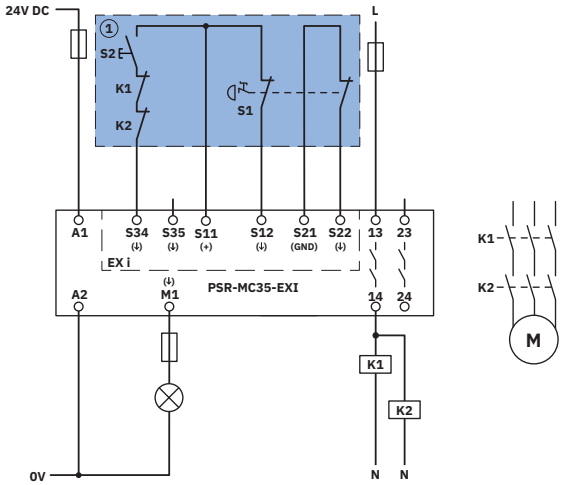
Application description:

- 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), if cross-circuits in the control to the actuator can be ruled out

Figure 18 Emergency stop monitoring/manual, monitored start



Key:

S1	Emergency stop button
S2	Manual reset device
K1/K2	Force-guided contactors
①	Ex zone 0

22.3 Safety door monitoring/manual, monitored start

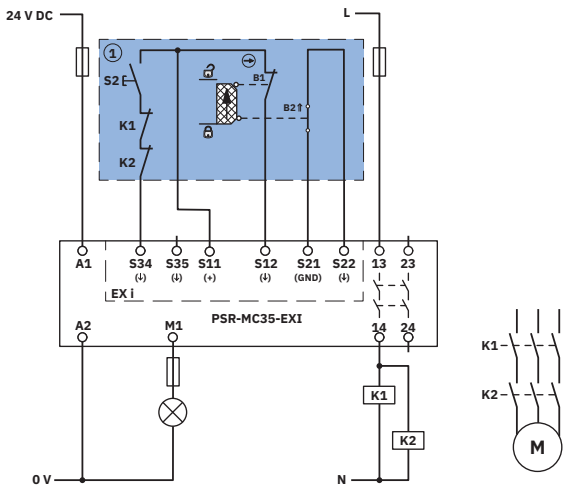
Application description:

- 2-channel safety door 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), if cross-circuits in the control to the actuator can be ruled out

Figure 19 Safety door monitoring/manual, monitored start



Key:

S2	Manual reset device
B1/B2	Mechanical safety door switches
K1/K2	Force-guided contactors
①	Ex zone 0

22.4 Magnetic switch monitoring/manual, monitored start

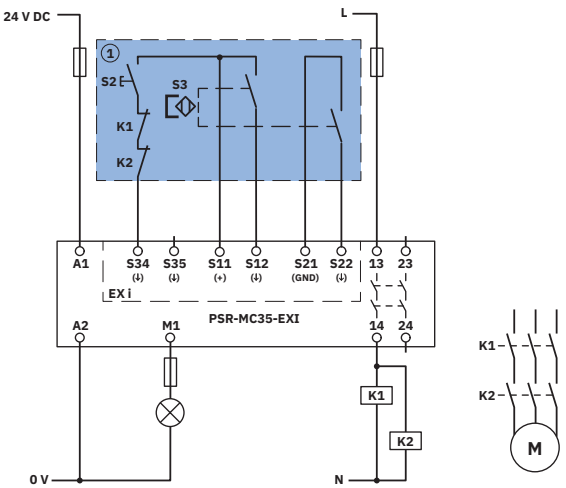
Application description:

- 2-channel 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), if cross-circuits in the control to the actuator can be ruled out

Figure 20 Magnetic switch monitoring/manual, monitored start



Key:

S2	Manual reset device
S3	Magnetic switch
K1/K2	Force-guided contactors
①	Ex zone 0

23 Device replacement, device defect, and repair

23.1 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

23.2 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.

24 Maintenance, decommissioning, and disposal

24.1 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.

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.

24.2 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.

25 Attachment

25.1 Using PSR devices at altitudes greater than 2000 m above sea level

The following section describes the special conditions for using PSR devices at altitudes greater than 2000 m above sea level.
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 greater than 2000 m above sea level
< 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 greater than 2000 m above sea level
< 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 above sea level	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

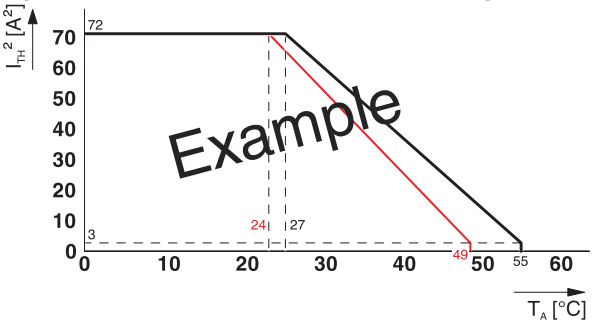
Example calculation for 3000 m

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 21 Example of a suspended derating curve (red)



25.2 Revision history

Version	Date	Contents
00	2026-02-10	First publication