# **SCHMERSAL**

Operating instructions. . . . . . . . . . . . pages 1 to 12

,	wiring examples
7.1	Application example fail-safe delay timer
7.2	Application examples safe standstill monitoring
7.3	Start configuration
7.4	Sensor configuration
8	Set-up and maintenance
8.1	Commissioning
	Functional testing11
8.3	Behaviour in the case of faults
8.4	Setting report
8.5	Maintenance
9	Disassembly and disposal
9.1	Disassembly
9.2	Disposal
	Appendix
10.	1 Wiring/circuit information
11	EU Declaration of conformity

# Content

About this document

1.1	Function	. 1
	Target group: authorised qualified personnel	
	Explanation of the symbols used	
	Appropriate use	
	General safety instructions	
	Warning about misuse	
1.7	Exclusion of liability	. 2
	Product description	
2.1	Ordering code	. 2
2.2	Special versions	. 2
	Purpose	
2.4	Technical data	. 3
2.5	Derating / electrical lifespan of safety contacts	. 3
2.6	Safety classification	۷.
3	Mounting	
•	mounting	
		. 4
3.1	General mounting instructions	
3.1 3.2	General mounting instructions	
3.1 3.2 <b>4</b>	General mounting instructions	۷.
3.1 3.2 <b>4</b> 4.1	General mounting instructions	.4
3.1 3.2 <b>4</b> 4.1 4.2	General mounting instructions  Dimensions  Rear side Electrical connection General information for electrical connection.  Coding of connecting terminals	.4
3.1 3.2 <b>4</b> 4.1 4.2 <b>5</b>	General mounting instructions	.4
3.1 3.2 <b>4</b> 4.1 4.2 <b>5</b> 5.1	General mounting instructions  Dimensions  Rear side Electrical connection General information for electrical connection  Coding of connecting terminals  Operating principle and settings Description of the terminals and LED indications	.4
3.1 3.2 <b>4</b> 4.1 4.2 <b>5</b> 5.1 5.2	General mounting instructions  Dimensions	.4
3.1 3.2 <b>4</b> 4.1 4.2 <b>5</b> 5.1 5.2 5.3	General mounting instructions.  Dimensions  Rear side Electrical connection General information for electrical connection. Coding of connecting terminals.  Operating principle and settings Description of the terminals and LED indications Adjustable applications. Changing setting or application.  Diagnostic	.2
3.1 3.2 <b>4</b> 4.1 4.2 <b>5</b> 5.1 5.2 5.3	General mounting instructions.  Dimensions  Rear side Electrical connection General information for electrical connection. Coding of connecting terminals.  Operating principle and settings Description of the terminals and LED indications Adjustable applications. Changing setting or application.  Diagnostic	.2
3.1 3.2 4 4.1 4.2 5 5.1 5.2 5.3 6 6.1	General mounting instructions.  Dimensions  Rear side Electrical connection General information for electrical connection. Coding of connecting terminals.  Operating principle and settings Description of the terminals and LED indications Adjustable applications. Changing setting or application.	.2
3.1 3.2 4 4.1 4.2 5 5.1 5.2 5.3 6 6.1 6.2	General mounting instructions.  Dimensions  Rear side Electrical connection General information for electrical connection. Coding of connecting terminals.  Operating principle and settings Description of the terminals and LED indications Adjustable applications. Changing setting or application.  Diagnostic LED indications.	.2

# 1. About this document

Wiring avamples

## 1.1 Function

This operating instructions manual provides all the information you need for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the safety-monitoring module. the operating instructions must be available in a legible condition and a complete version in the vicinity of the device.

## 1.2 Target group: authorised qualified personnel

All operations described in this operating instructions manual must be carried out by trained specialist personnel, authorised by the plant operator only.

Please make sure that you have read and understood these operating instructions and that you know all applicable legislations regarding occupational safety and accident prevention prior to installation and putting the component into operation.

The machine builder must carefully select the harmonised standards to be complied with as well as other technical specifications for the selection, mounting and integration of the components.

## 1.3 Explanation of the symbols used



# Information, hint, note:

This symbol is used for identifying useful additional information.



Caution: Failure to comply with this warning notice could lead to failures or malfunctions.

Warning: Failure to comply with this warning notice could lead to physical injury and/or damage to the machine.

# Operating instructions Fail-safe delay timer / Standstill monitor

#### 1.4 Appropriate use

The products described in these operating instructions are developed to execute safety-related functions as part of an entire plant or machine. It is the responsibility of the manufacturer of a machine or plant to ensure the correct functionality of the entire machine or plant.

The fail-safe delay timer must be exclusively used in accordance with the versions listed below or for the applications authorised by the manufacturer. Detailed information regarding the range of applications can be found in the chapter "Product description".

## 1.5 General safety instructions

The user must observe the safety instructions in this operating instructions manual, the country specific installation standards as well as all prevailing safety regulations and accident prevention rules.



Further technical information can be found in the Schmersal catalogues or in the online catalogue on the Internet: www.schmersal.net.

The information contained in this operating instructions manual is provided without liability and is subject to technical modifications.

There are no residual risks, provided that the safety instructions as well as the instructions regarding mounting, commissioning, operation and maintenance are observed.

## 1.6 Warning about misuse



In case of inadequate or improper use or manipulations of the fail-safe delay timer, personal hazards or damage to machinery or plant components cannot be excluded. The relevant requirements of the standards ISO 14119 and ISO 13850 must be observed.

# 1.7 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with this operating instructions manual. The manufacturer shall accept no liability for damages resulting from the use of unauthorised spare parts or accessories.

For safety reasons, invasive work on the device as well as arbitrary repairs, conversions and modifications to the device are strictly forbidden; the manufacturer shall accept no liability for damages resulting from such invasive work, arbitrary repairs, conversions and/or modifications to the device.

The safety relay module is to be operated in an area in which access by personnel is restricted.

## 2. Product description

## 2.1 Ordering code

This operating instructions manual applies to the following types:

## SRB-E-302FWS-TS-①

No.	Option	Description
1	СС	Plug-in screw clamps: single wire (rigid) or fine wire (flexible): 0.2 2.5 mm²; fine wire with ferrule: 0.25 2.5 mm² Plug-in cage clamps: single wire (rigid) or fine wire (flexible): 0.2 1.5 mm²; fine wire with ferrule: 0.25 1.5 mm²



Only if the action described in these operating instructions is carried out correctly will the safety function be safeguarded, including compliance with the Machinery Directive.

## 2.2 Special versions

For special versions, which are not listed in the order code below 2.1, these specifications apply accordingly, provided that they correspond to the standard version.

## 2.3 Purpose

## Safe pull-in delay function

The fail-safe delay timers for integration in safety circuits are designed for fitting in control cabinets. They serve as a reliable means of evaluating actuation signals and delayed authorisation of protective equipment.

The safety function is defined as deactivation of the fail-safe outputs Q1 and 13/14 (17/18), 23/34 (27/28) when inputs S12 and/or S22 are opened and the fail-safe outputs are activated when the set activation delay time has elapsed.

## Safe standstill monitoring function

The fail-safe standstill monitor is designed for control cabinet mounting. Standstill monitors serve for the fail-safe detection of the machine standstill and control of solenoid interlocks. If the safety control module has detected standstill, a solenoid interlock can be operated using the fail-safe outputs Q1, 13/14 (17/18), 23/34 (27/28).

The signals from one or two proximity switches are used to detect standstill. Optionally, an additional standstill signal can be monitored. The additional standstill signal can be derived from an already available standstill signal of the machine, e.g. evaluation of a tachogenerator by a PLC or the standstill output of a frequency converter.

Taking account of a PFH value assessment, the safety-relevant current paths meet the following requirements (see also chapter 2.6 "Safety classification")

- Control category 4 PL e to ISO 13849-1
- SIL 3 to IEC 61508
- SILCL 3 to IEC 62061

To determine the Performance Level (PL) to ISO 13849-1 of the entire safety function (e.g. sensor, logic, actuator), an assessment of all relevant components is required.



The entire concept of the control system, in which the safety component is integrated, must be validated to the relevant standards.

2.4	Technical	data
A		

EMC rating: Air clearances and creepage distances:	General data	
EMC rating:	Standards: EN 60204-	
Air clearances and creepage distances:  Air clearances and creepage distances:  Rated Olivi rail to EN 607* Terminal designations:  Electrical characteristics:  Rated operating voltage U <sub>s</sub> :  Pequency range:  Mains unit/mains power supply:  Mains unit/mains power supply:  SELV network as per EN 6095*  mains power supply must harmonis with device safety (characteristic/meltip property) so that triggering is assure property) so that triggering is assure we recommend a circ fuse (max. 15 A, delayed actio trust of fuse (max. 15 A, delayed actio trust (max.		IEC 62061, IEC 61508
Mounting: standard DIN rail to EN 607- Terminal designations: IEC 60947  Electrical characteristics: Rated operating voltage U <sub>s</sub> : 24 VDC -20%/+20′ residual ripple max. 10  Frequency range: Mains unit/mains power supply: SELV network as per EN 6095 mains power supply must harmonia with device safety (characteristic/melting property) so that triggering is assure of the operating voltage: we recommend a clayer of fuse (max. 15A, delayed action breaker type Z (max. 16 A) or a fire fuse (max. 15A, delayed action max. 16A, only use fuses accordance with UL 248 serial insulation values to IEC 60664-1: Rated insulation voltage U; - Safety contacts: 250 - Safety outputs: 50 Rated inpulse withstand voltage U lemp: - Safety output Qt1: 0,81 - Overvoltage actegory: Degree of pollution: Drop-out delay on "supply failure": < 10 n Bridging in case of voltage drops:		to EMC Directive
Terminal designations: IEC 60947 Electrical characteristics: Rated operating voltage U <sub>2</sub> : 24 VDC –20%/+20° residual ripple max. 10 Frequency range: Mains unit/mains power supply: SELV network as per EN 6095 mains power supply must harmonis with device safety (characteristic/meltiti property) so that triggering is assure Power consumption: 3 W (+ load of the safety output Fuse rating for the operating voltage: breaker type Z (max. 16 A) or a finduse (max. 15 A, delayed action to the safety output Preaker type Z (max. 16 A) or a finduse (max. 15 A, delayed action accordance with UL 248 seri Insulation values to IEC 60664-1: Rated insulation voltage U; - Safety contacts: 2500 Safety contacts: 2500 Safety contacts: 2500 Safety contacts: 2500 Safety contacts 17-18, 27-28: 61 Safety output Qt1: 0.8 If Overvoltage category: Degree of pollution: 2500 pollution: 2500 Safety output Qt1: 0.8 If Overvoltage category: 2500 Safety output Qt1: 0.8 If Overvoltage category: 2500 Safety output Safety Safe		to IEC 60664-1
Electrical characteristics:  Rated operating voltage Ue:  Rated operating voltage Ue:  SELV network as per EN 6095 mains power supply must harmonis with device safety (characteristic/meltin property) so that triggering is assure power consumption:  3 W (+ load of the safety output fuse (max. 16 A) or a fin fuse (max. 15 A, delayed action max. 16 A, only use fuses accordance with UL 248 seriunsulation values to IEC 60664-1:  Rated insulation voltage U;  - Safety outputs:  - Safety outputs:  - Safety output Set (and the safety output frequency:  - Degree of pollution:  Drop-out delay on "supply failure":  - Frequency measurement tolerance:  - Time measurement tolerance:  - Control current circuits/inputs:  Inputs S12, S22:  Max. input frequency:  - Good outputs S11, S21:  - Soloutout resistance:  - Reading outputs:  Switching capacity of the safety contacts:  - Safety outputs:  - Soloutout resistance:  - Safety outputs:  - Sumax. 16 A, only use fuses accordance with UL 248 serius (max. 15 A, delayed action max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (max. 16 A, only use fuses accordance with UL 248 serius (		
Rated operating voltage Ue:  Frequency range:  Mains unit/mains power supply:  Mains unit/mains power supply:  Mains unit/mains power supply:  Mains unit/mains power supply:  Mains power supply must harmonic with device safety (characteristic/melting property) so that triggering is assure power consumption:  Power consumption:  Jaw (+ load of the safety output breaker type Z (max. 15 A) or a fire fuse (max. 15 A), delayed action max. 16 A, only use fuses accordance with UL 248 seriul sulation values to IEC 60664-1:  Rated insulation voltage U;  Safety contacts:  Safety outputs:  Safety contacts:  Safety ontacts:  Safety output Qt1:  Overvoltage category:  Degree of pollution:  Drop-out delay on "supply failure":  Prequency measurement tolerance:  Control current circuits/inputs:  Inputs S12, S22:  Max. input frequency:  Gooth and per outp Cable length:  Conduction resistance:  Relay outputs:  Switching capacity of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blo which in gapacity of the safety outputs:  Puse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blo which in gapacity of the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo which in gapacity of the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo which in gapacity of the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo which in gapacity of the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo which in gapacity of the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo which in gapacity of the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo in the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo in the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo in the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo in the safety outputs:  Safety fuse 10 A quick blow, 6 A slow blo in the safety outputs:  Safet		IEC 60947-1
residual ripple max. 10 Frequency range:  Mains unit/mains power supply:  SELV network as per EN 6095* mains power supply must harmonic with device safety (characteristic/meltit property) so that triggering is assure  Power consumption:  3 W (+ load of the safety output Fuse rating for the operating voltage: breaker type Z (max. 16 A) or a fine fuse (max. 15 A, delayed actio max. 16 A, only use fuses accordance with UL 248 seriunsulation values to IEC 60664-1: Rated insulation voltage U; Safety outputs: Safety outputs: Safety outputs: Safety outputs: Safety output Qt1: Overvoltage category: Degree of pollution: Drop-out delay on "supply failure": Serieduncy measurement tolerance: Control current circuits/inputs: Inputs S12, S22: S24 VDC / 8 m Max. input frequency: Inputs S12, S22: Conduction resistance: Relay outputs: Switching capacity of the safety contacts: Safety fuse 10 A quick blow, 6 A slow of Mini. 10 VDC / 10 m (Derating see 2. External (I, = 1000. To EN 60947-5-1: DC-13: 24 V / 4 D		211/22 22/1/22/
Frequency range:  Mains unit/mains power supply:  SELV network as per EN 6095 mains power supply must harmonis with device safety (characteristic/melting property) so that triggering is assure we recommend a circular fuse:  Fuse rating for the operating voltage:  Fuse rating of external fuse:  UL Rating of the safety contacts:  UL Rating of the safety contacts:  UL Rating of the safety outputs:  Voltage drop:  Voltage drop:  Voltage fuse:  Vo	Rated operating voltage U <sub>e</sub> :	
Mains unit/mains power supply:     mains power supply must harmonic with device safety (characteristic/melting property) so that triggering is assure power consumption:     3 W (+ load of the safety output breaker type Z (max. 16 A) or a fixes fuse (max. 15 A, delayed action accordance with UL 248 serial fusual fusu		residuai rippie max. 10%
mains power supply must harmonis with device safety (characteristic/meltiti property) so that triggering is assure?  Power consumption:  3 W (+ load of the safety output Fuse rating for the operating voltage: breaker type Z (max. 16 A) or a fine fuse (max. 15 A, delayed actio max. 16 A, only use fuses accordance with UL 248 serial fuse in max. 16 A, only use fuses accordance with UL 248 serial fusualtation values to IEC 60664-1:  Rated insulation voltage U; - Safety outputs: - Safety outputs: - Safety output Qrt: - Safety or overvoltage category: - Degree of pollution: - Drop-out delay on "supply failure": - Safety measurement tolerance: - Safety max. 250 VDC, 10 mA per outp 1500 m with 1.5 mm 2500 m with 1.5 mm 2500 m with 1.5 mm 2500 m with 2.5 mm		- CELV naturals as not EN 60050:
with device safety (characteristic/meltii property) so that triggering is assure.  Power consumption: 3 W (+ load of the safety output fuse rating for the operating voltage: we recommend a circuit breaker type Z (max. 16 A) or a fit fuse (max. 15 A, delayed actio max. 16 A, only use fuses accordance with UL 248 sericus max. 16 A, only use fuses accordance with UL 248 V/2 A, only use fuses a		
Property) so that triggering is assure Power consumption: S W (+ load of the safety output Fuse rating for the operating voltage: we recommend a circ breaker type Z (max. 15 A, delayed actio Max. 15 A, only use fuses accordance with UL 248 seria Insulation values to IEC 60664-1: Rated insulation voltage U; - Safety contacts: - Safety outputs: - Safety outputs: - Safety output Qt1: - Overvoltage category: Degree of pollution: Drop-out delay on "supply failure": Frequency measurement tolerance: - Control current circuits/inputs: Inputs S12, S22: - Max. input frequency: - Conduction resistance: - Conduction resistance: - Relay outputs: - Safety outputs: - Safety outputs: - Safety own accordance with UL 248 serial residual control of the safety contacts - Safety output Qt1: - Overvoltage category: - Degree of pollution: - Drop-out delay on "supply failure": - Safety output get give in the safety contacts - Safety output S12, S25: - Safety output S12, S25: - Safety output S12, S25: - Safety output S14, S25: - Safety output S15, S26: - Safety output S17, S21: - Safety output S25 max. 40 - Relay outputs: - Safety output S25 max. 40 - Relay outputs: - Safety output S25 max. 40 - Relay outputs: - Safety output S25 max. 40 - Relay outputs: - Safety output S26 max. 40 - Relay outputs: - Safety fuse 10 A quick blow, 6 A slow blow to En 60947-5-1: - AC-15: 230 V/ 6 A output S26 max. 250 V, 6 A olam min. 10 VDC / 10 m (Derating see 2 Evise rating of the safety outputs: - Safety fuse 10 A quick blow, 6 A slow blow to En 60947-5-1: - AC-15: 230 V/ 4 V/ A output S26 max. 250 V, 6 A olam min. 10 VDC / 10 m (Derating see 2 Safety fuse 10 A quick blow, 6 A slow blow to En 60947-5-1: - AC-15: 230 V/ 4 V/ A output S26 max. 250 V, 6 A olam min. 10 VDC / 10 m (Derating see 2 Safety fuse 10 A quick blow, 6 A slow blow to En 60947-5-1: - AC-15: 230 V/ 4 V/ A output S26 max. 250 V, 6 A output S26 max.		
Power consumption: Fuse rating for the operating voltage: Fuse (max. 16 A, only use fuses accordance with UL 248 seri fuse (max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri fuse. Seric max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A, only use fuses accordance with UL 248 seri max. 16 A,		
Fuse rating for the operating voltage:  breaker type Z (max. 16 A) or a fire fuse (max. 15 A, delayed actio max. 16 A, only use fuses accordance with UL 248 series accordance with U. 2500 series accordance with U. 2500 series accordance with U. 2	Power consumption: 3	W (+ load of the safety outputs)
District		we recommend a circuit
Substitute		aker type Z (max. 16 A) or a fine
UL Rating of external fuse:  Insulation values to IEC 60664-1: Rated insulation voltage U; - Safety contacts: - Safety outputs: - Safety outputs: - Safety output Qt1: - Overvoltage category: - Degree of pollution: - Drop-out delay on "supply failure": - Frequency measurement tolerance: - Time measurement tolerance: - Time measurement tolerance: - Control current circuits/inputs: - Inputs S12, S22: - Pay VDC, 10 mA per outp Cable length: - Safety outputs: - Safety outputs: - Safety output Qt1: - Overvoltage category: - Degree of pollution: - Drop-out delay on "supply failure": - Safety general fuse of voltage drops: - Readiness after switching on voltage [s]: - Safety output gt1: - Safety output S12, S22: - Safety output S12, S22: - Safety output S11, S21: - Safety output S11, S21: - Safety output S11, S21: - Safety output S200 m with 1.5 mn 2500 m with 2.5 mr - Conduction resistance: - Max. 40  Relay outputs: - Safety fuse 10 A quick blow, 6 A slow blow of A slow blow of A slow blow of Safety fuse 10 A quick blow, 6 A slow blow blow of Safety fuse 10 A quick blow, 6 A slow blow blow of Safety fuse 10 A quick blow, 6 A slow blow blow of Safety fuse 10 A quick blow, 6 A slow blow blow of Safety fuse 10 A quick blow, 6 A slow blow blow of Safety fuse 10 A quick blow, 6 A slow blow blow of Safety fuse 10 A quick blow, 6 A slow blow blow blow of Safety fuse 10 A quick blow, 6 A slow blow blow blow blow blow blow blow b		
accordance with UL 248 seric insulation values to IEC 60664-1: Rated insulation voltage U; - Safety contacts: 250 - Safety outputs: 50 Rated impulse withstand voltage U <sub>imp</sub> : - Safety contacts 17-18, 27-28: 61 Safety coutput Qt1: 0.8 If Overvoltage category: Degree of pollution: Drop-out delay on "supply failure": 10 m Bridging in case of voltage drops: 15 typ. 5 m Readiness after switching on voltage [s]: 15.5 m Readiness after switching on voltage [s]: 15.5 m Readiness after switching on voltage [s]: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety contacts: 15.0 m Readiness after switching capacity of the safety outputs: 15.0 m Readiness after switching capacity of the safety outputs: 15.0 m Readiness after switching capacity of the safety outputs: 15.0 m Readiness after switching capacity of signalling outputs: 15.0 m Readiness after switching capacity of signalling outputs: 15.0 m Readiness after switching capacity of signalling outputs: 15.0 m Readiness after switching capacity of signalling outputs: 15.0 m Readiness after switching capacity of signalling outputs: 15.0 m Readiness after switching capacity of signalling outputs: 15.0 m Readiness after switching capacity of signalling outputs: 15.0 m Readiness after switching capacity of signalling outputs		max. 16 A, only use fuses in
Rated insulation voltage U; - Safety contacts: 50 - Safety contacts 17-18, 27-28: 61 - Safety contacts 17-18, 27-28: 61 - Safety output Qt1: 0.8 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.8 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.8 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.8 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow, 6 A slow blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow on Energy output Qt1: 0.9 Is - Safety fuse 10 A quick blow on En		accordance with UL 248 series
- Safety contacts:	Insulation values to IEC 60664-1:	
Safety outputs:  Rated impulse withstand voltage U <sub>imp</sub> : - Safety contacts 17-18, 27-28: - Safety output Qt1:  Overvoltage category: Degree of pollution: Drop-out delay on "supply failure": Prequency measurement tolerance: Time measurement tolerance: Time measurement tolerance:  Control current circuits/inputs: Inputs S12, S22: Inputs S12, S22: Inputs S12, S21: Colock outputs S11, S21: Cable length: Cable length: Conduction resistance:  Relay outputs: Switching capacity of the safety contacts: Switching capacity of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blc Utilisation category to IEC 60947-5-1: Max. fuse rating of the safety outputs: Cest impulse of the safety outputs: Contaction resistance or external (I <sub>k</sub> = 1000) To Electrical life: Contaction resistance: Contaction resistance: Contaction resistance: Conduction re	Rated insulation voltage U <sub>i</sub> :	
Rated impulse withstand voltage U <sub>imp</sub> : - Safety contacts 17-18, 27-28: - Safety output Qt1: - Overvoltage category: Degree of pollution: Drop-out delay on "supply failure": - Safety output Qt1: - Safety output Qt2: - Safety output Qt3: - Safety output gailure": - Safety outputs gailure gailur		250 V
- Safety contacts 17-18, 27-28:		50 V
Safety output Qt1: Overvoltage category: Degree of pollution: Drop-out delay on "supply failure":  Bridging in case of voltage drops: Readiness after switching on voltage [s]: Frequency measurement tolerance: Time measurement tolerance:  Control current circuits/inputs: Inputs S12, S22:  Max. input frequency: Good outputs S11, S21: Clock outputs S11, S21: Cable length: Cable length: Conduction resistance:  Relay outputs: Switching capacity of the safety contacts: Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow of A slow blo		
Overvoltage category: Degree of pollution: Drop-out delay on "supply failure": Readiness after switching on voltage [s]: Frequency measurement tolerance: Time measurement tolerance: Control current circuits/inputs: Inputs S12, S22:  Max. input frequency: Inputs S12, S22:  Max. input frequency: Inputs S11, S21: Cable length: Cable length: Conduction resistance: Relay outputs: Switching capacity of the safety contacts: Fuse rating of the safety contacts:  Willisation category to IEC 60947-5-1: Becking day and incomplete of the safety outputs:  Switching capacity of the safety outputs: Conductor outputs Switching capacity of the safety outputs: Cafe in multiple		6 kV
Degree of pollution:  Drop-out delay on "supply failure":  Bridging in case of voltage drops:  Frequency measurement tolerance:  Control current circuits/inputs:  Inputs S12, S22:  Max. input frequency:  Cable length:  Cable length:  Conduction resistance:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Withing capacity of the safety outputs:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Switching capacity of the safety outputs:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Switching capacity of the safety outputs:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Conduction resistance:  Safety fuse 10 A quick blow, 6 A slow blow of		0.8 kV
Drop-out delay on "supply failure":  Bridging in case of voltage drops:  Readiness after switching on voltage [s]:  Frequency measurement tolerance:  Control current circuits/inputs:  Inputs \$12, \$22:  Max. input frequency:  Inputs \$12, \$22:  Max. input frequency:  Inputs \$21, \$22:  Inputs \$24 VDC / 8 m  Clock outputs \$11, \$21:  Cable length:  Conduction resistance:  Relay outputs:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow 6 A slow blow  Utilisation category to IEC 60947-5-1:  Max. fuse rating of the safety outputs:  Switching capacity of the safety outputs:  Fuse rating of the safety outputs:  Switching capacity of the safety outputs:  Fuse rating of the signalling outputs:  Fuse rating of the signalling outputs:  Semi-conductor outputs Y1, Y2  24 VDC/100 m  Fuse rating of the signalling outputs:  Fuse rating of the signalling ou		III 2
Bridging in case of voltage drops:  Readiness after switching on voltage [s]:  Frequency measurement tolerance:  Control current circuits/inputs:  Inputs \$12, \$22:  Max. input frequency:  Inputs \$21, \$22:  Inputs \$24, \$27.  Max. input frequency:  Inputs \$24, \$27.  Clock outputs \$11, \$21:  Cable length:  Conduction resistance:  Relay outputs:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow of the safety outputs:  Switching capacity of the safety outputs:  Switching capacity of the safety outputs:  Fuse rating of the safety outputs:  Switching capacity of the safety outputs:  Fuse rating of the safety outputs:  Switching capacity of the safety outputs:  Fuse rating of the signalling outputs:  Fuse rating of the signalling outputs:  Semi-conductor outputs Y1, Y2  24 VDC/100 m  Fuse rating of the signalling outputs:  Semi-conductor outputs Y1, Y2  24 VDC/100 m  Fuse rating refer to 2.  Max. switching cycles / minute:		
Readiness after switching on voltage [s]: Frequency measurement tolerance:  Time measurement tolerance:  Control current circuits/inputs: Inputs S12, S22:  Max. input frequency: Inputs X2, X3, X7: Clock outputs S11, S21:  Cable length:  Conduction resistance:  Relay outputs:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Electrical life:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Switching capacity of the safety outputs:  Conduction resistance:  Fuse rating of the safety contacts:  Electrical life:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Contact outputs:  Switching capacity of the safety outputs:  Contact outputs:  Switching capacity of the safety outputs:  Contact outputs:  Switching capacity of the safety outputs:  Fuse rating of the safety outputs:  Contact outputs out		
Frequency measurement tolerance: 2% + 30n  Control current circuits/inputs: Inputs S12, S22: 24 VDC / 8 m  Max. input frequency: 6000 h Inputs X2, X3, X7: 24 VDC / 8 m  Cable length: 1500 m with 1.5 mm  Cable length: 1500 m with 2.5 mm  Conduction resistance: max. 40  Relay outputs:  Switching capacity of the safety contacts: 13/14 (17-18), 23/24 (27-26 max. 250 V, 6 A ohmm min. 10 VDC / 10 m  (Derating see 2.  Fuse rating of the safety contacts: external (I <sub>k</sub> = 1000. to EN 60947-5  Safety fuse 10 A quick blow, 6 A slow blow of EN 60947-5-1: AC-15: 230 V / 4  DC-13: 24 V / 4  Electrical life: refer to 2  Mechanical life: 10 million operation  Semi-conductor outputs: Q1: max. 2  Voltage drop: < 0.5  Leakage current: < 1 m  Max. fuse rating of the safety outputs: refer to "Operating voltage"  Test impulse of the safety outputs: refer to "Operating voltage"  Test impulse of the safety outputs: semi-conductor outputs Y1, Y  Switching capacity of signaling outputs: semi-conductor outputs Y1, Y  Switching capacity of signaling outputs: semi-conductor outputs Y1, Y  Electrical life: ning of the signalling outputs: semi-conductor outputs Y1, Y  Cay to C		
Control current circuits/inputs: Inputs S12, S22: Inputs S12, S22: Inputs S12, S22: Inputs X2, X3, X7: Clock outputs S11, S21: Cable length: Cable length: Conduction resistance: Relay outputs: Switching capacity of the safety contacts: Fuse rating of the safety contacts: Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow, 6 A sl		< 2%
Inputs S12, S22:  Max. input frequency:  Inputs X2, X3, X7:  Clock outputs S11, S21:  Cable length:  Cable length:  Conduction resistance:  Relay outputs:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow bl		2% + 30ms
Max. input frequency: Inputs X2, X3, X7: Clock outputs S11, S21: Cable length: Cable length: Conduction resistance: Conduction resistance: Conduction resistance: Conduction grapacity of the safety contacts: Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow, 6 A		
Inputs X2, X3, X7:  Clock outputs S11, S21:  Cable length:  Cable length:  Conduction resistance:  Relay outputs:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow, 6 A sl		
Clock outputs S11, S21: > 20 VDC, 10 mA per outp Cable length: 1500 m with 1.5 mm 2500 m with 2.5 mm Conduction resistance: max. 40  Relay outputs:  Switching capacity of the safety contacts: 13/14 (17-18), 23/24 (27-28 max. 250 V, 6 A ohm min. 10 VDC / 10 m (Derating see 2.  Fuse rating of the safety contacts: external (I <sub>k</sub> = 1000 to EN 60947-5  Safety fuse 10 A quick blow, 6 A slow blow Utilisation category to IEC 60947-5-1: AC-15: 230 V / 4  DC-13: 24 V / 4  Electrical life: refer to 2  Mechanical life: 10 million operation  Semi-conductor outputs: Q1: max. 2  Voltage drop: < 0.5  Leakage current: < 1 m  Max. fuse rating of the safety outputs: Q1: max. 2  Voltage drop: < 1 ms (negative < 100 µs (positive ) ms. (positive		
Cable length:  Conduction resistance:  Relay outputs:  Switching capacity of the safety contacts:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow. 6 A slo		
Z500 m with 2.5 mr max. 40  Relay outputs:  Switching capacity of the safety contacts:  Switching capacity of the safety contacts:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow. 6 A slow blo		
Relay outputs:  Switching capacity of the safety contacts:  Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow bl	3.	2500 m with 2.5 mm <sup>2</sup>
Switching capacity of the safety contacts:  13/14 (17-18), 23/24 (27-26 max. 250 V, 6 A ohm min. 10 VDC / 10 m (Derating see 2. Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow.		max. 40 Ω
$\begin{array}{c} \text{max. } 250 \text{ V, 6 A ohm} \\ \text{min. } 10 \text{ VDC / } 10 \text{ m} \\ \text{(Derating see 2.} \\ \text{Fuse rating of the safety contacts:} & \text{external (I}_k = 1000 \text{ to EN } 60947\text{-}5 \\ \text{Safety fuse } 10 \text{ A quick blow, } 6 \text{ A slow blow} \\ \text{DC-13: } 24 \text{ V / 4} \\ \text{DC-13: } 24 \text{ V / 4} \\ \text{Electrical life:} & \text{refer to } 2 \\ \text{Mechanical life:} & 10 \text{ million operation} \\ \text{Semi-conductor outputs:} \\ \text{Switching capacity of the safety outputs:} & Q1\text{: max. } 2 \\ \text{Voltage drop:} & < 0.5 \\ \text{Leakage current:} & < 1 \text{ m} \\ \text{Max. fuse rating of the safety outputs:} & \text{refer to "Operating voltag} \\ \text{Test impulse of the safety outputs:} & < 1 \text{ ms (negative < 100 } \mu \text{ s (positive } \\ \text{Switching capacity of signaling outputs:} & \text{semi-conductor outputs Y 1, Y } \\ 24 \text{ VDC/100 m} \\ \text{Fuse rating of the signalling outputs:} & \text{internal electronic tripping current > 100 m} \\ \text{Electrical life:} & \text{(Derating refer to 2.} \\ \text{Max. switching cycles / minute:} & \text{(Derating refer to 2.} \\ \text{Max. switching cycles / minute:} & \text{(Derating refer to 2.} \\ \text{Max. switching cycles / minute:} & \text{(Derating refer to 2.} \\ \text{Max. switching cycles / minute:} & \text{(Derating refer to 2.} \\ \text{Max. switching cycles / minute:} & \text{(Derating refer to 2.} \\ \text{(Derating refer to 2.} $		
$\begin{array}{c} \text{min. 10 VDC / 10 n} \\ \text{(Derating see 2.} \\ \text{Fuse rating of the safety contacts:} & \text{external (I}_k = 1000. \\ \text{to EN 60947-5} \\ \text{Safety fuse 10 A quick blow, 6 A slow blow} \\ \text{Utilisation category to IEC 60947-5-1:} & \text{AC-15: 230 V / 4} \\ \text{DC-13: 24 V / 4} \\ \text{Electrical life:} & \text{refer to 2} \\ \text{Mechanical life:} & 10 \text{ million operation} \\ \text{Semi-conductor outputs:} \\ \text{Switching capacity of the safety outputs:} & \text{Q1: max. 2} \\ \text{Voltage drop:} & < 0.5 \\ \text{Leakage current:} & < 1 \text{ m} \\ \text{Max. fuse rating of the safety outputs:}} & \text{refer to "Operating voltag} \\ \text{Test impulse of the safety outputs:}} & < 1 \text{ ms (negative conductor outputs of the safety outputs:}} & < 1 \text{ ms (negative conductor outputs of the safety outputs:}} & < 1 \text{ ms (negative conductor outputs outputs}} & < 100 \text{ µs (positive conductor outputs outputs})} & < 100 \text{ ps (positive conductor outputs outputs} & < 100 \text{ ps (positive conductor outputs outputs})} & < 100 \text{ ps (positive conductor outputs outputs})} & < 100 \text{ ps (positive conductor outputs outputs})} & < 100 \text{ ps (positive conductor outputs})} & < 100 \text{ ps (positive conductor)} & < 100  ps (positive c$	Switching capacity of the safety contacts	
(Derating see 2. Fuse rating of the safety contacts:  Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow. 7 DC-13: 24 V / 4 DC-13: 24 V / 4 DC-13: 24 V / 4 DC-13: 24 V / 2 Switching capacity of signaling outputs:  Fuse rating of the safety outputs:  Fuse rating of the signalling outp		
Fuse rating of the safety contacts:  Safety fuse 10 A quick blow, 6 A slow blow. 7 Electrical life:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Voltage drop:  Leakage current:  Max. fuse rating of the safety outputs:  Test impulse of the safety outputs:  Test impulse of the safety outputs:  Test impulse of the safety outputs:  Voltage drop:  1 max. 2  1 ms (negative. 100 μs (positiv. 1		
to EN 60947-5  Safety fuse 10 A quick blow, 6 A slow blow Utilisation category to IEC 60947-5-1:  AC-15: 230 V / 4  DC-13: 24 V / 4  Electrical life:  Mechanical life:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Voltage drop:  Leakage current:  Max. fuse rating of the safety outputs:  Test impulse of the safety outputs:  Villisation category to IEC 60947-5-1:  Switching capacity of signaling outputs:  Switching capacity of signaling outputs:  Voltage drop:	Fuen rating of the eafoty contacts:	
Safety fuse 10 A quick blow, 6 A slow blow. Utilisation category to IEC 60947-5-1:  Blectrical life:  Mechanical life:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Voltage drop:  Leakage current:  Max. fuse rating of the safety outputs:  Test impulse of the safety outputs:  Villisation category to IEC 60947-5-1:  Switching capacity of signaling outputs:  Switching capacity of signaling outputs:  Test impulse of the safety outputs:  Voltage drop:	i use rating of the safety contacts.	
Utilisation category to IEC 60947-5-1:  Electrical life:  Mechanical life:  Semi-conductor outputs:  Switching capacity of the safety outputs:  Voltage drop:  Leakage current:  Max. fuse rating of the safety outputs:  Test impulse of the safety outputs:  Utilisation category to IEC 60947-5-1:  Switching capacity of signaling outputs:  Switching capacity of signaling outputs:  Switching capacity of signalling outputs:  Fuse rating of the signalling outputs:  Fuse rating of the signalling outputs:  Fuse rating of the signalling outputs:  Electrical life:  Max. switching cycles / minute:	Safety fus	
Electrical life: refer to 2  Mechanical life: 10 million operation  Semi-conductor outputs:  Switching capacity of the safety outputs: Q1: max. 2  Voltage drop: < 0.5  Leakage current: < 1 m  Max. fuse rating of the safety outputs: refer to "Operating voltage Test impulse of the safety outputs: < 1 ms (negative < 100 µs (positive Utilisation category to IEC 60947-5-1: DC-13: 24 V / 2  Switching capacity of signaling outputs: semi-conductor outputs Y1, Y 24 VDC/100 m  Fuse rating of the signalling outputs: internal electronic tritipping current > 100 m  Electrical life: (Derating refer to 2. Max. switching cycles / minute: 2. Am in the signal outputs: 2. Am in the signal outputs: 2. Am internal electronic tritipping current > 100 m  Electrical life: (Derating refer to 2. Max. switching cycles / minute: 2. Am in the signal outputs: 2. Am in the si		AC-15: 230 V / 4 A
Mechanical life: 10 million operation  Semi-conductor outputs:  Switching capacity of the safety outputs: Q1: max. 2  Voltage drop: < 0.5  Leakage current: < 1 m  Max. fuse rating of the safety outputs: refer to "Operating voltage of the safety outputs:		DC-13: 24 V / 4 A
Semi-conductor outputs:  Switching capacity of the safety outputs:  Voltage drop:  Leakage current:  Max. fuse rating of the safety outputs:  Test impulse of the safety outputs:  Switching capacity of signaling outputs:  Semi-conductor outputs Y1, Y  24 VDC/100 m  Fuse rating of the signalling outputs:  Internal electronic tri  tripping current > 100 m  Electrical life:  Max. switching cycles / minute:	Electrical life:	refer to 2.5
Switching capacity of the safety outputs:  Voltage drop:  Leakage current:  Max. fuse rating of the safety outputs:  Test impulse of the safety outputs:  Semi-conductor outputs Y1, Y  24 VDC/100 m  Tuse rating of the signalling outputs:  Titipping current > 100 m  Electrical life:  Max. switching cycles / minute:	Mechanical life:	10 million operations
Voltage drop: < 0.5 Leakage current: < 1 m Max. fuse rating of the safety outputs: refer to "Operating voltage Test impulse of the safety outputs: < 1 ms (negative < 100 µs (positive Utilisation category to IEC 60947-5-1: DC-13: 24 V / 2 Switching capacity of signaling outputs: semi-conductor outputs Y1, Y 24 VDC/100 m Fuse rating of the signalling outputs: internal electronic tritipping current > 100 m Electrical life: (Derating refer to 2.) Max. switching cycles / minute:	Semi-conductor outputs:	
Leakage current:  Max. fuse rating of the safety outputs: Test impulse of the safety outputs:  Test impulse of the safety outputs:  Comparison outputs of the safety outputs:  Comparison outputs of the safety outputs:  Comparison outputs outputs outputs:  Comparison outputs outputs outputs:  Comparison outputs outputs outputs:  Comparison outputs o		
Max. fuse rating of the safety outputs:  Test impulse of the safety outputs:  Test impulse of the safety outputs:  Value of th		< 0.5 V
Test impulse of the safety outputs: <pre></pre>		< 1 mA
Control of the signalling outputs: Switching capacity of signalling outputs: Fuse rating of the signalling outputs: Electrical life: Max. switching cycles / minute: Control of positive positive properties Semi-conductor outputs Y1, Y 24 VDC/100 m Internal electronic tritripping current > 100 m (Derating refer to 2.)		
Utilisation category to IEC 60947-5-1: DC-13: 24 V / 2 Switching capacity of signaling outputs: semi-conductor outputs Y1, Y 24 VDC/100 m Fuse rating of the signalling outputs: internal electronic tri tripping current > 100 m Electrical life: (Derating refer to 2.  Max. switching cycles / minute:	Test impulse of the safety outputs:	
Switching capacity of signaling outputs: semi-conductor outputs Y1, Y 24 VDC/100 m  Fuse rating of the signalling outputs: internal electronic tripping current > 100 m  Electrical life: (Derating refer to 2. Max. switching cycles / minute:	Litilization category to IEC 60047 5.1:	
Fuse rating of the signalling outputs: internal electronic tripping current > 100 m  Electrical life: (Derating refer to 2. Max. switching cycles / minute:		
Fuse rating of the signalling outputs: internal electronic tri tripping current > 100 m  Electrical life: (Derating refer to 2.  Max. switching cycles / minute:		
tripping current > 100 m  Electrical life: (Derating refer to 2.  Max. switching cycles / minute:		
Electrical life: (Derating refer to 2. Max. switching cycles / minute:		
Max. switching cycles / minute:		internal electronic trip, tripping current > 100 mA
Inductive consumers: provision is to be made for suitab	Fuse rating of the signalling outputs:	internal electronic trip,
·	Fuse rating of the signalling outputs:  Electrical life:  Max. switching cycles / minute:	internal electronic trip, tripping current > 100 mA (Derating refer to 2.5) 20
protective wiring for suppression	Fuse rating of the signalling outputs:  Electrical life:  Max. switching cycles / minute:  Inductive consumers: pro	internal electronic trip, tripping current > 100 mA (Derating refer to 2.5) 20 ovision is to be made for suitable

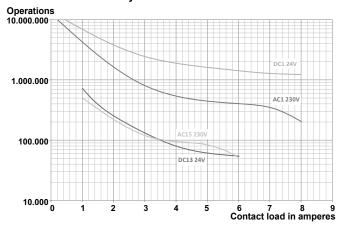
Mechanical data:	
Connection type:	refer to 2.1
Cable section:	refer to 2.1
Connecting cable:	rigid or flexible
Tightening torque for the terminals:	0.5 Nm
Material of enclosure:	glass-fibre reinforced
	thermoplastic, ventilated
Weight:	180 g
Ambient conditions:	
Ambient temperature:	−25°C +60°C
	(non condensing)
Storage and transport temperature:	−40°C +85°C
	(non condensing)
Protection class:	Enclosure: IP40,
	Terminals: IP20,
	Clearance: IP54
Resistance to shock:	30 g / 11 ms
Resistance to vibrations	·
to EN 60068-2-6:	10 55 Hz, amplitude 0.35 mm
Altitude:	max. 2,000 m

# 2.5 Derating / electrical lifespan of safety contacts

No derating with individual installation of modules.

Derating on request if several modules are installed one after the other without spacing and with maximum output load and ambient temperatures.

# Electrical life of the safety contacts



## 2.6 Safety classification

## 2.6.1 Safety classification of semi-conductor output

Standards:	ISO 13849-1, IEC 61508, IEC 62061
PL:	e
Control Category:	4
PFH <sub>D</sub> :	≤ 2.66 x 10 <sup>-9</sup> / h
PFD <sub>avg</sub> :	≤ 2.42 x 10 <sup>-5</sup>
SIL:	suitable for SIL 3 applications
Service life:	20 years

## 2.6.2 Classification of relay output

Standards: ISO 13849-1, IEC 61508, IEC 6			
PL:	e		
Control Category:	4		
DC:	high		
CCF:	> 65 points		
PFH <sub>D</sub> :	≤ 1.25 x 10 <sup>-8</sup> / h		
PFD <sub>avg</sub> :	≤ 5.3 x 10 <sup>-5</sup>		
SIL:	suitable for SIL 3 applications		
Service life:	20 years		

The PFH value of 1.25 × 10-8/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles  $(n_{\text{opy}})$  mentioned in the table below. At 365 operating days per year and a 24-hours operation, this results in the below-mentioned switching cycle times  $(t_{\text{cycle}})$  for the relay contacts. Diverging applications upon request.

n <sub>op/y</sub>	t <sub>cycle</sub>
880,000	0.6 min
330,000	1.6 min
110,000	5.0 min
44,000	12.0 min
17,600	30.0 min
	880,000 330,000 110,000 44,000

# 3. Mounting

## 3.1 General mounting instructions

Mounting: snaps onto standard DIN rails to EN 60715.

Hook bottom of enclosure in DIN rail and push down until it engages in position.



To avoid EMC disturbances, the physical ambient and operational conditions at the place where the product is installed, must meet the provisions laid down in the paragraph "Electromagnetic Compatibility (EMC)" of EN 60204-1.

Avoid laying proximity switch connection cables in areas where strong interference signals are present (e.g. frequency converters or cable leads from powerful electric motors); the utilisation of shielded cables may be necessary.



Mount proximity switches / pulse generators mechanically separated from each other (not on the same mounting angle). The toothed wheel (encoder) must be mounted on the shaft with a positive joint free of slip.

## 3.2 Dimensions

All measurements in mm.

Device dimensions (H/W/D): 98 x 22.5 x 115 mm

# 4. Rear side Electrical connection

## 4.1 General information for electrical connection

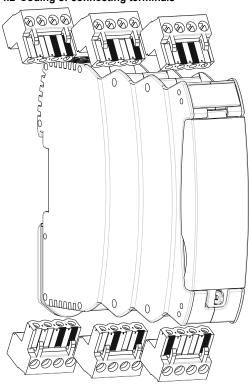


The electrical connection may only be carried out by authorised personnel in a de-energised condition.



If mains unit is a new installation or a replacement, the connector of the output level must be removed and correct connection of the power supply (A1) must be checked.

## 4.2 Coding of connecting terminals

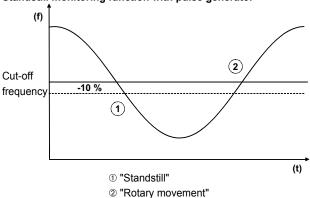


# 5. Operating principle and settings

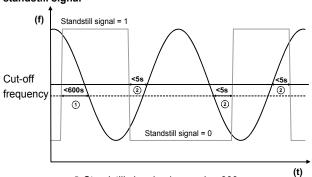
## 5.1 Description of the terminals and LED indications

Pin	Function	LED	Function
A1	Operating voltage + 24 VDC	RUN	Operating voltage OK RUN mode For flash code, see section 5.3
A2	Operating voltage 0 V		
		ERR	Error code refer to part 6
X2	Reset input		
X3	Start input		
X7	Input additional		
	standstill signal		
S11	Test pulse outputs		
S21			
S12	Input channel 1	In 1	High level at S12
			flash code, see section 6
S22	Input channel 2	In 2	High level at S22
			flash code, see section 6
Y1	Diagnostic output Error code		flash code, see section 6
Y2	Signalling output (NO)		
13/14	Safety	Out 1	Outputs activated
(17/18), 23/34 (27/28)	contacts		flash code, see section 6
Q1	Safety	Out 2	Outputs activated
	output		flash code, see section 6

# Standstill monitoring function with pulse generator



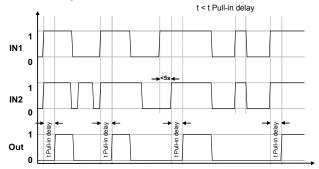
# Standstill monitoring function with pulse generator and standstill signal

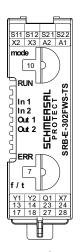


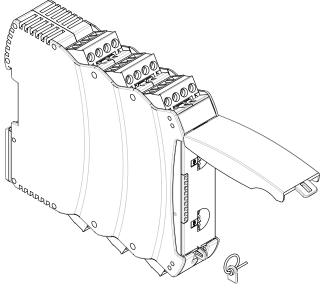
① Standstill signal = 1, max. lag 600s

 $\ensuremath{@}$  Difference monitoring max. 5s permitted

# Fail-safe delay timer function







## Adjustment of application using rotary "mode" switch

- · Open front transparent cover (see fig.).
- Opening is carried out by lifting side with lock.
- Select desired application using rotary mode switch (1 ... 15) by turning up or down (see 5.3).
- Set pull-in delay or cut-off frequency by turning the f/t rotary switch up or down (see 5.3).
- After performing setting, close front cover again.
- The front cover can be secured with a seal for protection against unintentional opening



Only touch the components after electrical discharge!

# 5.2 Adjustable applications

# Adjustable applications standstill monitoring function:

	Rotary sw	Rotary knob f/ t			
Pos.	1 or 2 sensors	2 sensors with level monitoring	Standstill signal	Pos.	Cut-off frequency
1	Yes	-	No	1	0.5 Hz
2	_	Yes	No	2	1 Hz
3	Yes	_	Yes	3	2 Hz
С		Configuration mode		4	3 Hz
				5	4 Hz
				6	5 Hz
				7	8 Hz
				8	10 Hz

# Adjustable applications delay timer function:

	Rotary switch (mode)			Rotary knob f/ t				
Pos.	Contact configuration Synchronism < 5 s	Cross-wire monitoring	Timebase	Pos.	Time 1 (sec.)	Time 2 (sec.)	Time 3 (sec.)	Time 4 (sec.)
				1	0.5	35	120	300
				2	1.0	40	130	400
				3	1.5	45	140	500
4	NC / NO	Yes	Time 1	4	2.0	50	150	600
5	NC / NO	Yes	Time 2	5	2.5	55	160	700
6	NC / NO	Yes	Time 3	6	3	60	170	800
7	NC / NO	Yes	Time 4	7	4	65	180	900
8	NO / NO	No	Time 1	8	5	70	190	1000
9	NO / NO	No	Time 2	9	8	75	200	1200
10	NO / NO	No	Time 3	10	10	80	210	1400
11	NO / NO	No	Time 4	11	12	85	220	1600
12	NO / NO	Yes	Time 1	12	15	90	230	1800
13	NO / NO	Yes	Time 2	13	18	95	240	2000
14	NO / NO	Yes	Time 3	14	20	100	250	2300
15	NO / NO	Yes	Time 4	15	25	105	260	2600
С	Co	nfiguration mod	de	С	30	110	270	3000

# 5.3 Changing setting or application

Rotary (mode) switch	Rotary knob	System response	LED indi	ications		
	(f / t)		RUN		ln 2	Out
Position 3	1 Hz	Ready for application	-	-	-	-
		Without connected sensors!	Lights up	-	-	-
Turn to position C		Application is deleted	Lights up	Flashes	Flashes	Flashes
		Application is deleted	-	-	-	-
		No valid application saved	Flashes	-	-	-
pplications						
	Set frequency		Flashes	-	-	-
	/ time 1-C					
Select desired application (1-15).		New application will be loaded	Lights up	-	-	-
(Time window for setting proce-						
dure approx. 3 sec.)						
			Lights up	Lights up	-	-
			Lights up	Lights up	Lights up	-
			Lights up	Lights up	Lights up	Lights up
The desired application is configured		Adopt new application	Lights up	-	-	-
	Turn to position C  pplications  Select desired application (1-15). (Time window for setting procedure approx. 3 sec.)  The desired application is configured	Position 3  1 Hz  Turn to position C  pplications  Set frequency / time 1-C  Select desired application (1-15). (Time window for setting procedure approx. 3 sec.)  The desired application is configured	Position 3  1 Hz  Ready for application  Without connected sensors!  Turn to position C  Application is deleted  Application is deleted  No valid application saved  Poplications  Set frequency / time 1-C  Select desired application (1-15). (Time window for setting procedure approx. 3 sec.)  The desired application is configured  Adopt new application	Position 3  1 Hz  Ready for application  Without connected sensors!  Lights up  Turn to position C  Application is deleted  Application is deleted  -  No valid application saved  Flashes  Polications  Set frequency / time 1-C  Select desired application (1-15). (Time window for setting procedure approx. 3 sec.)  Lights up  Lights up  The desired application is configured  Adopt new application  Lights up  Lights up  Lights up	Position 3 1 Hz Ready for application Without connected sensors! Lights up	Position 3 1 Hz Ready for application

# 6. Diagnostic

# 6.1 LED indications

LED	Function	Display type
RUN	Ready for operation	Continuously lit
	Not a valid application	Flashes
	Signal on input S12	Continuously lit
In 1	Second channel,	Flashes slowly
	input S22 has not opened	
	Signal on input S22	Continuously lit
In 2	Second channel,	Flashes slowly
	input S12 has not opened	
Out 1	Standstill / time elapsed	Continuously lit
Out 1	Standstill / time elapsed,	Flashes quickly
Out 2	input X3 open	
In1 –	Switch-on delay active	Flashing light
Out2		

Single flashing of all LEDs with mains on

## 6.2 Malfunctions

Malfunctions and fault causes are displayed with the ERR-LEDs via short and long flashing signals

SHOIL AND 10	ng nashing signals			
LED + Output	Error cause	Long flash	Short flash	
	Operating voltage too low	1	1	
	Operating voltage too high	1	2	
	Invalid rotary switch setting	1	3	
	External voltage on output Q1	1	5, 7, 9	
	Termination to GND on	2	2	
	output Q1	_	_	
	Cross-wire between inputs	2	4	
ERR	Undefined level on			
Y1	X2	3	4	
• •	X3	3	5	
	X7	3	9	
	S12	2	9	
	S22	3	1	
	Rotary switch > 30 sec. to position C	6	8	
	Application changed and	LEDs flash quickly:		
	activation of operating voltage	RUN, In 1, In 2, Out		
	Application was changed	LEDs flash quickly:		
	during active operation	ERR, In 1, In 2, Out		
	Other fault codes: Consult technical sales dept.			
	at Schmersal			

# 6.3 Warnings standstill monitoring function

Warning messages are indicated by means of short and long flashes on the ERR LED.

LED + Output	Error cause	Long flash	Short flash
	Frequency deviation between the two channels ( > 20%)	4	4
ERR	Maximum frequency (6 KHz) reached	4	5
Y1	Limit dropped below, low signal on input S12 and S22 (see 10.1)	4	6
	Standstill signal static or sensor faulty	4	7

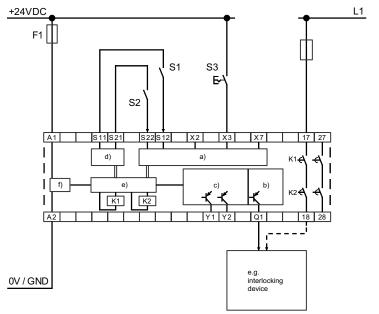
## Input X2, delete warning messages

All warning messages that have occurred due to asynchronous signals can be cleared by pressing the Reset button.

# 7. Wiring examples

## 7.1 Application example fail-safe delay timer

Two-channel operation with Start function



## Key

- S1/S2: Safety input contacts
- S3: Start button
- a) Safety inputs
- b) Safety outputs
- c) Signalling outputs
- d) Clock outputs
- e) Processing
- f) Power

- Function description of actuation:
- Upon actuation of inputs S12 and S22 (closing of contacts S1 and S2) the set activation delay timer is started.
- If the contacts S1 or S2 are opened and closed again before the time has elapsed, the time is restarted.
- Once the period has elapsed, the safety outputs with input X3 can be activated.
- If the safety outputs are to be activated automatically when the time has elapsed, input X3 must be switched to + 24 VDC.

# Function description of safety outputs:

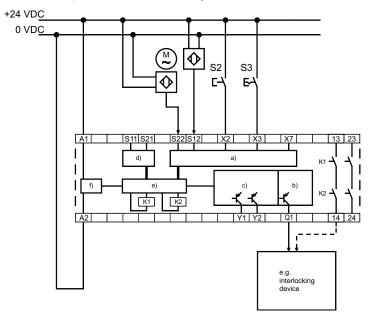
• It is possible for e.g. a safety door to be actuated with the two delayed safety contacts 17/18 and 27/28 or with the fail-safe semi-conductor output Q1.



Signalling outputs must not be used in safety circuits.

## 7.2 Application examples safe standstill monitoring

Two-channel operation with level monitoring and Start function



# Key

- S1: Additional standstill signal
- S2: Reset button (delete warning messages)
- S3: Start button
- a) Safety inputs
- b) Safety outputs
- c) Signalling outputs
- d) Clock outputs
- e) Processing
- f) Power

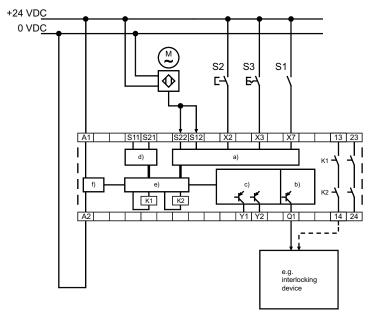
## Function description with level monitoring:

- The inputs S12 and S22 monitor the pulses from the sensors connected and compare them with the cut-off frequency set.
- The frequencies from the two sensors are continuously compared. A difference > 20% is detected as an error!
- After dropping below the cut-off frequency the safety output can be activated using input X3.
- If the safety outputs are to be activated automatically, the input X3 must be connected to + 24 VDC.

## Function description of safety outputs:

• Using the two safety contacts 13/14 and 23/24 or using the safe semiconductor output Q1, e.g. a safety door can be operated.

Two-channel operation with additional standstill signal and Start function



## Key

- S1: Additional standstill signal
- S2: Reset button (delete warning messages)

9

- S3: Start button
- a) Safety inputs
- b) Safety outputs
- c) Signalling outputs
- d) Clock outputs
- e) Processing
- f) Power

## Function description with additional standstill signal:

- The inputs S12 and S22 monitor the pulses from the sensor connected and compare them to the cut-off frequency set.
- The input X7 monitors the standstill signal function as a function of the frequency from the sensor. A difference > 5 s is detected as an error!
- After dropping below the cut-off frequency and standstill signal (= 1), the safety outputs can be activated using input X3.
- If the safety outputs are to be activated automatically, the input X3 must be connected to + 24 VDC.

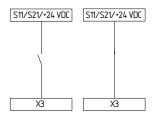
## Function description of safety outputs:

• Using the two safety contacts 13/14 and 23/24 or using the safe semiconductor output Q1, e.g. a safety door can be operated.

## 7.3 Start configuration

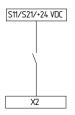
#### 7.3.1 Start/Autostart

- The safety outputs can be activated after the switch-on delay has elapsed or the cut-off frequency has been dropped below.
- With autostart, X3 must be bridged to S11, S21 or +24 VDC



## 7.3.2 Reset warning message

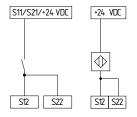
 All warning messages that have occurred due to asynchronous signals can be deleted by pressing the Reset button. The reset function is triggered on releasing the button.



## 7.4 Sensor configuration

## Single channel signal processing

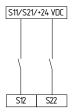
(Category 1 – PL c to ISO 13849-1 possible.



Rotary knob position	Function	
8, 9, 10, 11	NO	
	Time monitoring	
1	Standstill monitoring	

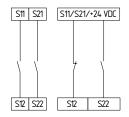
## Dual channel signal processing without cross-circuit monitoring

(Cat. 4 - PL e to ISO 13849-1 only possible with protective wiring)



Rotary knob position	Function
8, 9, 10, 11	NO / NO Time monitoring

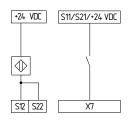
# **Dual channel signal processing with cross-circuit monitoring** (Category 4 – PL e to ISO 13849-1 possible)



Rotary knob position	Function
12, 13, 14, 15	NO / NO time monitoring
4, 5, 6, 7	NC / NO
	time monitoring

# Two-channel signal processing with standstill signal

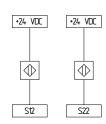
(Category 3 – PL d to ISO 13849-1 possible)



Rotary knob position	Function
3	Standstill monitoring

# Two-channel signal processing

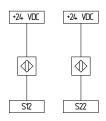
(Lay wires to the pulse generators separately and with protection, cat. 3 - PL e according to ISO 13849-1 can be achieved)



Rotary knob position	Function
1	Standstill monitoring

## Two-channel signal processing with level monitoring

(Lay wires to the pulse generators separately and with protection, cat. 4 - PL e according to ISO 13849-1 can be achieved)



Rotary knob position	Function
2	Standstill monitoring

## 8. Set-up and maintenance

## 8.1 Commissioning

The safety relay module features protection class IP54 for installation in a switch cabinet.

The safety relay module is delivered ready for operation.

## 8.2 Functional testing

The safety function of the safety-monitoring module must be tested. The following conditions must be previously checked and met:

- 1. Correct fixing
- 2. Check the integrity of the cable entry and connections
- 3. Check the safety-monitoring module's enclosure for damage.
- Check the electrical function of the connected sensor technology and their influence on the safety-monitoring module and the downstream actuators

The safety relay module features self-test functions. If a fault is detected, the system adopts a safe mode and leads, if necessary, to undelayed deactivation of all safety outputs.

# 8.3 Behaviour in the case of faults

In the event of a fault the following procedure is recommended:

- 1. Identify faults according to flash codes from chapter 6.2.
- 2. Rectify the fault if it is described in the table.
- 3. Switch operating voltage off and on and erase fault mode. If fault could not be rectified, please contact the manufacturer.

## 8.4 Setting report

This report regarding the setting of the device must be completed accordingly by the customer and enclosed in the technical documentation of the machine.

The setting report must be available whenever a safety check is performed.

Company: _				
The safety-monitoring	g module is used in th	ne following machine:		
Machine n°	Machine type	Module n°		
Configured application (mode):				
Set drop-out delay (t):				
Cut-off frequency set (f):				
Set on (date)	te) Signature of the responsible person			

# 8.5 Maintenance

A regular visual inspection and functional test, including the following steps, is recommended:

- 1. Check the correct fixing of the safety-monitoring module
- 2. Check the cable for damages
- 3. Check electrical function



If a manual functional check is necessary to detect a possible accumulation of faults, then this must take place during the intervals noted as follows:

- at least every month for PL e with category 3 or category 4 (according to ISO 13849-1) or SIL 3 with HFT (hardware fault tolerance) = 1 (according to IEC 62061);
- at least every 12 months for PL d with category 3 (according to ISO 13849-1) or SIL 2 with HFT (hardware fault tolerance) = 1 (according to IEC 62061).

Damaged or defective components must be replaced.

## 9. Disassembly and disposal

#### 9.1 Disassembly

The safety control module is only to be removed in a de-energised condition.

#### 9.2 Disposal

The safety control module must be disposed of in an appropriate manner in accordance with the national regulations and laws.

# 10. Appendix

## 10.1 Wiring/circuit information

## Two-channel signal processing with level monitoring

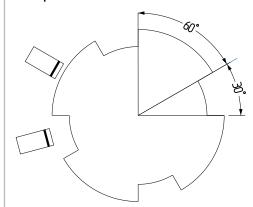
The proximity switches must be attached at a disc cam so at least one proximity switch is always actuated.

This can be realised by a minimum 1:1 division of the disc cam. When the proximity switches are correctly installed, the following unique signal sequence should be obtained by the utilisation of the switching hysteresis of the proximity switches during the rotation of the disc cam.

Proximity switch 1:			
Proximity switch 2:			

The adjustment of the proximity switches is facilitated, when the cam has a 2:1 division (or higher).

## Example cam



# Proximity switches / pulse generators

Use PNP-switching sensors with normally open function.

# 11. EU Declaration of conformity

# **EU** Declaration of conformity

**S** SCHMERSAL

Original K.A. Schmersal GmbH & Co. KG

Möddinghofe 30 42279 Wuppertal Germany

Internet: www.schmersal.com

We hereby certify that the hereafter described components both in their basic design and construction conform to the applicable European Directives.

Name of the component: SRB-E-302FWS-TS

Type: See ordering code

**Description of the component:** Fail-safe delay timer, safe standstill monitor

Relevant Directives: Machinery Directive 2006/42/EC EMC-Directive 2014/30/EU

RoHS-Directive 2011/65/EU

Applied standards: ISO 13849-1:2015,

ISO 13849-2:2012, IEC 61508 parts 1-7:2010, IEC 62061:2015

Notified body for the prototype test: TÜV Rheinland Industrie Service GmbH

Alboinstr. 56, 12103 Berlin

ID n°: 0035

EC-prototype test certificate: 01/205/5365.00/18

Person authorised for the compilation Oliver Wacker of the technical documentation: Möddinghofe 3

Möddinghofe 30 42279 Wuppertal

Place and date of issue: Wuppertal, July 17, 2018

Authorised signature Philip Schmersal Managing Director

i

SRB-E-302FWS-TS-C-EN

The currently valid declaration of conformity can be downloaded from the internet at www.schmersal.net.





Möddinghofe 30, D - 42279 Wuppertal Postfach 24 02 63, D - 42232 Wuppertal

Phone: +49 - (0)2 02 - 64 74 - 0
Telefax: +49 - (0)2 02 - 64 74 - 1 00
E-Mail: info@schmersal.com
Internet: http://www.schmersal.com