



EN Operating instructions.pages 1 to 6
Translation of the original operating instructions

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1. About this document

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.

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 machinery or plant.

The safety-monitoring module 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.



The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO 13849-2.

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 safety-monitoring module, personal hazards or damage to machinery or plant components cannot be excluded. The relevant requirements of the standard EN 1088 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.

2. Product description

2.1 Ordering code

This operating instructions manual applies to the following types:

FWS 1205^①

No.	Option	Description
①		Standstill frequencies of the inputs X1/X2:
	A	1 Hz/2 Hz
	B	2 Hz/2 Hz
	C	1 Hz/1 Hz



Only if the information described in this operating instructions manual are realised correctly, the safety function and therefore the compliance with the Machinery Directive is maintained.

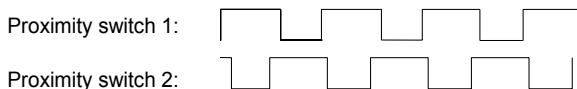
2.2 Special versions

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 Destination and use

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. As soon as the fail-safe monitor has detected the standstill, the solenoid interlock is controlled through the potential-free contacts of two safety relays. For the standstill detection, the signals of two proximity switches are evaluated.

It is recommended to install the proximity switches on a disc cam so that 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.



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

Design

The fail-safe standstill monitor has a dual-channel structure. It includes two safety relays with monitored positive guided contacts, which are controlled by two microprocessors, which are independent from one another. The series-wired NO contacts of the relays build the enabling path.

The feed cables of both proximity switches (power supply) must be laid so that in case of a wire breakage only one proximity switch is dead (star-shaped routing).

2.4 Technical data

Standards:	EN 60204-1, EN ISO 13849-1, IEC 61508, BG-GS-ET-20
Enclosure:	glass-fibre reinforced thermoplastic, ventilated
Feedback circuit (Y/N):	no
Standstill frequency:	Version A: X1/X2: 1 Hz / 2 Hz Version B: X1/X2: 2 Hz / 2 Hz Version C: X1/X2: 1 Hz / 1 Hz
Rated operating voltage U_e :	24 VDC \pm 15%
Rated operating current I_e :	0.2 A
Rated insulation voltage U_i :	250 V
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Inputs monitoring:	
Short-circuit recognition:	no
Wire breakage detection:	yes
Earth connection detection:	yes
Hysteresis:	10% of the standstill frequency
Max. input frequency:	4000 Hz
Min. impulse duration:	125 μ s
Input resistance:	approx. 4 k Ω against GND
Input signal „1“:	10 ... 30 VDC
Input signal „0“:	0 ... 2 VDC
Max. cable length:	1000 m of 0.75 mm ² conductor
Outputs:	
Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Number of auxiliary contacts:	0
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Required short-circuit current:	1000 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A; DC-13: 24 V / 2 A
Rated impulse withstand voltage U_{imp} :	4 kV
Thermal test current I_{th} :	6 A
Contact load capacity:	max. 250 VAC, max. 6 A (cos ϕ =1)
Max. fuse rating:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
EMC rating:	conforming to EMC Directive
Overvoltage category:	III to DIN VDE 0110
Degree of pollution:	2 to DIN VDE 0110
Resistance to vibration:	10 ... 55 Hz / amplitude 0.35 mm
Resistance to shock:	30 g / 11 ms
Environmental temperature:	0 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Degree of pollution:	2
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw connection
Min. cable section:	0.2 mm ²
Max. cable section:	2.5 mm ² , solid strand or multi-strand lead (including conductor ferrules)
Tightening torque:	0,6 Nm
Weight:	190 g
Dimensions (H x W x D):	100 x 22.5 x 121 mm

2.5 Safety classification

Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Control category:	up to 3
PFH-value:	1.0×10^{-7} / h; Applicable for applications with up to max. 50,000 switching cycles / year and max. 80 % contact load. Diverging applications upon request.
SIL:	up to 2
Service life:	20 years

3. Mounting

3.1 General mounting instructions

Mounting: snaps onto standard DIN rails to EN 60715.

3.2 Dimensions

Device dimensions (H/W/D): 100 x 22.5 x 121 mm

4. 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.

Wiring examples: see appendix



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 DIN EN 60204-1.

5. Operating principle and settings

5.1 Operating principle after the operating voltage is switched on

After the operating voltage has been applied, the internal functions and the condition of the safety relays will be tested by the fail-safe standstill monitor during the initialization phase. After this check, the inputs of the fail-safe standstill monitor will be evaluated. The cyclic frequency of the connected proximity switches is compared to a programmed limit frequency. If the value drops below the programmed frequency at both inputs, both safety relays are actuated and the enabling path is closed. If the limit frequency is exceeded at least at one input, the safety relays are disabled.

If the programmed upper or lower limit frequency is exceeded, the frequencies of both proximity switches are compared. A divergence of over 30% will be considered faulty and signalled. The yellow LED is flashing (refer to ISD table).

Inputs

X1: input for proximity switch 1

X2: input for proximity switch 2

X3: input for reset switch

A rising (0/1) edge at X3 deletes all ascertained errors of the fail-safe monitor and causes the relays to be switched off.

Outputs

(13/14, 23/24): NO contacts for safety functions (enabling paths)

Additional transistor outputs Y1/Y2

Y1: Authorized operation; the enabling path is closed

Y2: "Error"; if the fail-safe standstill monitor detects an error, Y2 is switched.

Note

The additional outputs Y1 and Y2 must not be integrated in the safety circuit. The feed cables of both proximity switches (power supply) must be laid so that in case of a wire breakage only one proximity switch is dead (star-shaped routing). According to EN ISO 13849-1, control category 3, an individual fault must not lead to a loss of safety.

6. Set-up and maintenance

6.1 Functional testing

The safety function of the safety-monitoring module must be tested.

The following conditions must be previously checked and met:

1. Correct fitting of the safety-monitoring module.
2. Fitting and integrity of the power cable.

6.2 Maintenance

In the case of correct installation and adequate use, the safety-monitoring module features maintenance-free functionality.

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

- Check the correct fixing of the safety monitoring module
- Check the cable for damage.

Damaged or defective components must be replaced.

7. Disassembly and disposal

7.1 Disassembly

The safety monitoring module must be disassembled in the de-energised condition only.

7.2 Disposal

The safety monitoring module must be disposed of in an appropriate manner in accordance with the national prescriptions and legislations.

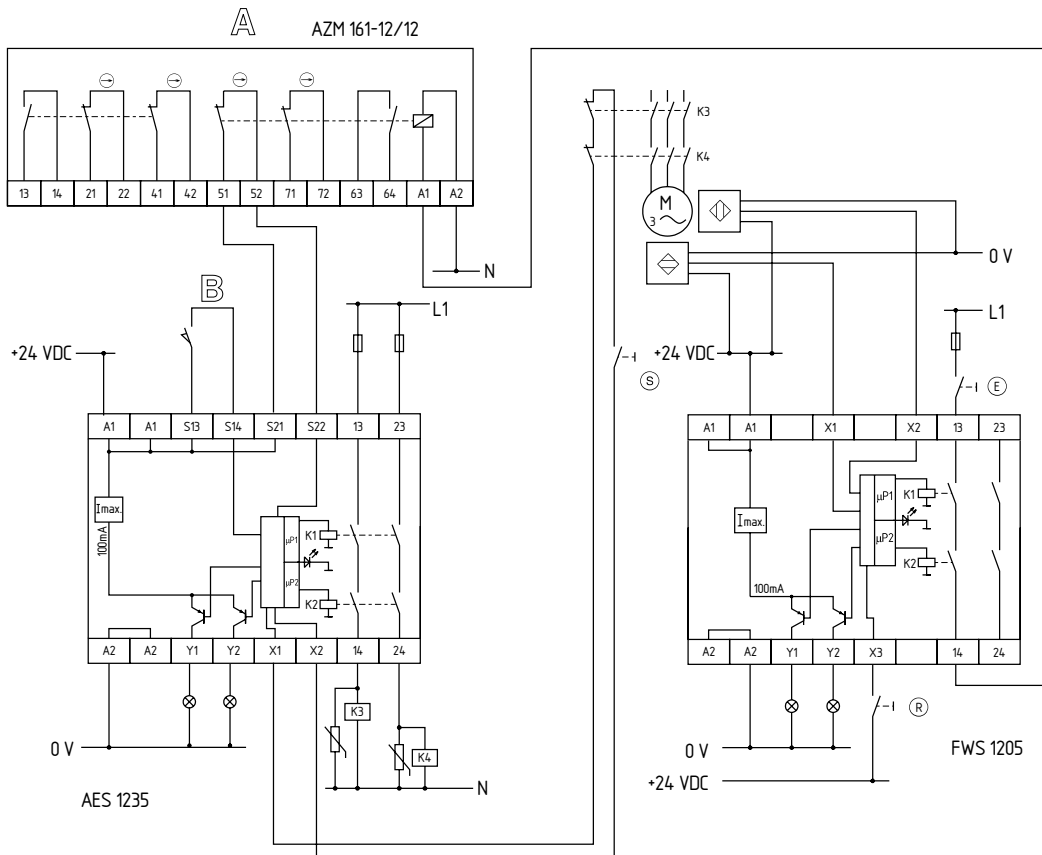
8. Appendix 1

8.1 Wiring examples

The application examples shown are suggestions. They however do not release the user from carefully checking whether the switchgear and its set-up are suitable for the individual application.

The wiring example refers to a closed safety guard and a voltage-free state. Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry.

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.



Legend

- Ⓢ Start button (optional)
- Ⓔ Release button (optional)
- Ⓓ reset button
- ⚡ Inductive proximity switch
- A Solenoid interlock
- B Safety switch

8.2 Integral System Diagnostics (ISD)

The safety monitoring modules LED display to show the different switching conditions and faults. The following tables show the different switching conditions.

Tables switching condition indication

Diagnostic LED	System condition
LED is green	Enabling paths closed
LED flashes yellow (0.5 Hz)	When two proximity switches are connected, only one switch has exceeded the lower limit frequency, the enabling paths are open
LED flashes yellow (2 Hz)	The motor is running, the limit frequency has been exceeded. The enabling paths are open

In case of error messages, the LED lights orange intermittently. During these intermissions, the LED flashes with short pulses.

Table error indications


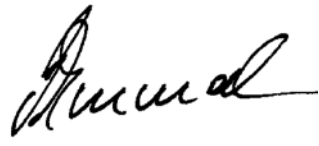
Indication (orange) LED	Error	Cause
1 impulse 	Frequency sensor 1 too low, Error input X1	Defective lead Defective proximity switch
2 impulses 	Frequency sensor 2 too low, Error input X2	Defective lead Defective proximity switch
4 impulses 	Interference at inputs, no safe evaluation	Too high capacitive or inductive interference at the inputs or the supply voltage lead
5 impulses 	One or both relays did not close within the monitoring time	Too low operating voltage U_e ; Defective relay
6 impulses 	Relay not disabled upon the actuation of the switch	May be due to contact welding
7 impulses 	Malfunction of internal data lines	Interruption of the internal data transfer due to a high capacitive or inductive interference on the internal data lines

Deleting the error message

The error message is deleted, when the error cause is eliminated and the FWS can check all functions.

9. Appendix 2

9.1 EC Declaration of conformity

	
<h3>EC Declaration of conformity</h3>	
Translation of the original declaration of conformity	K. A. Schmersal GmbH & Co. KG Industrielle Sicherheitssysteme Möddinghofe 30, 42279 Wuppertal Germany Internet: www.schmersal.com
We hereby certify that the hereafter described safety components both in its basic design and construction conform to the applicable European Directives.	
Name of the safety component / type:	FWS 1205
Description of the safety component:	Safety-monitoring module / Fail-safe standstill monitor
Harmonised EC-Directives:	2006/42/EC-EC-Machinery Directive 2004/108/EC EMC-Directive
Person authorized for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal
Notified body, which approved the full quality assurance system, referred to in Appendix X, 2006/42/EC:	TÜV Rheinland Industrie Service GmbH Alboinstrasse 56 12103 Berlin ID n°: 0035
Place and date of issue:	Wuppertal, September 3, 2012
FWS 1205-C-EN	
	Authorised signature Philip Schmersal Managing Director



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



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