SCHMERSAL

EN Operating instructions. . . . . .pages 1 to 6
Original

Content

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 switchgear. 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 machine or plant.

The safety switchgear 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.

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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 improper use or manipulation of the safety switchgear, personal hazards or damages 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:

T① 33② ③-AS

No.	Option	Description
	T	Slow action ⊖
①	Actuator selection	refer to main catalogue "Safety Technology"
②	5	Metal enclosure
	6	Thermoplastic enclosure
③	ST	M12 x 1 connector
	FK	Flat cable connection

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 Purpose

The safety switch is suitable for hinged or sliding guards, which need to be closed in order to provide for the necessary operational safety. The combination of the safety switch and the AS-i ASM safety monitor provides a safe monitoring of the condition of the corresponding safety guard.
The safety function consists in safely switching off the code transmission when the safety guard is opened and maintaining the safe switched off condition for as long as the safety guard is open.

An AS-Interface Safety at Work component functions on the basis of an individual code generator (8 x 4 bit). This safety code is cyclically transmitted over the AS-i network and monitored by the ASM safety monitor.
The component status can be evaluated through a PLC with AS-Interface master. The safety-related functions are enabled by means of the AS-i safety monitor.

The user must evaluate and design the safety chain in accordance with the relevant standards and the required safety level.

2.4 Technical data

Standards:	EN 60947-5-1, EN 50295, EN ISO 13849-1, IEC 61508
Design:	fixings to EN 50041
Enclosure:	335: zinc die-cast, enamel finish 336: glass-fibre reinforced thermoplastic, self-extinguishing
Switching system:	Slow action, positive break NC contact ⊖
Mechanical life:	≥ 1 million operations
Max. switching frequency:	5000/h
Max. Actuating speed:	1 m/s
Response time:	< 100 ms
Termination:	335: connector M12, 5 pole, or FK 336: connector M12, 4 pole, or FK
Electrical data - AS-Interface:	
AS-i supply voltage:	18.0 … 31.6 VDC through AS-Interface, reverse polarity-proof (stabilised PELV units)
AS-I power consumption:	≤ 0.05 A
AS-i device insulation:	internal short-circuit proof
AS-I specification:	
Version:	V 3.0
Profile:	S-0.B.F.F
IO-Code:	0x0
ID-Code:	0xB
ID-Code 1:	0xF
ID-Code 2:	0xF
AS-interface inputs:	
Channel 1:	DI 0 / DI 1 = dynamic code transmission
Channel 2:	DI 2 / DI 3 = dynamic code transmission
AS-interface outputs:	
DO 0 … DO 3:	no function
AS-Interface parameter port:	
P0:	Channel 2 switched
P1 … P3:	no function
Input module address:	0 preset to address 0, can be changed through AS-interface bus master or hand-held programming device
LED switching conditions display:	
LED yellow:	Channel 1, SaW-Bit 0.1
LED green-red (AS-i Duo LED):	AS-Interface supply voltage / AS-Interface communication error / slave address = 0 or periphery error detected
LED yellow:	Channel 2, SaW-Bit 2.3
Ambient conditions:	
Protection class:	IP67
Ambient temperature:	−25 °C … +60 °C
Storage and transport temperature:	–25 °C … +85 ºC
Relative humidity:	30 … 95%, no condensation, no icing
Resistance to vibration:	10 … 150 Hz (0.35 mm / 5 g)
Resistance to shock:	30 g / 11 ms
Protection rating:	II ⧈ (only 336)
Overvoltage category:	III
Degree of pollution:	3
Rated impulse withstand voltage U_{imp}:	800 V
Rated insulation voltage U_i:	32 VDC

2.5 Safety classification

Standards:	EN ISO 13849-1, IEC 61508
PL:	up to
Control category:	up to 1
PFH-value:	1.14 x 10^{-6} / h up to max. 100,000 switching cycles/year
SIL:	up to 1
Service life:	20 years
	If a fault exclusion of a hazardous damage to the 1-channel mechanics is authorised and sufficient protection against tampering is ensured, suitable up to:
PL:	up to d
Control category:	up to 3
PFH-value:	1.01 x 10^{-7} /h up to max. 100,000 switching cycles/year
SIL:	up to 2
Service life:	20 years

3. Mounting

3.1 General mounting instructions

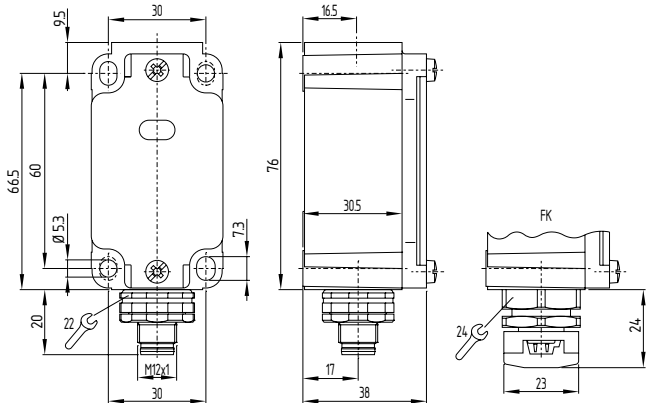
The mounting dimensions are mentioned at the rear of the enclosure. The fixing screws must be protected against unauthorised tampering. The enclosure must not be used as an end stop. Any mounting position. To ensure a proper functioning, the switch must be installed so that the required switch travel is obtained. For safety functions, at least the positive break travel indicated in the switch travel diagram (refer to catalogue) must be obtained. All components have sufficient after-travel to compensate for inaccuracies in the guidance of the actuating system. The actuation of the switch beyond its end stop however must be avoided.

⚠ Please observe the remarks of the standards EN ISO 12100, EN 953 and EN 1088.

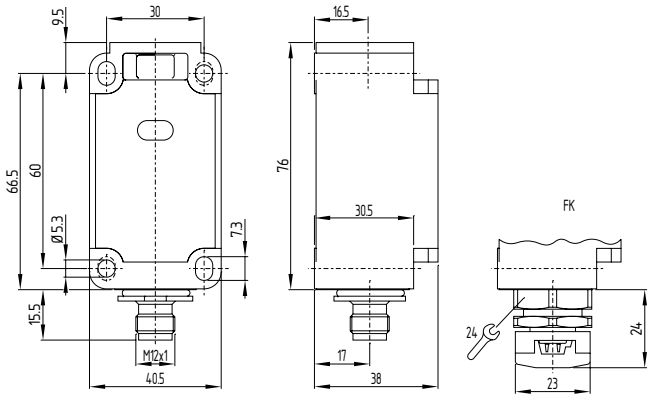
3.2 Dimensions

All measurements in mm.

T.. 335 AS



T.. 336 AS



Actuator heads T.. 335 / 336 AS

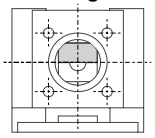
Selection and dimensions refer to SCHMERSAL Main catalogue "Safety Technology"

3.3 Changing the switching function (4VH, 4V7H, 4V10H)

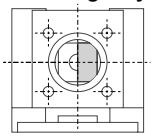
Position switches with "4V" actuating head can be set so that they are switched either only clockwise, only counterclockwise or in both directions. The following steps are required:

1. Unscrew the screws and remove the actuating head.
2. Change the position of both inner plastic parts.
3. Put back the actuating head and tighten the screws.

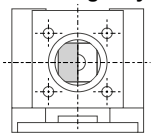
Switching in both directions



Switching only clockwise

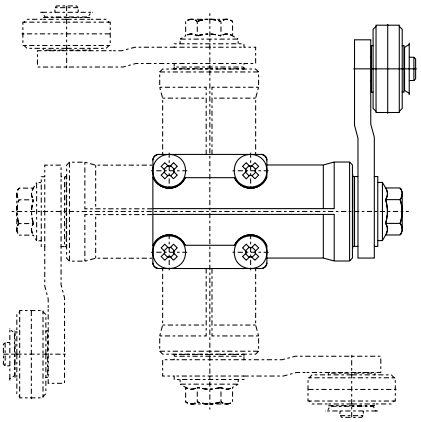


Switching only counterclockwise



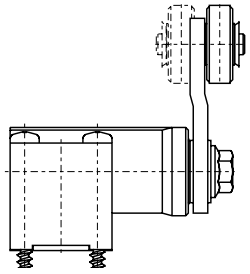
3.4 Mounting of the actuating heads

Repositioning the actuating head (R, 1K, 3K, V, 4V.H)



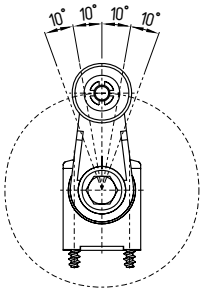
The actuating head can be repositioned by 4 x 90°. Unscrew the screws of the actuating head. Reposition the actuating head in the desired position and retighten the four screws.

Repositioning the roller lever (H)



The (offset) roller arm may be reversed, so that the roller faces the inside of the arm.

Positioning the lever (.H)

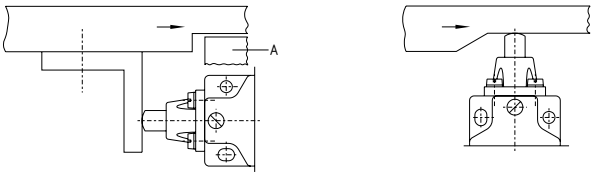


The roller lever can be repositioned over 360° on the toothed shaft in 10° steps. Unscrew the hexagonal screw approx. 4 mm, reposition the lever in the desired position and retighten the screw.

Length-adjustable lever (7H-2138)
To adjust the length of the lever, unscrew the fixing screw of the lever. Firmly retighten the screw after the length adjustment.

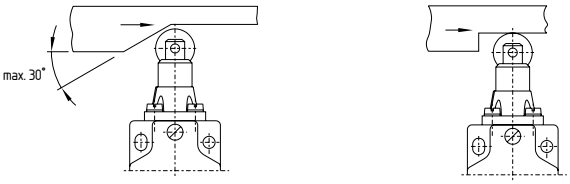
3.5 Actuation of the position switches

Top plunger

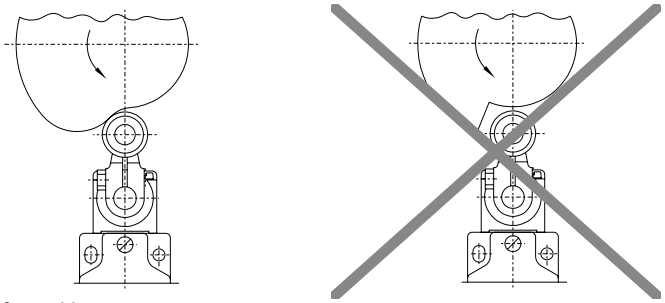


Key
A End stop

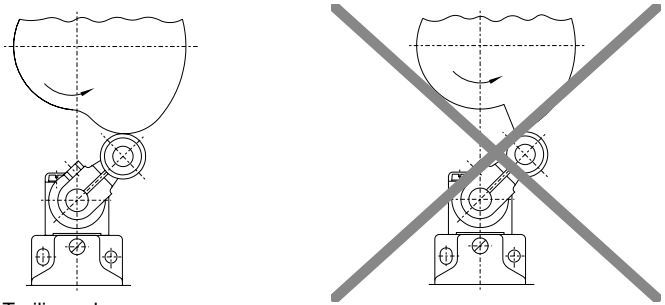
Roller plunger



Cam disc



front side



Trailing edge

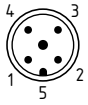
4. Rear side Electrical connection

4.1 General information for electrical connection

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

The connection to the AS-Interface system is realised through an M12 connector or an AS-i flat cable clamp. The wiring configuration of the M12 connector is defined as follows (to EN 50295):

Pin assignment
M12 connector
5-pole



PIN 1: AS-i +
PIN 2: spare
PIN 3: AS-i −
PIN 4: spare
PIN 5: FE (functional earth connection)

Connection Functional earth connection only available with metal enclosure.

5. Functions and configuration

5.1 Programming the slave address

The slave address is programmed through the M12 connector. Any address from 1 to 31 can be set by means of the AS-i bus master or a hand-held programming device.

5.2 Configuration of the safety monitor

The safety switch can be configured in the ASIMON configuration software with the following monitoring devices (refer to ASIMON manual):

Double channel dependent
- Optionally with startup test
- Synchronisation time typically 0.5 - 2.0 s

Double channel dependent with filtering
The use of this monitoring device is especially advantageous on safety guards where bounce or vibration against the mechanical stop upon closing is a problem.
- Optionally with startup test
- Stabilising time typically: 0.5 1.0 s
- Synchronisation time typically 5.0 - 10.0 s

The safety-monitoring module is only released after expiration of the stabilising time; the synchronization time always must exceed the stabilising time.

The configuration of the safety monitor must be tested and confirmed by a qualified and authorised safety expert/safety engineer.

5.3 Status signal "safety release"

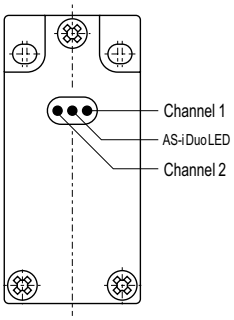
The "safety release" status signal from a Safety at Work slave can be cyclically queried by the control system through the AS-i master. To that effect, the 4 input bits with the varying SaW code of a Safety at Work slave are evaluated through an OR operation with 4 inputs in the control system.

6. Diagnostic

6.1 LED indications

The LED's have the following meaning (to EN 50295):

LED yellow	Channel 1 / AS-i SaW-Bit 0,1
green/red LED (AS-i Duo LED):	AS-Interface supply voltage/ AS-Interface communication error or slave address = 0 or periphery error
LED yellow	Channel 2 / AS-i SaW-Bit 2,3



6.2 Read-out of the parameter port

The parameter port P0 to P3 of an AS-i slave can be read out through the control interface of the AS-i master (see component description) by means of the "Write parameter" instruction (with hexadecimal value F). This (non-safe) diagnostic information from the reflected parameters or the answer to a "Write parameter instruction" can be used by the user for diagnostic purposes or for the control programme.

Table 3: diagnostic information (P0 … P3)

Parameter bit	Condition = 1	Condition = 0
0	Channel 2 activated	Channel 2 disabled
1	–	–
2	–	–
3	–	–

7. Set-up and maintenance

7.1 Functional testing

The safety function of the safety components must be tested. The following conditions must be previously checked and met:
1. Check the switch enclosure for damage.
2. Check the free movement of the actuating element.
3. Check the integrity of the cable entry and connections.

7.2 Maintenance

We recommend a regular maintenance, including the following steps:
1. Check the free movement of the actuating element.
2. Remove particles of dust and soiling.
3. Check cable entry and connections.

Damaged or defective components must be replaced.

8. Disassembly and disposal

8.1 Disassembly

The safety switchgear must be disassembled in a de-energised condition only.

8.2 Disposal

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

9. EU Declaration of conformity

EU Declaration of conformity

SCHMERSAL

Original

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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: T 335 AS, T 336 AS

Type: See ordering code

Description of the component: Positive break position switch for safety functions with integrated AS-i Safety at Work

Relevant Directives:

Machinery Directive	2006/42/EC
EMC-Directive	2014/30/EU
RoHS-Directive	2011/65/EU

Applied standards: DIN EN 60947-5-1:2010,
DIN EN ISO 13849-1:2016,
IEC 61508 parts 1-7:2010

Person authorised for the compilation of the technical documentation: Oliver Wacker
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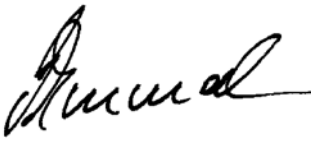
Place and date of issue: Wuppertal, December 6, 2016



Authorised signature
Philip Schmersal
Managing Director

T335-336AS-D-EN

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

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