



EN Operating instructions.pages 1 to 4
Original

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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 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.



If multiple safety components are wired in series, the Performance Level to EN ISO 13849-1 will be reduced due to the restricted error detection under certain circumstances. 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 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:

AST LC ST-AS

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 Opto-Tube AST LC ST-AS is a safe connecting module with two semi-conductor (p-type) inputs for non-contact safety guards. The Opto-Tube is suitable for connecting a light grid (to EN 61496) with two monitored semi-conductor outputs (OSSD). The Opto-Tube must be exclusively operated in combination with 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.

LED display

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

Green LED: AS-Interface supply voltage
 Red LED: AS-Interface communication error
 Yellow LED: Enabling status OSSD 1/2

2.4 Technical data

Standards:	EN 50295, EN 60947-5-1, EN ISO 13849-1, IEC 61508
Enclosure:	glass-fibre reinforced thermoplastic self-extinguishing
AS-Interface connection:	M12 connector
Protection class:	IP67 to IEC/EN 60529
AS-Interface voltage range:	26.5 ... 31.6 VDC, through AS-Interface, reverse polarity-proof
AS-interface power consumption:	≤ 50 mA
AS-Interface specification (V2.1):	Profile: S-0.B IO-Code: 0 x 0 ID-Code: 0 x B IO-Code1: 0 x F IO-Code2: 0 x E
AS-interface inputs: Contact 1:	Data bits D0 / D1 = static 00 or dynamic code transmission
AS-interface inputs: Contact 2:	Data bits D2 / D3 = static 00 or dynamic code transmission
Outputs:	A0 ... A3 no function
Parameter bits:	P0 ... P3 no function
Input module address:	preset to address 0, can be changed through AS-interface bus master or hand-held programming device

Diagnostic information:

LED indication:	LED green: Supply voltage LED red: Communication error LED yellow: Enabling status OSSD 1/2
Voltage supply for non-contact safety switchgear:	PELV unit to IEC 364-4-41
Response time:	≤ 20 ms
EMC rating:	to EMC-Directive
Ambient temperature:	-25 °C ... +60 °C
Storage and transport temperature:	-25 °C ... +85 °C

2.5 Safety classification

Standards:	EN ISO 13849-1, IEC 61508
PL:	up to e
Control category:	up to 4
PFH value:	1.74×10^{-9} /h
SIL:	up to 3
Service life:	20 years

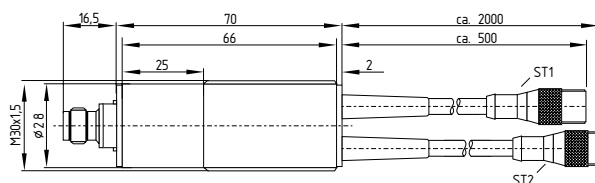
3. Mounting

3.1 General mounting instructions

The component can be mounted in any position. The cylindrical AS-i slave can be fitted in an M30 mounting hole; alternatively, the H 30 clamp (accessory) can be used for the fitting. The connecting cables for the safety components and the bus connection must be laid without sharp edges or buckling.

3.2 Dimensions

All measurements in mm.



Connection of the components:
 AS-i, voltage supply (ST1) and light grid (ST2)

4. Rear side Electrical connection

4.1 General information for electrical connection



The electrical connection to the AS-i system may only be carried out by authorised personnel in a de-energised condition (refer to EN 50295).

Connection to the AS-Interface system

The connection to the AS-Interface system is realised through an M12 connector (ST). The following wiring configuration is applicable for the AS-i Slave (cable configuration to EN 50295):

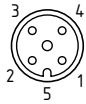
ST	1:	AS-i +
	2:	spare
	3:	AS-i -
	4:	spare



Connection of the light grid (receiver)

The connection to the light grid (E) is realised through an M12 connector (ST2). The wiring configuration is as follows:

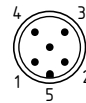
ST2	1:	+ 24 VDC
	2:	OSSD 1
	3:	GND
	4:	OSSD 2
	5:	FE (functional earth connection)



Connection of the 24V voltage supply of the light grid

The 24V voltage supply (PELV unit to IEC 364-4-41) is connected through an M12 connector (ST1). The wiring configuration is as follows:

ST1	1:	+ 24 VDC
	2:	spare
	3:	GND
	4:	spare
	5:	FE (functional earth connection)



For the installation of the Opto-Tube and a light grid, the following boundary conditions must be observed:

- the voltage supply of the light grid (E) is connected through the looped-through connecting cable from the control cabinet
- the protective wire connection for the light grid is looped through as well
- the connecting cable between the Opto-Tube and the light grid must be 5 m at the most
- the emitter of the light grid (refer to light grid description) must have a separate voltage supply

5. Configuration

5.1 Programming the slave address

The slave address is programmed through the M12 connector (ST). 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 Opto-Tube can be configured application-dependent in the ASM safety monitor. To this effect, two monitoring devices are recommended: double channel with positive break and double channel dependent. If the double channel dependent monitoring device with synchronisation time ∞ (endless) is used, the start-up test must be activated. An automatic start is not authorised without additional start condition.



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.



In order to ensure a correct function of the Opto-Tube, the parameter port must be set to the default value F hex (1111) according to the AS-i specification.



Safety instructions

In case for an interruption of the 0 volt cable for the connected light grid or light curtain, the max. output current (leakage current) of the OSSD (refer to technical data of the non-contact safety switchgear) must not exceed 0.5 mA. The Opto-Tube has a response time of ≤ 20 ms during the safety switch-off procedure. To calculate the minimum safety distance of the non-contact safety switchgear, the total response time, consisting of the response time of the non-contact safety switchgear, the Opto-Tube, the AS-i safety monitor and the machine standstill time must be observed.

6. Set-up and maintenance

6.1 Functional testing

The safety function of the Opto-Tube AST LC ST-AS must be tested. The following conditions must be previously checked and met:

1. Check for damages
2. Check the integrity of the cables and connections

6.2 Maintenance

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

1. Check for damages
2. Remove particles of dust and soiling
3. Check the integrity of the cables and connections

Damaged or defective components must be replaced.

7. Disassembly and disposal


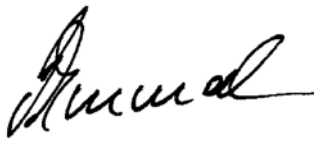
7.1 Disassembly

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

7.2 Disposal

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

8. EU Declaration of conformity

EU Declaration of conformity		
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:	AST LC ST-AS	
Type:	See ordering code	
Description of the component:	Connecting module with two safe inputs for light barriers or light grids with semiconductor outputs with integrated AS-i Safety at Work interface	
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 Möddinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, January 30, 2017	
AST LC AS-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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