

AS-i Safety 8I/1O Module

16/8 safe inputs and 1 (2) electronic safe outputs

User manual



...supports the requirements for AS-i Safety up to SIL3



Subject to modifications without notice.

Generally, this manual refers to products without mentioning existing patents, utility models, or trademarks.

The absence of any such references does not indicate that a product is patent-free.

Table of contents

AS-i Safety 8I/1O Module

User manual

EC Declaration of Conformity

1	Symbol Catalog	6
1.1	Abbreviations	6
2	General Remarks	7
2.1	Product information.....	7
2.2	Function of this manual	7
2.3	Target group.....	7
2.4	AS-i specification 3.0	7
3	Safety.....	8
3.1	Experienced staff	8
3.2	Range of application.....	8
3.3	Correct use	9
3.4	Disposal	9
4	Product Description	10
4.1	AS-i Safety at Work	10
4.2	Technical data	11
4.2.1	Special chyracteristics of the AS-i Safety Module.....	13
4.2.1.1	Inputs	13
4.2.1.2	Output	13
4.3	Safety relevant data	14
4.4	Requirements for the voltage supply +24 VEXT (AUX)	14
4.5	Front view and connections	15
4.6	LED status display.....	16
4.6.1	LED flashing sample.....	17
4.6.1.1	Restart block	18
4.6.1.2	Unlockable error state	19
4.6.1.3	Internal error.....	19
4.6.1.4	Peripheral fault	19
4.7	Montage	20
4.7.1	Dimensions.....	20

Issue date: 26.09.2014

4.8	Electrical Installation	21
4.8.1	Cross-circuit	21
4.9	Chip card	22
4.10	Diagnostic slaves	23
4.11	Configuration slave	24
4.11.1	Setting using the configuration slave	24
5	Maintenance	25
5.1	Controlling safe shutdowns	25
6	Address programming.....	26
6.1	Addressing instructions	26
6.1.1	Settings of the SEL switches (AS-i addressing).....	26
6.2	Addressing example: Slave on safety input 1	27
7	Configuration via the software ASIMON 3 G2	28
7.1	Configuring the Safety I/O Modules	29
7.1.1	List of Safety I/O Modules.....	29
7.1.2	Configuration	32
7.1.3	Status messages and progress	37
7.2	Configure all	38
8	Application examples	44
8.1	Connection examples	44
8.1.1	Connecting a safety contactor	44
8.1.2	Connecting OSSD.....	45
8.1.3	Additional connection examples	45
8.2	Addressing via rotary switches	46
8.3	Safe configuration using ASIMON.....	47
8.4	Replacing a defective device	48

Translation of the original
declaration of conformity

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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: **AS-i Safety input/output modules**

Type: **ASIO-8SI-1SO-S**

Description of the safety component: AS-i Safety input/output module
IP20

Relevant EC-Directives: 2006/42/EC EC-Machinery Directive
2004/108/EC EMC-Directive

Used harmonized standards: EN ISO 13849-1: 2008 / AC:2009
EN 62061: 2005 + A1:2013
EN 61508: 2010 parts 1-7

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Place and date of issue: Wuppertal, July 15, 2014



Authorised signature
Philip Schmersal
(Managing Director)

1. Symbol Catalog



Information!

This symbol indicates important information.



Attention!

This symbol warns of a potential failure. Non-compliance may lead to interruptions of the device, the connected peripheral systems, or plant, potentially leading to total malfunctioning.



Warning!

This symbol warns of an imminent danger. Non-compliance may lead to personal injuries that could be fatal or result in material damages and destruction.

1.1 Abbreviations

AS-i	AS-interface (actuator sensor interface)
I/O	Input/output
EMC	Electromagnetic compliance
PELV	Protective extra-low voltage
PFD	Probability of failure on demand
SaW	Safety at Work, safety technic
OSSD	Output Signal Switching Device, release circuit

2. General Remarks

Please read this chapter carefully before working with the documentation and the "AS-i Safety 8I/1O Module".

2.1 Product information

This user manual is valid for the following Schmersal GmbH devices:

AS-i Safety 8I/1O Module 16/8 safe inputs and 1 (2) electronic safe outputs	ASIO-8SI-1SO-S
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2.2 Function of this manual

This manual instructs for the safe assembly, electrical installation, addressing, start-up as well as for the operation and for the maintenance of the AS-i safety module.

This manual does **not** provide instructions for operating machines, on which this module is built in. Please view the appropriate machine manual for corresponding information.



Information!

Additional information concerning the technical data as well as the parameterization of the AS-i safety module can be found in data sheet ASIO-8SI-1SO-S that can be located at <http://www.schmersal.net>.



<http://www.schmersal.net>



ASIO-8SI-1SO-S



Extended search

2.3 Target group

This manual is intended for designers, developers and operators of systems that will be safeguarded by one or more AS-i Safety module. The manual is also targeted to people integrating AS-i Safety module into machinery, performing the initial start-up, or maintaining them.

2.4 AS-i specification 3.0

The "AS-i Safety 8I/1O Module" is designed according to the AS-i specification 3.0.

Earlier specifications (2.1 and 2.0) continue to be fully supported.

3. Safety

This chapter contains user safety information.



Warning!

Please read this chapter carefully before using the module in combination with other machine safeguarding components on protected machinery.

3.1 Experienced staff

The 'AS-i Safety 8I/1O Module' must only be installed, operated, and maintained by qualified staff.

Qualified is a person who

- has a suitable technical education
- has been instructed in operating the machinery and has been informed about the valid safety guidelines by the machinery operator
- has access to the user manual.

3.2 Range of application

The 'AS-i Safety 8I/1O Module' offers the maximum number of safety inputs with just 22.5 mm of control cabinet installation width, optimized for service and commissioning.

Technical implementation:

- Fewer signals can be processed. The module uses only the needed AS-i addresses.
- If safety input S3 is not needed, the protection feedback can be optionally connected to S3. Transmission is then as usual through the diagnostic slave of the safety AS-i output.
- There is no cable length restriction for safety inputs (maximum loop resistance is 150 Ohms).
- 16 / 8 safety inputs for potential-free contacts or optoelectronic protection devices.

Diagnostics and commissioning:

- LED indicators in connection with other safety slaves and the monitor.
- Simple configuration using the ASIMON software or selection of the AS-i slave and addressing using two rotary switches.
- Chip card for simple device replacement.
- Fixed safety code sequences for each AS-i address. Each module generates the same code sequences for the same address programming.

3.3 Correct use

The AS-i Safety 8I/1O Module must only be used as defined in chap. <Application area of the device>. The AS-i Safety 8I/1O Module must only be used on the system, at which it was installed in accordance with this manual by adept personnel.



Information!

If used in a way differing from this description or if the device has been changed in any way – even during installation – any warranty claims with respect to Schmersal GmbH are invalid.

3.4 Disposal



Information!

Electronic waste is hazardous waste. Please comply with all local ordinances when disposing this product!

The device does not contain batteries that need to be removed before disposing it.

4. Product Description

This chapter is intended to inform the reader about the special characteristics of the AS-i Safety 8I/1O Module. It describes the design and the functionality of the devices.



Warning!

This chapter must be read before installation and operation of the device in conjunction with other safety components on protected machinery.

4.1 AS-i Safety at Work

AS-i Safety at Work combines safe and non-safe data on a bus system. The classification AS-i Safety at Work identifies the safe data transfer that enables the integration of safety procedures in an AS-i network.

The components of AS-i Safety at Work conform to EN 50295 and are compatible with all other AS-i components. Therefore, existing AS-i applications can easily be extended with safety-relevant functions.

AS-i Safety at Work always requires a Safety Monitor (as a stand-alone device or integrated into a Gateway), that evaluates the safe signals on the bus, and a safe AS-Interface bus connection, that enables the transfer of safe signals from safety-relevant components (AS-i SaW input).

Additionally, decentralized safe AS-I SaW outputs can be added. Controlled by the Safety Monitor these outputs can be used to safely switch off safe actuators.

Several Safety Monitors and safe input and output slaves can be used on an AS-i system. At the same time, the Safety Monitors can be parameterized and, thus, be checked through AS-i and the configuration software.



Information!

By utilizing AS-i Safety at Work safety requirements according to SIL3, EN 61 508 and EN 62 061 and as well Cat. 4 and Performance-Level "e" according to EN ISO 13 849 can be satisfied.

In order to satisfy the requirements of these safety categories, all peripheral components, for instance the Safety Monitors, all safe bus connections, and all connected sensors must satisfy these standards.

4.2 Technical data

Article no.	ASIO-8SI-1SO-S
Connection	COMBICON clamp
Length of connector cable	unlimited ¹
AS-i	
Profile	safety input slaves: S-0.B.F.0 diagnostic slaves: S-7.A.5.E configuration slave: S-7.A.F.5
Voltage	18 ... 31,6 V
Max. current consumption	200 mA
Max. continuous operating current	125 mA
AUX	
Voltage	20 ... 30 V (PELV)
Max. current consumption	1 A max.
Input	
Number	16 / 8 safe inputs for floating contacts or optoelectronic protective devices switching current statical 4 mA at 24 V, dynamic 15 mA at 24 V (T=100 μ s)
Supply voltage	out of 24 V auxiliary power
Input level	10 mA, R < 150
Output	
Number	1 (2) output switching elements (semiconductor) max. contact load: 0,7 A DC-13 at 24 V
Supply voltage	out of 24 V auxiliary power
Max. output current for OSSD supply	0,7 A
Test pulse	when output is switched on minimal distance between 2 test pulses: 250 ms, pulse length to 1 ms

Product Description

Article no.	ASIO-8SI-1SO-S
Display	
LEDs S1 ... Sn (yellow)	state of inputs S1 ... S16
LED PWR (green)	AS-i power
LED FAULT/FLT (red)	AS-i error LED
LED O1 (yellow)	output 1 has switched
LED AUX (red)	24 V DC AUX
Display	
Applied standards	IEC 61508:2010 EN 62061:2005/A1:2013 EN ISO 13849-1:2008/AC:2009
Storage temperature	0 °C ... +55 °C
Operating temperature	-25 °C ... +85 °C
Housing	plastic, for DIN-rail mounting
Protection class (EN 60529)	IP20
Tolerable loading referring to humidity	according to EN 61131-2
Isolation voltage	~ 500 V
Weight	160 g
Dimensions (W / H / D in mm)	22,5 /99 / 114,5

1. loop resistance m150 6

	Clamps	Description
	S1, S2, S3, S4	safety input terminal input 1-4
	S5, S6, S7, S8	safety input terminal input 5-8
	S9, S10, S11, S12	safety input terminal input 9-12
	S13, S14, S15, S16	safety input terminal input 13-16
	1.14 _{ext.out}	semiconductor output 1
	T1	pulse 1 (S1, S3, S5, S7, S9, S11, S13, S15)
	T2	pulse 2 (S2, S4, S6, S8, S10, S12, S14, S16)
	0 V _{ext.out}	mass connection for semiconductor output
	AS-i+, AS-i-	connection to the AS-i-Bus
	ADDR	address socket
	AUX+ _{ext.in} AUX- _{ext.in}	power supply input

Addressing			SEL1 SEL2 Description		
0	0	RUN, without configuration slave			
E	E	RUN, with configuration slave			
1	1	addressing safety input 1, contacts	5	1	addressing safety input 1, OSSD
2	2	addressing safety input 2, contacts	6	2	addressing safety input 2, OSSD
3	3	addressing safety input 3, contacts	7	3	addressing safety input 3, OSSD
4	4	addressing safety input 4, contacts	8	4	addressing safety input 4, OSSD
5	5	addressing safety input 5, contacts	9	5	addressing safety input 5, OSSD
6	6	addressing safety input 6, contacts	A	6	addressing safety input 6, OSSD
7	7	addressing safety input 7, contacts	B	7	addressing safety input 7, OSSD
8	8	addressing safety input 8, contacts	C	8	addressing safety input 8, OSSD
9	9	addressing safety output 1			
A	A	addressing safety output 1, diagnostic			
D	D	reset to factory defaults			

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4.2.1 Special characteristics of the AS-i Safety Module

4.2.1.1 Inputs

Two-channel potential-free contacts

- Two-channel potential-free contacts are evaluated by connecting T1 using a potential-free switch set to 1, 3, 5, 7 and T2 using a potential-free switch set to 2, 4, 6, 8.
- T1 and T2 provide the 24V which is evaluated by the inputs. T1 and T2 are regularly turned off briefly (test pulses) to check the inputs for function and short-circuits.
- Short circuits are detected between inputs which are operated by various clock outputs. The short-circuit within a pair is checked before the code sequence is turned on.
- A short-circuit is indicated by flashing of the LEDs for both affected channels, and peripheral errors indicated on the affected slave(s). On AS-i the (double) 0 sequence is send on the bits for the affected channels as long as the short-circuit is present.
- The maximum loop resistance is 150 Ω . There is no cable length restriction.

Single-channel potential-free contacts

- To be able to connect signals single-channel to SIL3 the following fault exclusions are necessary:
- The switching signal is safety generated, e.g. by two positive opening relays in series.
- The signal line is routed such that a fault exclusion with respect to contact with external potentials can be achieved for the line.
- The signal is connected to an input pair (e.g. S1/S2) which are wired as OSSD.

4.2.1.2 Output

- The output switching elements are solid-state powered from the 24 V auxiliary source. It isolation voltage between U_{AUX} and AS-i is at least 500 V.
- The output must be powered by a PELV power supply.
- The maximum output current is 0.7 A, so that the output is suitable for DC13 loads.
- The plus side of the output load is on 1.14. The minus side of the output load must be connected to 0 $V_{ext out}$.
- The connection cables between the module and the load must be routed so that no interference voltages caused by damaged insulation can inadvertently switch the load.
- Test pulses are 700 μs long and are generated no oftener than every 250 ms.

4.3 Safety relevant data

Identification data	value	standard
Safety category	4	EN ISO 13849-1:2008
Performance Level (PL)	e	EN ISO 13849-1:2008
Safety Integrity Level (SIL)	3	EN 61508, EN 62061
Usage time (TM) in years	20	EN ISO 13849-1:2008
Max. power-on time in months	12	EN 61508, EN 62061
PFD	$9,58 \times 10^{-07}$	EN 61508
PFH _D (probability of a dangerous failure per hour)	$5,08 \times 10^{-09}$	EN 61508, EN 62061
max. system reaction time for the input [ms]:	11	
max. system reaction time for the output [ms]:	40	

Tab. 4-1.

To determine the safety characteristics (PFD and PFH), the values of all components using this function are to be considered. The ASIO-8SI-1SO-S module provides no significant contribution to the PFD or PFH values of the complete system. For the values of other components, please refer to relevant documentation.

4.4 Requirements for the voltage supply +24 V_{EXT} (AUX)

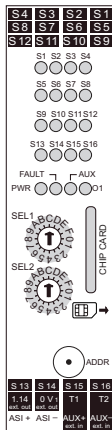


Information!

The externally connectable circuits are to be separated from the net absolutely reliable!

The power supply +24 V_{EXT} may only occur via SELV or PELV networks.

4.5 Front view and connections



SEL 1, SEL 2

Selector switch

Chip Card

Chip card

ADDR

Addressing port

S4, S3 | S2, S1

Terminals safety 2-channels inputs 2 + 1

S8, S7 | S6, S5

Terminals safety 2-channels inputs 4 + 3

S12, S11 | S10, S9

Terminals safety 2-channels inputs 6 + 5

S13, S14 | S15, S16

Terminals safety 2-channels inputs 7 + 8

1.14_{ext.out}

Semiconductor output 1

0V_{ext.out}

Mass connection for semiconductor output

T1, T2

Clock output

ASI+, ASI-

Connection to the AS-i Bus

AUX+_{ext.in}, AUX-_{ext.in}

Connection for external 24 V_{DC} PELV power supply

4.6 LED status display

LED	Description
S1 ... Sn	Corresponding input not switched on
	Corresponding input switched on
	Synchronous 1 Hz flashing of the LEDs of an input terminal pair: cross-circuit 1 Hz
	Alternating 1 Hz flashing of the LEDs of an input terminal pair: restart block after unilateral opening a channel with linked inputs 1 Hz
PWR	AS-i supply power not OK
	Address '0' or peripheral fault 1 Hz
	AS-i supply power OK
FAULT	At least one slave on-line
	At least one slave has periphery fault 1 Hz Chap. <Peripheral fault>
	No addressed slave is online
AUX	24V _{DC} AUX on
O1	Output off
	Restart block 1 Hz
	Unlockable error status 8 Hz
	Output on

Tab. 4-2. LEDs

(1) LED green

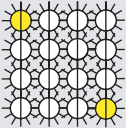


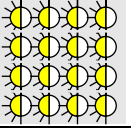


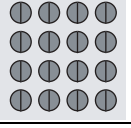
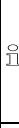


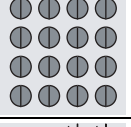



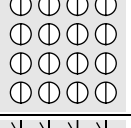

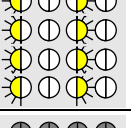
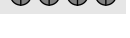

(2) LED red

(3) LED yellow

LED on LED flashing off

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4.6.1 LED flashing sample

LEDs	State	Process
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	 Chaser lights	Addressing mode
PWR, Fault, AUX, O1	  Tab. "LEDs"	
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	 2 x 1 Hz	Chip card will be written
PWR, Fault, AUX, O1	  Tab. "LEDs"	
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	  Tab. "LEDs"	 Restart block
PWR, Fault, AUX, O1	 1 Hz	
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	  Tab. "LEDs"	 Unlockable error status
PWR, Fault, AUX, O1	 8 Hz	
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	 —	Circuit or internal error
PWR, Fault, AUX, O1	 8 Hz	
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	 1 Hz	Data on chip card and device different
PWR, Fault, AUX, O1	  Tab. "LEDs"	

Tab. 4-3.

Issue date: 26.09.2014

LEDs	State	Process
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	1 Hz	Chip card defective
PWR, Fault, AUX, O1	Tab. "LEDs"	
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	—	desired address is blocked (incorrect double configuration).
PWR, Fault, AUX, O1	Tab. "LEDs"	
S1 ... S4 S5 ... S8 S9 ... S12 S13 ... S16	1 Hz 5 sec	Identification of the device via the configuration slave via ASIMON
PWR, Fault, AUX, O1	Tab. "LEDs"	

Tab. 4-3.

Legend

		Flashing in common mode
		Flashing in push-pull mode
		off
		on
		Chaser lights
		Standard view acc. to Tab. "LEDs"

Tab. 4-4.

4.6.1.1 Restart block



Restart (1Hz): If occasionally no data exchange with the AS-i master has taken place, the module requires a restart signal in order to turn on its safety output again. This prevents unintended activation of the output after interrupted AS-i communication. The output switches on after the reception of this signal.

Issue date: 26.09.2014

4.6.1.2 Unlockable error state



Error unlock (8Hz): If the safety output detects incorrect AS-i data, such as a code sequence error, the module requires an error unlocking signal in order to turn on its safety output again. This prevents unintended activation after interrupted or erroneous AS-i communication. The device resumes its normal operation after receiving this signal.

4.6.1.3 Internal error



An internal error can be displayed in the following situations:

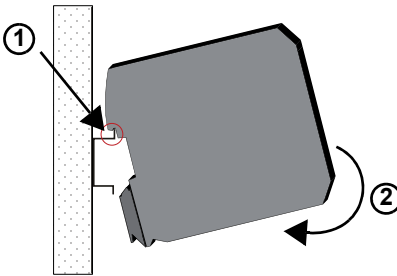
- an external power voltage source is connected on one of the safe outputs
- a capacitive load is connected on one of the safe outputs, so that the output level does not fall below 5 V within 4 ms after turn-off.
- For one of the safe input slave addresses which is set there is another slave having this address on the AS-i bus

4.6.1.4 Peripheral fault

A peripheral fault is caused:

- at all visible addresses if U_{AUX} is missing
- at SaW input addresses at which a cross-circuit is identified
- at the diagnostic slave at which its safe output detects an overload.

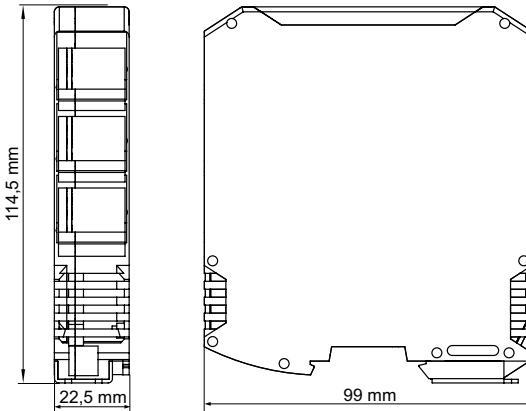
4.7 Montage






On mounting plate with 35 mm top-hat rail

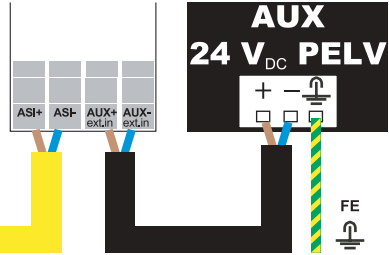
Vertical mounting position!

4.7.1 Dimensions

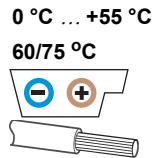


4.8 Electrical Installation

	0,6 Nm (5 lb _f -in)
	0,2 ... 2,5 mm ²
	0,2 ... 2,5 mm ²
AWG	24 ... 12



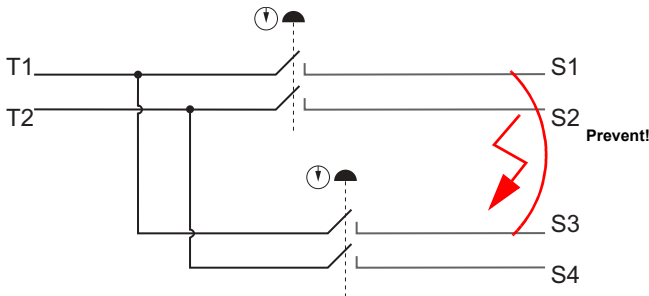
Ambient air temperature
 Temperature rating for cable
 Use copper conductors only



Caution

The AS-i power supply for the AS-i components must have isolation per IEC 60742 and be able to handle momentary power interruptions of up to 20 ms. The power supply for the 24 V supply must also have isolation per IEC 60742 and be able to handle momentary power interruptions of up to 20 ms. The maximum output voltage of the power supply must also be less than 42 V in case of a fault.

4.8.1 Cross-circuit



Caution!

Cross circuits between the inputs of a safe 2-channel input pair are detected. Cross circuits between inputs which are supplied by the same clock output (T1 = odd numbered input terminals; T2 = even numbered input terminals) must be prevented by use of suitable means when routing the cable.

Issue date: 26.09.2014

4.9 Chip card

The chip card stores the addresses of the slaves. All programming operations are stored both in the module and on the chip card.

- The device can operate both with and without a chip card.
- A blank chip card is either filled with 0xFF (as new) or contains Address 0 for all slaves.
- If a blank chip card is plugged into a programmed module (at least one slave address \neq 0, the configuration of the module is stored on the chip card.
- If a non-blank chip card is plugged into an non-programmed module (all slave addresses = 0, ID1 = 7 or F), the configuration of the chip card is transmitted to the module. The changes do not become effective until the module is restarted.
- If a non-blank chip card is plugged into a different programmed module, the configurations do not agree and an error message is displayed.



Information!

Switch setting 'D-D' enables the module to be reset to its factory default state (see also Section <Address Assignment>.) If the chip card is plugged in then, the module and chip card are cleared.

4.10 Diagnostic slaves

The input data bits 0 ... 2 are used by the diagnostic slaves. Bit 3 can be used as a conventional input (e.g. EDM) if the parameter bit 2=1 (default). Else it displays the release state.

Diagnostic slave output 1, input bit 3: state of switch at S3

The output data bit '0' is used in connection with the parameter bit 1=0 to switch the output off, even though it is released.

Bit	input	output	parameter
Bit0	diagnostic color	if P1=0 and O0=0, the output is switched off independent from release.	free
Bit1		free	Parameters to output bit O0
Bit2		free	Parameters to input bit 3
Bit3	P2=1: response switch S3 P2=0: response of the release state	non-existent	non-existent

Tab. 4-5. Bit allocation of diagnostic slaves

Value	color	description	state change	LED O1 / O2
0	green	output on		on
1	green flashing	cannot occur		
2	yellow	restart inhibit	help signal 2	1 Hz
3	yellow flashing	cannot occur		
4	red	output off		off
5	red flashing	waiting for "reset of error condition"	help signal 1	8 Hz
6	grey	internal error, such as „fatal error“	only by means of „power-on“ of the device	all LEDs 8Hz
7	green/yellow	output released, but not switched on	switching-on by setting „O0“	off

Tab. 4-6. Diagnostic colours

4.11 Configuration slave

Since setting of the addresses and selecting OSSD/potential-free contacts using the rotary switches can be very cumbersome, there is an alternative way to make settings using the configuration slave.

4.11.1 Setting using the configuration slave

1. The ASIO-8SI-1SO-S is connected to the AS-i network.
2. The configuration slave is set to an address which is not 0 with the switch set to 'E-E'.
3. The PC software is used to set the addresses and associated parameters.
4. If the ID needs to be changed, this can be done.
5. The project planner releases the data via software using his name and the ID. Name, date and ID are also stored with a CRC by both CPUs.
6. The data are written using ASIO-8SI-1SO-S and there saved with a CRC check. This makes the data valid in the ASIO-8SI-1SO-S.
7. The PC software reads the parameters via AS-i as plain text and displays them in a separate window as a release protocol. There is no conversion; the data are issued from the ASIO-8SI-1SO-S as plain text.
8. The protocol is printed out by the person performing the release and stored as part of the system documentation.
9. The function of the ASIO-8SI-1SO-S must be checked before first placing in service..

5. Maintenance

5.1 Controlling safe shutdowns

The plant safety engineer is responsible for verifying that the AS-i Safety 8I/1O Module works correctly as part of the safety system.

At least once a year it is necessary to verify the safe shutdown by initiating associated safety-related sensors or switches:

**Attention!**

Press each safety-related AS-i slave and watch the reaction of the output circuits of the AS-i Safety Monitor.

**Attention!**

Check the maximum activated time and the total operating time. These values depend on the PFD value chosen for the total failure probability. Please refer to the information in chap. <Safety relevant data>.

After reaching the projected maximum operating time (three, six, or twelve months) the entire safety system must be checked for proper operation.

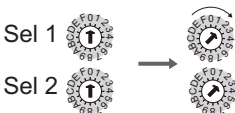
After reaching the projected total usage time (20 years) the device must be checked by the manufacturer concerning its proper operation.

6. Address programming

6.1 Addressing instructions

- Addressing is done using a configuration slave in Run mode (Switch 'E-E'). This Run mode is the preferred one and is therefore the factory default setting.
- The slaves cannot be re-addressed with the switch in position '0-0'.
- Input and diagnostics slaves which are programmed to Address 0 do not provide their status on the bus in switch positions '0-0' and 'E-E'.
- If one of the safety output slaves is programmed to 0, this slave does not respond to the safety monitor, i.e. it remains turned off.
- Multiple input slaves for potential-free contacts may not be programmed to the same address. Input slaves for potential-free contacts may also not be programmed to the same address as an output. If an attempt is made to program such a non-permitted address, an error message is generated.
- In switch position 'D-D' a slave having profile S-7.F.F.E appears at Address 1. If this slave is programmed to Address 0, the module and any chip card plugged into it is reset to the factory default settings (all slave addresses = 0, ID1 = 7 resp. F). When the module is in the factory default setting, the slave for switch position 'D-D' has Address 0.

6.1.1 Settings of the SEL switches (AS-i addressing)



SEL 1	SEL 2	Description
0	0	RUN (without configuration slave)
E	E	RUN (with configuration slave)
1	1	Safety input 1, <i>floating contacts</i>
2	2	Safety input 2, <i>floating contacts</i>
3	3	Safety input 3, <i>floating contacts</i>
4	4	Safety input 4, <i>floating contacts</i>
5	5	Safety input 5, <i>floating contacts</i>
6	6	Safety input 6, <i>floating contacts</i>
7	7	Safety input 7, <i>floating contacts</i>
8	8	Safety input 8, <i>floating contacts</i>
9	9	Safety output 1
A	A	Safety output 1, <i>diagnostics</i>
D	D	Reset to factory defaults
5	1	Safety input 1, <i>OSSD</i>

Tab. 6-7.

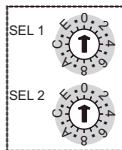
Issue date: 26.09.2014

6	2	Safety input 2, OSSD
7	3	Safety input 3, OSSD
8	4	Safety input 4, OSSD
9	5	Safety input 5, OSSD
A	6	Safety input 6, OSSD
B	7	Safety input 7, OSSD
C	8	Safety input 8, OSSD

Tab. 6-7.

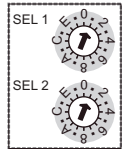
6.2 Addressing example: Slave on safety input 1

Programming of the safety address (safety input slave):

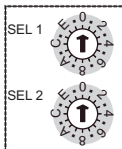


RUN

- Starting point



- Use the switches on the device to set the desired input.



RUN

- Use the hand-held addressing device or AS-i Master to set the desired address.
- Then set both switches back to the '0-0' (RUN) setting.



Information!

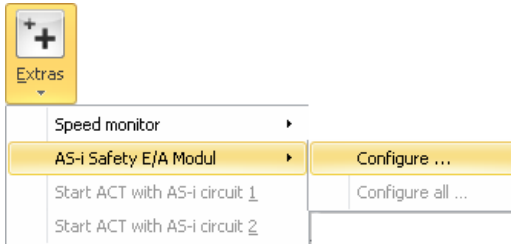
The module only uses the necessary AS-i addresses.

7. Configuration via the software ASIMON 3 G2

AS-i Safety I/O Modules integrate multiple safe inputs and outputs in one device.

Two modes for the configuration and diagnostics of Safety I/O Modules are available via the **Extras -> AS-i Safety I/O Module** menu:

- Configure
- Configure all.



Information!

Only AS-i Safety I/O Modules from Schmersal can be configured. To be able to configure the Safety I/O Modules, the dial of each must be set to position "E".

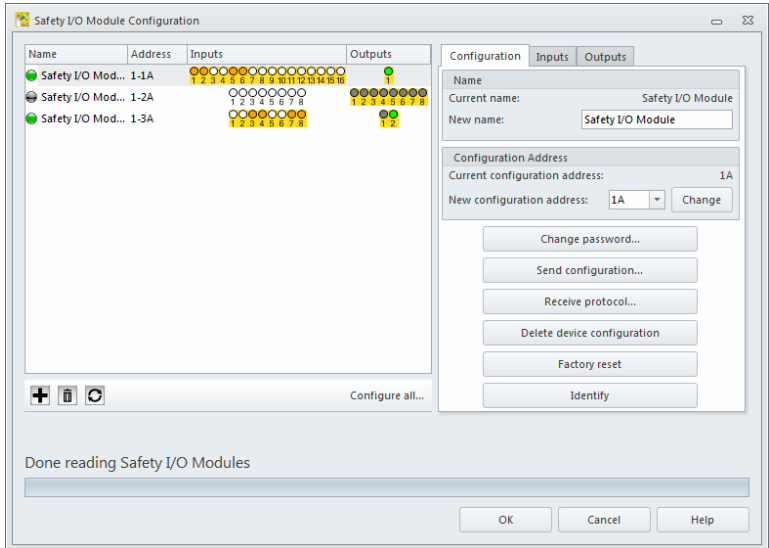
The configuration created in the windows described in the following is saved in a file in the same directory as the ASIMON configuration. It also has the same file name as the ASIMON configuration, except the file extension is: **.SIO3**. The Safety I/O Module configuration is thereby permanently linked to the ASIMON configuration.



Information!

If you manually copy an ASIMON 3 G2 configuration (.AS3BW), you must also copy the corresponding Safety I/O Module configuration (.SIO3)!

7.1 Configuring the Safety I/O Modules



In the **Safety I/O Module configuration** window, both connected as well as unconnected (offline) Safety I/O Modules can be configured on the AS-i master. All settings necessary for commissioning Safety I/O Modules are made here.

The general procedure during the commissioning of a Safety I/O Module is as follows:

- Configure Safety I/O Module with ASIMON
- Send configuration to the Safety I/O Module
- Validate the sent configuration
- Check the configuration for correctness.

The **Safety I/O Module configuration** window splits into a left, right and lower area. Located in the left area is a **list of Safety I/O Modules**. The right area is used for the configuration of the Safety I/O Module selected in the list. **Status messages** and the **progress** are displayed in the lower area.




Upon opening the window, all Safety I/O Modules that are connected to the AS-i master and all saved Safety I/O Modules are loaded and displayed in the list. A connected Safety I/O Module is indicated by a green dot (●); an unconnected Safety I/O Module is indicated with a gray dot (●).

To configure a Safety I/O Module, the Safety I/O Module is selected in the **list of Safety I/O Modules** and the desired settings made in the **configuration area**.

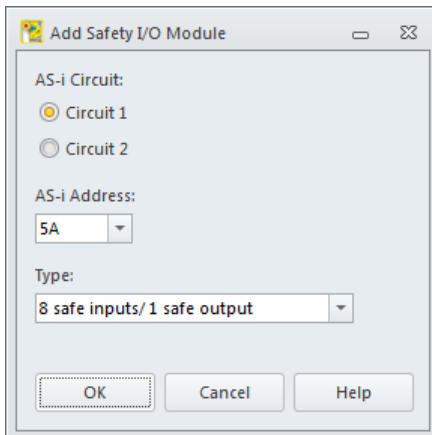
7.1.1 List of Safety I/O Modules

The list of Safety I/O Modules consists of four columns: **Name**, **Address**, **Inputs** and **Outputs**.

- **Name** contains the name of the Safety I/O Module. This can be freely assigned during configuration and is used to better identify the Safety I/O Module. If a Safety I/O Module is not yet configured, it is displayed as **Safety I/O Module**.
- The **Address** column displays the AS-i configuration address of the Safety I/O Module. The Safety I/O Module on the AS-i bus is configurable under this address. The used format has the following structure: (AS-i circuit)-(AS-i address)(A/B-slave).
- The **Inputs** column displays the state of the Sx input terminals. Depending on the used Safety I/O Module, a different number of inputs is shown here. A white circle represents an input that is switched off; an orange circle represents an input that is switched on.
- The **Outputs** column displays the status of the outputs. The status can only be requested if a diagnosis address is configured for the output. The displayed color corresponds to the **device color** of the output device.

Located below the list of Safety I/O Modules are the **Add** , **Delete** , **Reload**  and **Configure all...** buttons.

- Use the **Add** button to add a Safety I/O Module to the configuration. Click **Add** to open the window for adding a new Safety I/O Module. In this window, select to which AS-i circuit of the AS-i master the Safety I/O Module is to be connected and what its AS-i address will be. An AS-i address that is not yet used and is configured as a standard slave in the ASiMon bus information must be selected.
- This function can be used to configure Safety I/O Modules before they are connected to the AS-i bus.



- The **Delete** button is only available if a Safety I/O Module is selected in the list. Click on Delete to remove the selected Safety I/O Module from the current configuration.
- Click on **Reload** to again search the AS-i bus for Safety I/O Modules; all found Safety I/O Modules are displayed in the **list of Safety I/O Modules**.
- The **Configure all...** button is used to send the configurations to all Safety I/O Modules. This takes place in the background; work on the configuration may continue. Click **Configure all...** to open a window for each Safety I/O Module for validating and releasing the configuration. The validator name and the password configured in the Safety I/O Module must be entered here. The settings can be accepted for the subsequent Safety I/O Modules by selecting the Apply for all check box. The status of the sending of the configuration is displayed in the lower area of the window. Following the configuration of a given Safety I/O Module, the configuration log appears in a separate window with the option to save or print it.

**Attention!**

By validating the configuration, you confirm as safety officer that the system is set up correctly and all safety-relevant regulations and standards for the application have been adhered to!


7.1.2 Configuration

In the configuration area, the Safety I/O Module currently selected in the list is configured. If no Safety I/O Module is selected in the list, the configuration area is deactivated.

Grayed-out options are not supported by the connected Safety I/O Module. You need a Safety I/O Module with a new software version to be able to use this option.

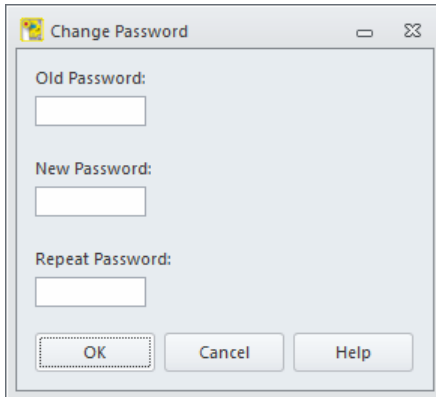
The configuration area is divided into the **Configuration**, **Inputs** and **Outputs** pages.

Configuration



The screenshot shows a configuration window with three tabs: 'Configuration', 'Inputs', and 'Outputs'. The 'Configuration' tab is selected. It contains two main sections: 'Name' and 'Configuration Address'. In the 'Name' section, 'Current name:' is 'Safety I/O Module' and 'New name:' is 'Safety I/O Module'. In the 'Configuration Address' section, 'Current configuration address:' is '1A' and 'New configuration address:' is '1A' with a dropdown arrow and a 'Change' button. Below these sections are several buttons: 'Change password...', 'Send configuration...', 'Receive protocol...', 'Delete device configuration', 'Factory reset', and 'Identify'.

- In the **Name** area, the name currently assigned to the Safety I/O Module is displayed and can be changed. The name of the Safety I/O Module is used for better distinguishing between multiple Safety I/O Modules.
- The Safety I/O Module is configurable on the AS-i bus under the configuration address. The configuration address can be changed here to a free standard slave address in the ASIMON bus information. The bus information can be called up and edited via the **Edit...** list entry.
- The **Change password...** button is used to change the password set in the Safety I/O Module. Click the button to open a new window for entering the old password and the new password. On delivery, the password is set to 0000. The password must be four digits long and may only contain the numbers 0 to 9.



Change Password

Old Password:

New Password:

Repeat Password:

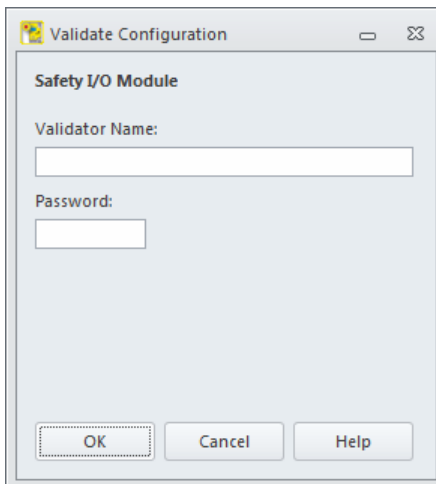
OK Cancel Help

- The **Send configuration...** button sends the current configuration to the Safety I/O Module, validates it and releases it so that the Safety I/O Module can start in safe operation. Click the button to open a window for entering the Validator name and the Password. After the configuration has been sent and successfully validated, the configuration log is displayed in a separate window. The log can be saved there in a file or printed on a printer.



Attention!

By validating the configuration, you confirm as safety officer that the system is set up correctly and all safety-relevant regulations and standards for the application have been adhered to!



Validate Configuration

Safety I/O Module

Validator Name:

Password:

OK Cancel Help

- Use the **Receive log...** button to receive the configuration log and display it in a separate window. The log can be saved there in a file or printed on a printer.

- Use the **Delete device configuration** button to delete the configuration stored in the Safety I/O Module.

Configuration log



Information!

The configuration log serves as safety-relevant documentation of the application. It contains all information about the configuration of the Safety I/O Module.

Example of a Safety I/O Module configuration log:

```

0000 ***** 0
0001 PARAMETER 8FI/1FO SaW Modul 1
0002 IDENT: Safety I/O Module 2
0003 ***** 3
0004 DEVICE SECTION 4
0005 ***** 5
0006 Monitor Version: 0.9 6
0007 Config Structure: 1.1 7
0008 PC Version: ASIMON DLL 8
0009 Download Time: 2012-10-24 14:07 9
0010 Validated: 2012-10-24 14:07 0
0011 by: "Test" 1
0012 Security Code: 97B4, Count: 89 2
0013 ***** 3
0014 ADDRESS SECTION 4
0015 ***** 5
0016 Input 0, Dry C, Adr.: 1 6
0017 Input 1, Dry C, Adr.: 2 7
0018 Input 2, OSSD, Adr.: 3 8
0019 Input 3, OSSD, Adr.: - 9
0020 Input 4, OSSD, Adr.: - 0
0021 Input 5, OSSD, Adr.: - 1
0022 Input 6, OSSD, Adr.: - 2
0023 Input 7, OSSD, Adr.: - 3
0024 Output, Adr.: 10 4
0025 Output Diag, Adr.: 11 A 5
0026 ***** 6
0027 Validated: 2012-10-24 14:07 7
0028 by: "Test" 8
0029 Security Code: 97B4, Count: 89 9
0030 ***** 0
0031 END OF CONFIGURATION 1
0032 ***** 2

```

- Line 0000...0003:** Header information of the configuration log
- Line 0002:** Name of the Safety I/O Module
- Line 0004...0013:** Information on the Safety I/O Module
- Line 0006:** Hardware version of the Safety I/O Module
- Line 0007:** Version of the configuration data
- Line 0008:** Name of the configuration tool
- Line 0009:** Time at which the saved configuration was transmitted
- Line 0010:** Time at which the saved configuration was validated
- Line 0011:** Name of the validator
- Line 0012:** Checksum of the configuration and the number of previous configurations for the Safety I/O Module
- Line 0014...0026:** Configuration of the inputs and outputs
- Line 0016:** Configuration of input 0 and safe AS-i address
- Line 0024:** Configuration of the safe output
- Line 0025:** Configuration of the output diagnostics
- Line 0026...0030:** Validation data repeated
- Zeile 0031...0032:** End of the configuration log
- Use the **Identify** button to instruct the Safety I/O Module to display a flashing sequence for several seconds to make it easier to identify the device.

Inputs

Configuration				Inputs	Outputs
Inputs					
Input	Actual	Type	AS-i Address		
S1/2	10	Dry Cont...	10		
S3/4	11	OSSD	11		
S5/6	12	OSSD	12		
S7/8	-	Dry Cont...	-		
S9/10	-	Dry Cont...	-		
S11/12	-	Dry Cont...	-		
S13/14	-	Dry Cont...	-		
S15/16	-	Dry Cont...	-		

The **inputs** of the Safety I/O Module are configured on this page. The currently set values and the values that are to be configured new are displayed.

A safe input always consists of two input terminals. Such an input is assigned a safe AS-i address on which a safe code sequence is output if the input is detected as switched on. An input can be configured as contact-based or electronic (OSSD input).

Outputs

Output	Actual	AS-i Address
O1	15	15
O1 Diagnosis	16A	16A

The **outputs** of the Safety I/O Module are configured here. The currently set values and the values that are to be configured new are displayed.

For each output there is a safe actuator output address and an optional unsafe diagnosis address. The color of the output can be read out via the diagnosis address.

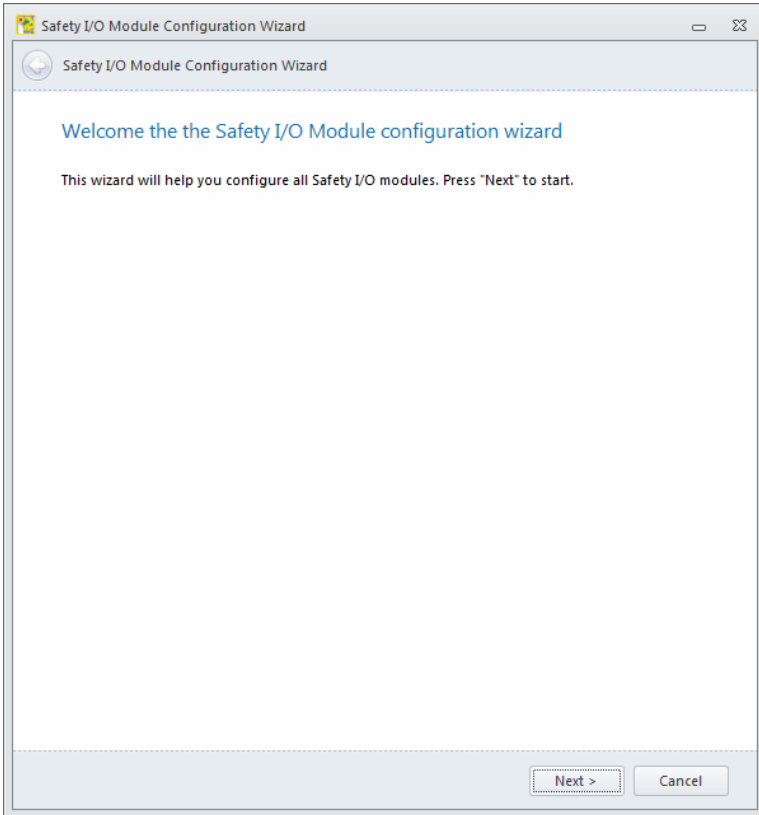
7.1.3 Status messages and progress

In this area of the window, the current status and error messages and the progress of a running process are displayed.

Two buttons are used for saving the configuration and for closing the window:

- Click the **OK** button to save the current configuration and close the window.
- Click **Cancel** to close the window without saving the configuration.

7.2 Configure all



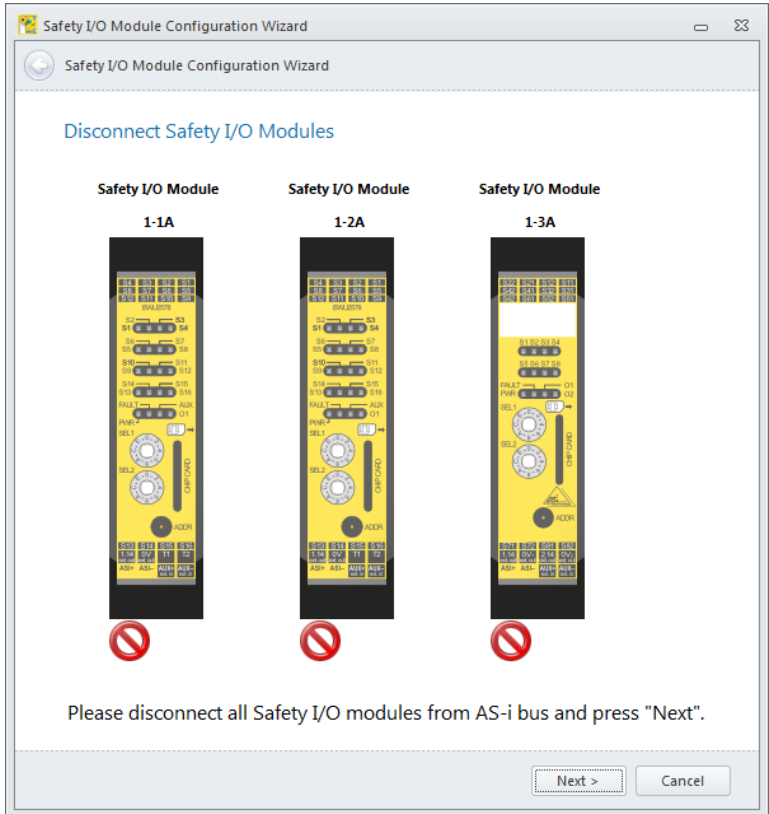
Information!

This mode is only available if a Safety I/O Module configuration has already been created.

In **Send configuration** mode, an already created configuration for one or more Safety I/O Modules is automatically sent to the Safety I/O Modules, validated and the configuration log read out. The user is guided through the configuration process step-by-step.

This mode is suitable for quickly commissioning preconfigured systems. The Safety I/O Modules may be in the state in which they were received on delivery; the correct AS-i address and the desired password are set automatically.

When the **Send configuration** mode is started, the user is prompted to disconnect all Safety I/O Modules from the bus. Once that has been done, click **Continue** to advance to the next step. You must now connect the Safety I/O Modules to the bus in sequence.

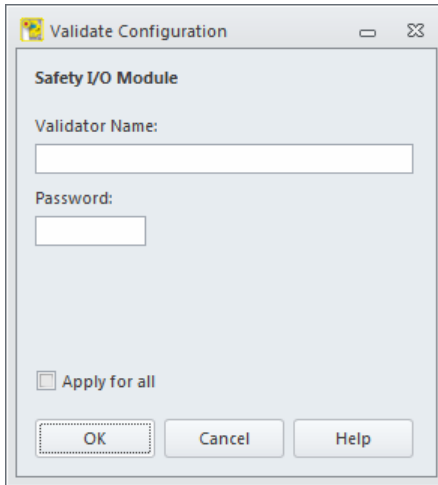




Information!

The Safety I/O modules must be either as shipped (configuration address is 0) or set to the correct configuration address. Any other configuration address will not allow the Safety I/O module to be found! In addition, the two rotary switches must be set to the 'E' position, otherwise the configuration slave is not visible.

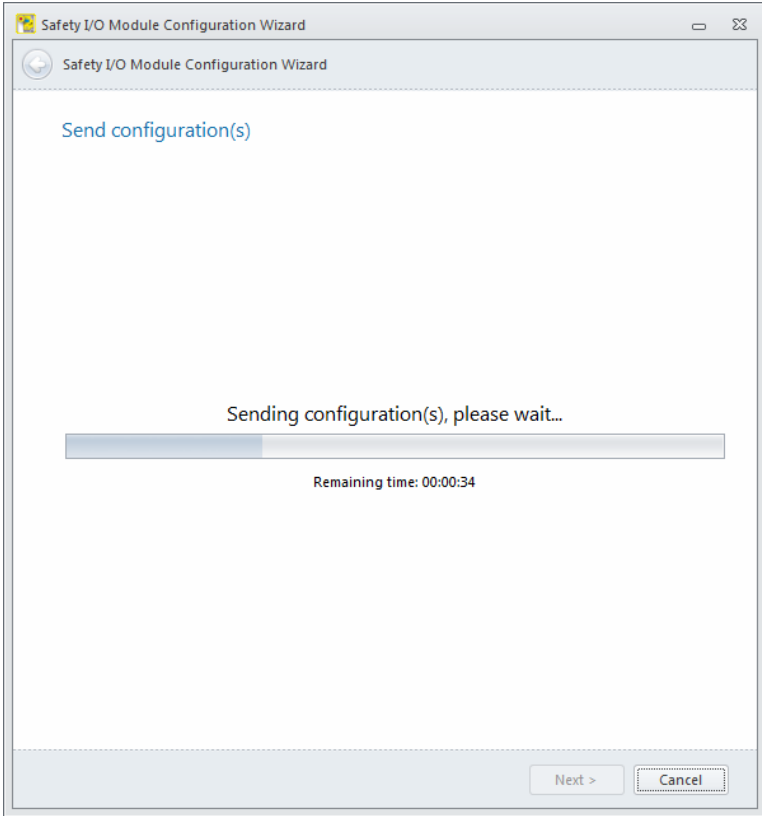
For each Safety I/O Module, the **name of the validator** and the **password** are queried. The settings made here can be applied to all other Safety I/O Modules that are to be configured.



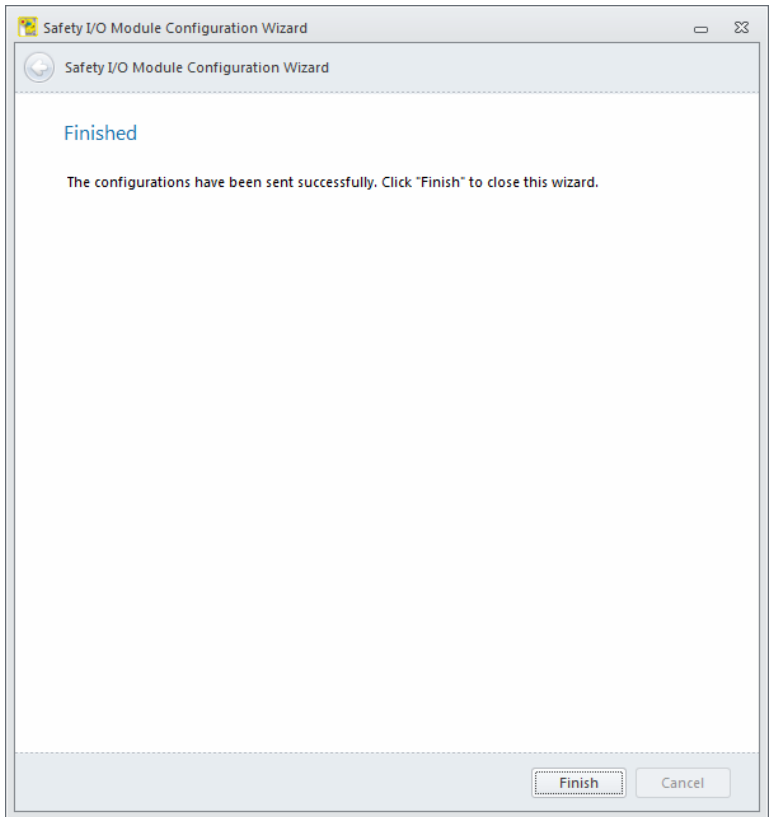
After all Safety I/O Modules have been connected, the program begins to write and validate the configurations in the Safety I/O Modules. Afterward, the **configuration log** is read for each Safety I/O Module and displayed in a separate window. Depending on the number of Safety I/O Modules and AS-i bus assignments, the configuration process may take some time, but occurs automatically upon connection of the last Safety I/O Module without any further interventions by the user. The remaining time is displayed.

**Attention!**

By validating the configuration, you confirm as safety officer that the system is set up correctly and all safety-relevant regulations and standards for the application have been adhered to!



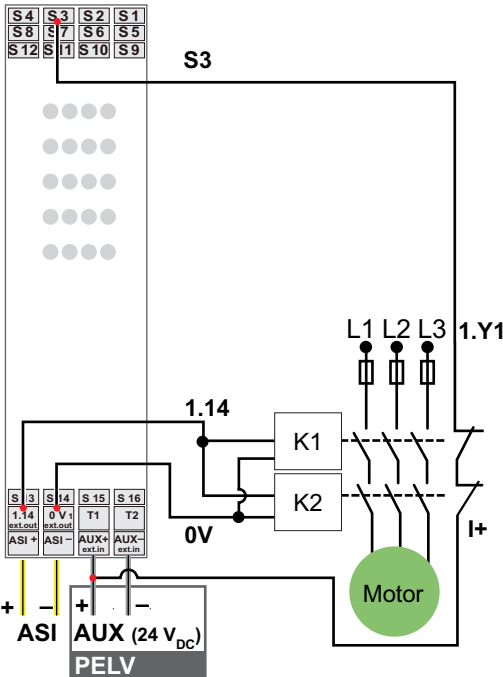
After configuring all Safety I/O Modules, the window can be closed via Finish.



8. Application examples

8.1 Connection examples

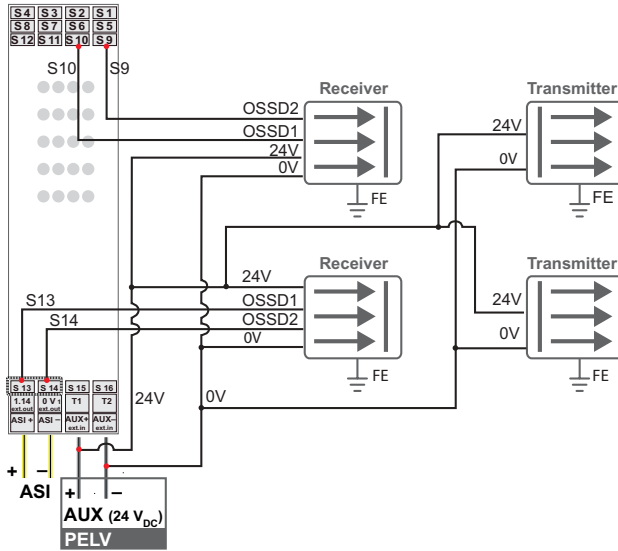
8.1.1 Connecting a safety contactor



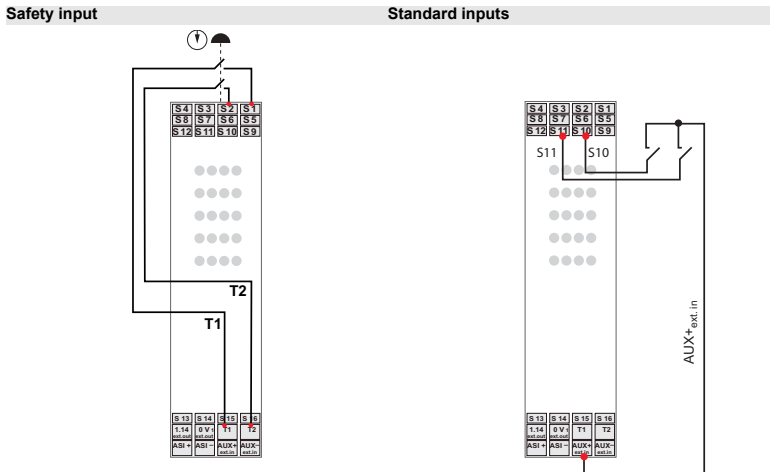
Caution!

Connect odd input clamps (S1, S3, ...) with T1 and even clamps (S2, S4, ...) with T2, if device inputs are configured as floating safe contacts!

8.1.2 Connecting OSSD



8.1.3 Additional connection examples



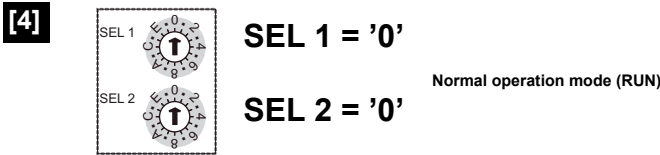
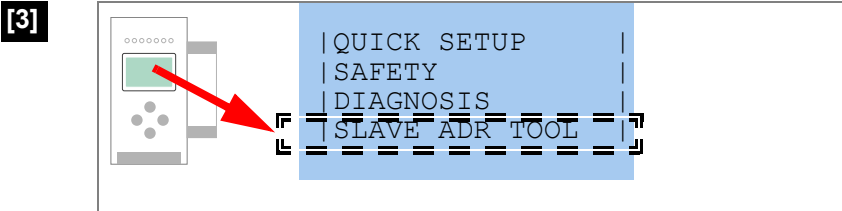
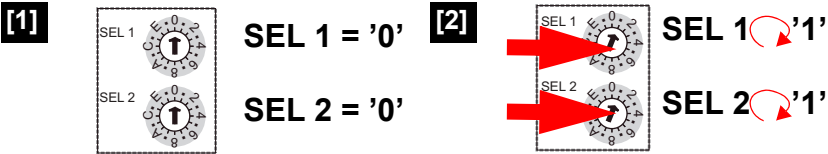
Tab. 8-8. Additional connection examples

Ausgabedatum: 26.09.2014

Application examples

8.2 Addressing via rotary switches

Example: Addressing of safe input 1

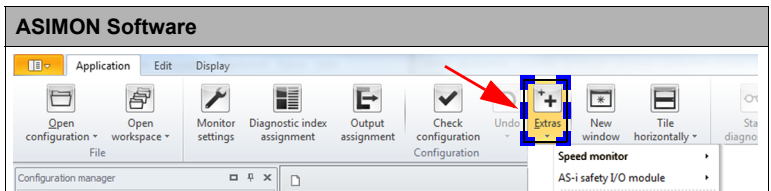
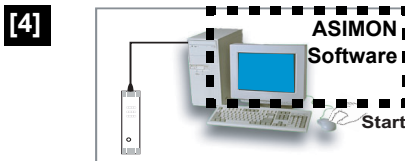
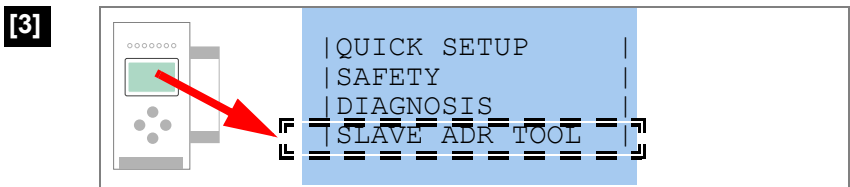
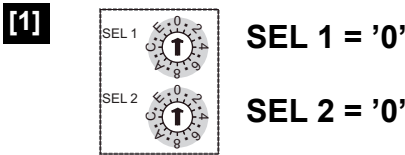


For further information, please refer to the documentation of your gateway.



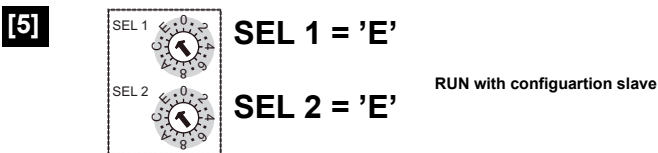
Addressing is possible also with hand addressing devices.

8.3 Safe configuration using ASIMON



Documentation

"ASIMON"



Ausgabedatum: 26.09.2014

8.4 Replacing a defective device



Caution!

Always turn off power before inserting or removing the card!

