ASIMON 3 G2

AS-i Safety Monitor

Configuration software for Microsoft®-Windows®

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1. General Information

1.1 About the ASIMON program

The software described here is intended for the configuration and commissioning of the AS-i Safety Monitor with the use of a PC.

By means of an easy-to-use user interface, the AS-i Safety Monitor can be configured in combination with safe AS-i slaves, such as emergency shutdown switches, safety gate switches, protective photo-electric sensors etc., within an AS-i bus system to provide safeguarding of the danger zones present at power-driven machinery.

The commissioning and documentation of your safety-oriented application are supported by **ASIMON 3 G2**.

○
⛭ *Information!*
A brief introduction to secure AS-i transmission can be found in the operating manual of the AS-i Safety Monitor.

This version of the **ASIMON 3 G2** configuration software has been developed for use under the Microsoft® Windows XP/Vista/Windows 7/Windows 8® operating systems.

1.2   Version information

The AS-i safety monitor and the corresponding **ASIMON 3 G2** configuration software have been further developed and their functionality enhanced since their production start in the year 2001.

Version 3.0 of the ASIMON 3 G2 configuration software includes the following new features:

- Support of safe AS-i transmission for **controlling safe AS-i actuators**
- **Coupling of multiple safe AS-i networks** through the function of the safety monitor as a safe input slave (only for new device types with safe AS-i output)
- **Multi-window technology** with graphical printout of the configuration for each window
- **Circuit diagram display of the logical links** from left to right
- **Extension of the device library** and restructuring of the monitoring devices
- New monitoring device: double channel dependent with filtering
- Definition of **user-specific functional devices**
- **Manual input of code sequences**
- Availability of the **standard out bits of the safe slaves** for operational switching tasks (acknowledgments, validations, unlocking, etc.)
- Diagnostics of the safe outputs
- Component manager for superior device overview
- Configuration manager to control multiple projects
- Muting device
- PROFIsafe device to control data from / to PROFIsafe
- Supports 'Safety Basis Monitor' configuration
- Support of 'Generation III' configuration
- SafeLink
- Logic for start devices
- Standstill monitor
- Augmented reliability
- Support of PROFIsafe gateway Safety Version 'SV4.3'
- Optimized printout of configuration files using the print manager
- Adding user comments
- Read and write AS-i parameters without additional PLC, e.g., for operating door locks (<*See "Standard slave parameter" on page 139*>)
- The zero-speed relay was enhanced with the speed monitoring function (<*See "Speed monitors" on page 439*>)
- "Color" diagnostics device (<*See "Device color" on page 183*>)
- Half-sequence detection. Diagnostics switches off a half sequence in the case of a safe slave without PLC in ASIMON. (<*See "Half-sequence detection" on page 149*>)
- Analog diagnostics slave. A diagnostics field is freely available to the user (page 32)
- System device - unsafe unit OK
  Simple monitoring of the unsafe parts in the Safety Basic Monitor. The system device is true as soon as the unsafe unit reports an error (<*See "System devices Safety Version 'SV4.4'" on page 301*>)

In addition to the features listed above, the current release also includes the following functions:

- AS-i Safety I/O Modules integrate multiple safe inputs and outputs in one device (page 467)
- Function for checking for which monitors the current configuration is suitable (page 312)

• Redesigned graphical user interface

1.3 Supported devices

The configuration software in the current version 3.0 supports the following device versions:

Function range - software								Function range - hardware							
Consortium Basic	Consortium Enhanced	Safety Basic Monitor	Enhanced/ Generation II 'SV3.0'	Generation II 'SV4.0 - 4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'	AS-i circuits	Devices	OSSDs	SaW outputs	SaW coupling	Local outputs	SafeLink	AS-i diagnostics output
–	Type 2							1	48	1	0	0	1	—	—
	Type 3							1	48	2	0	2 max.	2	—	—
		Type 8						1	128	8	8	8	4/8*1	—	—
			Type 4					1 + S*2	48	2	0	2 max.	2	—	—
				Type 5				2	256	16	16	16	2	—	—
				Type 6				2	256	16	16	16	2 + 2	—	—
					Type 9			2	256	32	32	32	2+2	yes	32
						Type 7		2	192	64	64	62	2 + 2	—	—
							Type 7	2	256	64	64	62	2 + 2	—	—

*1   Safety Basis Monitor supports up to 4 safe inputs. Optionally the safe inputs will be used as well as standard inputs (8 max.) and message outputs (8 max.)

*2   Coupling slave on the 2nd AS-i circuit

1.3.1 Availability of the devices

In the tables below you can see the difference according to the availability of the individual devices depending on the software function range:

Supported monitoring devices

	Function range - software								
	Safety Basis Monitor 'SV4.2'	Safety Basic Monitor 'SV4.3'	Safety Basis Monitor 'SV4.4'	Generation II 'SV4.0'	Generation II 'SV4.1'	Generation II 'SV4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'
Monitoring devices									
Double channel forced safety input	✓	✓	✓	✓	✓	✓	✓	✓	✓
Double channel dependent safety input	✓	✓	✓	✓	✓	✓	✓	✓	✓
Double channel dependent with debouncing	✓	✓	✓	✓	✓	✓	✓	✓	✓
Double channel dependent with filtering	✓	✓	✓	–	✓	✓	✓	✓	✓
Double channel conditionally dependent	✓	✓	✓	✓	✓	✓	✓	✓	✓
Double channel independent	✓	✓	✓	✓	✓	✓	✓	✓	✓
Internal speed monitor	–	–	✓	–	–	–	–	–	–
Safe output monitor	–	–	✓	–	–	–	–	–	–
Cross-communication input	–	–	–	–	–	–	✓	–	–
Standard slave	✓	✓	✓	✓	✓	✓	✓	✓	✓
Standard slave parameter	–	–	✓	–	–	–	–	–	–
Monitor input	✓	✓	✓	✓	✓	✓	✓	✓	✓
Button	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOP	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zero sequence detection	✓	✓	✓	✓	✓	✓	✓	✓	✓
Half-sequence detection	✓	✓	✓	✓	✓	✓	✓	✓	✓
Output F-CPU	–	–	–	–	–	–	–	✓	✓
Fieldbus bit	–	–	✓	–	–	–	✓	✓	✓
Standstill monitor	–	✓	✓	–	–	–	–	–	–
Remote output diagnostics	✓	✓	✓	✓	✓	✓	✓	✓	✓

Supported logic devices

	Function range - software								
	Safety Basis Monitor 'SV4.2'	Safety Basic Monitor 'SV4.3'	Safety Basis Monitor 'SV4.4'	Generation II 'SV4.0'	Generation II 'SV4.1'	Generation II 'SV4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'
Logic devices									
OR gate	✓	✓	✓	✓	✓	✓	✓	–	✓
AND gate	✓	✓	✓	✓	✓	✓	✓	–	✓
XOR gate	–	–	✓	–	–	–	–	–	–
R/S FlipFlop	✓	✓	✓	✓	✓	✓	✓	–	✓
Switching delay (switch-on delay variant)	✓	✓	✓	✓	✓	✓	✓	–	✓
Switching delay (switch-off delay variant)	✓	✓	✓	✓	✓	✓	✓	–	✓
Pulse generator on positive edge	✓	✓	✓	✓	✓	✓	✓	–	✓
NOT gate	✓	✓	✓	–	–	✓	✓	–	✓
Flashing	–	✓	✓	–	–	–	✓	–	✓
Color device	–	–	✓	–	–	–	–	–	–
Muting device	✓	✓	✓	–	✓	✓	✓	–	✓

Supported EDM devices

	Function range - software								
	Safety Basis Monitor 'SV4.2'	Safety Basic Monitor 'SV4.3'	Safety Basis Monitor 'SV4.4'	Generation II 'SV4.0'	Generation II 'SV4.1'	Generation II 'SV4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'
EDM circuit devices									
EDM circuit	✓	✓	✓	✓	✓	✓	✓	–	✓
EDM circuit with standard slave	✓	✓	✓	✓	✓	✓	✓	–	✓
EDM circuit for dependent, second OSSD	✓	✓	✓	✓	✓	✓	✓	–	✓
EDM circuit with standard slave for dependent, second OSSD	✓	✓	✓	✓	✓	✓	✓	–	✓

Supported start devices

	Function range - software								
	Safety Basis Monitor 'SV4.2'	Safety Basic Monitor 'SV4.3'	Safety Basis Monitor 'SV4.4'	Generation II 'SV4.0'	Generation II 'SV4.1'	Generation II 'SV4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'
Start devices									
Automatic start	✓	✓	✓	✓	✓	✓	✓	–	✓
Monitored start - standard slave	✓	✓	✓	✓	✓	✓	✓	–	✓
Monitored start - monitor input	✓	✓	✓	✓	✓	✓	✓	–	✓
Monitored start - safe input slave	✓	✓	✓	✓	✓	✓	✓	–	✓
Activation via standard slave	✓	✓	✓	✓	✓	✓	✓	–	✓

	Function range - software								
	Safety Basis Monitor 'SV4.2'	Safety Basic Monitor 'SV4.3'	Safety Basis Monitor 'SV4.4'	Generation II 'SV4.0'	Generation II 'SV4.1'	Generation II 'SV4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'
Activation via monitor input	✓	✓	✓	✓	✓	✓	✓	–	✓
Start by device	–	✓	✓	–	–	–	✓	–	✓
Activation by device	–	✓	✓	–	–	–	✓	–	✓

Supported output devices

			Function range - software						
	Safety Basis Monitor 'SV4.2'	Safety Basic Monitor 'SV4.3'	Safety Basis Monitor 'SV4.4'	Generation II 'SV4.0'	Generation II 'SV4.1'	Generation II 'SV4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'
Output devices									
Stop category 1 - message and delayed relay output	✓	✓	✓	✓	✓	✓	✓	–	✓
Stop category 0	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop category 1 - two relay outputs	✓	✓	✓	✓	✓	✓	✓	–	✓
Door lock by means of zero-speed relay and delay time	✓	✓	✓	✓	✓	✓	✓	–	✓
Door lock by means of zero-speed relay and delay time with stop category 1	✓	✓	✓	✓	✓	✓	✓	–	✓
Door lock by means of delay time	✓	✓	✓	✓	✓	✓	✓	✓	✓
Door lock by means of delay time with stop category 1	✓	✓	✓	✓	✓	✓	✓	✓	✓
Input F-CPU	–	–	–	–	–	–	–	✓	–

Supported system devices

	Function range - software								
	Safety Basis Monitor 'SV4.2'	Safety Basic Monitor 'SV4.3'	Safety Basic Monitor 'SV4.4'	Generation II 'SV4.0'	Generation II 'SV4.1'	Generation II 'SV4.2'	Generation II 'SV4.3'	PROFIsafe 'SV4.0'	PROFIsafe 'SV4.3'
System devices									
True	✓	✓	✓	✓	✓	✓	✓	✓	✓
False	✓	✓	✓	✓	✓	✓	✓	✓	✓
State of output switching element	✓	✓	✓	✓	✓	✓	✓	–	✓
State of message output	✓	✓	✓	✓	✓	✓	✓	–	✓
State of OSSD	✓	✓	✓	✓	✓	✓	✓	–	✓
State of devices before start	✓	✓	✓	✓	✓	✓	✓	–	✓
Colors of all devices	–	✓	✓	–	–	–	✓	–	✓
AS-i config error	–	–	✓	–	–	–	–	–	–
AS-i periphery error	–	–	✓	–	–	–	–	–	–

Compatibility

With version 3.0 of the **ASIMON 3 G2** configuration software, old configurations from version 1 and version 2 and the consortium version 3 can be opened, edited and saved.

> **Information!**
> **ASIMON** *configuration files have the extension* ***.ASI** *(version 1 AS-i safety monitors),* ***.AS2** *(version 2 AS-i safety monitors),* ***.AS3** (**ASIMON3** *consortium version),* ***.AS3BW** (**ASIMON 3 G2** *B+W version).*

1.4   Explanation of symbols

The symbols used in this manual are explained below.

Attention!
Pay attention to passages marked with this symbol. Failure to observe the provided instructions could lead to personal injury or damage to equipment.

Information!
This symbol indicates text which contains important information.

1.5   Definition of terms

Output switching element (safety output) of the AS-i safety monitor

Element activated by the logic of the monitor which is able to safely switch off the downstream control elements. The output switching element may switch to or remain in the ON state only when all components are functioning as intended.

Output circuit

Consists of the two logically connected output switching elements.

OSSD (release circuit)

The safety-oriented AS-i components and functional devices assigned to an output circuit of the AS-i safety monitor. They are responsible for releasing the machine element which generates the dangerous movement.

Integrated slave

Component with which sensor and/or actuator functions are grouped together with the slave into a unit.

Configuration operation

Operating state of the safety monitor in which the configuration is loaded and checked.

Master

Component for data transmission which controls the logical and temporal behavior on the AS-i line.

Protective operation

Operating state of the safety monitor in which the sensors are monitored and the output switching elements are switched.

Safety output

See output switching element.

Safety-oriented output slave

Slave to which the safety-oriented ON or OFF state is transferred by the safety monitor and which controls a safe actuator for switching off or shutting down while under voltage.

Safety-oriented input slave

Slave which reads in the safety-oriented ON or OFF state of the connected sensor or command device and transmits it to the master or safety monitor.

Safety-oriented slave

Slave for connecting safety-oriented sensors, actuators and other devices.

Safety monitor

Component which monitors the safety-oriented slaves and the correct function of the network.

Slave

Component for data transmission; the master cyclically addresses this component by its address. Only then does it generate an answer.

Standard slave

Slave for connecting non-safety-oriented sensors, actuators and other devices.

Synchronization time

The maximum permissible temporal offset between the occurrence of two events which are dependent on one another.

ON state

Switched on, logical "1", TRUE.
This state means that the device has agreed to validate the circuit, i.e. to activate the safety switching outputs. Depending on the device type, various conditions must first be met.

OFF state

Switched off, logical "0", FALSE.
This state means that the device has not agreed to validate the circuit, i.e. it results in the switching off of the safety switching outputs.

1.6 Abbreviations

AS-i   Actuator Sensor Interface

AOPD   Active Optoelectronic Protective Device

EDM   External Device Monitoring

OSSD   OSSD (Output Signal Switching Device)

PLC   Programmable Logic Control

SV   Safety Version Number

2. Installation of hardware and software

2.1 Hardware

2.1.1 Prerequisites

To configure the AS-i Safety Monitor via a PC, you will need:

- an AS-i Safety Monitor
- the interface cable for connecting the PC and AS-i Safety Monitor
- a PC or a laptop with the following minimum requirements:
    - an Intel® processor at Pentium® level
      (or compatible models, e.g. AMD® or Cyrix®)
    - a CD-ROM drive for installing from CD-ROM
    - a mouse (recommended)
    - a free RS 232 (serial) interface with 9-pin Sub-D connection or a network interface card.

⚠ *Attention!*
When using an USB-RS 232 interface converter or a serial interface card, communication problems may occur with the safety monitor.

2.1.2   Connection between the AS-i safety monitor and the PC

Information!
The connection of the AS-i Safety Monitor to the PC is described here only briefly. Detailed information can be found in the operating manual for the AS-i Safety Monitor.

To configure the AS-i Safety Monitor with **ASIMON 3 G2**, you must connect your PC and the AS-i Safety Monitor using the serial interface cable (available as accessory) or a network cable.

Attention!
Use only the interface cable which is available as an accessory. The use of a different cable may lead to data loss or damage to the connected AS-i Safety Monitor!

• Connection of monitors with a RJ 45 socket

To connect, plug the interface cable end with the RJ 45 connector into the 'CONFIG' socket on the front of the AS-i Safety Monitor and the other end with the 9-pin Sub-D socket connector to a free COM port (serial RS 232 interface) on your PC.

• Connection of monitors with a RS 232 socket

To connect, plug the diagnostic cable end with the PS/2 connector into the socket of the diagnostic interface (RS 232) of the AS-i safety monitor and the other end with the 9-pin Sub-D socket connector to a free COM port (serial RS 232 interface) on your PC.

Information!
If the connection between the AS-i Safety Monitor and the PC is already established when the PC is started, the mouse cursor may move erratically about the screen.
Remedy:
• When starting the PC, unplug the connection cable between the PC and the safety monitor.
• Change the start behavior of the PC (see user documentation for the PC or that of the operating system manufacturer).

2.2   Software

2.2.1   System requirements

The following system requirements are necessary for the AS-i Safety Monitor configuration software:

- at least 32 MB free main memory (RAM)
- at least 500 MB free hard disk memory
- Microsoft® Windows XP/Vista/Windows 7/Windows 8® as operating system

2.2.2   Installation

To install the configuration software, you need the installation CD-ROM.

Upon execution of the setup program *setup.exe* on the installation CD-ROM, a self-explanatory installation routine is started. After the installation, the program is ready to be started.

3. First steps

Information!
Connect the interface cable to the PC and the safety monitor as described in chapter "Supported devices". Switch on the power supply for the safety monitor before starting the configuration software. Data transmission is otherwise not possible.
However, even if the safety monitor is not connected to the PC, you may still define device configurations and save them on your PC or edit a previously saved device configuration. However, in this case time delays may occur at certain points since the program is trying to establish a connection with the monitor.

3.1   Starting the program

To start the configuration software for the AS-i Safety Monitor, select from the **Start** menu the **ASIMON** item, which is located in the program folder you specified during installation.

After the program has started, the window with the **ASIMON 3 G2** configuration software user interface appears on the screen. When the program is started, the **Start Assistant** is called up to guide you through the first steps following program startup.

1 Start Assistant window

2 Menu bar

3 Tool bar

4 State/Info bar
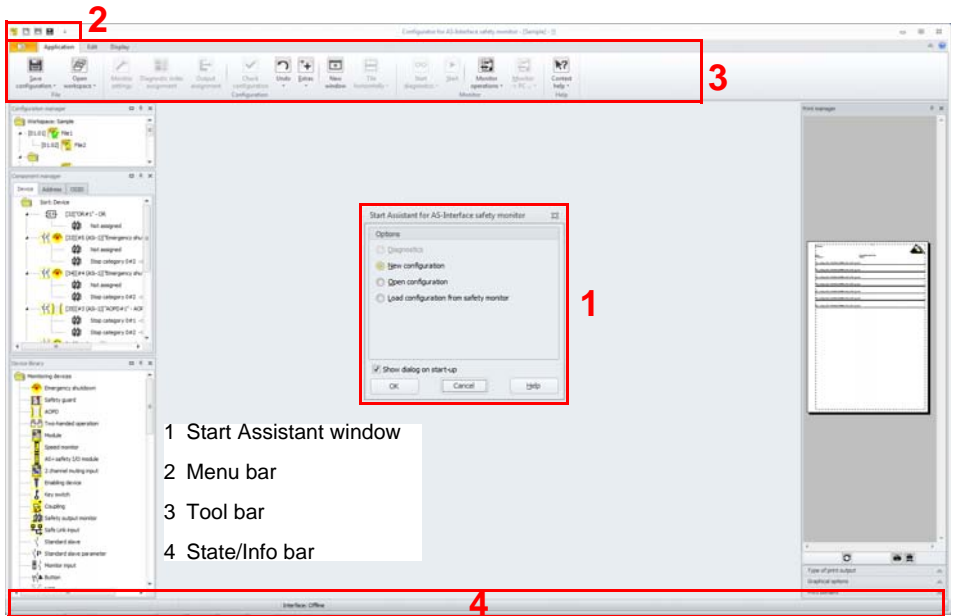
Fig.: User interface of the **ASIMON 3 G2** configuration software after starting the software

Start Assistant

> *Information!*
> *In order to query the diagnostic information, the connected AS-i Safety Monitor must be in protective operation.*

> *If a connection to the AS-i Safety Monitor cannot be established on program startup (no AS-i Safety Monitor connected, connected to wrong interface etc.) or if the connected AS-i Safety Monitor is in configuration operation, the* **Diagnostics** *option is deactivated.*
>
> *In this case, it is only possible to create a new configuration, load and edit a configuration which has been saved on a data carrier or for troubleshooting (see chapter 6.5 "Troubleshooting and error rectification").*

Option **Diagnostics**

When you select the **Diagnostics** option, first a window opens with the following query:
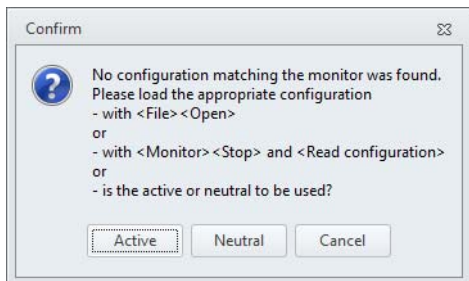
Fig.: Query with the **Diagnostics** option

By clicking **Neutral**, the diagnostic information of the connected AS-i Safety Monitor is queried, even if no configuration is loaded in **ASIMON 3 G2**.

> *Information!*
> *Querying the diagnostic information of an unknown configuration can take several minutes, as the configuration of the connected AS-i Safety Monitor must be reconstructed in* **ASIMON 3 G2**. *In this way you can load an unknown configuration without needing to exit protective operation.*

Next, the Diagnostics window opens (see chapter 6.1 "Diagnostics").

Option **New configuration**

With the **New configuration** option, you can create a completely new configuration for the AS-i Safety Monitor. First, you must enter the base data for the new configuration in the **Monitor settings** window. This window is displayed automatically.

> **Information!**
> The **Monitor settings** *window can be called up at any time. Select* **Monitor settings** *on the ribbon or click on the* 🔧 *button.*

> **Information!**
> *If a valid configuration has been loaded to or from an AS-i Safety Monitor, the time at which the current configuration in the program was transmitted to the AS-i Safety Monitor is shown in the* **Download time** *window area.*

In the **Monitor information** tab, you must enter a title for the configuration, select the operating mode, specify whether a safety AS-i output exists and specify the function range of the AS-i safety monitor.
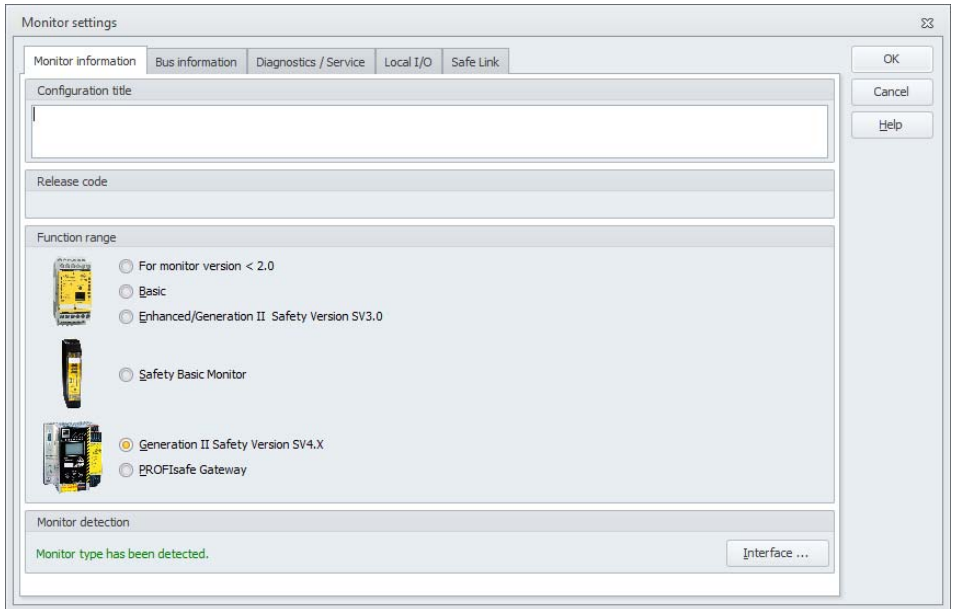
Fig.: **Monitor settings** window, **Monitor information** tab

If "**PROFIsafe**" is selected as monitor mode, a radio button appears to the side for the Safety Version of the PROFIsafe Gateway. This must be set correctly in order for the configuration to match the device.

Information!
To convert PROFIsafe configurations with Safety Version < 'SV4.3' to a configuration with ***SV4.3***, *the Safety Version* $\geq$ ***SV4.3*** *check box must be selected and OK must be clicked. No automatic conversion takes place during the download. This conversion cannot be undone!*

Automatic generation of a safety configuration from the input slaves selected in the bus configuration is offered when the dialog is closed with <OK>.

If the configuration is still empty, an additional four OSSDs (1 - 4) are created for the monitor outputs and the four monitor inputs are linked to the first four fieldbus bits. The OSSD for the slave addresses are consecutively numbered in descending order beginning with 64. If too many slaves are present (more than 62) or if a PROFIsafe bit is already occupied in the safety configuration, no safety configuration can be generated for the corresponding slaves. In this case, a corresponding error message is issued.

The assignments of slave address, OSSD and PROFIsafe bit, as well as monitor input and fieldbus bit, are as follows (example):

Addr	OSSD	PROFIsafe bit (F-Input)
2-31	64	63
2-1	63	33
1-31	62	31
1-1	61	1

PROFIsafe bit (F-Output)	OSSD
1	1
2	2
3	3
4	4

Monitor input	Fieldbus bit
1.Y2	1
1.Y2	2
2.Y1	3
2.Y2	4

Configuration title

In this field, enter a title for the new configuration. The title may contain up to 63 characters.

Monitor detection

When creating a new configuration ASIMON tries to detect the monitor type automatically to adjust the function range.

If the monitor type has been detected correctly, the message "Monitor type has been detected" will be printed in green color (see fig. <Monitor settings window, Monitor information tab>).

In the case the communication interface has been set up incorrectly, it could be corrected pressing the **Interface** button.

Function range

Here, enter the function range of the AS-i Safety Monitor which is to be configured (see also table "Supported devices", on page 11).

On the **Bus information tab**, you must enter the AS-i bus addresses of the used standard slaves and the safety-oriented AS-i slaves which are present in this AS-i network.

If the option **Select output and coupling slaves** is activated, actuator and coupling slaves can be selected additionally. In this case only selected slaves are visible in the output device. If the option is not selected, only free slaves can be selected in the output devices.

Safe output is an actuator slave that is produced by another device and which is to be evaluated in the configuration by a monitoring device.
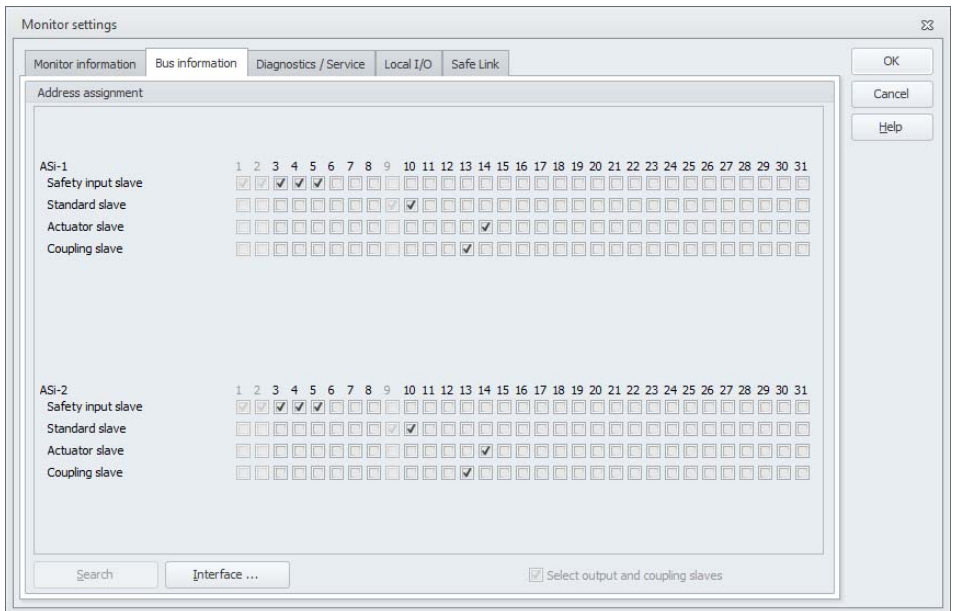
Fig.: **Monitor settings** window, **Bus information tab**

⚠️ ***Attention!***
If you would like to operate two or more AS-i Safety Monitors on the same AS-i bus, you must enter for all AS-i Safety Monitors all safe slaves on this AS-i bus in the Bus information tab even when they are not monitored by the given AS-i Safety Monitor.

🔵 ***Information!***
If you want to configure speed monitors later (see chapter 8. "Speed monitors"), you must first enter here all addresses (safe and unsafe) necessary for the speed monitors so that you can use them later in the configuration tool.

With the **Search** button, you can also search the AS-interface bus for slaves when the AS-i Safety Monitor is in configuration operation.

With the **Interface** button, you can change the interface for the monitor connection before the search.

🔵 ***Information!***
The AS-i slaves found when searching the AS-i bus are first all listed in the **Bus information** *tab as standard. You must then manually assign each as safe/standard!*

If you clicked the **Simulate slaves** check box on the **Diagnostics / Service** tab, two or four bus addresses are automatically assigned for the simulated slaves and the corresponding check box de-activated. In order to be able to activate **Simulate slaves**, the one or three addresses which follow the monitor address must be free.

On the **Diagnostics / Service** tab, you can make service settings for Diagnostics stop and for Error unlock as well as configure the diagnostics via the AS-i bus.

Via the **AS-i Slave for Fieldbus Bits** check box, another analog slave is set on the address after the last monitor slave if monitor diagnostics is selected. With the help of this analog slave, 16 fieldbus bits can be displayed and processed. In addition, the occupied slave addresses are also displayed.

🔵 ***Information!***
This function is only available for Safety Basic Monitors beginning with Safety Version 'SV4.4'!
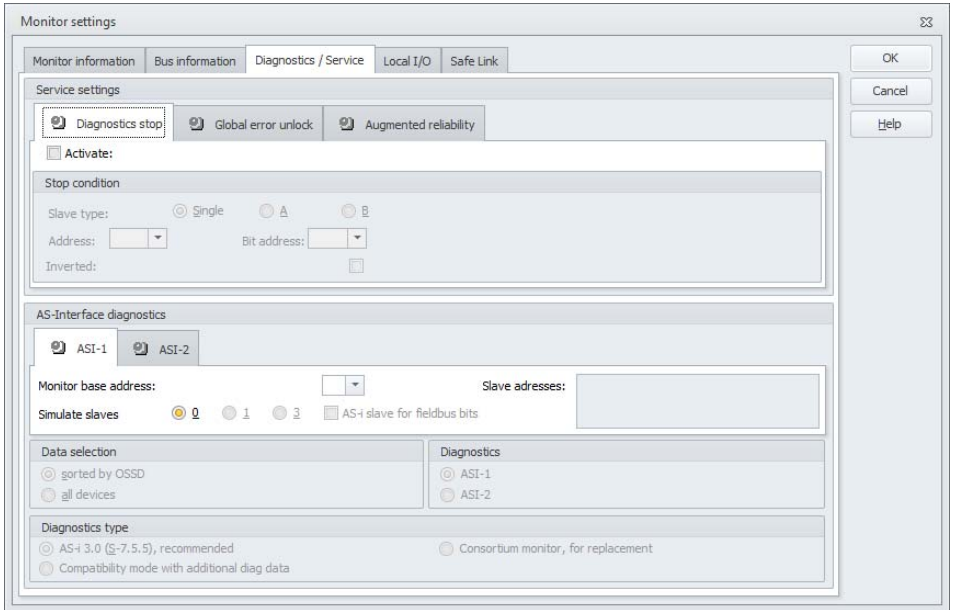
Fig.: **Monitor settings** window, **Diagnostics / Service** tab

Service settings, **Diagnostics stop** sub-tab
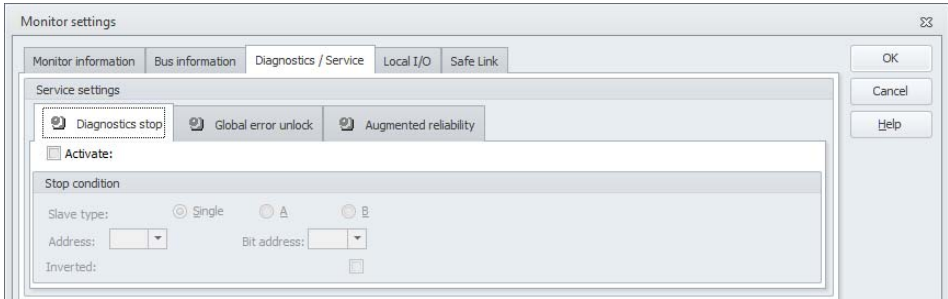
Fig.: **Diagnostics stop** sub-tab of the **Diagnostics / Service** tab

A **diagnostics stop** means the monitoring devices are stopped after shut-off in a ready state (Diagnostics LED yellow, waiting for confirmation).

This function is quite helpful for example with very brief shut-off events in detecting which device, and thereby which safety input slave, was responsible for the shut-off.

Clicking on the **Activate** box activates the **Diagnostics stop** function.

If the AS-i single/A/B slave specified under "Stop condition" is in the **ON** state, the **Diagnostics stop** is carried out when a monitoring device is shut off. By switching to the OFF state, the **Diagnostics stop** is acknowledged and deactivated.

The diagnostics stop does not function when reset is activated. The **Diagnostics stop** is level-sensitive and deactivated when the specified AS-i Single-/A-/B- Slave does not have bus communication.

Information!
Beginning with Safety Version 'SV4.3', local inputs can also be used for the Diagnostics stop.

Information!
For additional information on calling up diagnostic information see chapter 6. "Diagnostics and error handling" and chapter 7. "AS-i Safety Monitor diagnostics".

Service settings, **Error unlock** sub-tab
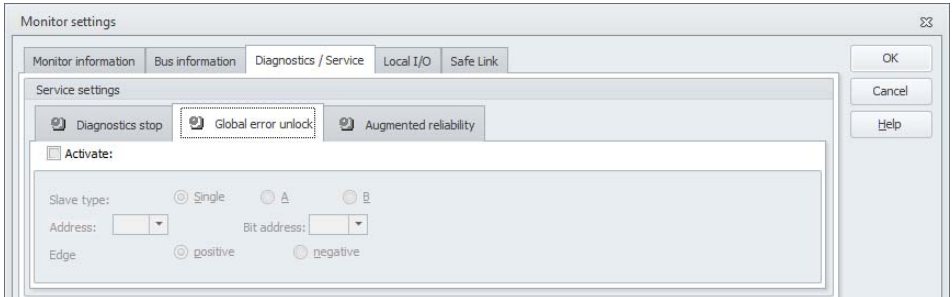
Fig.: **Error unlock** sub-tab of the **Diagnostics / Service** tab

By selecting the **Activate** check box, the global error unlock via one of the single/A/B slaves connected to the AS-i bus is activated.

If a device detects an error, the AS-i Safety Monitor enters the error state. The error state is locked (error lock). With versions of the AS-i Safety Monitor before 2.0, the error state can be rectified only by resetting the AS-i communication or by resetting the AS-i Safety Monitor by switching off and then switching back on the AS-i Safety Monitor or by pressing the Service button on the AS-i Safety Monitor.

As of version 2.0 of the AS-i Safety Monitor, the error unlock (Reset) can be handled in various ways. Error unlock can be activated by a single/A/B AS-i slave, e.g. a button, and acts only on a device level. Thus, the complete safety monitor is not reset, but rather only the device locked in the error. For a safety monitor with two independent OSSDs, therefore, only that OSSD is reset in which the device locked in the error is configured.

○
Ⓘ   *Information!*
*Beginning with Safety Version 'SV4.3', local inputs can also be used for the **Error unlock**.*

Service settings, **Augmented reliability** sub-tab (from Safety Version 'SV4.3' on)

If 'Safety Basic Monitor' or ''Generation II Version 4.x'' has been selected in the window **Monitor settings**, the **Augmented reliability** tab will be displayed additionally:
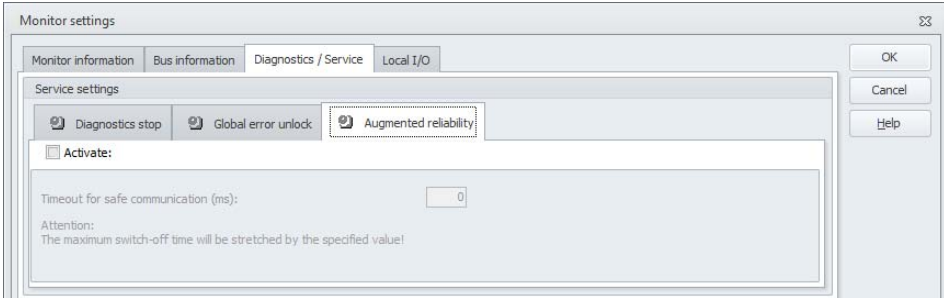
Fig.: **Augmented reliability** sub-tab of the **Diagnostics / Service** tab

Clicking on the **Activate** box activates the Augmented reliability function.

The timeout for **safe communication** determines the time after which a slave is declared to be *not* present if no response is received. The timeout is restricted to a maximum of 10 seconds.

• If **Augmented reliability** is not activated, the maximum reaction time of the safety monitor is specified as indicated in the operating manual.
• As soon as **Augmented reliability** is activated, the maximum reaction time of the device is calculated as follows:
max. reaction time = (timeout for safe communication x 1.2) - 20 ms + value specified in the operating manual.

> *Information!*
> *In the event of a slave failure, the shut-off time of safe communication is extended by the maximum reaction time!*

> *Information!*
> *The augmented reliability is very well suited to buffer telegram errors on the AS-i bus, but it does not delay a switch off when the 0 sequence is send for a slave.*

Example:

AS-i Safety E-STOP button module on a local relay output:

Timeout for safe communication = 20 ms

Max. reaction time = (20 ms x 1.2) - 20 ms + 40 ms + t_{E-STOP} = 44 ms + t_{E-STOP}

> *Information!*
> *Examples for the reaction times of our devices can be found in chapter 10.5 "Reaction times".*

AS-i diagnostics

Monitor base address

You can assign an AS-i bus address for the AS-i Safety Monitor. In this case, it is possible to query diagnostic information about the AS-i bus from your AS-i master (e.g. the PLC). If you do not assign an AS-i bus address, the AS-i Safety Monitor functions strictly as a "listener", i.e. only as a monitor on the bus. It is not possible to communicate with the safety monitor via AS-interface in this case. However, only the AS-i circuit selected for the **Diagnostics** operation can be used to communicate with the monitor.

For assigned monitor base addresses, you can set under **Data selection** whether the diagnostic data are to be output via AS-i **sorted by OSSD** or are to be left unsorted (**all devices**) (see chap. 7.). This option has an effect with standard diagnostics only, however.

> *Information!*
> *When performing diagnostics via the AS-i, the PLC is informed of the indices of the devices which are switched off. Previously, if a device was pasted to or deleted from the configuration, all subsequent indices were moved. As a result, it was necessary for the user to modify the diagnostics program in the PLC.*
> *In the* **Application** *menu of* **ASIMON** *version 2.1, you can now use the* **Diagnostics index assignment …** *menu item to freely assign the diagnostics indices to the devices for AS-i diagnostics (see chapter 7.2 "Assignment of the AS-i diagnostics indices").*

Diagnostics type

With the Safety Basic Monitor, it is possible to reset the diagnostics type to **Compatibility mode with additional diag data**. This mode differs for emulated slaves 3 and 4 of the consortium monitors, however; see table **"Consortium diagnostics with S-7.3 extension" on page 436**.

For Safety Basis Monitors beginning with Safety Version 'SV4.3', it is, however, also possible to select the **Consortium monitor, for replacement** diagnostics type. In this operating mode, the slaves with addresses 3 and 4 also behave identically to the consortium monitor.

Simulate slaves

If less than five safe or unsafe AS-i slaves are connected to the AS-i bus, you must set **Simulate slaves** to non-zero in order for the AS-i Safety Monitor to function correctly.

> *Information!*
> *If* **Simulate slaves** *is set unequal to zero, either 1 or 3 additional AS-i slaves are simulated internally. These slaves are automatically assigned the first or first three bus address(es), respectively, which follow on the AS-i safety monitor.*

If the **Simulate slaves** function is activated (number of simulated slaves: 1 or 3), the state of the relay- and message outputs can be queried by the AS-i master (PLC) via the AS-i at **monitor base address+1**, data bits **D3 … D0**. Bit state 0 identifies an inactive output, bit state 1 an active output, corresponding to the substitute value in the process image of the AS-i master.

According to this, the AS-i Safety Monitor occupies a different number of bus addresses in the AS-i network:

Number of occupied bus addresses	Meaning
0	No bus address was assigned to the AS-i Safety Monitor. No communication and, thus, no diagnostics possible via AS-i with the safety monitor.
1	One bus address was assigned to the AS-i Safety Monitor. Diagnostics possible via AS-i with the safety monitor. Number of simulated slaves equal to **0**.
2	One bus address was assigned to the AS-i Safety Monitor. Diagnostics possible via AS-i with the safety monitor. Number of simulated slaves equal to **1**. State of output circuits / message outputs 1 and 2 can be accessed via AS-i at **monitor base address+1**.
4	One bus address was assigned to the AS-i Safety Monitor. Diagnostics possible via AS-i with the safety monitor. Number of simulated slaves equal to **3**. State of output circuits / message outputs 1 and 2 can be accessed via AS-i at **monitor base address+1**. State of output circuits / message outputs 3 and 4 can be accessed via AS-i at **monitor base address+2**.

A description of the diagnostics options offered by the monitor slaves can be found in chap. 7.

Data of the different diagnostics modes (Safety Basic Monitor only)			
	AS-i 3.0 (S-7.5.5), recommended	Consortium monitor, for replacement	Compatibility mode with additional diagnostics data
Base addr.	**S-7.5** communication (see chap. 7.5)	consortium diagnostics (see chap. 7.3)	consortium diagnostics (see chap. 7.6)
Simulated slave 1 Base addr+1	state OSSD1+OSSD2	state OSSD1+OSSD2	state OSSD1+OSSD2
Simulated slave 2 Base addr+2	**S-7.F** slave, input data = 0	**S-7.F** slave, input data = 0	**S-7.3.0.C** slave
Simulated slave 3 Base addr+3	**S-7.F** slave, input data = 0	**S-7.F** slave, input data = 0	**S-7.3.1.C** slave

Issue date: 2.4.13

Local I/O tab (Safety Basic Monitor)

If 'Safety Basic Monitor' has been selected in the 'Monitor information' window, the following tab will be displayed additionally:
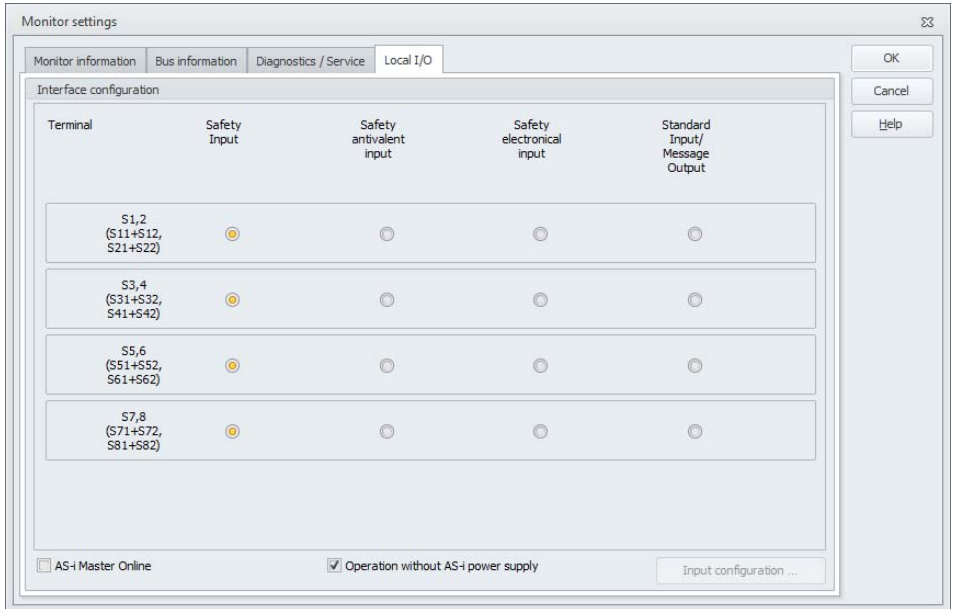
For each connection, the following options are available:

• **Safe input** for potential-free contacts (normally closed / normally closed), used in monitoring devices.
• **Safety antivalent input** for potential-free contacts (normally closed / normally open), used in monitoring devices (beginning with Safety Version 'SV4.3').

- **Safe electronic input** connected to an OSSD output with test pulses, used in monitoring devices.
  - If this option is selected, the **Input Configuration** button can be used to make settings for the safe electronic inputs. An additional window opens in which – for the respective input – cyclic sensors or the maximum test pulse width (0.2 ... 51.0 ms) can be defined for the OSSDs.
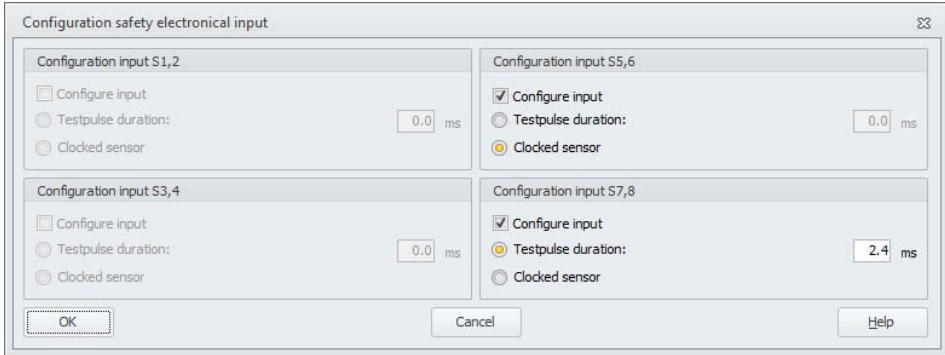
- **Standard input** and/or **message output** (can be used in monitor inputs and message output assignment, see chapter 6.4 "Output assignment").

    Information!
    To meet the safety requirements, it is recommended that an antivalent switch be used only in combination with the "forced" or "dependent" input devices in order to monitor switching between the two contacts over time.

	'A' open	'A' closed
'B' open	Transition state	On
'B' closed	Off	Transition state

'A' — S11, S31, S51, S71 / S12, S32, S52, S72

'B' — S21, S41, S61, S81 / S22, S42, S62, S82

- **AS-i Master Online**: With this option the internal AS-i master of the Safety Basic Monitor can be activated.
  In this case it's not allowed to connect an external AS-i Master to the AS-i line!
- **Operation without AS-i power supply**: Activate this option, if the AS-i Power24V data decoupling network shall be used in the Safety Basic Monitor instead of an external AS-i power supply.
  The internal decoupling network can supply a maximum current of 500mA.

Local I/O tab

('Safety Monitor with 6/3 safe inputs and 6 safe outputs')

Information!
Beginning with Safety Version 'SV4.3' and 'Safety Monitor with 6/3 safe inputs and 6 safe outputs', you can configure the local I/O via this page.

Certain devices from Safety Version 'SV4.3' and higher are available with a local I/O extension. Via these page, you can configure the local I/O:
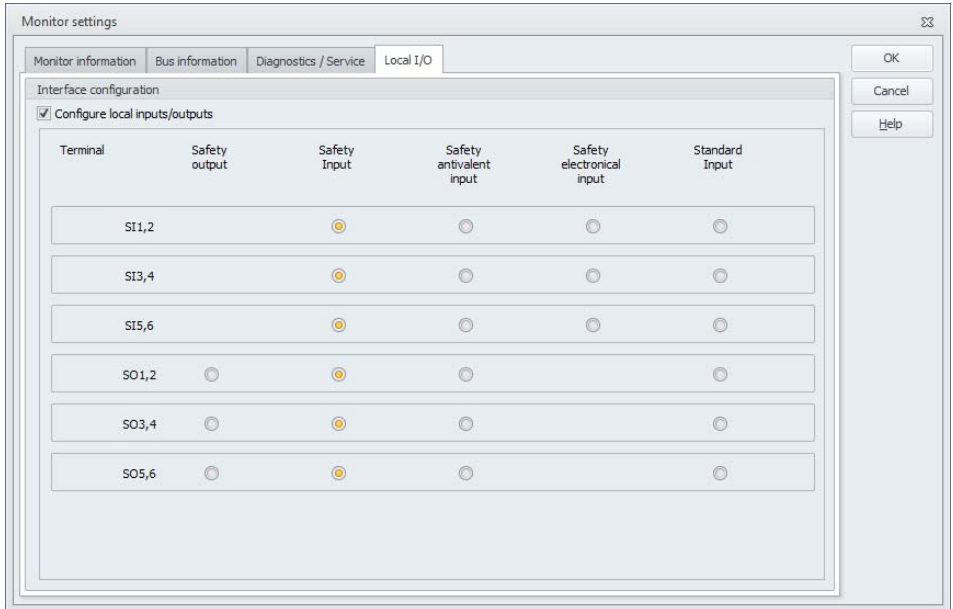
To activate the I/O extension, the **Configure local inputs/outputs** option must first be set.

Information!
*Via **Extras->Options**, **Basic settings** tab, the default value for this option can be set. However, please observe that devices without local I/O extension cannot be configured when the **Configure local inputs/outputs** option is active.*
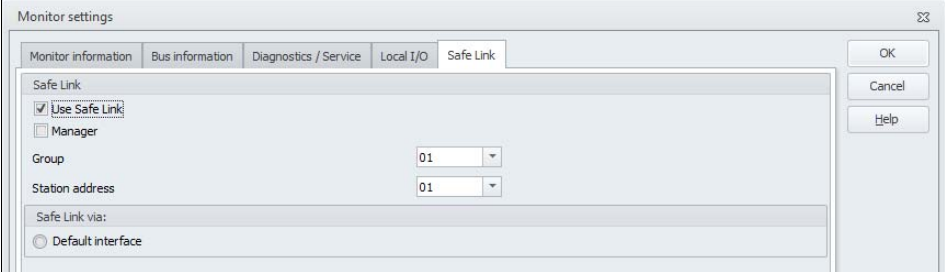
For each connection, the following options are subsequently available:

- **Safe semiconductor output**, can be used for output devices (only available on the SO1-SO6 terminals).
- **Safe input for potential-free contacts (normally closed / normally closed)**, used in monitoring devices.
- **Safety antivalent input for potential-free contacts (normally closed / normally open)**, used in monitoring devices (beginning with Safety Version 'SV4.3').

- **Safe electronic input** connected to an OSSD output with test pulses, used in monitoring devices (only available on the SI1-SI6 terminals)
- **Standard input and/or message output** (can be used in monitor inputs and message output assignment, see chapter 6.4 "Output assignment").

SafeLink tab

If 'Generation II Version 4.x' has been selected in the 'Monitor information' window, the following tab will be displayed additionally:

Settings for the SafeLink of multiple safety monitors can be configured on this page. With safe coupling, it is possible to exchange safe data between safety monitors independent of AS-i.

The data to be sent are created in the **output assignment** (<*See "Output assignment" on page 371*>). The received data can be received with the **cross-communication input** device (<*See "Cross-communication input" on page 135*>).

To use safe coupling, the configurations of all participating devices must be saved in the **Configuration Manager** (workspace).

If the interface has not yet been selected for SafeLink and the **Standard Interface** button is not active, the preferred or most recently selected interface is automatically set during the download. If the **Standard Interface** button is active, a selection dialog appears before each download for selecting the interface (see chap. 5.4) of the safe coupling.

> *Information!*
> *If SafeLink is used, all configurations of the participating monitors must be saved in the same workspace! While downloading the configurations, ASIMON then enters the missing communication parameters in the configurations.*

> *Information!*
> *If there are configurations which are not located in the workspace that were already downloaded once, these can be written to the monitor without changing the safe communication parameters.*

The following options are available:

• **Use SafeLink**: This option is used to activate SafeLink in the monitor.
• **Manager**: A participant in a communication group (same group number) of the safe coupling must be a manager. After downloading and starting the configurations of all group participants, the manager must then still be taught (<*See "Teaching of SafeLink" on page 331*>).
• **Group**: Only participants with the same group number can communicate with one another.
• **Station address**: Each device in a group must have a unique device number.
• **SafeLink via**: The interface for SafeLink can be selected here.

Option **Open configuration**

With the **Open configuration** option, you can open an existing configuration file (***.asi**) which was previously saved on a data carrier for purposes of editing or transmitting to an AS-i safety monitor.
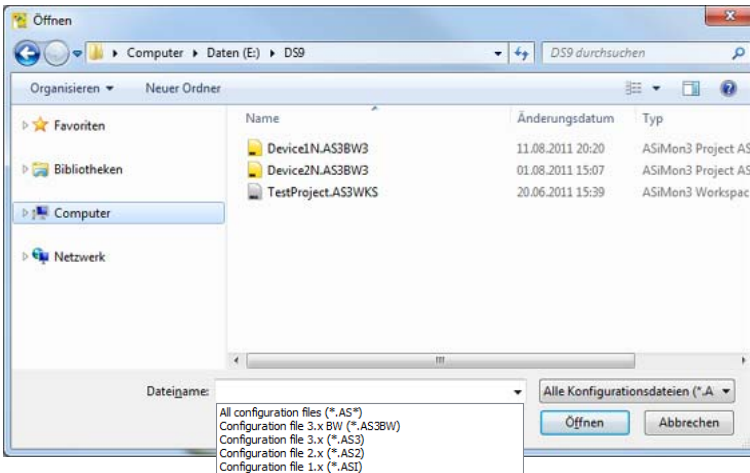
Fig.: Opening a saved configuration file

Information!
ASIMON *configuration files have the extension* ***.ASI** *(version 1 AS-i safety monitors),* ***.AS2** *(version 2 AS-i safety monitors),* ***.AS3** (**ASIMON3** *consortium version),* ***.AS3BW** (**ASIMON 3 G2** *B+W version).*

Option **Load configuration from AS-i Safety Monitor**

Information!
If a connection to the AS-i Safety Monitor cannot be established on program startup (no AS-i Safety Monitor connected, connected to wrong interface etc.) or if the connected AS-i Safety Monitor is in protective operation, the **Load configuration from AS-i Safety Monitor** *option is deactivated.*
In this case, it is only possible to create a new configuration, load and edit a configuration which has been saved on a data carrier or for troubleshooting (see chapter 6.5 "Trouble-shooting and error rectification").

When you select the **Load configuration from AS-i Safety Monitor** option, the configuration of the connected AS-i Safety Monitor is queried and displayed in the main program window.

Check box **Show dialog on start-up**

When this check box is activated, the Start Assistant is called up each time the **ASIMON 3 G2** program is started. If you do not wish to use this program feature, simply deactivate this check box and the Start Assistant will no longer automatically be opened on program startup.

On the **Extras** menu under **Use Start Assistant**, you can reactivate or deactivate the automatic call of the Start Assistant on program startup at any time.

3.2   Description of the user interface

The software's workspace consists of the following components:

1.   Quick Access Toolbar (see chapter 3.2.1)

2.   Ribbon (see chapter 3.2.2)

3.   Configuration manager(see chapter 3.2.3)

4.   Component manager (see chapter 3.2.4)

5.   Device library (see chapter 3.2.5)

6.   The state/info bar (see chapter 3.2.7)

7.   Print manager (see chapter 5.12.3)
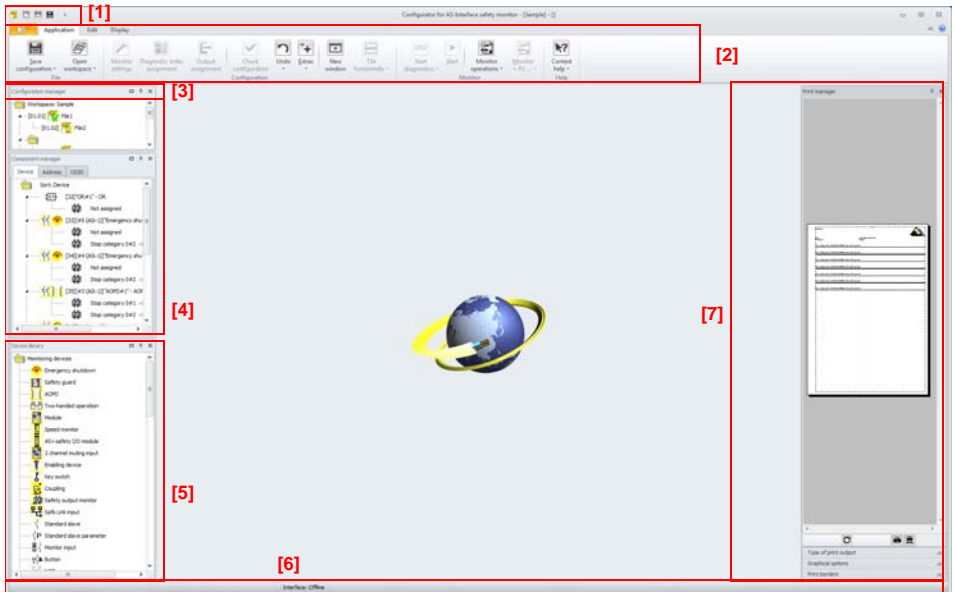
Fig.: The workspace

3.2.1   The Quick Access Toolbar

Via the Quick Access Toolbar, you can directly call up several important functions without using the ribbon.

Menu command:

Adjust Quick Access Toolbar

Save current configuration

Open an existing configuration

Create a new configuration

3.2.2 The ribbon

3.2.2.1 The "Application" main menu
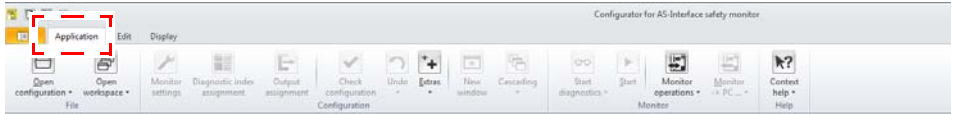
1. File operations submenu:
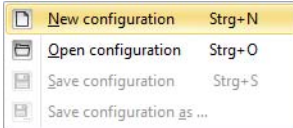
   - **New configuration**: Creates a new configuration.
   - **Open configuration**: Opens an existing configuration.
   - **Save configuration**: Saves current configuration.
   - **Save configuration as**: Saves current configuration under new name.

2. **Workspace** submenu: The functions of the configuration manager are contained here (see page 57).
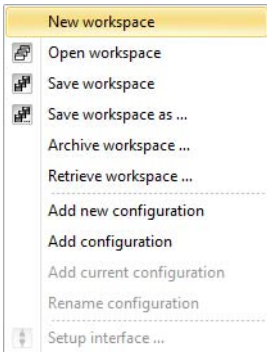
3. **Monitor settings**: Opens the dialog box for performing global monitor settings (see graphic "Monitor settings window, Monitor information tab" on page 29).

4. **Diagnostic index assignment**: Assignment of the device indices for diagnostics (see chapter 7.2 "Assignment of the AS-i diagnostics indices").

5. **Output assignment**: Assignment of devices to outputs (see chapter 6.4 "Output assignment").

6. **Check configuration**: Checks the configuration for logical errors and displays the monitor compatibility window (see chapter 4.5 "Checking the configuration").

7. **New window**: Opens a new window for creating an OSSD or user device.

8. **Window state** submenu (see "Window arrangement submenu:" on page 52).
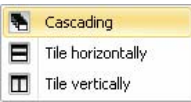
9. **Undo/Redo** submenu:
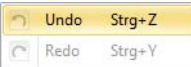
    • **Undo**: Restores the previous state of the configuration (Ctrl+Z).
    • **Redo:** Following an **Undo** operation, restores the previous state (Ctrl+Y).

10. **Extras** submenu:
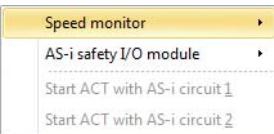
    • **Speed monitor**: Calls up the functions of the speed monitor (see chapter 8. "Speed monitors").
    • **Safety I/O Module**: Calls up the functions of the Safety I/O Module (see chapter 9. "AS-i Safety I/O Module").
    • **Start ACT with AS-i circuit 1**: Calls up the AS-Interface Control Tools with AS-i circuit 1.
    • **Start ACT with AS-i circuit 2**: Calls up the AS-Interface Control Tools with AS-i circuit 2.

11. **Diagnostics**: Starts or exits monitor diagnostics (see chapter 6.1).

- **Diagnostics** submenu: Additional diagnostics functions.
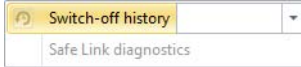
- **Switch-off history**: The OSSD for the switch-off history can be selected via the list in the menu item. Click the menu item to toggle between diagnostics and switch-off history (see chapter 6.2 "Switch-off history").

- **SafeLink diagnostics**: Displays/hides the diagnostics for SafeLink (only in diagnostics mode), see chapter 6.6.

12. **Start/Stop**: Starts or stops the safety monitor (see chapter 5.6 "Validating the configuration"/ chapter 5.8 "Stopping the AS-i Safety Monitor").

13. **Monitor functions** submenu:
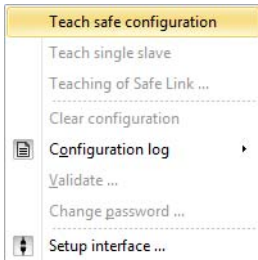
- **Teach safe configuration**: Teaches the safe AS-i configuration (see chapter 5.5 "Teach safe configuration").

- **Teach single slave**: Teaches safe configuration of an AS-i slave in protective operation (see chapter 5.9 "Teach single slave").

- **Teaching of SafeLink**: Starts teaching of SafeLink (see chapter 5.10 "Teaching of Safe-Link").

- **Clear configuration**: Clears the current configuration in the monitor (see chapter 5.11 "Clear configuration").

- **Configuration log** submenu:
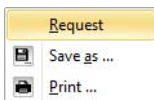
- **Request**: Reads the configuration log from the monitor (see chapter 5.12.1 "Configuration log").
- **Save as**: Saves current configuration log.
- **Print**: Prints current configuration log (see chapter 5.12.3 "Print manager").
- **Release**: After reading the configuration log, this can be used to release the configuration. (see chapter 5.6 "Validating the configuration").
- **Change password**: Changes or assigns a password in the safety monitor (see chapter 5.13 "Entering and changing the password").
- **Setup interface**: Sets up interface to the monitor (see chapter 3.3.2 "Interface configuration").

14. Send/read configuration submenu:

    | Monitor -> PC ... |
    | PC -> Monitor ... |
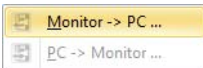
- **Monitor -> PC**: Writes configuration to the monitor (only in configuration operation) (see chapter 5.3 "Transferring a configuration to the AS-i Safety Monitor").
- **PC -> Monitor**: Reads configuration from the monitor (only in configuration operation), see chapter 5.2.

15. Main button **Context help**: After selecting this button, the mouse pointer switches to help mode. With the next mouse click, help for the selected element is requested.

    ▶?

- **Help** submenu:

    | Help topics ... |
    | Manuals   ▸ |
    | ❶ About ... |
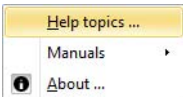
    - **Help topics**: Opens the start page for the help system.
    - **Manuals** submenu: If present, additional manuals are located in this submenu.
    - **Info**: Opens the ASIMON Info window.

3.2.2.2 The "Edit" menu

1. **Copy**: Copies the selected device (Ctrl+C)

2. **Cut**: Cuts the selected device (Ctrl+X)

3. **Paste**: Inserts the last copy (Ctrl+X)

4. **Delete**: Deletes the current device (Delete)

5. **Edit functions** submenu:
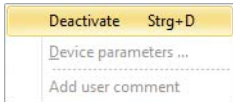
-   **Activate/Deactivate**: Activates or deactivates the selected device (Ctrl+D), see "Deactivating devices" on page 307.

-   **Device parameters**: Opens the dialog for setting the parameters of the current device.

-   **Add user comment**: Adds a user comment to the current window (see chapter "User comments").

3.2.2.3 The "Display" menu
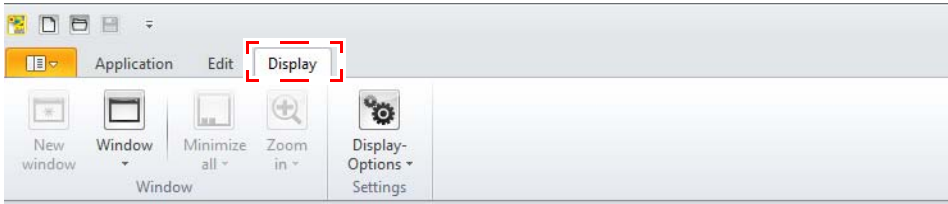
1. **New window**: Opens a new window for creating an OSSD or user device.

2. **Window** submenu:
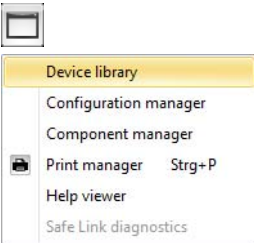
- **Device library**: Displays/hides the device library window (chap. 3.2.5)
- **Configuration manager**: Displays/hides the configuration manager (chap. 3.2.3)
- **Component manager**: Displays/hides the component manager (chap. 3.2.4)
- **Print manager**: Displays/hides the print manager (chap. 5.12.3)
- **Help display**: Displays/hides the help display (page 76)
- **SafeLink diagnostics**: Displays/hides SafeLink diagnostics (only in diagnostics mode), chap. 6.6

3. Window arrangement submenu:
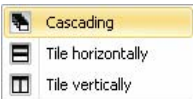
- **Cascading**: Cascades windows
- **Tile horizontally**: Tiles windows horizontally
- **Tile vertically**: Tiles windows vertically

4. Window state submenu:
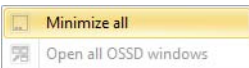
- **Minimize all**: Minimizes all windows
- **Open all OSSD windows**: Opens all OSSD windows

5.   Zoom submenu:

🔍	Zoom in
🔍	Zoom out
🔍	Zoom 100%
	Zoom to fit
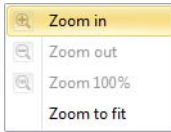
- **Zoom in**: Enlarges the size of window contents (graphic display only)
- **Zoom out**: Decreases the size of window contents (graphic display only)
- **Zoom 100%**: Window contents at original size (graphic display only)
- **Zoom to fit**: Window contents adjusted to fit in the page (graphic display only)

6.   **Display options** submenu:

Language	▸
Options ...	
✓ Use Start Assistant	
Reset to default settings	
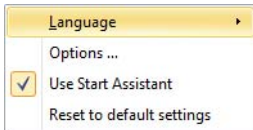
- **Options**: Configuration of the various program options (page 74)
- **Use Start Assistant**: If this option is active, the Start Assistant opens when the program is started (page 28)
- **Reset to default settings**: All program settings are reset to default values after ASIMON is restarted (page 77)
  - **Language** submenu: Selection of the current language

	Deutsch
✓	English
	Français
	Español
	Italiano
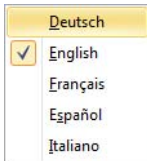
3.2.2.4 The "Application" menu
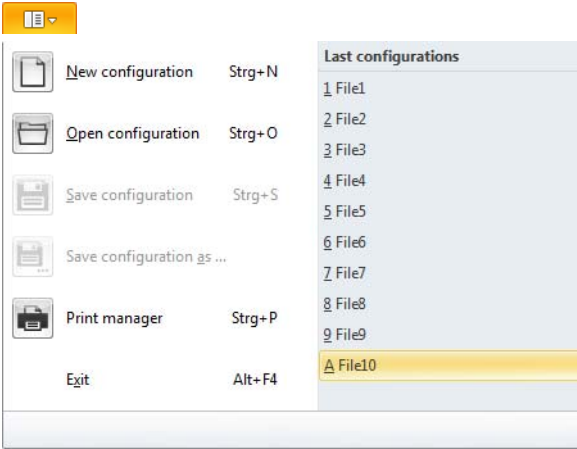
Via the Application menu, you can execute basic application functions without using the ribbon:

- **New configuration**: Creates a new configuration
- **Open configuration**: Opens an existing configuration
- **Save configuration**: Saves current configuration
- **Save configuration as**: Saves current configuration under new name
- **Print manager**: Opens the print manager window with configuration options for printing
- **Exit**: Exits the ASIMON program

In the right window, a list of the most recently opened configurations is also displayed.

3.2.3 Configuration manager

By using the configuration manager multiple configuration files can be easily controlled. The configuration manager can be configured by opening the menu tab **Workspace** or by using the context menu of the "Configuration manager". A configuration can be opened by double clicking in the configuration manager.

○⌇ *Information!*
Only a single configuration *can be opened at a time!*
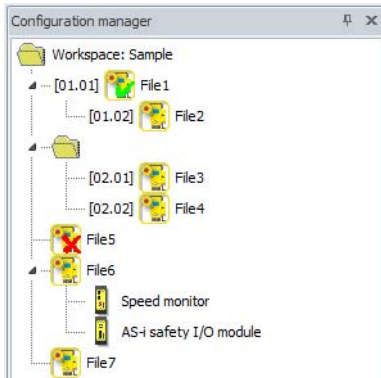
Fig.: Configuration manager window

If configurations with safe coupling are present in the workspace, all configurations with the same group number are in their own subcategory.

Located to the left of the icon is the address of the safe communication in format ['Group'.'Station address'].

If a group contains a manager, this is always displayed as head node; otherwise, the folder icon appears here.

If a configuration is currently open, a green check mark appears above the symbol.

If the configurations cannot be read or are defective, a red cross is superimposed on the symbol.

If a speed monitor configuration exists for a configuration, a speed monitor icon is displayed below the configuration icon.

A speed monitor configuration can be created and configured via **Extras -> Speed monitor** (see chapter 8.1.2 "Configuration").

Information!
It is recommended to file all configurations in the workspace directory. Archiving configurations is only possible when this condition is fulfilled.

Information!
If a configuration is opened from Windows Explorer, ASIMON tries to find the suitable workspace in the same directory. If the configuration exists in several workspaces, the user can select the desired workspace from a list.

Menu items for managing the configuration manager ("Workspace" submenu)
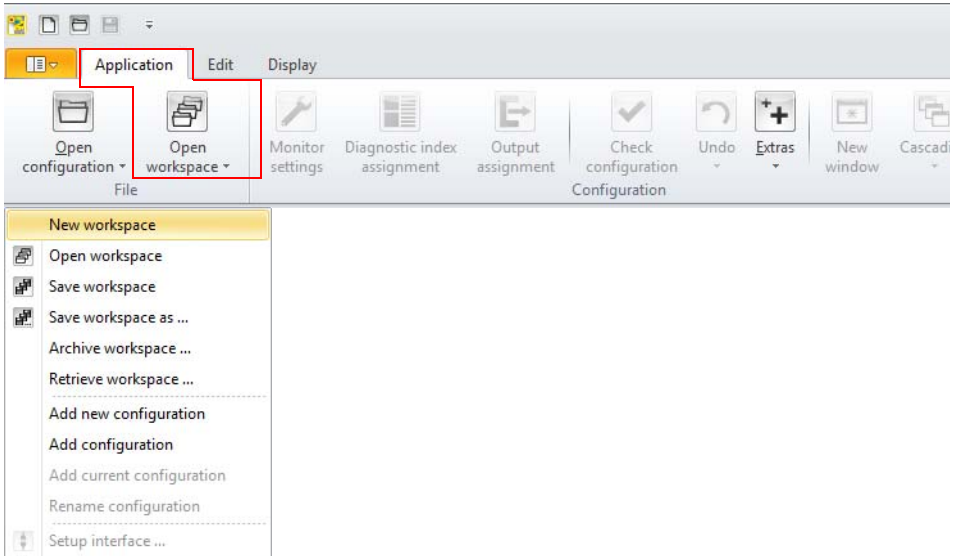
New workspace:	You can create a new empty workspace here. First you are requested to create or select a directory for the workspace. We recommend using only one workspace per directory.
Open workspace:	Opens an existing workspace (*.AS3WKS). It is possible to open a workspace by double-clicking on the corresponding file or via drag & drop into the main window.
Save workspace:	Saves an existing workspace after changes to its data have been made.
Save workspace as:	Saves the current workspace using a new file name. There are different options here: • All configurations of the workspace are in the same directory as the workspace: the workspace as well as all configuration files are copied in the destination folder. In addition, a sub-directory with the configuration names is created in the selected directory. • There are configurations outside of the workspace directory: it is possible to copy only the workspace file or to copy all configurations together with the workspace. The last option is useful for preparing the archiving of distributed work-spaces.

Archive workspace:	Archives the workspace and all configurations contained in it in a ***.AS3ARV** file. This function can only be executed if all configurations are in the workspace directory. If necessary, you can restructure the workspace appropriately using **Save configuration as**.
Restore workspace:	Restores a workspace from a ***.AS3ARV** archive. A subdirectory with the name of the archive is created in the selected directory.
Add a new configuration:	(Also available through the context menu) This menu item can be used to create a new configuration and, at the same time, add it to the workspace. To do this, however, the configuration must be saved as a file. It is recommended to file the configuration in the same directory as the workspace. Adding a configuration into the workspace is also possible by using drag & drop to move a configuration file.
Add configuration:	(Also available through the context menu) Adds an existing configuration file (***.AS1, *.AS2, *.AS3, *.AS3BW**) to the workspace. It doesn't matter where the configurations are inserted in the tree. Configurations with safe coupling are sorted according to group and station address; the remaining configurations are sorted alphabetically.
Add current configuration:	(Also available via the context menu) Like **Add configuration**, but adds the currently opened configuration to the workspace.
Delete configuration:	(Only available via the context menu) Deletes the selected configuration from the configuration manager. In addition, you can choose whether the configuration file is also removed.
Rename configuration:	(Also available through the context menu) You can hereby rename the configuration file and the entry in the workspace. This function can also be accessed by clicking on the selected configuration name for a prolonged time.
Setup interface:	(Also available through the context menu) This menu option is used to edit the interface configuration for the selected configuration. This dialog is similar to the one in the menu **Communication –>Setup**, but saves the configuration data in the workspace. If a configuration is opened via the workspace and the interface setting is not set to "Offline", the settings are accepted as current. If the selected configuration is the configuration that is currently open in the workspace (green check mark), the global setting is changed if the interface is changed in the workspace.

Information!

It is recommended to save the workspace in the same directory as its related configurations. Only the relative paths to the configurations are saved in the workspace and not the configurations themselves! If the configurations are saved on another hard drive the absolute paths are saved. This is important when copying workspaces and configurations.

3.2.4 Component manager

The component manager is designed to easily manage components (devices) used in the current configuration. Generally, there are 3 sorting possibilities for the devices:

• Sorting according to device indices
• Sorting according to AS-i addresses
• Sorting according to release circuit/user devices.

Sorting according to device indices

All available devices and system devices are listed. The usage locations (release circuits and user devices) are displayed after opening the device. Double-clicking on a "Release circuit" or "User device" icons opens the relevant window and marks the respective device. If devices are used multiple times in one window, they are also displayed multiple times in the device manager.

The node devices can be included in the current configuration by a simple **Drag&Drop** or **Copy/Paste** operation (if this is allowed for the respective device type).

The properties of the devices can be changed using the context menu of the node devices.
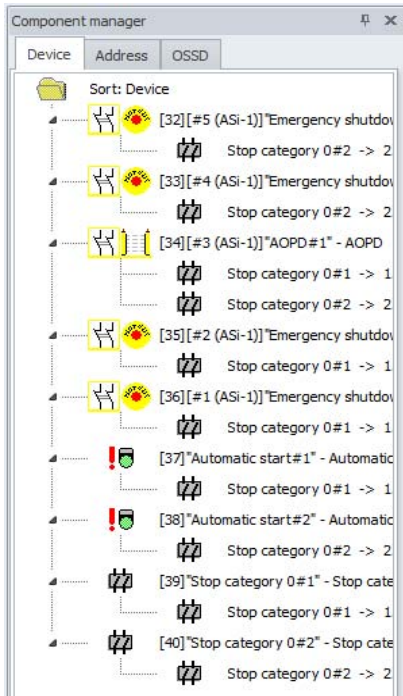
Sorting according to AS-i addresses

Only those devices associated with a safe or unsafe AS-i address are displayed. Devices with multiple AS-i addresses are displayed separately for each address (and, thus, can appear multiple times). All devices are also listed which contain logic operations in the output assignment. The operation is identical to "Sorting according to device indices".
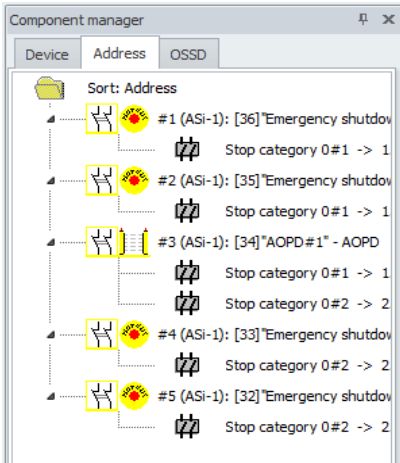
Sorting according to release circuit/user device

All existing release circuits and user devices are listed. If these nodes are opened, all associated devices and system devices can be accessed. Double-clicking on a device icon opens the relevant window and marks the respective device. The devices can be reused in the current configuration by a simple **Drag&Drop** or **Copy/Paste** operation (if this is allowed for the respective device type). The characteristics of the devices can be changed using their context menu.

> **Information!**
> *Release circuit or user devices can be deleted by selecting **Delete** from the context menu of the release circuit/user device node.*
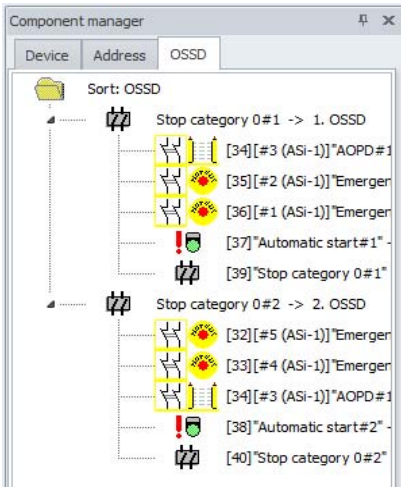
Sorting according to PROFIsafe *(Safety Version < 'SV4.3' only)*

The "**PROFIsafe**" sorting function is additionally available in "PROFIsafe" operating mode.

The assignment is represented here between:

safe input slave → input F-CPU

and

output F-CPU → OSSD.

Sorting takes place in accordance with the PROFIsafe bit number.

Operating is identical to "**Sorting acc. to AS-i addresses**".

3.2.5 Device library

This window is used to select new devices to be used in the current configuration. These devices can be transferred to the configuration via **Drag&Drop** or **Copy/Paste** (see chapter 3.2.8).

In addition, user devices can be copied to the device library from a different configuration via the clipboard. Note, however, that no conflicts may occur at the AS-i addresses/connections. Otherwise, an error message appears that specifies the problem in greater detail.

Information!
Devices can be copied only from configurations with the same monitor type.
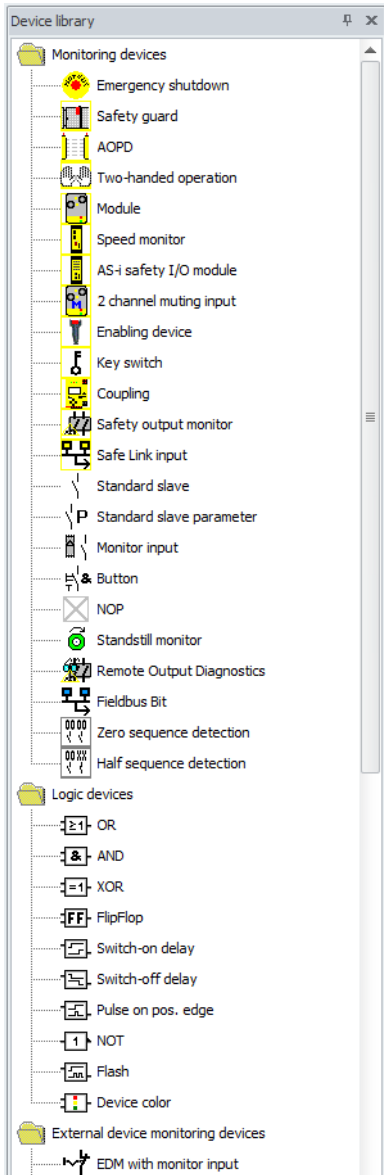
Fig.: Device library window

Issue date: 2.4.13

3.2.6 Arrangement of the editing window (Docking)

The windows **Device library**, **Configuration manager**, and **Component manager** can be docked on the left or the right side of the workspace.

The following docking options are available:

• Vertical docking:

If a dockable window is moved into an already docked window, it can be positioned at all four sides of the existing window.
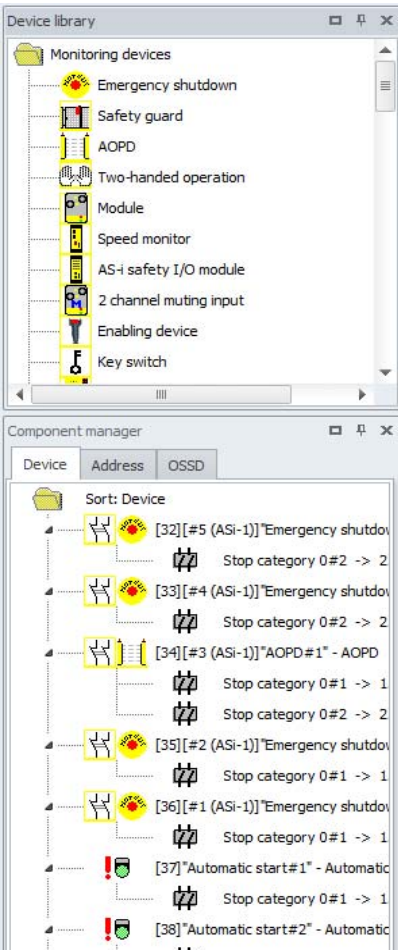
- Tabbed docking:

If a dockable window is moved to the title line of the already docked window, both windows are over-layed and can be selected by clicking on the name tab at the bottom of the window.

A window can be separated by pulling its name tab from the group tabs.
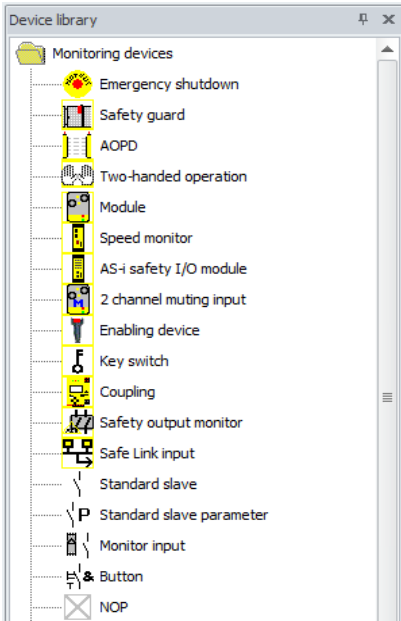
- Auto Hide:

By clicking on the "Auto hide" icon on the title line of a docked window, the window is automatically moved to the side as soon as the mouse leaves the window. The window becomes visible again by clicking the side name tab.

3.2.7 The state/info bar

The state/info bar provides valuable information regarding program operation and alerts you of problems and errors during program execution.

Left side:	Center:	Right side:
Help information	**Monitor version**	**State and error information**

| Show print manager | CV 4.00E 01 23 00 67BB (SV4.3) | Interface: COM1; The safety monitor is running in configuration operation |

Fig.: State/info bar

Meaning of the monitor version:	
CV	Configuration Validated
04.00E	Safety monitor version
01	Hardware configuration (01 = Monitors with the function range "Generation II Version 4.x" or higher).
23	UART version
00	Free
67BB	Release code
(SV4.3)	Safety version of the monitor

Meaning of the state error information:	
Interface	The current interface configuration is displayed here:
• Offline	No interface is selected.
• COMX	The interface is the serial port X.
• a.b.c.d	The IP connection with the selected IP address has been configured.

The current state of the connection is displayed after the ";".

Click the state/info bar in configuration operation to open a window with state information on the connected AS-i Safety Monitor.

Monitor status	$\boxtimes$
Hardware:	16 OSSDs
Firmware:	04.00 / Enhanced / 00
UART:	23
Configuration:	validated / 1234

OK
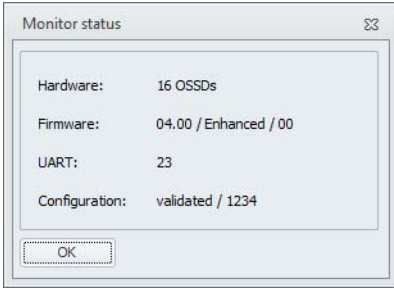
Fig.: Monitor status window

3.2.8   The workspace

The configuration of an AS-i Safety Monitor with the **ASIMON 3 G2** software is performed graphically and interactively. Using an icon library representing devices (left window, docked), you can select the safe AS-i slaves which are to be monitored as well as other functional devices and assemble a configuration with them.

The configuration (or parts thereof) are represented in a circuit diagram display as logically linked devices from left to right in the windows.
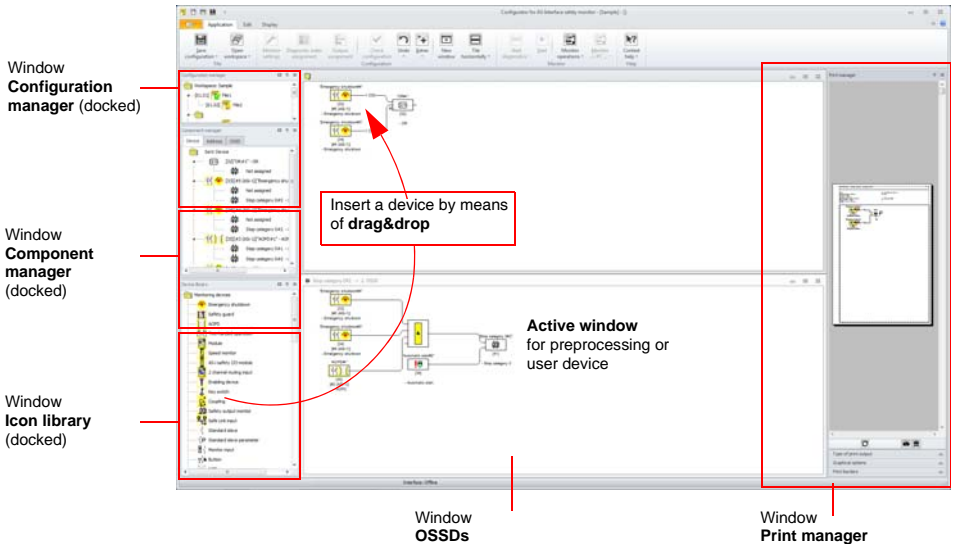
Fig.: Workspace with windows

> *Information!*
> *You can switch between the new circuit diagram display (beginning with software version 3) and the old tree structure display.*
> *To do this, select the **Display** –> **Display options** –> **Options** menu or press **<Ctrl> + <G>** or **<Ctrl> + <T>**.*

The sizes of the individual windows can be adjusted with the mouse to meet your needs as in other Windows® programs.

Window

The work area may contain any number of windows. The functions in the **Display menu** are available for arranging the windows.

As in the past, a device is inserted from the icon library using drag&drop. All windows are initially equal. A window becomes an OSSD window by pasting an output device. If all OSSDs are defined by a separate configuration window, no further output devices can be pasted in other windows.

In addition to the OSSD windows, which contain the actual configuration for an AS-i Safety Monitor, you can use other windows to form substructures (sub-devices) and create user devices.

> **Information!**
> The **Preprocessing** window area familiar from previous software versions no longer exists.
>
> For AS-i safety monitors with 'Basic' function range, the only possible logic device available for the linking of **two** monitoring or system devices is the logic OR function.

In the OSSD windows, the monitoring devices (safe AS-i slaves), start devices, EDM circuit devices, system devices, logic devices and output devices are grouped into the desired configuration and linked to one another using the logical AND function. Very complex functions can be created in this way.

> **Information!**
> The view in the window is updated by pressing the <F5> button; i.e. the window contents are redrawn on the screen.

Gestures

Several windows support the Windows gestures for touchscreens (Windows 7 and higher).

The following gestures are used in the windows listed:

- Vertical scrolling with one finger: Configuration manager, Print manager
- Vertical scrolling with two fingers: Configuration manager, Component manager, Device library, Print manager and Configuration window
- Horizontal scrolling with two fingers: Graphic configuration window
- Zooming with 2 fingers: Graphic configuration window

Issue date: 2.4.13

Operation

To paste devices from the icon library into the other windows, as well as to edit, delete, move and copy devices between the windows, various options are available depending on your personal preference:

- With the mouse:
    - using **Drag&Drop** from any window:
      Left-click on a device, move device while holding the mouse key. When moving devices between or within workspaces the devices actually change their location. If the devices are moved while holding the **<Ctrl>** button, they will be copied to the new location.

    - using the **right mouse button**:
      click device with right mouse button and select **action** from the pop-up menu. If necessary, change to another window area, click the right mouse button again and select action.

    - using **menu commands**:
      click device with the left mouse button, on the **Edit** menu select one of the commands **Deactivate**, **Invert**, **Delete**, **Select**, **Paste**, **Move**, **Assign** or **Replace**. If necessary, change to another window area, click OSSD, Preprocessing, device or position and again click a command on the **Edit** menu.

- With the keyboard:
    - with the **<Tab>** button: change window areas.
    - with the arrow keys: select circuit, device or position.
    - perform action with the following keyboard commands:

<Ctrl> + <D> =	Activate/Deactivate
<Ctrl> + <I> =	Invert
<Delete> =	Delete
<Ctrl> + <Delete> =	Delete all devices in the window
<Ctrl> + <C> =	Copy
<Ctrl> + <X> =	Cut
<Ctrl>+P =	Show or hide print manager
<Ctrl>+Y =	After <Ctrl>+Z, restore the previous state
<Ctrl>+Z =	Restore the previous state of the configuration

In addition to the devices themselves, you can also change the connection lines of the devices (and thus the device assignment).

Information!
When copying devices, all logic devices in the copied tree are assigned new index numbers.
If logic devices are turned into user devices, the copy will retain the same index number as
the original.

1

Click the output of a device with the left mouse button and hold down.

2

Pull the connection line ("rubber band") to the input on the desired device and release the left mouse button.

3

Device is assigned to the link
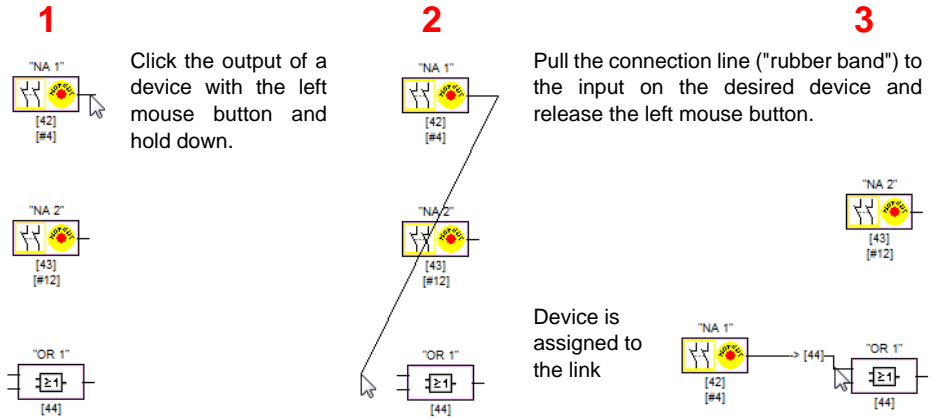
Fig.: Device assignment by creating/moving connection lines

Significance of the cursor shape

	Switching devices (only displayed at the output)
	Add device to another device (input port and logic devices)
	Add device index to a window (window background, insertion position is auto-matically selected)
	Replace device (formerly only possible for the device at the top right of the user function block group)
	Additional device index is copied.

User comments

Use **Edit** -> **Edit functions** -> **Add user comment** or the context menu to add any number of user comments to the circuit diagram display. The size of the comment fields depends on the text contained within. The text size can be changed by pulling on the comment field. Existing fields can be edited by pressing F2 or double-clicking on the comment. A new line can be entered with <Ctrl> <Enter>.

Information!

The position of the comments is relative to the size of the window required for the graphic representation. The positions of the user comments are adjusted corresponding to the size changes. Some overlapping with devices can, however, occur. In this case, the comments must be manually repositioned.

Options

You can set with which informational content the devices are to be displayed in the windows and the size in which the windows are printed out as graphics. To do this, select the **Display-Options -> Options …** (*)* menu item on the **Display** menu.
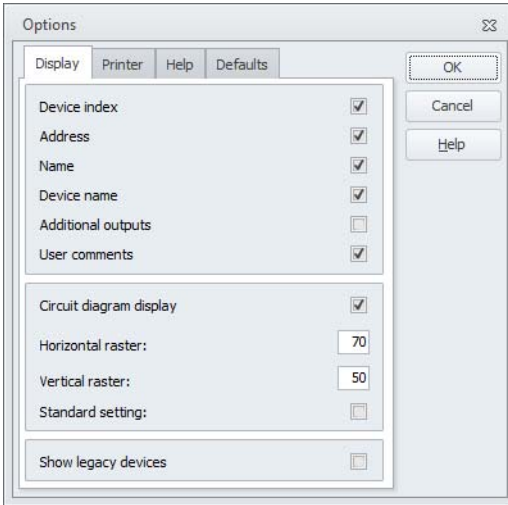
Fig.: Options - display

Options for the information to be displayed on the devices:

• Device index: The internal position number of the device.
• Address: The AS-i addresses used.
• Name: The device name specified by the user.
• Device name: Name of the device type.
• Additional outputs: The assigned outputs of the output assignment (page 46) (circuit diagram display only), also accessible via the toolbar.
• User comments: Freely placeable, user-defined comments (circuit diagram display only), also accessible via the toolbar.

In addition, you can globally set the type of configuration display for all windows here:

• new circuit diagram display (beginning with software version 3) –> check mark in **Circuit diagram display**.
• old tree structure display –> no check mark in **Circuit diagram display**.
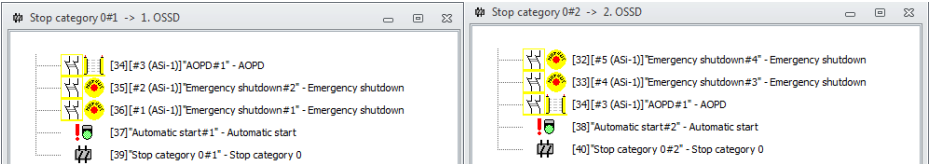
Fig.: Example: Old tree structure display

The **Horizontal raster** and **Vertical raster** values determine the distances between the individual devices in the circuit diagram display. By setting the check mark for **Standard setting**, the default values (h:100, v:50) for the device raster are restored.

By activating the **Display obsolete devices** option, the **Dependent with debouncing** type is made visible in the monitoring devices. This type should absolutely be avoided for new configurations! If the current configuration already contains this device type, the option is always active.

You can specify the scaling for printing the active window as a graphic on the **Printer** tab.

This setup can also be found in the print manager (page 348).
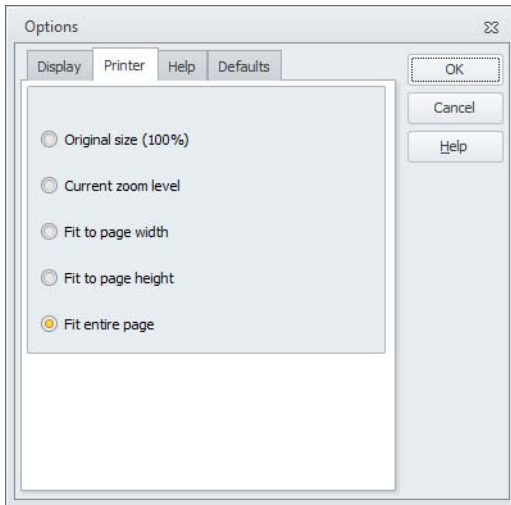
Fig.: Options - printer

In the **Help** tab, you will find the setup for the help display:
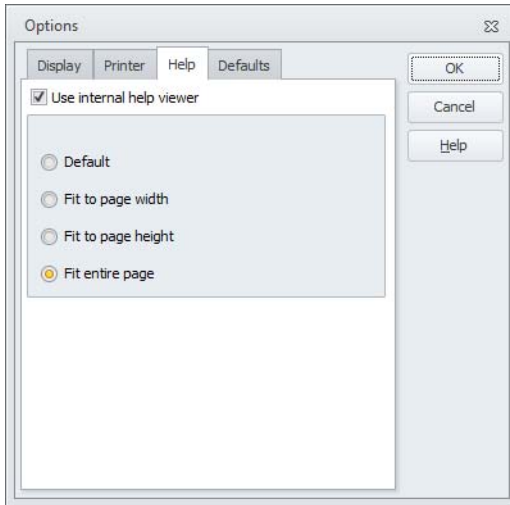
Fig.: Options - Help

By activating the **Use internal help display** option (standard), the help information is displayed in a window integrated in ASIMON. In this case, several scaling options are available for adjusting the size of the help page.

In addition, the **Display -> Window -> Help display** menu item for opening the help window is active.

When the internal help display is deactivated, Acrobat (Reader) is opened as an external program.

Standard values for different processes can be set on the **Basic settings** tab:
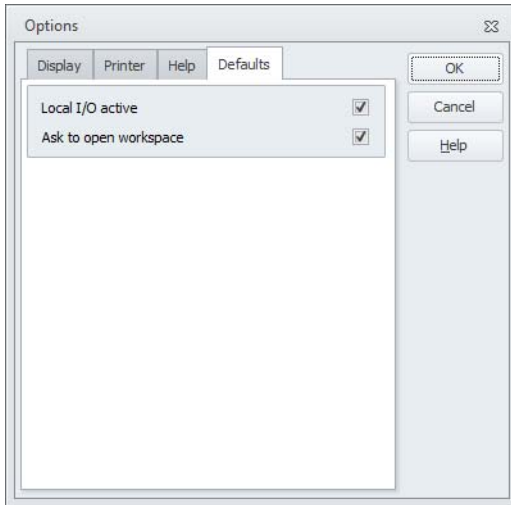
Fig.: Options - Basic settings

- **Local I/O active**: If this option is set, the **Local inputs/outputs** option is always automatically activated in the **Monitor/bus information** on the **Local I/O** tab (see "Local I/O tab" on page 41).
- **Ask after opening workspace**: If this option is active and ASIMON is started from Explorer by double-clicking on a configuration file, ASIMON tries to find and open a workspace suitable for the configuration.

Reset to default settings

To reset all user-defined settings in ASIMON to standard values, on the **Display -> Display options** menu select the **Reset to default settings** menu item. This option does not take effect until the next time ASIMON is started.

3.3   Program settings

3.3.1   Setting the program language

The user interface of the **ASIMON 3 G2** configuration software supports the following languages:

• German
• English
• French
• Spanish
• Italian

To change the language of the user interface, select on the **Display** menu under the **Display options** -> **Language** menu item the desired language. The program does not need to be restarted after changing the language.
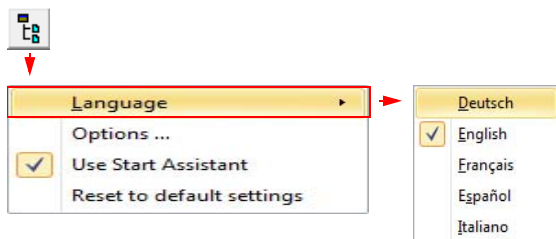
Fig.: Setting the program language

3.3.2 Interface configuration

In order to configure the AS-i Safety Monitor with **ASIMON 3 G2**, an interface must be selected first. Use the configuration dialog box for this purpose. This dialog box can be opened via the **Application** -> **Monitor functions** -> **Setup interface** (*)* menu item.
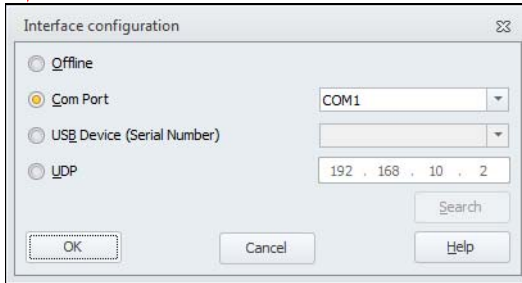
Fig.: Selecting the interface

The following options are available when selecting the interface:

• **Offline: ASIMON 3 G2** operates offline. AS-i Safety Monitors can neither be configured nor read.
• **Com Port:** The connection to the AS-i Safety Monitor is established via serial interface. The serial interface can be selected in the list box.
• **USB Device**: The connection to the AS-i Safety Monitor is established via USB interface. In the list box the serial numbers of all detected safety monitors are displayed.
• **UDP:** The AS-i Safety Monitor is connected via a network cable. In the input field next to this the Monitor's IP address must be specified. If the address is unknown, the monitor can be selected by using the **Search** button.

> **Information!**
> *Only a single configuration can be opened at a time!*

> **Information!**
> *If an interface is selected, ASIMON prevents the computer from automatically switching to standby mode.*
> *It is, however, still possible to manually switch to standby mode.*

Searching the AS-i Safety Monitor on the network

Clicking on the **Search** button in the menu "Interface configuration" opens to the following window:
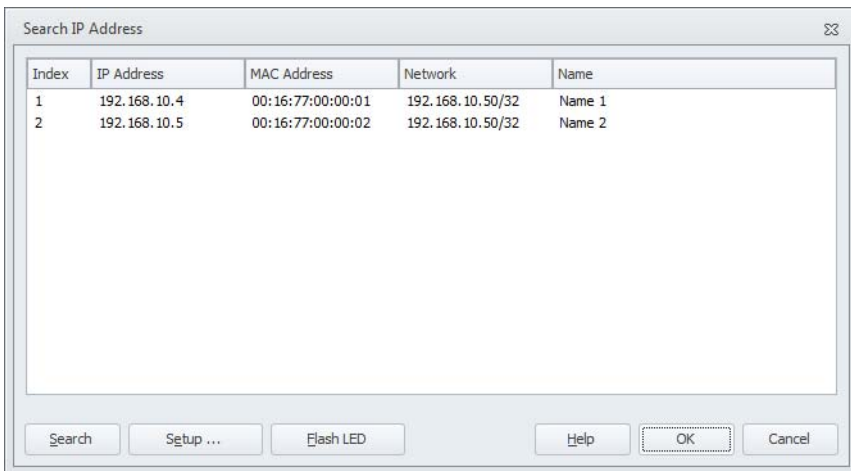
After opening the window, all AS-i Safety Monitors on the network are retrieved and displayed in the list.

Afterwards, the following functions are available:

- **Search**: The search process is restarted.
- **Setup**: The network interface of the currently selected safety monitor can be configured. This function can also be selected by double-clicking in the selection list. The button opens the menu "IP settings".
- **Flash LED**: When this menu item is selected, the LEDs of the selected AS-i Safety Monitor are flashing.
- **OK:** Transfer of the selected IP address into the previous dialog box.
- **Cancel**: IP address is not transfered.

Network interface setup

If the Setup button in "Search IP addresses" dialog box is clicked, the following window opens:

IP Settings					23
Name	Name				
MAC Address	00:16:77:00:00:01				
Current Settings					
IP Address	192 . 168 . 10 . 4				
Mask	255 . 255 . 255 . 0				
Gateway	192 . 168 . 10 . 1				
IP Configuration	DHCP				
Auto IP Address	0 . 0 . 0 . 0				
Configured Settings					
IP Address	192 . 168 . 10 . 20				
Mask	255 . 255 . 255 . 0				
Gateway	192 . 168 . 10 . 1				
IP Configuration	⦿ DHCP ○ Static ○ Both off				
Accept	Help	Cancel			
Accept and activate					

All network specific properties of the AS-i Safety Monitor are displayed and can be edited:

Name:	Freely selected name of the Safety Monitor. Simplifies recognition in the **Search** window.
MAC address:	MAC address of the selected Safety Monitor (cannot be edited).
Current settings:	The current setup information for the AS-i Safety Monitor is displayed. The entire section cannot be edited.
- **IP address**:	Current IP address of the AS-i Safety Monitor.
- **Subnet Mask**:	Current subnet mask of the AS-i Safety Monitor.
- **Gateway**:	Current network gateway of the AS-i Safety Monitor.
- **IP configuration**:	Type of the address assignment. Possible values are "static" and "DHCP".
- **Auto IP address**:	Reserved for future extensions.
Configured settings:	This section contains configurable entries for the AS-i Safety Monitor:
- **IP address**:	Static IP address of the AS-i Safety Monitor.
- **Subnet Mask**:	Static subnet mask of the AS-i Safety Monitor.
- **Gateway**:	Static network gateway of the AS-i Safety Monitor.
- **IP configuration**:	Type of the address assignment:
Static:	• Use the static address set above.
DHCP:	• The address is assigned by the DHCP server.
Both off:	• No IP address being used.
Accept:	The setup will be incorporated. However, they will not be activated until the AS-i Safety Monitor has been restarted.
Accept and activate:	The setup will be incorporated and activated directly.

4. Configuring the AS-i Safety Monitor

The AS-i safety monitor is a universally usable protective device and can, therefore, be configured for a very wide range of applications.

4.1 Function of the AS-i Safety Monitor

The functional task of the AS-i Safety Monitor is to continuously specify the state(s) of the OSSD(s) in accordance with the configuration specified by the user based on the states of the configured devices and to activate or deactivate the assigned safety switching outputs or safe actuators.

The **ASIMON 3 G2** software automatically arranges the devices in the respective windows during configuration.

Each device can take on two states:

ON state (switched on, logical "1")

This state means that the device has agreed to validate the circuit, i.e. to activate the safety switching outputs. Depending on the device type, various conditions must first be met.

OFF state (switched off, logical "0")

This state means that the device has not agreed to validate the circuit, i.e. it results in the switching off of the safety switching outputs.

In the first step of the evaluation, the states of all monitoring, logic and EDM circuit devices are linked to one another by means of a global logic AND function, i.e. only when all configured monitoring, logic and EDM circuit devices have the ON state is the result of the AND function equal to ON. In principle, the device states are evaluated in the same way as in an electrical safety circuit in which all safety switching elements are switched in series and validation is possible only when all contacts are closed.

In the second step, the start devices which determine the startup behavior of the OSSD are evaluated. A start device enters the ON state when the result of the AND function from the first step of the evaluation is equal to ON and when the respective start condition is fulfilled. With regard to the start condition, the start devices have a lock. The start condition must therefore only be fulfilled once. A start device is reset (OFF state) when the result of the AND function from the first step of the evaluation returns the OFF state. The states of the start devices used are linked to one another with an OR function, i.e. only one of the start devices needs to be in the ON state in order for the internal validation of the circuit to occur.

In the third step, the output device is then analyzed. If the circuit has been internally validated (result of the OR function from the second step of the evaluation is equal to ON), the output device switches the message and safety switching outputs of the OSSD in accordance with its function characteristics and time behavior, i.e. the relays trip and the switching contacts close or the safe AS-i output is set.
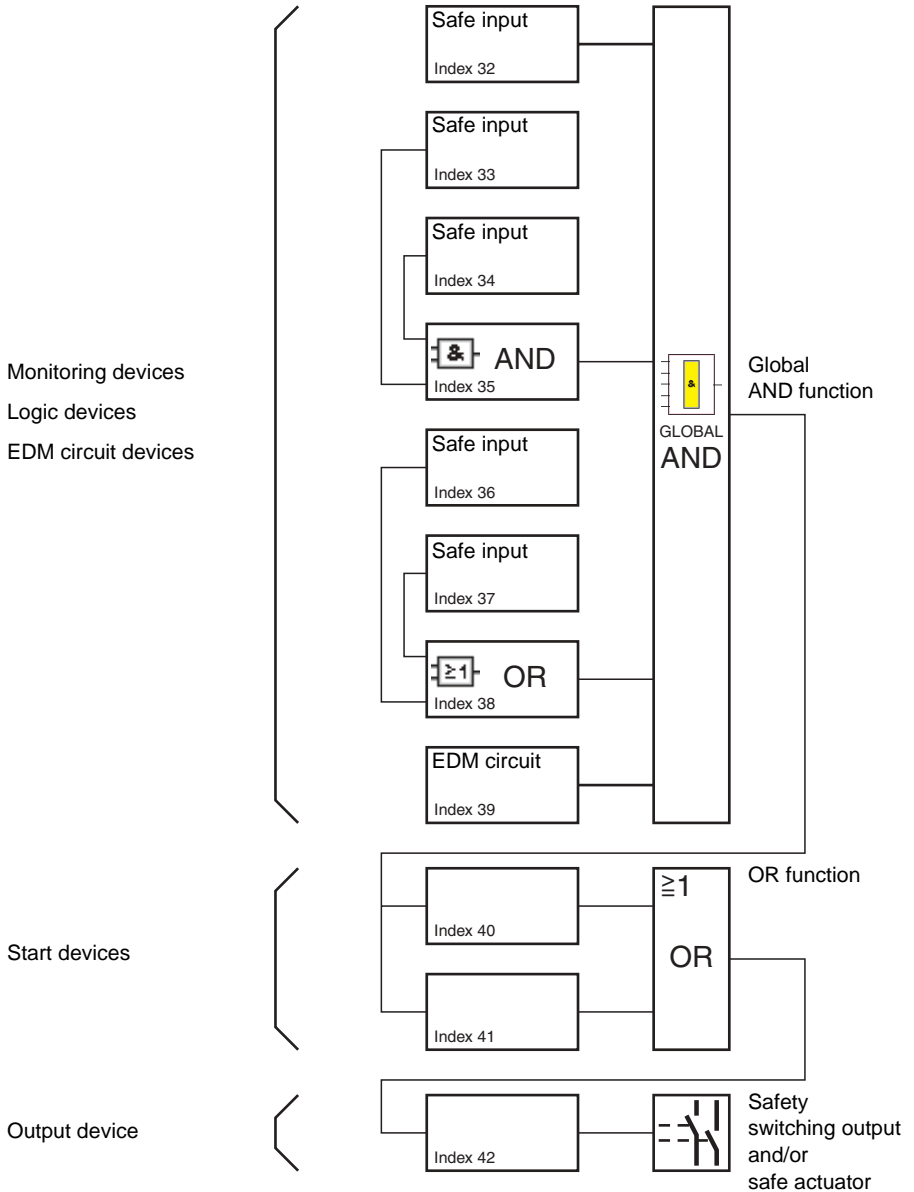
Fig.: Order of events during the evaluation of the configured devices

4.2 General procedure

The process is identical for all device variants of the AS-i Safety Monitor (1 or 2 OSSDs, 'Basic' or 'Enhanced' function range, with or without safe AS-i output).

Step 1 - Monitor settings

In order to create a new configuration, you must first make the required entries in the **Monitor settings** window for the AS-i safety monitor and the slaves which are to be monitored (see "Start Assistant" on page 28):

• Assign the configuration title
• Specify the function range of the AS-i Safety Monitor
    • Function range 'Basic', 'Enhanced/Generation II', ''Generation II V4.x'', 'PROFIsafe Gateway' or 'Safety Basic Monitor'
• Enter the AS-i bus addresses of the safe and unsafe AS-i slaves which are to be monitored
• If necessary, activate diagnostics stop via Standard slave
• If necessary, activate Error unlock via Standard slave
• Activate diagnostics via AS-i
    • Enter the AS-i bus address of the AS-i Safety Monitor
    • Selection of the diagnostic data: sorted by OSSD or by all devices
    • If necessary, activate the option 1 or 3 **Simulate slaves**

Step 2 - Create configuration

At this point the new configuration can be created by selecting the required devices from the icon library (see see chapter 4.3 "Creating and changing a configuration"). Additionally, if using **ASIMON** Version 2.1 or higher the diagnostics indices for the AS-i diagnostics can be chosen freely (see chapter 7.2 "Assignment of the AS-i diagnostics indices").

Step 3 - Commissioning

After you have created a valid configuration, you can commission the AS-i Safety Monitor. The commissioning procedure is described in chap. 5.

4.3 Creating and changing a configuration

A valid configuration for the AS-i Safety Monitor must consist of the following devices for each independent OSSD:

- at least 1 monitoring device
- at least 1 start device (with two dependent output groups, only for independent OSSDs)
- exactly 1 output device (with two dependent output groups, only for independent OSSDs)

The maximum number of devices is dependent on the function range of the AS-i Safety Monitor type:

- function range **'Basic'**: maximum 32 devices (device index 32 … 63).
- function range **'Enhanced/Generation II'**: maximum 48 devices (device index 32 … 79).
- function range '**Safety Basic Monitor**': maximum 128 devices (device index 0 … 127, system devices S-0 … S-127).
- function range **''Generation II V4.x''**: maximum 256 devices (device index 0 … 255, system devices S-0 … S-255).
- function range **'PROFIsafe Gateway'** Safety Version 'SV4.0': maximum 192 devices (device index 0 … 191, system devices S-0 … S-191).
- function range **'PROFIsafe Gateway'** Safety Version 'SV4.3': maximum 256 devices (device index 0 … 255, system devices S-0 … S-255).

Information!
Detailed information about the software function range can be found in the chap. "Supported devices" on page 11.

Procedure

Select a device from the icon library and insert it into the window of the desired OSSD (see "Operation" on page 71).

Information!
Detailed information about which devices can be used with which configurations can be found in the description of the individual devices.

When you insert the device into a window, the input mask for the device first opens. Here, you can make all required entries for this device.

This includes information such as:

- designation (name) of the device within your application, e.g. "Lock gate1"
- type, e.g. "double channel forced"
- AS-i bus address
- additional device options which can be activated
- monitoring and delay times

After confirming your entries with the **OK** button, the device appears in the window of the respective OSSD.

Information!
The view in the window is updated by pressing the <F5> button; i.e. the window contents are redrawn on the screen.

Example:
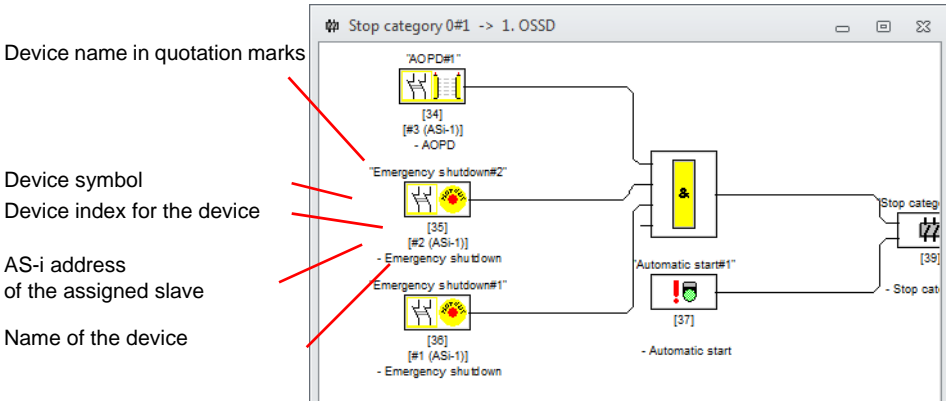
Fig.: Graphic depiction of the devices

In addition to symbol, designation and name, the respective device index for each device is specified. The index, which is automatically assigned by **ASIMON 3 G2** for each configured device, uniquely identifies each device, regardless of the OSSD it has been configured for.

The index begins with 0 (''Generation II V4.x'', 'PROFIsafe Gateway' and 'Safety Basic Monitor') or 32 ('Basic' or 'Enhanced/Generation II') and increases incrementally by 1. Within the configuration log, each configured device can be uniquely identified using the index.

Information!
''Generation II V4.x'', 'PROFIsafe Gateway' and 'Safety Basic Monitor' always start with device index 0. System devices are preceded by an "S-".

Information!
The display of the devices can be modified.
To do this, on the Extras menu select the Options menu item or click the 🔲 *button (see chapter 3.2.8 "The workspace").*

Information!
When performing diagnostics via the AS-i, the PLC is informed of the indices of the devices which are switched off. Previously, if a device was pasted to or deleted from the configuration, all subsequent indices were moved. As a result, it was necessary for the user to modify the diagnostics program in the PLC.

*In the **Application** menu of **ASIMON**, beginning with version 2.1, you can now use the **Diagnostics index assignment …** menu item to freely assign the diagnostics indices to the devices for AS-i diagnostics (see chapter 7).*
When making the assignments you can specify whether the diagnostics index range is 0 … 47 (monitors with function range 'Basic' and 'Enhanced/Generation II') or analogous to the device indices 32 … 79. The diagnostics index range of ''Generation II V4.x'', 'PROFIsafe Gateway' and 'Safety Basic Monitor' always starts with device index 0.

ASIMON automatically organizes all devices of a configuration with respect to the device indices in the following order:

1. Monitoring and logic devices in any order
2. EDM circuit devices (contactor monitoring)
3. Start devices
4. Output device

Upon insertion of a new device, the indices are correspondingly rearranged.

Information!
A monitoring or logic device can also be used in several OSSDs.

You can define a device or a logical group of devices as a user device; this user device can then very easily be used multiple times in the OSSDs.

Example:
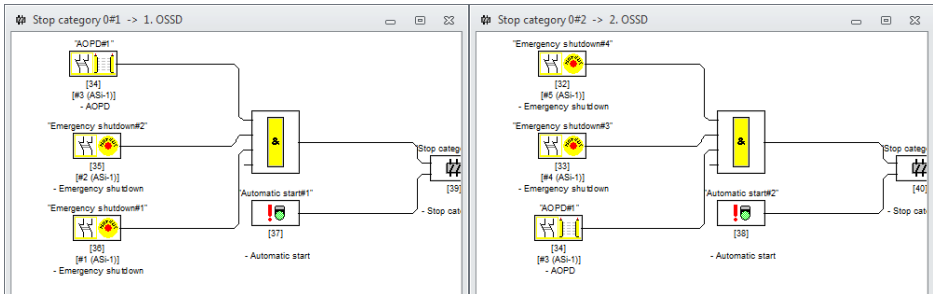
Fig.: Example: Structure of a configuration

To delete a device from the configuration, mark it with the mouse and then select the **Delete** command from the **Edit** menu or the pop-up menu (right mouse button) or simply press the **<Delete>** key.

To edit a device, double-click its symbol to reopen its input mask. Here, you can edit all device parameters. Alternatively, you can use the **Device parameters**… command in the **Edit** menu or the **Edit …** command in the pop-up menu.

4.3.1 Monitoring devices

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

The monitoring devices constitute the actual safety-oriented switching components of the OSSD(s) in the configuration.

For the safe monitoring devices, a distinction is made depending on **type** between:

Double channel, forced components

Upon actuation of an emergency shutdown switch with its two redundant contacts, the two contacts open simultaneously. As a result of this construction, both contacts are always either open or closed. If one of the two contacts closes or opens either too early or too late, an error results after a accepted transition time has passed.

The functional device for double channel, forced components can, thus, be used for applications such as

• emergency shutdown switches
• safety guards
• active optoelectronic protective device
• zero-speed relays.

Here, both the direct connection of an integrated AS-i slave as well as the connection of a conventional device via a safe coupling module are possible. Local acknowledgment and/or the start-up test are available as options.

Double channel, dependent components

The monitoring to determine whether a safety guard is open or closed is performed by two safety switches. If this safety guard is opened or closed, the safety switches are not actuated simultaneously. In the double channel dependent functional device, a contact synchronization time can, therefore, be

specified. Both switches must close within this contact synchronization time. If the contact synchronization time is exceeded, the start-test state results.

The safety monitor also monitors the switches to ensure that one of the two end positions "both switches open" or "both switches closed" is always achieved.

The functional device for double channel, dependent components can, thus, be used for applications such as

- safety guards with two safety switches
- two-handed operations.

Here, both the direct connection of an integrated AS-i slave as well as the connection of a conventional device via a safe coupling module are possible. Local acknowledgment and/or the start-up test are available as options.

Double channel, dependent components with debouncing

The monitoring to determine whether a safety guard is open or closed is performed by two safety switches. If this safety guard is opened or closed, the safety switches are not actuated simultaneously. Moreover, the switches bounce, for example when the guard is closed too fast. In the double channel dependent functional device with debouncing, it is, therefore, also possible to specify a bounce time in addition to the contact synchronization time. The bounce time begins when both contacts close the first time. Within the specified bounce time, the switches can change their state freely. After the bounce time has passed, both contacts are again queried. If they are then closed and if the contact synchronization time has not yet passed, the validation is performed. The selected contact synchronization time must be greater than the bounce time. If the contact synchronization time is exceeded, the start-test state results. The safety monitor also monitors the switches to ensure that one of the two end positions "both switches open" or "both switches closed" is always achieved.

The functional device for double channel, dependent components with debouncing can, thus, be used for applications such as

- slow-action switches
- switches with high bounce times.

Here, both the direct connection of an integrated AS-i slave as well as the connection of a conventional device via a safe coupling module are possible. Local acknowledgment and/or the start-up test are available as options.

Double channel, dependent components with filtering

The monitoring to determine whether a safety guard is open or closed is performed by two safety switches. If this safety guard is opened or closed, the safety switches are not actuated simultaneously. In addition, guard vibrations may result in single-channel interruptions. This monitoring device can be used to "filter out" such interference without causing the system to be switched off. The user defines a synchronization time, a contact stabilizing time and, if necessary, a tolerance time for single-channel

interruptions. When switching on, the safety switch may change between all possible states (none, one, both contacts closed or undefined) during the contact synchronization time.

If both contacts remain open for the duration of the contact stabilizing time, the contact synchronization time is restarted when the contacts are again closed. If the safety switch is in an undefined state for the duration of the contact stabilizing time, the functional device switches to the locked error state. Only if both contacts close within the contact synchronization time and remain closed for the duration of the contact stabilizing time is the validation performed.

The functional device offers various possibilities for handling single-channel interruptions. Local acknowledgment and/or the start-up test are available as options.

Double channel, conditionally dependent components

The monitoring to determine whether a safety guard is open or closed is performed by a safety switch with lock. One contact is switched by the safety switch, the second by the lock monitor. If the lock is opened, the guard can also be opened. This sequence of events is monitored. It is an error if the safety switch opens first.

Which contact is dependent on which can be freely selected in the double channel conditionally dependent functional device. The independent contact can be freely opened and closed as long as the dependent contact is not opened (see description of the device "Double channel conditionally dependent" on page 121).

The functional device for double channel, conditionally dependent components can, thus, be used for applications such as

• door switch with lock.

Here, both the direct connection of an integrated AS-i slave as well as the connection of a conventional device via a safe coupling module are possible.

⚠️ *Attention!*
As a result of the permissible, independent actuation, a loss of redundancy is not detected!

Local acknowledgment and/or the start-up test are available as options.

Double channel, independent components

The monitoring to determine whether a safety guard is open or closed is performed by a safety switch with lock. One contact is switched by the safety switch, the second by the lock monitor. With this functional device, it is possible to open and close the lock without forcing the guard to open or close.

The functional device for double channel independent components can, thus, be used for applications such as

• safety switch for door monitoring.

Here, both the direct connection of an integrated AS-i slave as well as the connection of a conventional device via a safe coupling module are possible. Local acknowledgment and/or the start-up test are available as options.

⚠️ *Attention!*
As a result of the permissible, independent actuation, a loss of redundancy is not detected!

Safe output monitor

Safe output monitors can be used within an OSSD. These monitor the output code sequence of an actuator slave. With this function, already existing release signals can be used in an AS-i circuit without needing to expand the original configuration by adding coupling slaves.

Standard slave

Within an OSSD, it is also possible to use standard AS-i slaves in order to realize, by means of their switching signals (inputs or outputs), an exclusively operational switching of the safety switching outputs of the AS-i Safety Monitor in an OSSD.

⚠️ *Attention!*
The use of a standard slave device for safety-oriented switching tasks is not permitted!

Slave parameter

Within an OSSD, it is also possible to use parameter bits of a slave in order to realize an exclusively operational switching of the safety switching output(s) of the AS-i safety monitor in an OSSD. By using a parameter bit of a slave, the parameters are cyclically written by the master. This only functions if the integrated master is used, however.

⚠️ *Attention!*
The use of a slave parameter device for safety-oriented switching tasks is not permitted!

Monitor input

Within the OSSDs or preprocessing, the input signals of the 2 or 4 inputs 1.Y1, 1.Y2 and 2.Y1, 2.Y2, respectively, of the AS-i Safety Monitor can also be used to implement strictly operational switching of the safety switching output(s) of the AS-i Safety Monitor in an OSSD.

⚠️ *Attention!*
The use of a monitor input device for safety-oriented switching tasks is not permitted!

Button

The Button device can be integrated within the OSSD or Preprocessing. The Button device makes acknowledgment possible on the device level. As soon as the validation for the device which is linked to the button is present, this device can be validated by actuating the button, i.e. acknowledged.

With the aid of the Button device, it is possible, for example, to assign a common local acknowledgment / reset to multiple light barriers which have been linked together by an AND gate.

NOP

Dummies (NOP - No OPeration) can be used within an (OSSD) window to make the configuration or the graphical display in **ASIMON 3 G2** easier to organize or to create a sample configuration to be used as a pattern for different configuration variants. An NOP dummy occupies an index within the configuration. Each functional device can be replaced by an NOP dummy and vice versa.

Zero sequence detection

The zero sequence detection monitoring device can be used to monitor whether both switches of a safety input slave are open. The device switches to the ON state when the value 0000 is continuously transmitted by the safe slave.

> ⚠️ ***Attention!***
> *The use of a zero sequence detection device for safety-oriented switching tasks is not permitted!*

Output F-CPU

The output F-CPU monitoring device receives data that arrive via PROFIsafe.

Fieldbus bit

The monitoring device Fieldbus Bit transmits the unsafe data from the Control/State module to the Safety Monitor.

Remote output diagnostics

The diagnostics functional device of the safe output has no safety function, but is used to visualize the state of the safe AS-i output slave.

Standstill monitor

With the standstill monitor monitoring device, it is possible to monitor a defined rotational speed for underspeed (with hysteresis). The device switches on (ON) if the rotational speed drops below the minimum value.

Application symbols

The safe monitoring devices generally differ from one another only in type, e.g. double channel dependent. From an application perspective, a device of the same type can be used both as a safety guard as well as for two-handed operation.

Described in the following are the safe monitoring devices organized according to type. In the icon library, you must first select the application symbol for the desired device and then select the respective type in the input mask.

To the left of the application symbol in the configuration window, the type symbol (double channel forced, double channel dependent, double channel independent, etc.) is displayed for all safe monitoring devices in order to clearly represent the configuration with a practical perspective. The input mask of the application symbols offers all device options, even if e.g. a local acknowledgment / reset for a two-handed operation does not make much sense.

Device options

Many monitoring devices also possess, in addition to their safe switching behavior, options which can be used to fulfill more complex applications. These include:

Start-up test

The start-up test is used, for example, when the proper function of a safety guard is to be inspected prior to starting the machine. In this case, the start-up test requires that the guard be opened and closed again before the machine is started. Only then can the machine be started. The address to be tested is shown in Generation II (and newer) monitors in plain-text on the display.

Local acknowledgment / reset

Local acknowledgment / reset is used, for example, when a safety guard is located in an area not visible from the control desk. With local acknowledgment / reset, acknowledgment (i.e. a confirmation that no persons are present in this part of the machine) can only be performed from the local operating desk.

In terms of the AS-i bus, an additional switching signal is linked to the monitoring device. Only if this switching signal was active is the monitoring device validated in the safety monitor. The switching signal for the local acknowledgment / reset can be a standard slave, an A/B slave or the non-safety OUT bits of a safety input slave whose AS-i bus address and bit address must be specified.

Information!
Certain time conditions apply to the arrival of the signals. These are illustrated using a safety light barrier as an example:

1. *Between the release of the safety light barrier and the actuation of the local acknowledgment, at least 50 ms must pass.*
2. *An actuation of the local acknowledgment is evaluated as valid when the switching signal is present for a minimum of 50 ms and a maximum of 2 s.*
3. *After the local acknowledgment is released, the monitoring device is validated following a wait period of 50 ms.*

The available monitoring devices are described individually below.

Information!
The functional devices and their variants, e.g. **double channel forced safety input** *with* **start-up test***, included in the devices described below can be found in this form in the configuration log of the AS-i safety monitor (see chapter 5.9 and examples of the respective monitoring devices).*

Overview of monitoring devices

Symbol	Type	Functional device
	20	**Double channel forced safety input**
	21	**Double channel dependent safety input**
	24	**Double channel dependent with debouncing**
	30	**Double channel dependent with filtering**
	25	**Double channel conditionally dependent**
	22	**Double channel independent**
	33	**Speed monitors**
	34	**Safe output monitor**
	37	**Cross-communication input**
	23	**Standard slave**
	35	**Standard slave parameter**
	28	**Monitor input**
	26	**Button**
	59	**NOP**
	27	**Zero sequence detection**
	32	**Half-sequence detection**
	39	**Output F-CPU**
	38	**Fieldbus bit**

Symbol	Type	Functional device
	36	**Standstill monitor**
	67	**Remote output diagnostics**

Information!
Detailed information about supported devices can be found in the chapter 1.3.1 "Availability of the devices".

Double channel forced

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   **Double channel forced safety input**

Type	Designation in the configuration log
20	double channel forced safety input
Variants	
Without start-up test	SUBTYPE: no startup test
With start-up test	SUBTYPE: startup test
Without local acknowledgment / reset	SUBTYPE: no local acknowledge
With local acknowledgment / reset	SUBTYPE: local acknowledge
With local acknowledgment / reset also after start-up	SUBTYPE: local acknowledge always

Parameter

Name: max. 29 ASCII characters plaintext

Address: AS-i circuit and AS-i bus address (1 … 31)
also S1,2 … S7,8 ('Safety Basis Monitor' only)

Start-up test: with / without

Local acknowledgment / reset: with / also after start-up / without

Slave type: single/A/B-Slave

Address: address of the local acknowledgment
AS-i circuit and AS-i bus address (1 … 31)
also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)

Bit address: In-0 … In-3 or Out-0 … Out-3

inverted / not inverted

Input mask

Description

With the **double channel forced** monitoring device, the switching signal of the respective safe AS-i slave acts on all four bits of the transmission sequence.

Optionally, a start-up test and/or a local acknowledgment/reset are/is possible. Upon activation of the **Also acknowledge after startup** check box, local acknowledgment/reset is always mandatory even after switching on the AS-i safety monitor or following a communication error (warm start of the AS-i safety monitor).

Information!
If only one contact opens/closes, after a tolerated transition time of 100 ms the device switches to the "Error" state.

Application symbols

EMERGENCY SHUTDOWN

Safety guard

Active Optoelectronic Protective Device

Module - used to connect conventional safety switching elements via a safety-oriented AS-i module

Enabling device

Key switch

Coupling - AS-i safety monitor of a coupled network which provides its validation information as a safety input slave to another network (no local acknowledgment / reset possible)

Configuration log

Example: without start-up test + without local acknowledgment / reset

(Generation II and lower)

```
0018 INDEX:      32 = "Name"                                          8
0019 TYPE:       20 = double channel forced safety input             9
0020 SUBTYPE:    no startup test                                     0
0021 SUBTYPE:    no local acknowledge                                1
0022 ASSIGNED:   channel one                                         2
0023 SAFE SLAVE: 5                                                   3
```

('Generation II V4.x' or higher)

```
0020 Index:       0 = "Name"                                         0
0021 Type:       20 = double channel forced safety input             1
0022 Subtype:    no startup test                                     2
0023 Subtype:    no local acknowledge                                3
0024 Assigned:   to OSSD 1                                           4
0025 Safe Slave: AS-i 1, slave 5                                     5
```

Example with start-up test + without local acknowledgment / reset

(Generation II and lower)

```
0025 INDEX:      33 = "Name"                                          5
0026 TYPE:       20 = double channel forced safety input             6
0027 SUBTYPE:    startup test                                        7
0028 SUBTYPE:    no local acknowledge                                8
0029 ASSIGNED:   channel one                                         9
0030 SAFE SLAVE: 5                                                   0
```

('Generation II V4.x' or higher)

```
0048 Index:       4 = "Name"                                         8
0049 Type:       20 = double channel forced safety input             9
0050 Subtype:    startup test                                        0
0051 Subtype:    no local acknowledge                                1
0052 Assigned:   to OSSD 1                                           2
0053 Safe Slave: AS-i 1, slave 5                                     3
```

Example: without start-up test + with local acknowledgment / reset

(Generation II and lower)

```
0032 INDEX:      34 = "Name"                                          2
0033 TYPE:       20 = double channel forced safety input             3
0034 SUBTYPE:    no startup test                                     4
0035 SUBTYPE:    local acknowledge        ADDRESS:    21   BIT:  In-0 noninv 5
0036 ASSIGNED:   channel one                                         6
0037 SAFE SLAVE: 5                                                   7
```

('Generation II V4.x' or higher)

```
0034 Index:       2 = "Name"                                         4
0035 Type:       20 = double channel forced safety input             5
0036 Subtype:    no startup test                                     6
0037 Subtype:    local acknowledge: AS-i 1, slave 21, bit in-0 noninv 7
0038 Assigned:   to OSSD 1                                           8
0039 Safe Slave: AS-i 1, slave 5                                     9
```

Example: without start-up test + with local acknowledgment / reset also after start-up

(Generation II and lower)

```
0039 INDEX:      35 = "Name"                                              9
0040 TYPE:       20 = double channel forced safety input                  0
0041 SUBTYPE:    no startup test                                          1
0042 SUBTYPE:    local acknowledge always  ADDRESS:     21   BIT:  In-0 invert 2
0043 ASSIGNED:   channel one                                              3
0044 SAFE SLAVE:  5                                                       4
```

('Generation II V4.x' or higher)

```
0041 Index:       3 = "Name"                                             1
0042 Type:       20 = double channel forced safety input                 2
0043 Subtype:   no startup test                                          3
0044 Subtype:  local acknowledge always: AS-i 1, slave 21, bit in-0 noninv   4
0045 Assigned:   to OSSD 1                                                5
0046 Safe Slave: AS-i 1, slave 5                                         6
```

Example: with start-up test + with local acknowledgment / reset

(Generation II and lower)

```
0046 INDEX:      36 = "Name"                                              6
0047 TYPE:       20 = double channel forced safety input                 7
0048 SUBTYPE:    startup test                                            8
0049 SUBTYPE:    local acknowledge            ADDRESS:     21   BIT:  In-0 noninv 9
0050 ASSIGNED:   channel one                                             0
0051 SAFE SLAVE:  5                                                      1
```

('Generation II V4.x' or higher)

```
0048 Index:       4 = "Name"                                             8
0049 Type:       20 = double channel forced safety input                 9
0050 Subtype:   startup test                                             0
0051 Subtype:   local acknowledge: AS-i 1, slave 21, bit in-0 noninv     1
0052 Assigned:   to OSSD 1                                                2
0053 Safe Slave: AS-i 1, slave 5                                         3
```

Double channel dependent

○
∐
Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device **Double channel dependent safety input**

Type	Designation in the configuration log
21	double channel dependent safety input
Variants	
Without start-up test	SUBTYPE: no startup test
With start-up test	SUBTYPE: startup test
Without local acknowledgment / reset	SUBTYPE: no local acknowledge
With local acknowledgment / reset	SUBTYPE: local acknowledge
With local acknowledgment / reset also after start-up	SUBTYPE: local acknowledge always

Parameter

Name:	max. 29 ASCII characters plaintext
Address:	AS-i circuit and AS-i bus address (1 … 31) also S1,2 … S7,8 ('Safety Basis Monitor' only)
Start-up test:	with / without
Contact synchronization time:	100ms … 30s in multiples of 100ms or ∞ (infinite)
Local acknowledgment / reset:	with / also after start-up / without
Slave type:	single/A/B-Slave
Address:	address of the local acknowledgment AS-i circuit and AS-i bus address (1 … 31) also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on) or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted

Input mask

Description

With the **Double channel dependent** monitoring device, both switching signals of the respective safety AS-i slave each act on 2 bits of the transmission sequence. In this case, both of the switching signals must arrive within a contact synchronization time defined by the user. If only one contact opens, the second contact must still open before both contacts can be closed again.

Optionally, a start-up test and/or a local acknowledgment/reset are/is possible. Upon activation of the **Also acknowledge after startup** check box, local acknowledgment/reset is always mandatory even after switching on the AS-i safety monitor or following a communication error (warm start of the AS-i safety monitor).

Information!
If the contact synchronization time defined by the user is exceeded, the activation must be repeated. If the contact synchronization time is set to infinite (∞), the AS-i safety monitor does not grant the validation until the second switching signal arrives.

Application symbols

EMERGENCY SHUTDOWN

Safety guard

Active Optoelectronic Protective Device

Module - used to connect conventional safety switching elements via a safety-oriented AS-i module

Enabling device

Key switch

Two-handed operation
(as per EN 574: with start-up test, max. contact synchronization time 500 ms)

⚠️ ***Attention!***
When using for two-handed operation, the corresponding application notes in the manufacturer's documentation must be observed!

Configuration log

Example: without start-up test + without local acknowledgment / reset

(Generation II and lower)

```
0018 INDEX:       32 = "Name"                                            8
0019 TYPE:        21 = double channel dependent safety input            9
0020 SUBTYPE:     no startup test                                        0
0021 SUBTYPE:     no local acknowledge                                   1
0022 ASSIGNED:    channel one                                            2
0023 SAFE SLAVE:  5                                                      3
0024 SYNC TIME:   0.100 Sec                                              4
```

('Generation II V4.x' or higher)

```
0020 Index:        0 = "Name"                                            0
0021 Type:         21 = double channel dependent safety input           1
0022 Subtype:     no startup test                                        2
0023 Subtype:     no local acknowledge                                   3
0024 Assigned:    to OSSD 1                                              4
0025 Safe Slave: AS-i 1, slave 5                                         5
0026 Sync Time:  0.100 sec                                               6
```

Example with start-up test + without local acknowledgment / reset

(Generation II and lower)

```
0025 INDEX:       33 = "Name"                                            5
0026 TYPE:        21 = double channel dependent safety input            6
0027 SUBTYPE:     startup test                                           7
0028 SUBTYPE:     no local acknowledge                                   8
0029 ASSIGNED:    channel one                                            9
0030 SAFE SLAVE:  5                                                      0
0031 SYNC TIME:   0.100 Sec                                              1
```

('Generation II V4.x' or higher)

```
0028 Index:        1 = "Name"                                            8
0029 Type:         21 = double channel dependent safety input           9
0030 Subtype:     startup test                                           0
0031 Subtype:     no local acknowledge                                   1
0032 Assigned:    to OSSD 1                                              2
0033 Safe Slave: AS-i 1, slave 5                                         3
0034 Sync Time:  0.100 sec                                               4
```

Example: without start-up test + with local acknowledgment / reset

(Generation II and lower)

```
0032 INDEX:      34 = "Name"                                                2
0033 TYPE:       21 = double channel dependent safety input                 3
0034 SUBTYPE:    no startup test                                            4
0035 SUBTYPE:    local acknowledge          ADDRESS:    21   BIT:  In-0 noninv 5
0036 ASSIGNED:   channel one                                                6
0037 SAFE SLAVE: 5                                                          7
0038 SYNC TIME:   0.100 Sec                                                 8
```

('Generation II V4.x' or higher)

```
0036 Index:       2 = "Name"                                                6
0037 Type:       21 = double channel dependent safety input                 7
0038 Subtype:    no startup test                                            8
0039 Subtype:    local acknowledge: AS-i 1, slave 21, bit in-0 noninv       9
0040 Assigned:   to OSSD 1                                                   0
0041 Safe Slave: AS-i 1, slave 5                                            1
0042 Sync Time:  0.100 sec                                                  2
```

Example: without start-up test + with local acknowledgment / reset also after start-up

(Generation II and lower)

```
0040 INDEX:      35 = "Name"                                                0
0041 TYPE:       21 = double channel dependent safety input                 1
0042 SUBTYPE:    no startup test                                            2
0043 SUBTYPE:    local acknowledge always  ADDRESS:    21   BIT:  In-0 invert 3
0044 ASSIGNED:   channel one                                                4
0045 SAFE SLAVE: 5                                                          5
0046 SYNC TIME:   0.100 Sec                                                 6
```

('Generation II V4.x' or higher)

```
0044 Index:       3 = "Name"                                                4
0045 Type:       21 = double channel dependent safety input                 5
0046 Subtype:    no startup test                                            6
0047 Subtype:    local acknowledge always: AS-i 1, slave 21, bit in-0 noninv 7
0048 Assigned:   to OSSD 1                                                   8
0049 Safe Slave: AS-i 1, slave 5                                            9
0050 Sync Time:  0.100 sec                                                  0
```

Example: with start-up test + with local acknowledgment / reset

(Generation II and lower)

```
0048 INDEX:      36 = "Name"                                              8
0049 TYPE:       21 = double channel dependent safety input              9
0050 SUBTYPE:    startup test                                             0
0051 SUBTYPE:    local acknowledge          ADDRESS:    21   BIT:  In-0 noninv 1
0052 ASSIGNED:   channel one                                              2
0053 SAFE SLAVE:  5                                                       3
0054 SYNC TIME:   0.100 Sec                                               4
```

('Generation II V4.x' or higher)

```
0052 Index:       4 = "Name"                                             2
0053 Type:        21 = double channel dependent safety input             3
0054 Subtype:    startup test                                            4
0055 Subtype:    local acknowledge: AS-i 1, slave 21, bit in-0 noninv    5
0056 Assigned:   to OSSD 1                                               6
0057 Safe Slave: AS-i 1, slave 5                                         7
0058 Sync Time:  0.100 sec                                               8
```

Double channel dependent with debouncing

○
Ⅱ
Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   **Double channel dependent safety input with debouncing**

Type	Designation in the configuration log
24	double channel dependent slow action safety input
Variants	
Without start-up test	SUBTYPE: no startup test
With start-up test	SUBTYPE: startup test
Without local acknowledgment / reset	SUBTYPE: no local acknowledge
With local acknowledgment / reset	SUBTYPE: local acknowledge
With local acknowledgment / reset also after start-up	SUBTYPE: local acknowledge always

Parameter

Name:	max. 29 ASCII characters plaintext
Address:	AS-i circuit and AS-i bus address (1 … 31)
	also S1,2 … S7,8 ('Safety Basis Monitor' only)
Start-up test:	with / without
Contact synchronization time:	200 ms … 60 s in multiples of 100 ms
	or ∞ (infinite), default 0.5 s
Bounce time:	100 ms … 25 s in multiples of 100 ms
Local acknowledgment / reset:	with / also after start-up / without
Slave type:	single/A/B-Slave
Address:	address of the local acknowledgment
	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted

Input mask

Description

With the **double channel dependent with debouncing** monitoring device, both switching signals of the respective safety AS-i slave each act on 2 bits of the transmission sequence. In this case, both of the switching signals must arrive within a contact synchronization time defined by the user.

For debouncing the contacts, a bounce time can be defined. During this time, the contacts are not evaluated. The bounce time begins when both contacts close the first time. After the bounce time has passed, both contacts are again queried. If they are then closed and if the contact synchronization time has not yet passed, the validation is performed. The selected contact synchronization time must be greater than the bounce time.

Information!
The set bounce time is always allowed to pass. This means that if a bounce time of 10s is set, then the device is validated no sooner than this time.

If only one contact opens, the second contact must still open before both contacts can be closed again.

> *Information!*
> *If the contact synchronization time defined by the user is exceeded, the activation must be repeated. If the contact synchronization time is set to infinite (∞), the AS-i safety monitor does not grant the validation until the second switching signal arrives.*

Optionally, a start-up test and/or a local acknowledgment/reset are/is possible. Upon activation of the **Also acknowledge after startup** check box, local acknowledgment/reset is always mandatory even after switching on the AS-i safety monitor or following a communication error (warm start of the AS-i safety monitor).

Application symbols

Safety guard

Active Optoelectronic Protective Device

Enabling device

EMERGENCY SHUTDOWN

Key switch

Configuration log

Example: contact synchronization time 0.3s, bounce time 0.2s

(Generation II and lower)

```
0020 INDEX:      32 = "Name"                                                    0
0021 TYPE:       24 = double channel dependent slow action safety input         1
0022 SUBTYPE:    no startup test                                                2
0023 SUBTYPE:    no local acknowledge                                           3
0024 ASSIGNED:   both channels                                                  4
0025 SAFE SLAVE: 1                                                              5
0026 SYNC TIME:  0.300 Sec                                                      6
0027 CHATTER:    0.200 Sec                                                      7
```

('Generation II V4.x' or higher)

```
0020 Index:       0 = "Name"                                                    0
0021 Type:       24 = double channel dependent slow action safety input         1
0022 Subtype:    no startup test                                                2
0023 Subtype:    no local acknowledge                                           3
0024 Assigned:   to OSSD 1                                                      4
0025 Safe Slave: AS-i 1, slave 1                                                5
0026 Sync Time:  0.300 sec                                                      6
0027 Chatter:    0.200 sec                                                      7
```

Example: contact synchronization time infinite, bounce time 0.1 s

(Generation II and lower)

```
0029 INDEX:      33 = "Name"                                                    9
0030 TYPE:       24 = double channel dependent slow action safety input         0
0031 SUBTYPE:    no startup test                                                1
0032 SUBTYPE:    no local acknowledge                                           2
0033 ASSIGNED:   channel one                                                    3
0034 SAFE SLAVE: 2                                                              4
0035 SYNC TIME:  infinite                                                       5
0036 CHATTER:    0.100 Sec                                                      6
```

('Generation II V4.x' or higher)

```
0029 Index:       1 = "Name"                                                    9
0030 Type:       24 = double channel dependent slow action safety input         0
0031 Subtype:    no startup test                                                1
0032 Subtype:    no local acknowledge                                           2
0033 Assigned:   to OSSD 1                                                      3
0034 Safe Slave: AS-i 1, slave 2                                                4
0035 Sync Time:  infinite                                                       5
0036 Chatter:    0.100 sec                                                      6
```

Example: With start-up test

(Generation II and lower)

```
0038 INDEX:      34 = "Name"                                                  8
0039 TYPE:       24 = double channel dependent slow action safety input       9
0040 SUBTYPE:    startup test                                                 0
0041 SUBTYPE:    no local acknowledge                                         1
0042 ASSIGNED:   channel one                                                  2
0043 SAFE SLAVE: 3                                                            3
0044 SYNC TIME:      0.500 Sec                                               4
0045 CHATTER:        0.100 Sec                                               5
```

('Generation II V4.x' or higher)

```
0038 Index:       2 = "Name"                                                  8
0039 Type:       24 = double channel dependent slow action safety input       9
0040 Subtype:    startup test                                                 0
0041 Subtype:    no local acknowledge                                         1
0042 Assigned:   to OSSD 1                                                     2
0043 Safe Slave: AS-i 1, slave 3                                              3
0044 Sync Time:  0.500 sec                                                    4
0045 Chatter:    0.100 sec                                                    5
```

Example: with start-up test and local acknowledgment / reset

(Generation II and lower)

```
0056 INDEX:      36 = "Name"                                                  6
0057 TYPE:       24 = double channel dependent slow action safety input       7
0058 SUBTYPE:    startup test                                                 8
0059 SUBTYPE:    local acknowledge         ADDRESS:    10   BIT: In-0 noninv   9
0060 ASSIGNED:   channel one                                                  0
0061 SAFE SLAVE: 5                                                            1
0062 SYNC TIME:      0.500 Sec                                               2
0063 CHATTER:        0.100 Sec                                               3
```

('Generation II V4.x' or higher)

```
0047 Index:       3 = "Name"                                                  7
0048 Type:       24 = double channel dependent slow action safety input       8
0049 Subtype:    startup test                                                 9
0050 Subtype:    local acknowledge: AS-i 1, slave 10, bit in-0 noninv         0
0051 Assigned:   to OSSD 1                                                     1
0052 Safe Slave: AS-i 1, slave 5                                              2
0053 Sync Time:  0.500 sec                                                    3
0054 Chatter:    0.100 sec                                                    4
```

Double channel dependent with filtering

○
Ɪ̈   *Information!*
      Availability of the individual devices depends on the device type and the safety version.
      Further information can be found in tab. "Monitoring devices", on page 13.

○
Ɪ̈   *Information!*
      The **"Double channel dependent with filtering"** *monitoring device was developed for*
      applications in areas with electrical interference as well as with vibrating guards.

Symbol

Functional device   Double channel dependent safety input with filtering

Type	Designation in the configuration log
30	double channel dependent safety input with filtering
Variants	
Without start-up test	SUBTYPE: no startup test
With start-up test	SUBTYPE: startup test
Without local acknowledgment / reset	SUBTYPE: no local acknowledge
With local acknowledgment / reset	SUBTYPE: local acknowledge
With local acknowledgment / reset also after start-up	SUBTYPE: local acknowledge always

Parameter		
	Name:	max. 29 ASCII characters plaintext
	Address:	AS-i circuit and AS-i bus address (1 … 31)
		also S1,2 … S7,8 ('Safety Basis Monitor' only)
	Start-up test:	with / without
	Contact synchronization time:	100 ms … 60s in multiples of 100ms or ∞ (infinite), default 0.5s
	Contact stabilizing time:	100ms … 10s in multiples of 100ms
	Single-channel interruption:	shutdown with test request/ shutdown without test request/ tolerancing without shutdown
	Tolerance time:	100ms … 1s in multiples of 100ms, default 0.1s
	Local acknowledgment / reset:	with / also after start-up / without
	Slave type:	single/A/B-Slave

Address: address of the local acknowledgment
AS-i circuit and AS-i bus address (1 … 31)
also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)

Bit address: In-0 … In-3 or Out-0 … Out-3

inverted / not inverted

Input mask

Description

With the double channel dependent with filtering monitoring device, both switching signals of the respective safe AS-i slave each act on 2 bits of the transmission sequence. The user defines a synchronization time, a stabilizing time and, if necessary, a tolerance time. When switching on, the safety switch may change between all possible states (none, one, both contacts closed) during the contact synchronization time.

If both contacts close within the contact synchronization time and remain closed for the duration of the contact stabilizing time is the validation performed. For correct operation of the device, the contact synchronization time should be considerably larger than the contact stabilizing time.

If both contacts remain open for the duration of the contact stabilizing time, the contact synchronization time is restarted when the contacts are again closed.

If the safety switch sends only faulty safety codes for the duration of the contact stabilizing time, the functional device switches to the locked error state.

The functional device offers 3 possibilities for handling single-channel interruptions.

- If shutdown with test request is activated, the functional device always calls for restart with test request.
- If shutdown without test request is activated, the functional device calls for restart with test request only for single-channel interruptions which have lasted longer than the set tolerance time.
- If tolerancing without shutdown is selected, shut-off in the event of single-channel interruptions only occurs after the tolerance time has passed. Note here that the reaction time is extended by the set tolerance time!

> ***Attention!***
> ***If tolerancing without shutdown is selected, shut-off in the event of single-channel interruptions only occurs after the tolerance time has passed. The reaction time is extended by the set tolerance time!***

> ***The set tolerance time in the "Tolerancing without shutdown" operating mode must not exceed one tenth of the average time between two actuations of the monitored switch!***
>
> ***Example:***
>
> ***The shortest time between 2 opening operations of a safety guard is 5s.***
> ***The set tolerance time in this case may be maximum 0.5 seconds.***

Optionally, a start-up test and/or a local acknowledgment/reset are/is possible. Upon activation of the **Also acknowledge after startup** check box, local acknowledgment/reset is always mandatory even after switching on the AS-i safety monitor or following a communication error (warm start of the AS-i safety monitor).

Application symbols		
		Safety guard
		Module - used to connect conventional safety switching elements via a safety-oriented AS-i module
		Active Optoelectronic Protective Device
		Enabling device
		EMERGENCY SHUTDOWN
		Key switch

Configuration log

Example:
Contact synchronization time 0.3s, contact stabilizing time 0.2s, shutdown with test request

```
0022 INDEX:       32 = "F1"                                                      2
0023 TYPE:        30 = double channel dependent safety input with filtering      3
0024 SUBTYPE:    no startup test                                                 4
0025 SUBTYPE:    no local acknowledge                                            5
0026 ASSIGNED:   channel one                                                     6
0027 SAFE SLAVE:  5                                                              7
0028 SYNC TIME:          0.300 Sec                                              8
0029 STABLE TIME:        0.200 Sec                                              9
0030 1-CHANNEL-INTERRUPT TOLERANCE:    off                                      0
```

Example:
Contact synchronization time infinite, contact stabilizing time 0.2s, shutdown without test request

```
0170 INDEX:       45 = "F2"                                                      0
0171 TYPE:        30 = double channel dependent safety input with filtering      1
0172 SUBTYPE:    no startup test                                                 2
0173 SUBTYPE:    local acknowledge always  ADDRESS:    31   BIT: In-0 noninv     3
0174 ASSIGNED:   channel one                                                     4
0175 SAFE SLAVE: 14                                                             5
0176 SYNC TIME:       infinite                                                  6
0177 STABLE TIME:        0.200 Sec                                              7
0178 1-CHANNEL-INTERRUPT TOLERANCE:   delayed test request                     8
0179 TOLERANCE TIME:     0.700 Sec                                             9
```

Example:
Contact synchronization time infinite, contact stabilizing time 0.2s, tolerancing without shutdown

```
0308 INDEX:       55 = "F3"                                                      8
0309 TYPE:        30 = double channel dependent safety input with filtering      9
0310 SUBTYPE:    startup test                                                   0
0311 SUBTYPE:    local acknowledge           ADDRESS:    31   BIT: In-0 invert   1
0312 ASSIGNED:   channel one                                                     2
0313 SAFE SLAVE: 26                                                             3
0314 SYNC TIME:       infinite                                                  4
0315 STABLE TIME:        2.000 Sec                                              5
0316 1-CHANNEL-INTERRUPT TOLERANCE:   delayed switch off                       6
0317 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!7
0318 !!! ADDITIONAL FAULT DETECTION TIME =    0.600 Sec !!!!!!!!!!!!!!!!!!!!!!!!8
0319 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!9
0320 TOLERANCE TIME:     0.600 Sec                                             0
```

Double channel conditionally dependent

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   **Double channel conditionally dependent safety input**

Type	Designation in the configuration log
25	double channel priority safety input
Variants (up to Safety Version 'SV4.3')	
None	

Variants (from Safety Version 'SV4.3' on)	
Without start-up test	SUBTYPE: no startup test
With start-up test	SUBTYPE: startup test
Without local acknowledgment / reset	SUBTYPE: no local acknowledge
With local acknowledgment / reset	SUBTYPE: local acknowledge
With local acknowledgment / reset also after start-up	SUBTYPE: local acknowledge always

Parameter

Name:	max. 29 ASCII characters plaintext
Address:	AS-i circuit and AS-i bus address (1 … 31) also S1,2 … S7,8 ('Safety Basis Monitor' only)
Independent:	bit address of the independent contact (In-1 or In-2)

Further parameters (from Safety Version 'SV4.3' on)

Start-up test:	with / without
Contact synchronization time:	100 ms … 30 s in multiples of 100 ms or ∞ (infinite)
Local acknowledgment / reset:	with / also after start-up / without
Slave type:	single/A/B-Slave

Address: address of the local acknowledgment
AS-i circuit and AS-i bus address (1 … 31)
also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)

Bit address: In-0 … In-3 or Out-0 … Out-3

inverted / not inverted

Input mask

Description

With the **double channel conditionally dependent** monitoring device, both switching signals of the respective safety AS-i slave each act on 2 bits of the transmission sequence. In order for the second, dependent switching signal to be accepted in this case, the first switching signal must be present. Which contact is dependent on which can be freely selected. It is an error if the second, dependent switching signal arrives before the first switching signal.

Example: A door switch with lock. One contact is operated by the door switch (independent contact), the second by the lock monitor (dependent contact). Only if the door is closed, the lock can be opened and closed. An opened door contact with the lock closed is an error.

Optionally, a start-up test and/or a local acknowledgment/reset are/is possible beginning with Safety Version 'SV4.3'. Upon activation of the **Also acknowledge after startup** check box, local acknowledgment/reset is always mandatory even after switching on the AS-i safety monitor or following a communication error (warm start of the AS-i safety monitor).

⚠️ ***Attention!***
Double channel conditionally dependent monitoring devices offer only limited safety, as they cannot be checked for simultaneousness. Check carefully to ensure that the use of a double channel conditionally dependent monitoring device fulfills the requirements of the desired safety category.

Application symbols

Safety guard with lock

Module - used to connect conventional safety switching elements via a safety-oriented AS-i module

Configuration log

Example: Contact with bit address In-1 is the independent contact

(Generation II and lower)

```
0026 INDEX:      33 = "Name"                                          6
0027 TYPE:       25 = double channel priority safety input            7
0028 SUBTYPE:    in-1 is independent                                  8
0029 ASSIGNED:   channel one                                          9
0030 SAFE SLAVE: 4                                                    0
```

('Generation II V4.x' or higher)

```
0020 Index:      0 = "Name"                                           0
0021 Type:       25 = double channel priority safety input            1
0022 Subtype:    in-1 is independent                                  2
0023 Assigned:   to OSSD 1                                            3
0024 Safe Slave: AS-i 1, slave 4                                      4
```

Example: Contact with bit address In-2 is the independent contact

(Generation II and lower)

```
0020 INDEX:      32 = "Name"                                          0
0021 TYPE:       25 = double channel priority safety input            1
0022 SUBTYPE:    in-2 is independent                                  2
0023 ASSIGNED:   channel one                                          3
0024 SAFE SLAVE: 3                                                    4
```

('Generation II V4.x' or higher)

```
0026 Index:      1 = "Name"                                           6
0027 Type:       25 = double channel priority safety input            7
0028 Subtype:    in-2 is independent                                  8
0029 Assigned:   to OSSD 1                                            9
0030 Safe Slave: AS-i 1, slave 3                                      0
```

Double channel independent

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   Double channel independent safety input

Type	Designation in the configuration log
22	double channel independent safety input
Variants	
Without start-up test	SUBTYPE: no startup test
With start-up test	SUBTYPE: startup test
Without local acknowledgment / reset	SUBTYPE: no local acknowledge
With local acknowledgment / reset	SUBTYPE: local acknowledge
With local acknowledgment / reset also after start-up	SUBTYPE: local acknowledge always

Parameter

Name:	max. 29 ASCII characters plaintext
Address:	AS-i circuit and AS-i bus address (1 … 31)
	also S1,2 … S7,8 ('Safety Basis Monitor' only)
Start-up test:	with / without
Local acknowledgment / reset:	with / also after start-up / without
Slave type:	single/A/B-Slave
Address:	address of the local acknowledgment
	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted

Input mask

Description

With the **double channel independent** monitoring device, the two switching signals of the respective safe AS-i slave each act on 2 bits of the transmission sequence. In this case, it is only necessary that both switching signals arrive. There is no synchronization time.

Optionally, a start-up test and/or a local acknowledgment/reset are/is possible. Upon activation of the **Also acknowledge after startup** check box, local acknowledgment/reset is always mandatory even after switching on the AS-i safety monitor or following a communication error (warm start of the AS-i safety monitor).

Information!
If the start-up test option is selected, both switches must be open at all times during the test. Moreover, a start-up test must be performed following the error unlock.

Attention!
Double channel independent monitoring devices offer only limited safety, as they cannot be checked for simultaneousness. Check carefully to ensure that the use of a double channel independent monitoring device fulfills the requirements of the desired safety category.

Application symbols   EMERGENCY SHUTDOWN

Safety guard

Module - used to connect conventional safety switching elements via a safety-oriented AS-i module

Enabling device

Key switch

Double channel muting input

Configuration log

Example: With start-up test

(Generation II and lower)

```
0020 INDEX:     32 = "Name"                                             0
0021 TYPE:      22 = double channel independent safety input           1
0022 SUBTYPE:   startup test                                           2
0023 SUBTYPE:   no local acknowledge                                   3
0024 ASSIGNED:  both channels                                          4
0025 SAFE SLAVE: 1                                                     5
```

('Generation II V4.x' or higher)

```
0020 Index:      0 = "Name"                                            0
0021 Type:      22 = double channel independent safety input           1
0022 Subtype:   startup test                                           2
0023 Subtype:   no local acknowledge                                   3
0024 Assigned:  to OSSDs 1, 2                                          4
0025 Safe Slave: AS-i 1, slave 1                                       5
```

Example: with local acknowledgment / reset also after start-up

(Generation II and lower)

```
0027 INDEX:     33 = "Name"                                             7
0028 TYPE:      22 = double channel independent safety input           8
0029 SUBTYPE:   no startup test                                        9
0030 SUBTYPE:   local acknowledge always  ADDRESS:  10   BIT: In-0 noninv  0
0031 ASSIGNED:  channel one                                           1
0032 SAFE SLAVE: 2                                                     2
```

('Generation II V4.x' or higher)

```
0027 Index:      1 = "Name"                                            7
0028 Type:      22 = double channel independent safety input           8
0029 Subtype:   no startup test                                        9
0030 Subtype:   local acknowledge always: AS-i 1,slave 10, bit in-0 noninv  0
0031 Assigned:  to OSSD 1                                              1
0032 Safe Slave: AS-i 1, slave 2                                       2
```

Speed monitor

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol (internal) or (external)

Functional device   Speed monitor

Type	Designation in the configuration log
33 (internal speed monitor)	speed monitoring
Variants	
single channel	SUBTYPE: singlechannel
double channel	SUBTYPE: doublechannel
20 (external speed monitor)	double channel forced safety input
Variants	
without start-up test	SUBTYPE: no startup test
with start-up test	SUBTYPE: startup test

Parameter
Name: max. 29 ASCII characters plaintext
Address: AS-i circuit and AS-i bus address (1 … 31)
also S1,2 … S7,8 ('Safety Basis Monitor' only)
see chapter 8.2.2 "Configuration"
Start-up test: with / without

Input mask

Description

With the **speed monitor** monitoring device, the switching signal of the corresponding safe AS-i slave acts on all four bits of the code sequence in the case of an external configuration.

For an internal configuration, the sensor signal acts directly on the selected input of the monitor (see chapter 8.2.2 "Configuration").

⚠️ ***Attention!***
Double channel independent monitoring devices offer only limited safety, as they cannot be checked for simultaneousness. Check carefully to ensure that the use of a double channel independent monitoring device fulfills the requirements of the desired safety category.

Application symbols   "Internal" speed monitor

"External" speed monitor

Configuration log

Example: for internal speed monitor

(single channel)
```
0022 Index:        0 = "Speed monitor#1"                                    2
0023 Type:        33 = Speed Monitoring                                     3
0024 Subtype:     Singlechannel                                            4
0025 Input:       S52                                                      5
0026 Assigned:    to OSSD 1                                                6
0027 Upper Frequency: 100.0 Hz                                             7
0028 Lower Frequency: 90.0 Hz                                              8
```

(double channel)
```
0022 Index:        0 = "Speed monitor#1"                                    2
0023 Type:        33 = Speed Monitoring                                     3
0024 Subtype:     Doublechannel                                            4
0025 Input:       S52 & S61                                                5
0026 Assigned:    to OSSD 1                                                6
0027 Upper Frequency: 100.0 Hz                                             7
0028 Lower Frequency: 90.0 Hz                                              8
```

Example: without start-up test + without local acknowledgment / reset

(Generation II and lower)
```
0018 INDEX:       32 = "Name"                                              8
0019 TYPE:        20 = double channel forced safety input                  9
0020 SUBTYPE:     no startup test                                          0
0021 SUBTYPE:     no local acknowledge                                     1
0022 ASSIGNED:    channel one                                              2
0023 SAFE SLAVE:  5                                                        3
```

('Generation II V4.x' or higher)
```
0020 Index:        0 = "Name"                                              0
0021 Type:        20 = double channel forced safety input                  1
0022 Subtype:     no startup test                                          2
0023 Subtype:     no local acknowledge                                     3
0024 Assigned:    to OSSD 1                                                4
0025 Safe Slave: AS-i 1, slave 5                                           5
```

Example with start-up test + without local acknowledgment / reset

(Generation II and lower)

```
0025 INDEX:      33 = "Name"                                        5
0026 TYPE:       20 = double channel forced safety input            6
0027 SUBTYPE:    startup test                                       7
0028 SUBTYPE:    no local acknowledge                               8
0029 ASSIGNED:   channel one                                        9
0030 SAFE SLAVE: 5                                                  0
```

('Generation II V4.x' or higher)

```
0048 Index:       4 = "Name"                                        8
0049 Type:       20 = double channel forced safety input            9
0050 Subtype:    startup test                                       0
0051 Subtype:    no local acknowledge                               1
0052 Assigned:   to OSSD 1                                          2
0053 Safe Slave: AS-i 1, slave 5                                    3
```

Safe output monitor

○
Ⅱ
Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Safe output monitor **functional device**

Type	Designation in the configuration log
34	safe output monitor
Variants	
Without start-up test	SUBTYPE: no startup test
With start-up test	SUBTYPE: startup test
Without local acknowledgment / reset	SUBTYPE: no local acknowledge
With local acknowledgment / reset	SUBTYPE: local acknowledge
With local acknowledgment / reset also after start-up	SUBTYPE: local acknowledge always

Parameter

Name: max. 29 ASCII characters plaintext

Address: AS-i circuit and AS-i bus address (1 … 31)

Start-up test: with / without

Local acknowledgment / reset: with / also after start-up / without

Local error unlock: with / without

Local restart: with / without

inverted / not inverted

Input mask

Description

The **safe output monitor** monitoring device acts like a safe remote output. The code sequence of the transmitter of the release signal is safely evaluated. Help signals are also detected and evaluated. Furthermore, the help signals can also be locally superimposed. For this purpose, the contacts for restarting and error unlocking are provided with corresponding devices. To obtain exactly the same behavior as for a safe remote output, the Start-up test option must be activated. In this case, it is only necessary that both switching signals arrive. There is no synchronization time.

Optionally, a start-up test and/or a local acknowledgment/reset are/is possible. Upon activation of the **Also acknowledge after start-up** check box, local acknowledgment/reset is always mandatory even after switching on the AS-i safety monitor or following a communication error (warm start of the AS-i safety monitor).

Configuration log

Example:

('Generation II V4.x' or higher)

```
0119 Index:        14 = "Name"                                           9
0120 Type:         34 = output monitoring                                0
0121 Subtype:   no startup test                                          1
0122 Subtype:   no local acknowledge                                     2
0123 Output diagnosis Address:    AS-i 1, slave 27B, bit in-0 noninv     3
0124 Output Signal: 01                                                   4
0125    auxiliary signal 1 active during both transitions on            5
0126                    device   S-1 = true - static on                  6
0127    auxiliary signal 2 active during ON state of                    7
0128                    device   S-1 = true - static on                  8
0129 Assigned:   to OSSD 1                                               9
0130 Safe Slave: AS-i 1, slave 26                                        0
```

Cross-communication input

○
∐ *Information!*
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

○
∐ *Information!*
*To use this device, **SafeLink** must be activated in the **Monitor/Bus information** window,*
***SafeLink** tab.*

Symbol

Functional device   **Cross-communication input**

Type	Designation in the configuration log
37	safe cross communication input device
Variants	
None	

Parameter   Name: Max. 29 ASCII characters plaintext
                             Device: Device number of the SafeLink (1 … 31)
                    Bit address: Bit number in the data of the SafeLink (1 … 31)

Input mask

[32] Safe Link input	⊠
Name:	02: 10#1
Station:	02
Bit address:	10
Show all items	✓

OK
Cancel
Help

Diagnostics index
Output

Description

The cross-communication input monitoring device allows safe input data to be received by another
safety monitor. For this purpose, **SafeLink** must be selected in Monitor/Bus information (see chapter
"SafeLink tab").

If **Show all items** is not selected, only the devices and bits from the devices are displayed for which
data is available.

In order for a device to send data, bits must be assigned to the devices in the **Output assignment**
(see chapter 6.4) under the **SafeLink** selection.

ℹ️ *Information!*
*The maximum time for data transmission is specified in the configuration log under **Resp.**
***Time**. This time is dependent on the number of devices participating in the current group.*

Configuration log

Example:

```
0061 Index:       5 = "Name"                                        1
0062 Type:       37 = safe cross communication input device         2
0063 Sender:     station 12                                          3
0064 Resp. Time: 194ms (worst case)                                  4
0065 Data Item:  Bit 21                                              5
0066 Assigned:   to OSSD 2                                           6
```

Standard slave

Information!	

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol
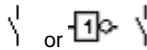
Functional device   Standard slave

Type	Designation in the configuration log
23	activation switch
Variants	
None	

Parameter

Name:	max. 29 ASCII characters plaintext
Address:	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Slave type:	single/A/B-Slave
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted

Input mask
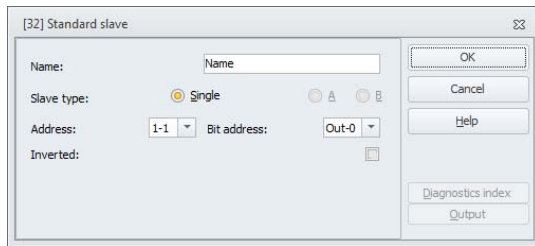
Description

The standard slave monitoring device is used to integrate one bit (input or output) of a non-safety-oriented, standard AS-i slave as an additional switching signal **for operational switching** of the AS-i Safety Monitor relay(s) in an OSSD.

Information!
With the input and output bits of a non-safety-oriented, standard AS-i slave, the process image is always analyzed, i.e. the **ON** *state always means an* **active signal in the process image***.*

With the standard slave, the output bits of a slave address can also be used. In this way it is possible to react to a signal from the controller as well. As of version 2.0 the slaves simulated by the monitor can also be used for this purpose.

If the **Inverted** *parameter is activated, the inverter symbol precedes the symbol for the standard slave device in the configuration.*

Configuration log

Example:

(Generation II and lower)

```
0018 INDEX:      32 = "Name"                              8
0019 TYPE:       23 = activation switch                   9
0020 ASSIGNED:   channel one                              0
0021 ADDRESS:    21  BIT:  In-0 noninv                    1
```

('Generation II V4.x' or higher)

```
0020 Index:      0 = "Name"                               0
0021 Type:       23 = activation switch                   1
0022 Assigned:   to OSSD 1                                2
0023 Address:    AS-i 1, slave 21, bit in-0 noninv        3
```

Standard slave parameter

○
Ⅱ
Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

Symbol   ⌐P

Functional device   Standard slave parameter

Type	Designation in the configuration log
35	Standard slave bit
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext
                            Address: AS-i circuit and AS-i bus address (1 … 31)
                         Slave type: single/A/B-Slave
                      Parameter bit: In-0 … In-3 or Out-0 … Out-3
                                        inverted / not inverted

Input mask

[32] Standard slave parameter		⊠
Name:	Name	OK
Slave type:	◉ Single ○ A ○ B	Cancel
Address:	1-1 ▼ Parameter bit: In-0 ▼	Help
Inverted:	☐	
		Diagnostics index
		Output

Description

The standard slave monitoring device parameter is used to integrate one parameter bit (input or output) as an additional switching signal **for operational switching** of the AS-i Safety Monitor relay(s) in an OSSD.

Information!
With the standard slave parameter, the parameter bits of the slave are evaluated. With the help of this bit, it is possible to respond to other signals of the slave in addition to the safe code sequence.

Example:
One common use of the slave parameter is door locking. The safe state (closed) is signaled here via the code sequence. A parameter bit also indicates whether the door is locked.

Attention!
The use of a standard slave parameter for safety-oriented switching tasks is not permitted!

Configuration log

Example:

(Generation II and lower)

```
0018 INDEX:      32 = "Name"                            8
0019 TYPE:       35 = parameter bit                     9
0020 ASSIGNED:   channel one                            0
0021 ADDRESS:    21  BIT:  In-0 noninv                  1
```

('Generation II V4.x' or higher)

```
0020 Index:      0 = "Name"                             0
0021 Type:       35 = parameter bit                     1
0022 Assigned:   to OSSD 1                              2
0023 Address:    AS-i 1, slave 21, bit in-0 noninv      3
```

Monitor input

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol 　　　　　　　　册 ᠈ or ◁1▷ 册 ᠈
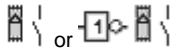
Functional device 　　　Monitor input

Type	Designation in the configuration log
28	monitor input
Variants	
None	

Parameter 　　　　　Name: 　max. 29 ASCII characters plaintext
　　　　　　　　Monitor input: 　1.Y1, 1.Y2, 2.Y1 or 2.Y2 (except 'Safety Basis Monitor')
　　　　　　　　　　　　S12 … S81 ('Safety Basis Monitor' only)
　　　　　　　　　　　　inverted / not inverted

Input mask

Input mask[*1]

*1 　Input mask in the 'Safety Basis Monitor' setting

Description

The monitor input monitoring device is used to link a signal to one of the inputs 1.Y1 through 2.Y2 of the AS-i safety monitor as an additional switching signal **for operational switching** of the AS-i safety monitor relay(s) in an OSSD.

The state of the device corresponds to the level at the selected monitor input. In order to change the state of the device, the level at the selected monitor input must remain stable for the duration of three machine cycles. It is possible to invert the device state.

> *Information!*
> *A configuration which uses inputs 2.Y1 or 2.Y2 cannot be operated in a single-channel AS-i Safety Monitor.*
>
> *If the **Inverted** parameter is activated, the inverter symbol precedes the symbol for the monitor input device in the configuration.*

> *Attention!*
> *The use of a monitor input device for safety-oriented switching tasks is not permitted!*

Configuration log

Example:

(Generation II and lower)

```
0018 INDEX:      32 = "Name"                                    8
0019 TYPE:       28 = monitor input                             9
0020 ASSIGNED:   channel one                                    0
0021 INPUT:       1.Y2    invert                                1
```

('Generation II V4.x' or higher)

```
0020 Index:       0 = "Name"                                    0
0021 Type:       28 = monitor input                             1
0022 Assigned:   to OSSD 1                                      2
0023 Input:       1.Y2 inverted                                 3
```

Button

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   **Button**

Type	Designation in the configuration log
26	button
Variants	
None	

Parameter

Name:	max. 29 ASCII characters plaintext
Slave type:	single/A/B-Slave
Address:	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted
Pulse length:	5 ms … 300 s in multiples of 5 ms
	or ∞ (infinite)

Input mask

Description

The Button device can be integrated within the OSSD or Preprocessing. The Button device makes acknowledgment possible on the device level. As soon as the validation for the device which is linked to the button is present, this device can be validated by actuating the button, i.e. acknowledged (device switches to the ON state). If the device is not validated before the acknowledgment arrives, the device switches to the OFF state.

Information!
This function requires that the button remain unactuated after the validation condition has been fulfilled for at least 50 ms and then be actuated for at least 50 ms yet for no more than 2 s. After the button is released, the device switches to the ON state after an additional 50 ms for the time set under pulse length.

Configuration log

Example:
(Generation II and lower)

```
0020 INDEX:       32 = "Name"                                          0
0021 TYPE:        26 = button                                          1
0022 ASSIGNED:   channel one                                           2
0023 ADDRESS:     10   BIT:  In-0 noninv                               3
0024 ENABLE DEV:   8 = system device: dev before start one            4
0025 PULSE WIDTH:    0.005 Sec                                          5
```

('Generation II V4.x' or higher)

```
0020 Index:        0 = "Name"                                          0
0021 Type:        26 = button                                          1
0022 Assigned:   to OSSD 1                                             2
0023 Address:    AS-i 1, slave 10, bit in-0 noninv                     3
0024 Enable Dev: S-64 = devices before start OSSD 1                    4
0025 Pulse Width: 0.005 sec                                            5
```

NOP

○
𝕀 *Information!*
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   **Dummy**

Type	Designation in the configuration log
59	no operation
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext
                               State: ON or OFF

Input mask
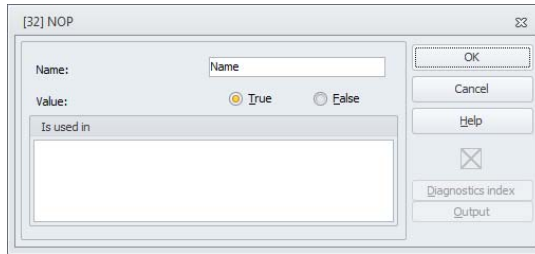
Description

Dummies (NOP - No OPeration) can be used within one of the OSSDs or Preprocessing to make the configuration or the graphical display in **ASIMON 3 G2** easier to organize or to create a sample configuration to be used as a pattern for different configuration variants. An NOP dummy occupies an index within the configuration. Each functional device can be replaced by an NOP dummy and vice versa.

○
𝕀 *Information!*
With NOP devices, make certain that the state values are assigned correctly in the configu-
ration. In AND logic operations, NOP devices should be assigned the ON state; in OR logic
operations, on the other hand, they should be assigned the OFF state.

Configuration log

Example: NOP device with OFF state

(Generation II and lower)

```
0020 INDEX:      32 = "Name"                              0
0021 TYPE:       59 = no operation                        1
0022 SUBTYPE:    device value is false                    2
0023 ASSIGNED:   channel one                              3
```

('Generation II V4.x' or higher)

```
0020 Index:       0 = "Name"                              0
0021 Type:       59 = no operation                        1
0022 Subtype:    device value is false                    2
0023 Assigned:   to OSSD 1                                3
```

Example: NOP device with ON state

(Generation II and lower)

```
0025 INDEX:      32 = "Name"                              5
0026 TYPE:       59 = no operation                        6
0027 SUBTYPE:    device value is true                     7
0028 ASSIGNED:   channel one                              8
```

('Generation II V4.x' or higher)

```
0025 Index:       1 = "Name"                              5
0026 Type:       59 = no operation                        6
0027 Subtype:    device value is true                     7
0028 Assigned:   to OSSD 1                                8
```

Zero sequence detection

O
Ⅱ
Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.
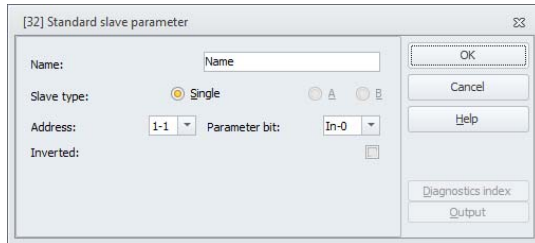
Symbol

Functional device	Zero sequence detection

Type	Designation in the configuration log
27	zero sequence detection
Variants	
None	

Parameter

Name: max. 29 ASCII characters plaintext
Address: AS-i circuit and AS-i bus address (1 … 31)
also S1,2 … S7,8 ('Safety Basis Monitor' only)
State: ON or OFF

Input mask

[32] Zero sequence detection

Name: Name
Address: 1-1

OK
Cancel
Help

Diagnostics index
Output
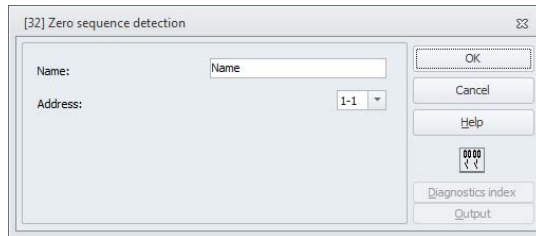
Description

The zero sequence detection monitoring device can be used to monitor whether both switches of a safety input slave are open. It is used to perform operational switching tasks. The device switches to the ON state when the value 0000 is continuously transmitted by the safe slave. With zero sequence detection, safe input slaves which are included at a different point in the configuration can also be monitored. And vice versa, the address selected for zero sequence detection for monitoring devices remains available.

⚠ *Attention!*
In the event of a defect or error, e.g. insufficient voltage at the slave, the ON state can also be achieved when both switches are closed. For this reason, it is not permitted to use a zero sequence detection device for safety-oriented switching tasks!

Configuration log

Example: Zero sequence detection device

(Generation II and lower)

```
0020 INDEX:        32 = "Name"                              0
0021 TYPE:         27 = zero sequence detection             1
0022 ASSIGNED:     channel one                              2
0023 SAFE SLAVE: 2                                          3
```

('Generation II V4.x' or higher)

```
0020 Index:        0 = "Name"                               0
0021 Type:         27 = zero sequence detection             1
0022 Assigned:     to OSSD 1                                2
0023 Safe Slave: AS-i 1, slave 2                            3
```

Half-sequence detection

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   **Half-sequence detection**

Type	Designation in the configuration log
32	half sequence detection
Variants	
None	

Parameter

Name:	max. 29 ASCII characters plaintext
Address:	AS-i circuit and AS-i bus address (1 … 31)
	also S1,2 … S7,8 ('Safety Basis Monitor' only)
State:	ON or OFF

Input mask
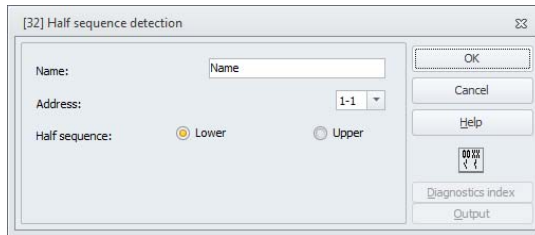
Description

The lower (In-0 and In-1) or upper (In-2 and In-3) half-sequence of a safety input slave can be monitored independently of each other using the **Half-sequence detection** device.

Attention!
The use of a standard slave device for safety-oriented switching tasks is not permitted!

Configuration log

Example:

```
0063 Index:      6 = "Name"                                    3
0064 Type:      32 = half sequence detection                   4
0065 Assigned:   to OSSD 3                                      5
0066 Address:    AS-i 1, slave 2                                6
0067 Subtype:    lower half sequence D0 + D1                    7
```

Remote output diagnostics

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   Remote output diagnostics

Type	Designation in the configuration log
58	Remote output diagnostics
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext
                           Slave type: single/A/B-Slave
                           Address: AS-i circuit and AS-i bus address of diagnostics slave (1 … 31)
                           Diagnostics type: type of the safe output (only from Safety Version 'SV4.3' on)

Input mask

Description

The diagnostics functional device of the safe output has no safety function, but is used to visualize the state of the safe AS-i output slave.

The field "address" must contain the unsafe address of the safe AS-i output. During online diagnostics or diagnostics via AS-i the color indicates the state of the output. The colors have the following meaning.

Value	Display or color	Description	Change of state	LED "Out"
0/8		Green	Output on		On
1/9		Green flashing	–		–
2/10		Yellow	Restart-disable	Auxiliary signal 2	1 Hz
3/11		Yellow flashing	–		–
4/12		Red	Output off		Off
5/13		Red flashing	Waiting for error unlock	Auxiliary signal 1	8 Hz
6/14		Gray	Internal error, for instance "fatal error"	Only through turning power "on" on the device	All LEDs are flashing
7/15		Green/yellow	Output validated but not switched on	Switched "on" by setting O1	Off

Fig.: Example: Structure of a safe output configuration

Color table in Safety Version 'SV4.3'

Beginning with Safety Version 'SV4.3', it is possible to select various slave types via **Diagnostics type**.

	Display or color				
Value	**Type 1 (B+W)**	**Type 2 (IFM 1)**	**Type 3 (IFM 2)**	**Type 4 (Siemens)**	**Type 5 (Festo)**
0	Green	Red	Red	Green	Green flashing
1	Green flashing	Red	Yellow flashing	Green	Green
2	Yellow	Red	Red	Green	Red flashing
3	Yellow flashing	Red	Yellow flashing	Green	Red
4	Red	Green	Green	Green	Green flashing
5	Red flashing	Green	Green	Green	Green
6	Gray	Green	Green	Green	Red flashing
7	Green/ yellow	Green	Green	Green	Red
8	Green	Red	Red	Red flashing	Green flashing
9	Green flashing	Red	Yellow flashing	Red flashing	Green
10	Yellow	Red	Red	Red flashing	Red flashing
11	Yellow flashing	Red	Yellow flashing	Red flashing	Red
12	Red	Green	Green	Red flashing	Green flashing
13	Red flashing	Green	Green	Red flashing	Green
14	Gray	Green	Green	Red flashing	Red flashing
15	Green/ yellow	Green	Green	Red flashing	Red

Configuration log

Example: Remote output diagnostics

```
0028 Index:       1 = "Name"                                    8
0029 Type:       58 = remote output diagnostics                 9
0030 Subtype:    device value is false                          0
0031 Assigned:   to OSSD 1                                       1
0032 Monitor:    AS-i 1, slave 10                                2
```

Output F-CPU

○
Ꚛ

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device   Output F-CPU

Type	Designation in the configuration log
39	PROFIsafe input device
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext
                              F-Output: bit within the 8 byte PROFIsafe output data.

Input mask


```
[32] Output F-CPU                                    ☒

   Name:              Name                        ┌──────────────┐
                                                  │      OK       │
   F-Output:          PROFIsafe Bit 0-1    ▼      └──────────────┘
                                                  ┌──────────────┐
   Inverted:                              ☐       │    Cancel     │
                                                  └──────────────┘
                                                  ┌──────────────┐
                                                  │     Help      │
                                                  └──────────────┘
                                                       🌼
                                                  Diagnostics index
                                                       Output
```

Description

The monitoring device **Output F-CPU** receives data sent via the PROFIsafe.

8-bytes of safe data are available (per direction) for the PROFIsafe. The desired bit can be selected in the drop-down menu of the input mask.

The first bit of the data field is reserved and cannot be selected.

Coupling example:

• **Output F-CPU** to a safe AS-i output
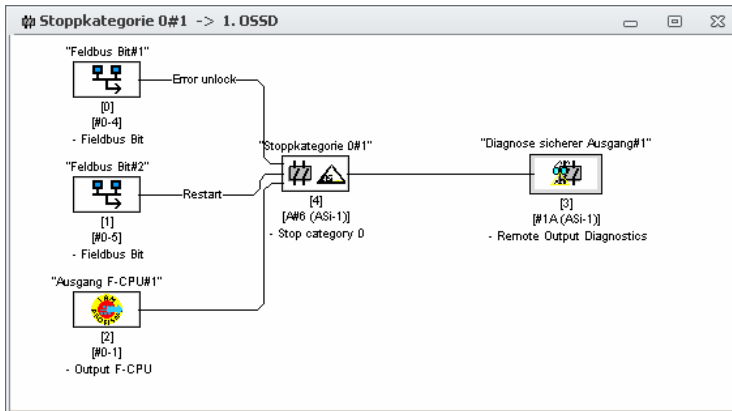
Configuration log

Example:

(PROFIsafe Gateway)

```
0035 ---------------------------------------------------------------------- 5
0036 Index:        2 = "Output F-CPU"                                        6
0037 Type:        39 = PROFIsafe input device                               7
0038 F-Output:   byte 0, bit 1                                              8
0039 Assigned:   to OSSD 1                                                  9
0040 ---------------------------------------------------------------------- 0
```

Fieldbus bit

○
Ⅱ **Information!**
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Monitoring devices", on page 13.

Symbol

Functional device Fieldbus bit

Type	Designation in the configuration log
38	fieldbus bit monitoring device
Variants	
None	

Parameter Name: max. 29 ASCII characters plaintext

Fieldbus: bit from the 12 bit unsafe data of the **Control/State** module.

Input mask

Description

The monitoring device **Fieldbus Bit** allocates the unsafe bits from the fieldbus module **Control/State** for the safety monitor. The first 4 bits in the **Control/State** are preselected. The rest of the 12 bits are available for this device.

Coupling examples

With this device it is possible to operate Error unlock and Restart.
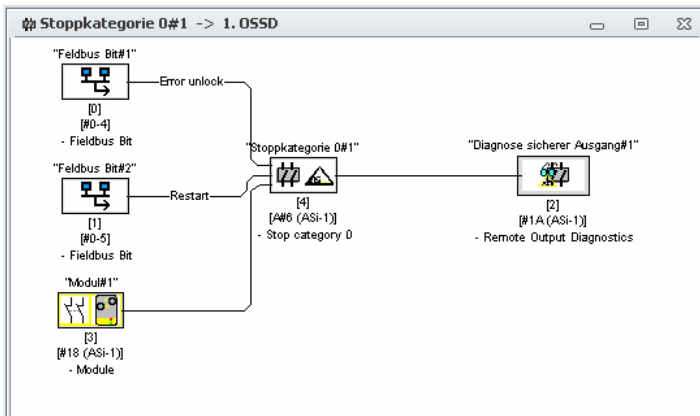
Configuration log

Example:

(PROFIsafe Gateway)

```
0050 ------------------------------------------------------------------------- 0
0051 Index:        5 = "Fieldbus Bit"                                          1
0052 Type:        38 = fieldbus bit monitoring device                         2
0053 Bit Number: 4                                                            3
0054 Assigned:    to OSSD 1                                                   4
0055 ------------------------------------------------------------------------- 5
```

Standstill monitor

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Monitoring devices", on page 13.

Attention!
This device satisfies the safety requirement up to max. SIL 2.

Attention!
This device cannot detect an error such as cable break until after three cycles have been completed. Therefore, three times the "upper threshold cycle time" value must be added to the reaction time!
Example: Upper threshold cycle time = 600 ms
*The reaction time is extended by 3 * 600 ms = 1.8 s.*

Attention!
The maximum input frequency must not exceed 70 Hz.
Every signal level must be applied for at least 7 ms.

Symbol

Functional device   Standstill monitor

Type	Designation in the configuration log
36	Standstill monitoring
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext
Lower threshold cycle time: 0.020 … 300s
Upper threshold cycle time: 0.020 … 300s
Monitor input: S12+S21, S32+S41, S52+S61, S72+S81
inverted / not inverted

Input mask
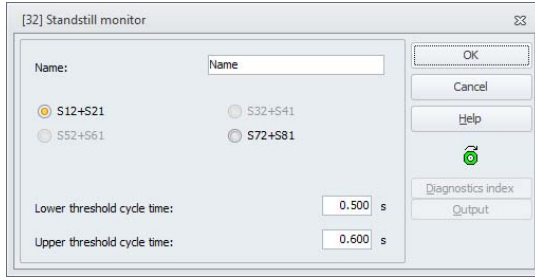
Description

With the standstill monitor monitoring device, it is possible to monitor a defined rotational speed for underspeed (with hysteresis). The device switches on (ON) if the rotational speed drops below the minimum value or if the **Upper threshold cycle time** value is exceeded. The device switches off (OFF) if the value drops below the **Lower threshold cycle time**.

The sensors must be connected in such a way that at least one is always damped (see fig. "Sensor arrangement (S1=damped, S2=not damped)").

The tolerance for the cycle time measurement is ± 7 ms.
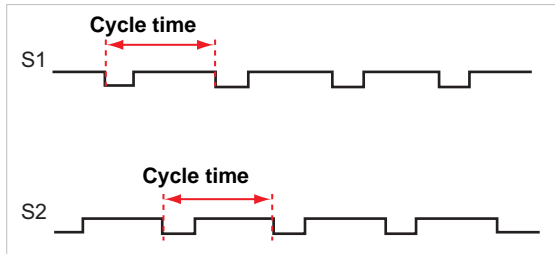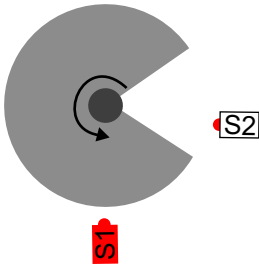
Fig.: Sensor arrangement (S1=damped, S2=not damped)

Configuration log

Example:

(Safety Basic Monitor)

```
0103 ------------------------------------------------------------------ 3
0104 Index:       12 = "Name"                                          4
0105 Type:        36 = Standstill Monitoring                           5
0106 Inputs:     S32 & S41                                             6
0107 Assigned:    to OSSD 1                                            7
0108 upper th cycle time:  500 ms                                      8
0109 lower th cycle time:  600 ms                                      9
0110 ------------------------------------------------------------------ 0
```

4.3.2 Logic devices

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.

In more complex safety tasks, complex linking of the various input signals and intermediate states is required – the global AND does not suffice here. Logic devices are available for this purpose:

• Logic OR operation
• Logic AND operation
• Logic exclusive OR operation
• R/S FlipFlop with SET and HOLD input
• Switch-on delay
• Switch-off delay
• Pulse on positive edge
• Inversion
• Flashing

Information!
You can also link monitoring devices from the other OSSD by assigning them to a logic device.

*For AS-i safety monitors with 'Basic' function range, the only possible logic device available for the linking of **two** monitoring or system devices is the logic OR function.*

Example 1:

Circuit diagram display   Tree structure display
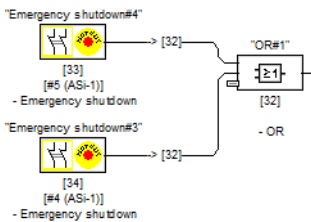
Fig.: Logic device example

In the example shown here, the OR logic device switches to the ON state (switched on) when the optoelectronic protective device "LG1" is in the ON state (switched on) or the safety switching output of the second OSSD is activated (relay triggered) or both conditions are true.
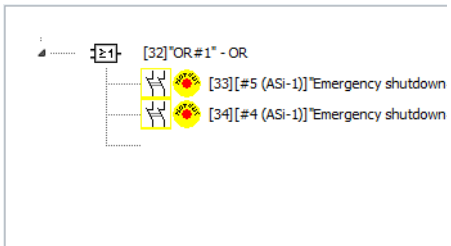
Example 2:
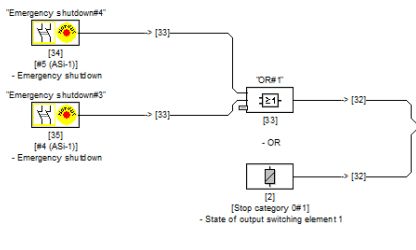
Circuit diagram display   Tree structure display
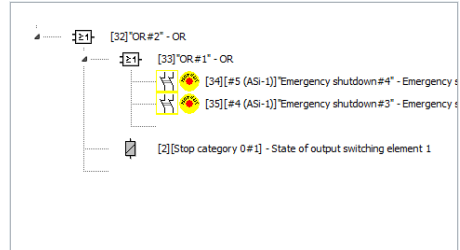
Fig.: Nested logic devices example

As shown in the second example, logic devices can also be nested.

Overview of logic devices

Symbol	Type	Functional device
	40	**OR gate**
	41	**AND gate**
	54	**XOR gate**
	42	**R/S FlipFlop**
	43	**Switching delay (switch-on delay variant)**
	43	**Switching delay (switch-off delay variant)**
	44	**Pulse generator on positive edge**
	56	**NOT gate**
	53	**Device color**
	57	**Muting device**

OR

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.
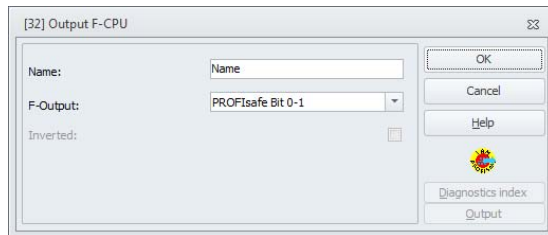
Information!
For AS-i safety monitors with 'Basic' function range, the only possible logic device available for the linking of two monitoring or system devices is the logic OR function.

Symbol

Functional device   **OR gate**

Type	Designation in the configuration log
40	or gate
Variants	
2 inputs [*1]	SUBTYPE: number of inputs 2
2 … 6 inputs [*2]	SUBTYPE: number of inputs 2 or SUBTYPE: number of inputs 3 or SUBTYPE: number of inputs 4 or SUBTYPE: number of inputs 5 or SUBTYPE: number of inputs 6

[*1] Only available starting with the function range 'Basic' or higher (see "Supported devices" on page 11)!
[*2] Only available starting with the function range 'Enhanced/Generation II' or higher (see "Supported devices" on page 11)!

Parameter   Name: max. 29 ASCII characters plaintext

Input mask

Issue date: 2.4.13
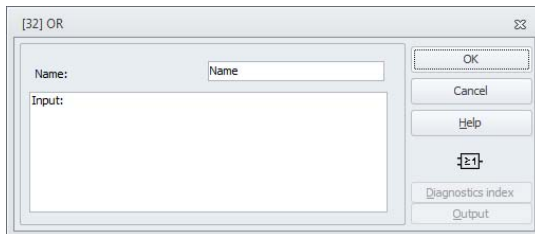
Description

With the OR logic device, up to 6 monitoring or system devices are linked to one another via the logic OR function.

The OR logic device is in the ON state when **at least one** of the linked devices has the ON state.

⚠ *Attention!*
In the configuration of the AS-i Safety Monitor, the same functional devices can be used e.g. for a light barrier and an emergency shutdown switch. When configuring, you must pay attention to which safety functions may and which may not be bridged.

An application which can make use of the OR logic device is, for example, a material lock in which the machine may only be put into operation when at least one of the two lock gates is closed.

Configuration log

Example: OR link

(Generation II and lower)

```
0062 INDEX:      38 = "Name"                              2
0063 TYPE:       40 = or gate                             3
0064 SUBTYPE:    number of inputs  6                      4
0065 ASSIGNED:   channel one                              5
0066 IN DEVICE:  32 = "Name of Device 1"                  6
0067 IN DEVICE:  33 = "Name of Device 2"                  7
0068 IN DEVICE:  34 = "Name of Device 3"                  8
0069 IN DEVICE:  35 = "Name of Device 4"                  9
0070 IN DEVICE:  36 = "Name of Device 5"                  0
0071 IN DEVICE:  37 = "Name of Device 6"                  1
```

('Generation II V4.x' or higher)

```
0068 Index:      6 = "Name"                               8
0069 Type:       40 = or gate                             9
0070 Subtype:    number of inputs: 6                      0
0071 Assigned:   to OSSD 1                                1
0072 IN DEVICE:  0 = "Name of Device 1"                   2
0073 IN DEVICE:  1 = "Name of Device 2"                   3
0074 IN DEVICE:  2 = "Name of Device 3"                   4
0075 IN DEVICE:  4 = "Name of Device 4"                   5
0076 IN DEVICE:  5 = "Name of Device 5"                   6
0077 IN DEVICE:  6 = "Name of Device 6"                   7
```

AND

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.

Symbol

Functional device **AND gate**

Type	Designation in the configuration log
41	and gate
Variants	
2 … 6 inputs	SUBTYPE: number of inputs 2 or
	SUBTYPE: number of inputs 3 or
	SUBTYPE: number of inputs 4 or
	SUBTYPE: number of inputs 5 or
	SUBTYPE: number of inputs 6

Parameter Name: max. 29 ASCII characters plaintext

Input mask

Description

With the AND logic device, up to 6 monitoring or system devices are linked to one another via the logic AND function.

The AND logic device only has the ON state when **all** linked devices have the ON state.

Configuration log

Example: AND link

(Generation II and lower)

```
0073 INDEX:      39 = "Name"                              3
0074 TYPE:       41 = and gate                            4
0075 SUBTYPE:    number of inputs  6                      5
0076 ASSIGNED:   channel one                              6
0077 IN DEVICE:  32 = "Name of Device 1"                  7
0078 IN DEVICE:  33 = "Name of Device 2"                  8
0079 IN DEVICE:  34 = "Name of Device 3"                  9
0080 IN DEVICE:  35 = "Name of Device 4"                  0
0081 IN DEVICE:  36 = "Name of Device 5"                  1
0082 IN DEVICE:  37 = "Name of Device 6"                  2
```

('Generation II V4.x' or higher)

```
0068 Index:      6 = "Name"                               8
0069 Type:       41 = and gate                            9
0070 Subtype:    number of inputs: 6                      0
0071 Assigned:   to OSSD 1                                1
0072 IN DEVICE:  0 = "Name of Device 1"                   2
0073 IN DEVICE:  1 = "Name of Device 2"                   3
0074 IN DEVICE:  2 = "Name of Device 3"                   4
0075 IN DEVICE:  4 = "Name of Device 4"                   5
0076 IN DEVICE:  5 = "Name of Device 5"                   6
0077 IN DEVICE:  6 = "Name of Device 6"                   7
```

XOR

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.

Symbol

Functional device   **XOR gate**

Type	Designation in the configuration log
54	xor gate
Variants	
2 … 6 inputs	SUBTYPE: number of inputs 2 or SUBTYPE: number of inputs 3 or SUBTYPE: number of inputs 4 or SUBTYPE: number of inputs 5 or SUBTYPE: number of inputs 6

Parameter   Name: max. 29 ASCII characters plaintext

Input mask

Description

With the XOR logic device, up to 6 monitoring or system devices are linked to one another via the logic XOR function.

The XOR logic device has the ON state if an odd number of the linked devices have the ON state.

Attention!
The use of a XOR device for safety-oriented switching tasks is not permitted!

Configuration log

Example: XOR link

('Generation II V4.x' or higher)

```
0068 Index:      6 = "Name"                              8
0069 Type:       54 = xor gate                           9
0070 Subtype:    number of inputs: 6                     0
0071 Assigned:   to OSSD 1                               1
0072 IN DEVICE:  0 = "Name of Device 1"                  2
0073 IN DEVICE:  1 = "Name of Device 2"                  3
0074 IN DEVICE:  2 = "Name of Device 3"                  4
0075 IN DEVICE:  4 = "Name of Device 4"                  5
0076 IN DEVICE:  5 = "Name of Device 5"                  6
0077 IN DEVICE:  6 = "Name of Device 6"                  7
```

FlipFlop

O
⫯

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Logic devices", on page 14.

Symbol   ⊣FF⊢

Functional device   **R/S-FlipFlop**

Type	Designation in the configuration log
42	r/s - flipflop
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext

Input mask

Description

With the FlipFlop logic device, two monitoring or system devices are linked to one another via the logic R/S-FlipFlop function.

The state of the FlipFlop logic device is calculated according to the following table:

Old output	Set input (Set)	Hold input (Hold)	New output
any	switched on (ON)	switched on (ON)	switched on (ON)
any	any	switched off (OFF)	switched off (OFF)
switched on (ON)	switched off (OFF)	switched on (ON)	switched on (ON)
switched off (OFF)	switched off (OFF)	switched on (ON)	switched off (OFF)

Configuration log

Example:

(Generation II and lower)

```
0084 INDEX:       40 = "Name"                              4
0085 TYPE:        42 = r/s - flipflop                      5
0086 ASSIGNED:    channel one                              6
0087 HOLD DEVICE: 34 = "Name of Device 1"                  7
0088 SET DEVICE:  36 = "Name of Device 2"                  8
```

('Generation II V4.x' or higher)

```
0036 Index:       2 = "Name"                               6
0037 Type:        42 = r/s - flipflop                      7
0038 Assigned:    to OSSD 1                                8
0039 Hold Device: 0 = "Name of Device 1"                   9
0040 Set Device:  1 = "Name of Device 2"                   0
```

Switch-on delay

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.

Symbol

Functional device   **Switching delay**

Type	Designation in the configuration log
43	delay timer
Variants	
Switch-on delay	SUBTYPE: on delay

Parameter   Name: max. 29 ASCII characters plaintext
                 Delay time: 5 ms … 300 s in multiples of 5 ms

Input mask

Description

With the switch-on delay logic device, the switching on of a monitoring or system device can be delayed by the adjustable delay time. The state of the switch-on delay logic device is calculated according to the following table:

Linked device	Result of the link
switched on (ON) for t ≥ delay time	switched on (ON) after the delay time has passed
switched on (ON) for t < delay time	switched off (OFF)
other	switched off (OFF)

Configuration log

Example:

(Generation II and lower)

```
0090 INDEX:      41 = "Name"                              0
0091 TYPE:       43 = delay timer                         1
0092 SUBTYPE:    n delay                                  2
0093 ASSIGNED:   channel one                              3
0094 IN DEVICE:  32 = "Name of Device"                    4
0095 DELAY TIME: 0.005 Sec                                5
```

('Generation II V4.x' or higher)

```
0028 Index:       1 = "Name"                              8
0029 Type:       43 = delay timer                         9
0030 Subtype:    on delay                                 0
0031 Assigned:   to OSSD 1                                1
0032 In Device:   0 = "Name of Device"                    2
0033 Delay Time: 0.005 sec                                3
```

Switch-off delay

Information!

Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.

Attention!

Note that the system reaction time can be lengthened as a result of the use of the switch-off delay device.

Symbol

Functional device   **Switching delay**

Type	Designation in the configuration log
43	delay timer
Variants	
Switch-off delay	SUBTYPE: off delay

Parameter   Name: max. 29 ASCII characters plaintext

Delay time: 5ms … 300s in multiples of 5ms

Input mask
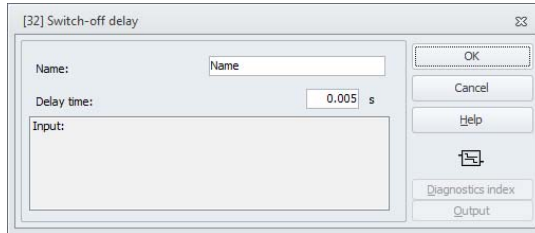
Description

With the switch-off delay logic device, the switching off of a monitoring or system device can be delayed by the adjustable delay time. The state of the switch-off delay logic device is calculated according to the following table:

Linked device	Result of the link
switched off (OFF) for t ≥ delay time	switched off (OFF) after the delay time has passed
switched off (OFF) for t < delay time	switched on (ON)
other	switched on (ON)

Configuration log

Example:

(Generation II and lower)

```
0097 INDEX        42 = "Name"                                          7
0098 TYPE         43 = delay timer                                     8
0099 SUBTYPE      off delay                                            9
0100 ASSIGNED     channel one                                          0
0101 IN DEVICE    33 = "Name of Device"                               1
0102 DELAY TIME   0.005 Sec                                            2
```

('Generation II V4.x' or higher)

```
0043 Index:        3 = "Name"                                         3
0044 Type:        43 = delay timer                                    4
0045 Subtype:     off delay                                           5
0046 Assigned:    to OSSD 1                                           6
0047 In Device:   2 = "Name of Device"                                7
0048 Delay Time:  0.005 sec                                           8
```

Pulse on pos. edge

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.
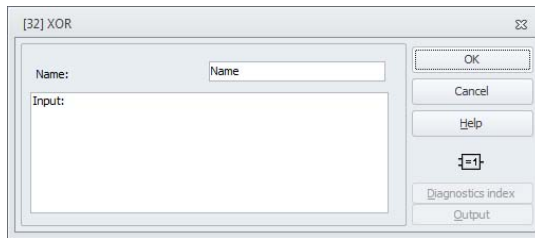
Icon

Functional device   **Pulse generator on positive edge**

Type	Designation in the configuration log
44	convert edge to pulse
Variants	
On positive edge	SUBTYPE: on positive edge

Parameter   Name: max. 29 ASCII characters plaintext
                        Pulse duration: 5 ms … 300 s in multiples of 5 ms

Input mask

Description

With the Pulse on pos. edge logic device, an ON pulse with adjustable pulse duration is created if a monitoring or system device changes state from OFF to ON.

The state of the Pulse on pos. edge logic device is calculated according to the following table:

Linked device	Result of the link
switched off (OFF)	switched off (OFF)
switched on (ON)	switched on (ON) for the length of time set under pulse duration
other	switched off (OFF)

⚠️ *Attention!*
While the ON pulse is present at the output, the input is not monitored, i.e. a change of the input state during the ON pulse is not evaluated and has no effect on the ON pulse. The function of the device corresponds to a non-retriggering monoflop.

⚠️ *Attention!*
Even a short communication error on the AS-i line results in an ON pulse at the output!

Configuration log

Example:

(Generation II and lower)

```
0104 INDEX:       43 = "Name"                                    4
0105 TYPE:        44 = convert edge to pulse                     5
0106 SUBTYPE:     on positive edge                               6
0107 ASSIGNED:    channel one                                    7
0108 IN DEVICE:   36 = "Name"                                    8
0109 PULSE WIDTH: 0.005 Sec                                      9
```

('Generation II V4.x' or higher)

```
0028 Index:        1 = "Name"                                    8
0029 Type:        44 = convert edge to pulse                     9
0030 Subtype:     on positive edge                               0
0031 Assigned:    to OSSD 1                                      1
0032 In Device:    0 = "Name"                                    2
0033              Pulse Width:    0.005 sec                      3
```

NOT

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.

Symbol

Functional device   **NOT gate**

Type	Designation in the configuration log
56	not gate
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext

Input mask
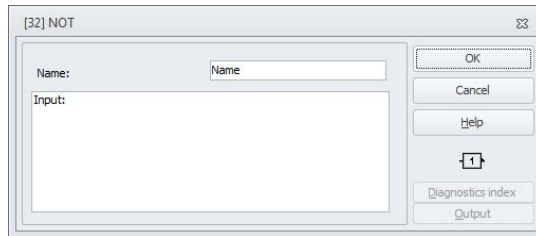
Description

The NOT logic device is used for inverting the logic state of the input.

Attention!
For safe signals, the low level is usually the safe state and is included in the safety considerations. An inversion of the state can impair system safety!

Configuration log

Example: NOT gate

```
0027 Index:        1 = "Name"                            7
0028 Type:        56 = not gate                          8
0029 Assigned:    to OSSD 1                               9
0030 In Device:    0 = "Name of Device 1"                0
```

Flashing

> **Information!**
> *Availability of the individual devices depends on the device type and the safety version.*
> *Further information can be found in tab. "Logic devices", on page 14.*

Symbol

Functional device   **Flashing**

Type	Designation in the configuration log
55	device flash
Variants	
Power-on time	0.005 … 300,000 [s]
Off-time	0.005 … 300,000 [s]

Parameter   Name: max. 29 ASCII characters plaintext

Input mask

Description

The **Flash** logic device is used to output a flash pattern for a signal lamp. The pulse/pause ratio can be set. Flashing can be most sensibly transmitted with the aid of the **output assignment** (chapter 6.4 "Output assignment").

Configuration log

Example: Flashing

```
0106 Index:        10 = "Name"                                              6
0107 Type:         55 = Device Flash                                        7
0108 Assigned:   to OSSD 1                                                  8
0109 In Device:     9 = "Module#1"                                         9
0110 High time:       0.005 sec                                            0
0111 Low time:        0.005 sec                                            1
```

Device color

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Logic devices", on page 14.

Symbol

Functional device   **color gate**

Type	Designation in the configuration log
53	device color
Variants	
1 … 6 inputs	SUBTYPE: number of inputs 1 or SUBTYPE: number of inputs 2 or SUBTYPE: number of inputs 3 or SUBTYPE: number of inputs 4 or SUBTYPE: number of inputs 5 or SUBTYPE: number of inputs 6

Parameter   Name: max. 29 ASCII characters plaintext

Input mask
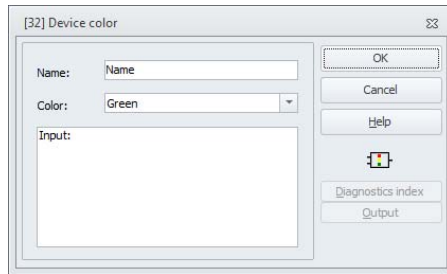
Description

The **color** logic device has the ON state if one of the linked devices has the state of the monitored color.

Attention!
The use of a color device for safety-oriented switching tasks is not permitted!

Configuration log

Example: COLOR link

('Generation II V4.x' or higher)

```
0068 Index:       6 = "Name"                            8
0069 Type:        53 = device color                     9
0070 Subtype:     number of inputs: 6                   0
0071 Assigned:    to OSSD 1                              1
0072 IN DEVICE:   0 = "Name of Device 1"                2
0073 IN DEVICE:   1 = "Name of Device 2"                3
0074 IN DEVICE:   2 = "Name of Device 3"                4
0075 IN DEVICE:   4 = "Name of Device 4"                5
0076 IN DEVICE:   5 = "Name of Device 5"                6
0077 IN DEVICE:   6 = "Name of Device 6"                7
```

Muting (controlled suppression of the protection function)

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Logic devices", on page 14.

Information!
To operate this device exclusively with local inputs and outputs, slaves must be simulated. A detailed description can be found in the "SaW application examples" manual.

Symbol

Functional device   Muting

Type	Designation in the configuration log
57	Muting
Variants	
2 crossed beams	SUBTYPE: 2 sensors, crossed beams (T configuration)
4 beams, both directions	SUBTYPE: 4 sensors, both directions
4 beams, direction S4 $\rightarrow$ S1	SUBTYPE: 4 sensors, direction S4 to S1
4 beams, direction S1 $\rightarrow$ S4	SUBTYPE: 4 sensors, direction S1 to S4

Parameter	Name:	Max. 29 ASCII characters plaintext
	Muting duration:	Maximum duration of the muting action. 1 s – 3600 s, resolution 1 second or ∞
	Synchronization time:	Monitoring time for synchronization between the sensor pairs (S1/2 and S3/4). 1 s … 4 s, resolution 1 second or ∞
	Tolerated interruption time:	Filter time for sensor signals. 0.16 s … 5 s, resolution 0.16 s
	2 sensors on one module:	2 muting sensors on one safety input module instead of sensors on standard slaves (see device Double channel independent)
	Conveyor stop instead of Enable:	The Enable signal is replaced by a conveyor stop signal
	AOPD monitoring:	When checking the muting action the AOPD signal is also evaluated
	Sequence control:	When sequence control is enabled, the sequence of the sensors is taken into consideration
	End muting by AOPD:	(Only possible if AOPD monitoring is active). The end of muting is initiated by the AOPD signal and not by the sensors

Error unlock:	With / without
Slave type:	Single A/B-Slave
Address:	AS-i circuit and AS-i bus address of the error unlock (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3. Inverted / not inverted

Input mask

Description:

Muting, or controlled temporary suppression of the protective devices (AOPD), which for example enables material transporting within the danger zone, is supported as crossed, sequential, parallel or direction muting.

This makes it possible to transport material to or from a machine or piece of equipment without having to interrupt the work process. The muting device uses additional sensors for this (S1-S4) and can thereby distinguish between persons and material. The signals from external sensors are processed as a logical operation:

• If the controller detects "Material" in the danger zone, there is no message, the protective device is bypassed and the material to be transported passes through the protective device without interruption.
• If the controller receives incorrect sensor signals, the muting device enters the error state and the protective device is not bypassed anymore.
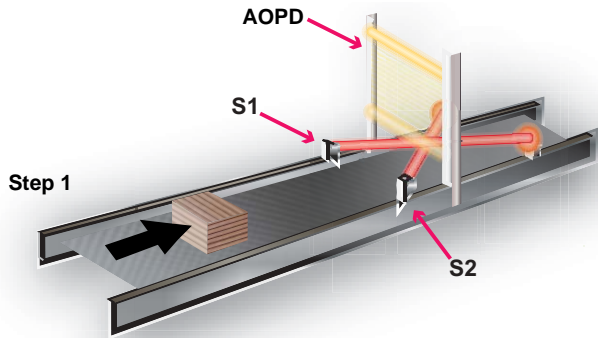
The above example shows a conveyor belt with a protective device (AOPD). The material is transport-ed towards the protective device (Step 1).
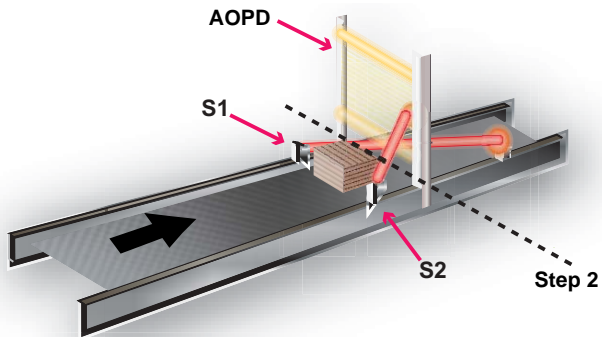
As soon as the muting sensors **S1** and **S2** are damped, the protective effect of the AOPD protective device is bypassed and the material is allowed to enter the danger zone (Step 2).

As soon as the muting sensors are activated again (Step 3), the protective effect of the protective device is resumed.
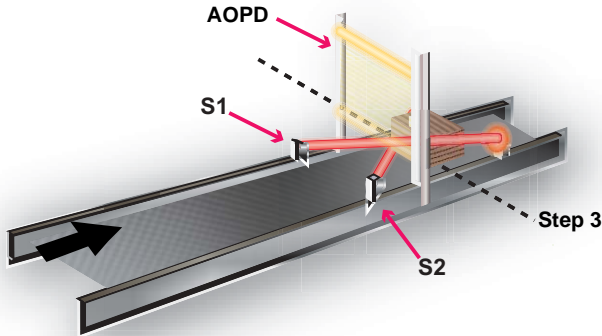
⚠ *Attention!*
When possible only activate the muting action only during the time in which the transported material passes the AOPD protective device.

Muting cycle

A muting cycle consists of a sequence of specified actions. The cycle begins with activation of the first sensor and ends with enabling of the last sensor. The material can be transported as long as the muting condition remains in effect.

A new cycle can only be started once the old one has completely ended.

Muting sensors

The material moved by the conveyor belt is detected by the sensors (muting sensors) and this information is transmitted to the controller. If the muting conditions are met, the AOPD is bridged by the controller and the material is transported unhindered. Other functions (Enable, Conveyor stop, Override) can also be linked.

ℹ *Information!*
If the muting sensors (S1 - S4) are connected to standard slaves, the sensor pairs must absolutely be connected with separate slaves, e.g. slave 1: S1/S3, slave 2: S2/S4. This is not necessary if safety input slaves (see chap. "Safety input slaves" on page 204) are used.

The sensor signals may originate from the following sources:

• Optical sensors
• Inductive sensors
• Mechanical switches
• Signals from the controller.

Using the muting device

To be able to use the muting device, its output signal must be linked with the AOPD signal using an OR device. The resulting signal can for example be directly connected to an OSSD with monitored start (see example "Using the muting device" on page 488").

In the case of the muting sensors (S1 - S4) the output levels must be used as follows:

Output level from muting sensors	State
High	Activated, material detected
Low	Deactivated, no material detected

Muting lamp

The muting action can be visualized using a muting lamp. Use of a muting lamp is recommended.

Information!
The muting lamp will only function as it is supposed to if it is clearly visible and placed in view of the operator.

Attention!
According to EN 61496-1 certain applications require use of a muting state signal or a signal lamp.

In order to be able to drive the muting lamp, the muting signal must be connected to a separate OSSD. Since the muting signal is also needed for linking with the AOPD in the protective OSSD, the muting device must in this case be converted into a **user device** (See example "Using the muting device" on page 488)!

Arrangement of muting sensors
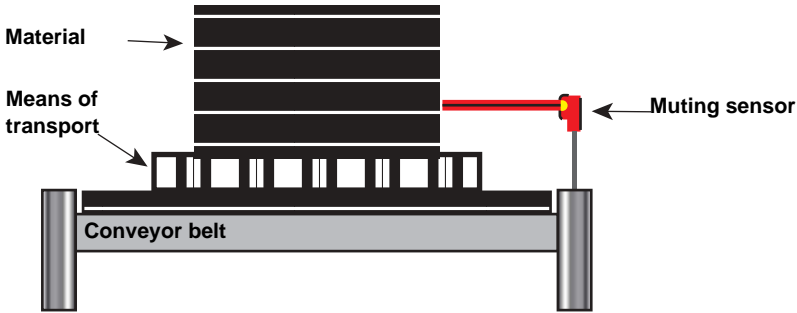
Note the following when configuring the muting sensors:

• The sensors must detect only the material and not the means of transport.
• The sensors must be arranged so that the material can pass by error-free but persons can be reliably detected.
• When arranging the sensors, a minimum distance (L) from the light beams of the AOPD [2] must be maintained for the detection zone of the material [1].
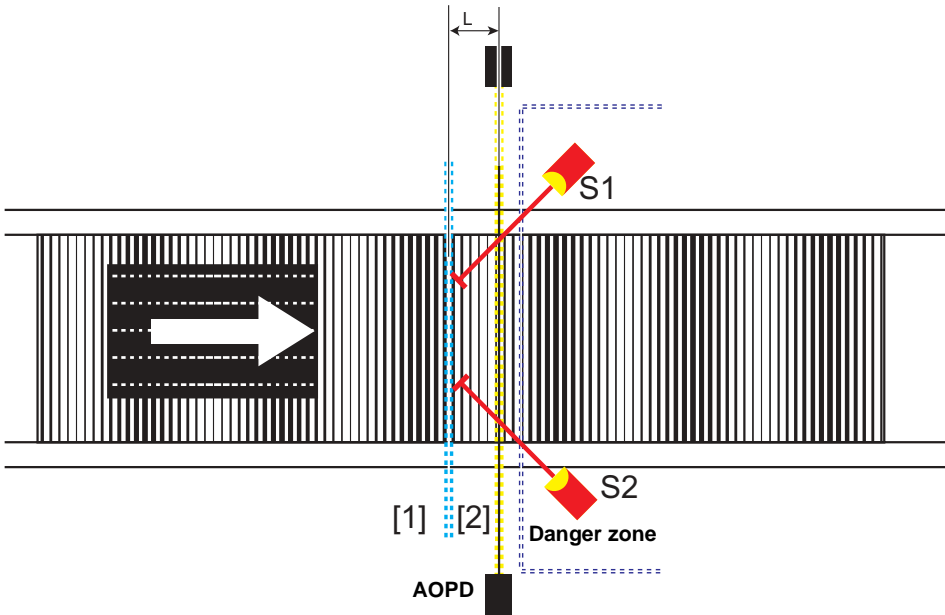
Calculation of the minimum distance to the light beams of the AOPD

$L \geq v \cdot (t_d + t_{res})$

Legend:

L	Minimum distance [m]
V	Velocity of the material (e.g. of the conveyor belt) [m/s]
t_d	Input delay of the sensor and the AS-i input slave [s] (Information about this can be found in the associated manual for the external components)
t_{res}	Response time: 40 ms + "Tolerated interruption time"

Information!
Place the sensors in such a way, that people do not step unnoticed inside the danger zone.

Information!
Optical sensors with background suppression detect material only up to a certain distance. Objects farther away than the material to be detected are not sensed. For this reason this sensor type should be used.

Functionality of sensors with background suppression

Material is detected   Material is **not** detected
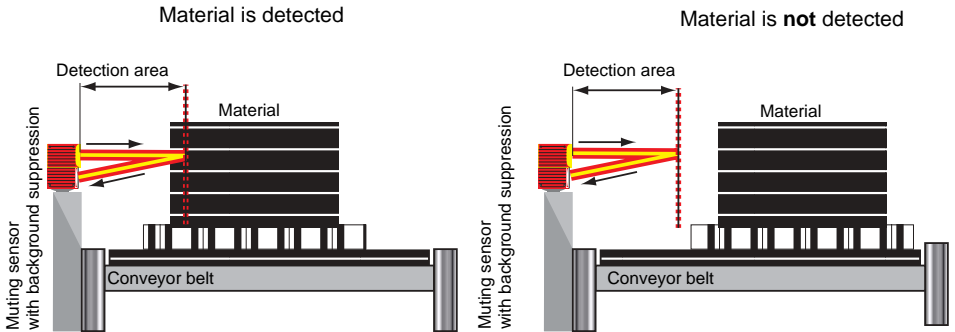
Muting with one sensor pair (crossed arrangement)

(Option: "2 crossed beams")
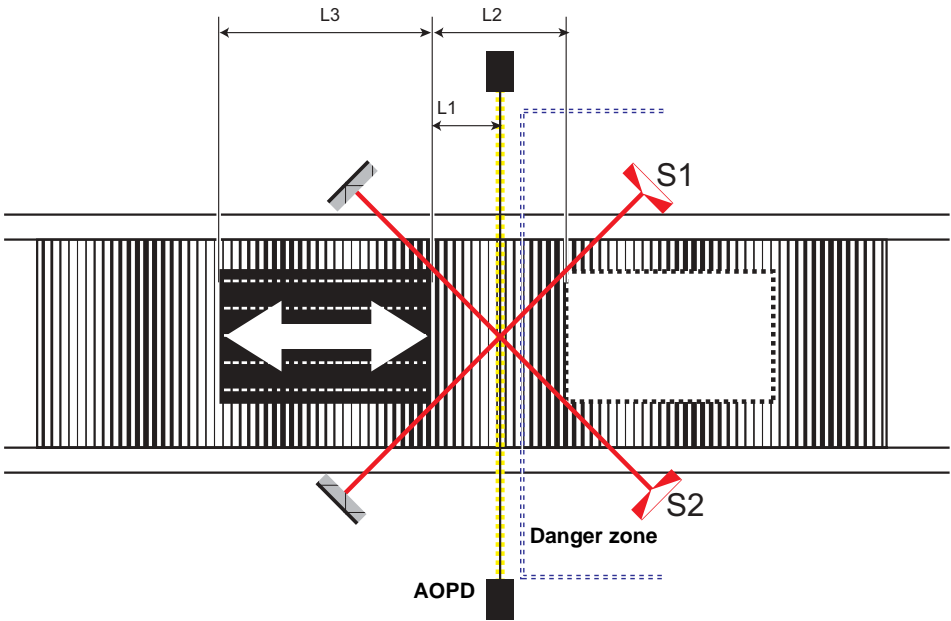
As soon as the muting sensors **S1** and **S2** have detected the material, the protective effect of the AOPD is disabled.

Condition for muting with one sensor pair:

Condition	Description
S1 & **S2**	Muting is in effect as long as this condition is met

Calculation of the minimum distance to the light beams of the AOPD

$$L_1 \geq v \cdot (t_d + t_{res})$$

$$v \cdot t > L_2 + L_3$$

Legend:

L_1	Minimum distance between the light beams of the AOPD and the detection of the muting sensors [m]
L_2	Distance between the two detection lines of the sensors (sensors actuated/sensors clear) [m]
L_3	Length of the material in the transport direction [m]
V	Velocity of the material (e.g. of the conveyor belt) [m/s]
t_d	Input delay of the sensor and the AS-i input slave [s] (Information about this can be found in the associated manual for the external components)
t_{res}	Response time: 40 ms + "Tolerated interruption time"

Information!
- Material transport in both directions is possible.
- Be sure that the crossing point of the muting sensors lies on the path of the AOPD light beams. If this is not possible, the crossing point must be located in the direction of the danger zone.
- For crossed arrangement of the sensors through-beam and retro-reflective sensors are appropriate.

Information!

The following configurations will increase safety and security against manipulation:

- Select as short a synchronization time as possible
- Select as short a muting duration as possible
- Use end muting by AOPD
- Use of a Muting Enable signal.

Attention!
*The both sensors (**S1/S2**) may not be attached to the same standard slave!*
The suppression of the protective device can be extended up to 150 ms at appearance of faulty code sequences, if both sensors are attached to a safety input slave!

Muting with two sensor pairs (sequential arrangement)

(Option: "4 beams")
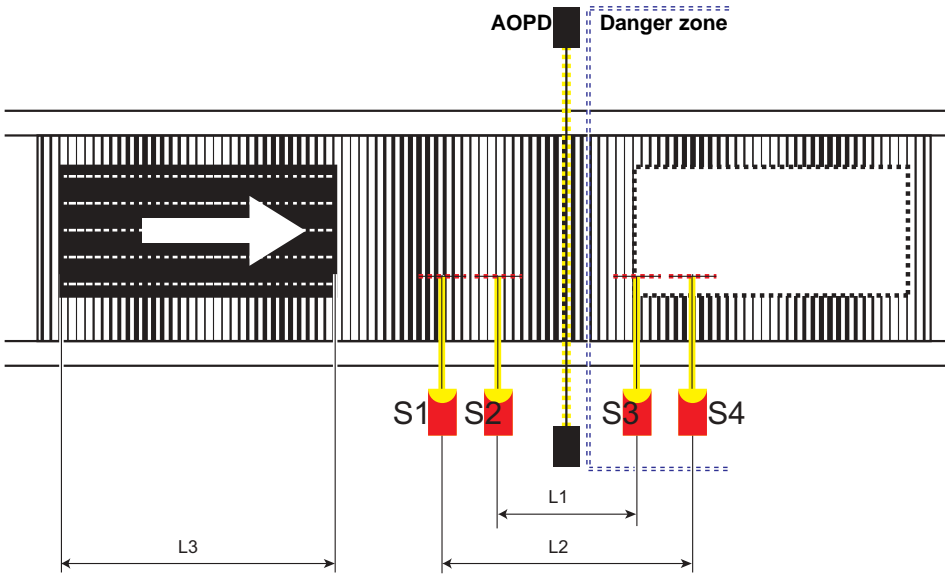
In this solution the protective effect of the AOPD is bypassed when the muting sensors **S1** and **S2** are triggered. The AOPD remains bypassed until one of the sensors in the second pair (**S3**, **S4**) is clear again.

Condition for muting with two sensor pairs:

Condition	Description
S1 & **S2 (or S3** & **S4)**	Momentary, for starting muting. The first sensor pair is activated. Depending on the transport direction the second sensor pair is used as the condition.
S3 & **S4 (or S1** & **S2)**	If end muting by AOPD is not selected: Muting is active as long as this condition is met.
S3 & **S4 (or S1** & **S2) & AOPD**	If end muting by AOPD is selected: Muting is active as long as this condition is met. Depending on the transport direction the second sensor pair is used as the condition.

Calculation of the minimum distance to the light beams of the AOPD

$$L_1 \geq v \cdot 2 \cdot (t_d + t_{res})$$

$$v \cdot t > L_1 + L_3$$

$$L_2 < L_3$$

Legend:

|	
L_1	Distance of the inner sensors (arrangement symmetrical to the light path between emitter and receiver) [m]
L_2	Distance of the outer sensors (arrangement symmetrical to the light path between emitter and receiver) [m]
L_3	Length of the material in the transport direction [m]
V	Velocity of the material (e.g. of the conveyor belt) [m/s]
t_d	Input delay of the sensor and the AS-i input slave [s] (Information about this can be found in the associated manual for the external components)
t_{res}	Response time: 40 ms + "Tolerated interruption time"
t	Muting duration [s]

Information!
- Material transport in both directions is possible. The direction can however also be specified by selecting "Direction S1 $\rightarrow$ S4" or "Direction S4 $\rightarrow$ S1".
- Ensure that the sensors do not mutually interfere with each other.
- For this sensor arrangement all types of sensors and retro-reflective photoelectric sensors are suitable.

Information!

The following configurations will increase safety and security against manipulation:

- Select as short a synchronization time as possible
- Select as short a muting duration as possible
- Use end muting by AOPD
- Use a Muting Enable signal
- Sequence control.

Attention!
The sensor pairs (S1/S2) and (S3/S4) may not be attached to the same standard slave!
The suppression of the protective device can be extended up to 150 ms at appearance of faulty code sequences, if sensor pairs (S1/S2) and (S3/S4) are attached to a safety input slave!

Muting with two sensor pairs (parallel arrangement)

(Option: "4 sensors")
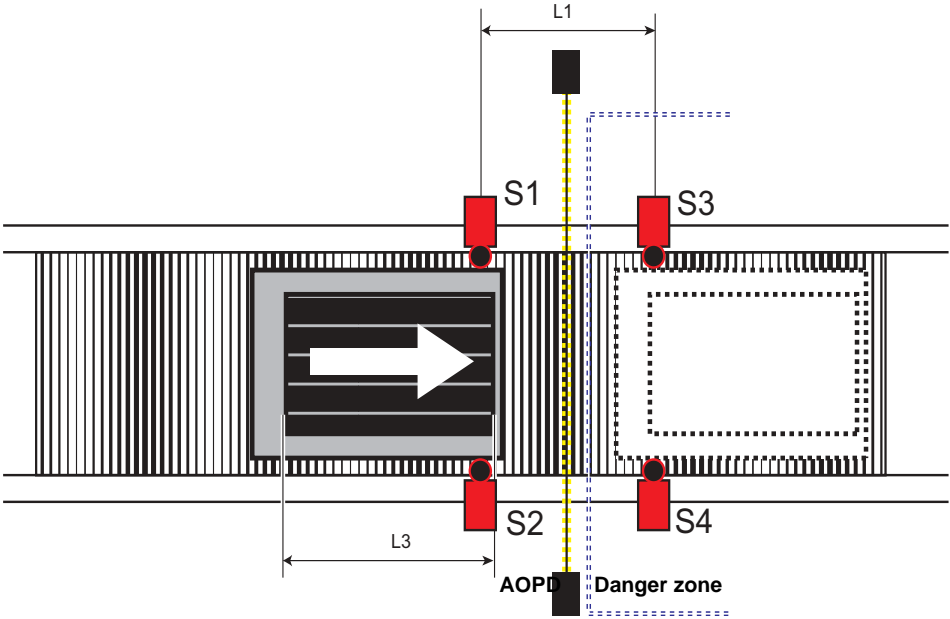
In this solution the protective effect of the AOPD is bypassed if the first sensor pair (**S1** and **S2)** is activated. The AOPD remains bypassed until the second sensor pair (**S3**, **S4**) is clear again.

Condition for muting with two sensor pairs:

Condition	Description
S1 & **S2 (or S3** & **S4)**	Momentary, for starting muting. The first sensor pair is activated. Depending on the transport direction the second sensor pair is used as the condition.
S3 & S4 (or S1 & S2)	If end muting by AOPD is not selected: Muting is active as long as this condition is met.
S3 & **S4** (or **S1** & **S2**) & **AOPD**	If end muting by AOPD is selected: Muting is active as long as this condition is met. Depending on the transport direction the second sensor pair is used as the condition.

Calculation of the minimum distance to the light beams of the AOPD

$$L_1 \geq v \cdot 2 \cdot (t_d + t_{res})$$

$$v \cdot t > L_1 + L_3$$

$$L_1 < L_3$$

Legend:

L_1	Distance of the sensors in the conveying direction [m]
L_3	Length of the material in the transport direction [m]
V	Velocity of the material (e.g. of the conveyor belt) [m/s]
t_d	Input delay of the sensor and the AS-i input slave [s] (Information about this can be found in the associated manual for the external components)
t_{res}	Response time: 40 ms + "Tolerated interruption time"
t	Muting duration [s]

Information!

- Material transport in both directions is possible. The direction can however also be specified by selecting "Direction S1 $\rightarrow$ S4" or "Direction S4 $\rightarrow$ S1".
- Ensure that the sensors do not mutually interfere with each other.
- This arrangement of sensors is suitable for optical (photoelectric) sensors and all types of non-optical sensors. Sensors with background suppression must be used.

Information!

The following configurations will increase safety and security against manipulation:

- Select as short a synchronization time as possible
- Select as short a muting duration as possible
- Use end muting by AOPD
- Use of a Muting Enable signal.

Input filter

(Option: "Tolerated interruption time")

Sensor signals S1 - S4 can be filtered using the time from "Tolerated interruption time". This prevents short signals from resulting in errors. Be sure however that the sensor signals are also delayed by this value! The AOPD signal is not however filtered.

⚠️ *Attention!*
The end muting is extended by an tolerated interruption time.

Conveyor stop

(Option: "Conveyor stop instead of Enable" and Conveyor stop input connected)

With the **conveyor stop** function and a conveyor stop signal it's possible to pause the muting time monitoring. This maintains a valid muting condition after the muting time monitoring has elapsed. Activated muting sensors and the AOPD are still monitored for changes while the conveyor stop signal is active.

The conveyor stop pauses the following time monitoring actions:

• Monitoring of the total muting time
• Simultaneousness monitoring.

Input conveyor stop	State
LOW	Conveyor belt running, muting time monitoring active.
HIGH	Conveyor belt stopped: The time monitoring functions for muting are paused, nevertheless the state of all muting sensors and the AOPD are monitored.

Enable

(Option: No "Conveyor stop instead of enable" and **Enable** input connected.)

With the **Enable** signal it's possible to allow the muting action only at certain times. The Enable signal must be active while the sensor pair that initiates muting ((**S1** & **S2**) or (**S3** & **S4**)) is damped. Otherwise the muting device enters the error state (red flashing). In addition, the Enable signal must go inactive at least once between two muting actions.

○
Ⴎ **Information!**
If no device is connected on the enable input of the muting device, validation is automatic.

Input Enable	State
LOW	Muting cannot be initiated. Damping the sensors results in an error.
HIGH	Muting can be initiated.
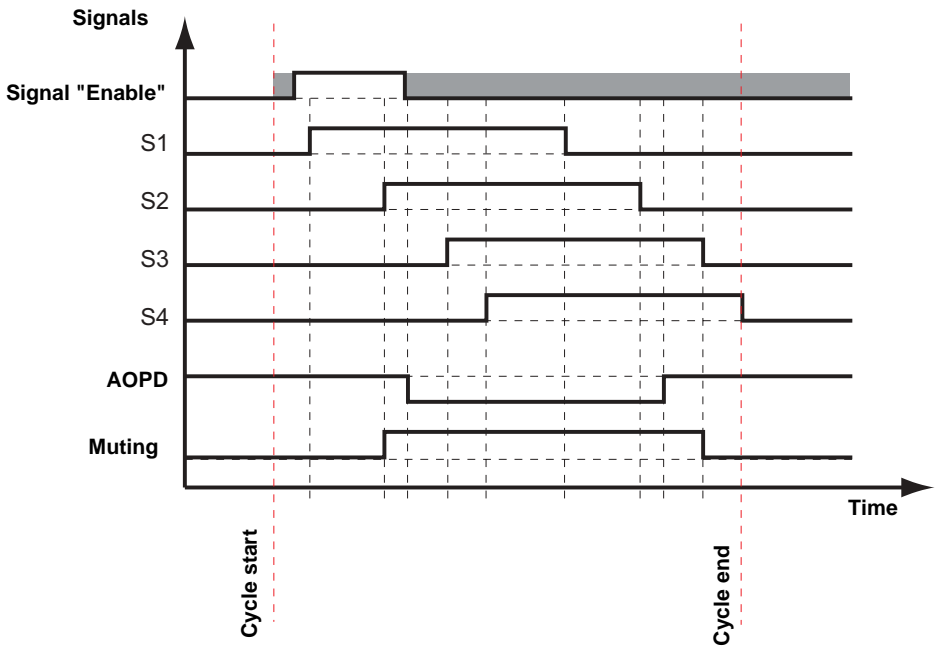
End muting by AOPD

(Option: "End muting by AOPD")

During a normal muting cycle the muting function ends, after the last sensor pair has changed its state to inactive. At this instant the condition for muting is no longer met. If end muting by AOPD is activated, the muting function ends as soon as the AOPD is clear. This shortens the muting duration and increases security. If the AOPD is not clear, the muting cycle ends at the latest after the last sensor pair has changed its state to inactive.
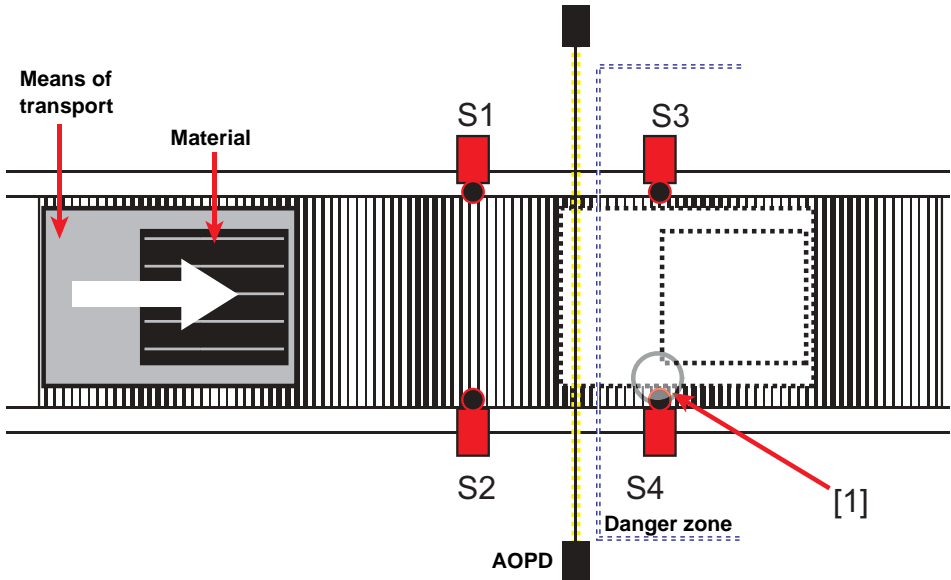
Without the end muting by AOPD function, muting is not ended until a sensor in the last sensor pair is clear again [1].
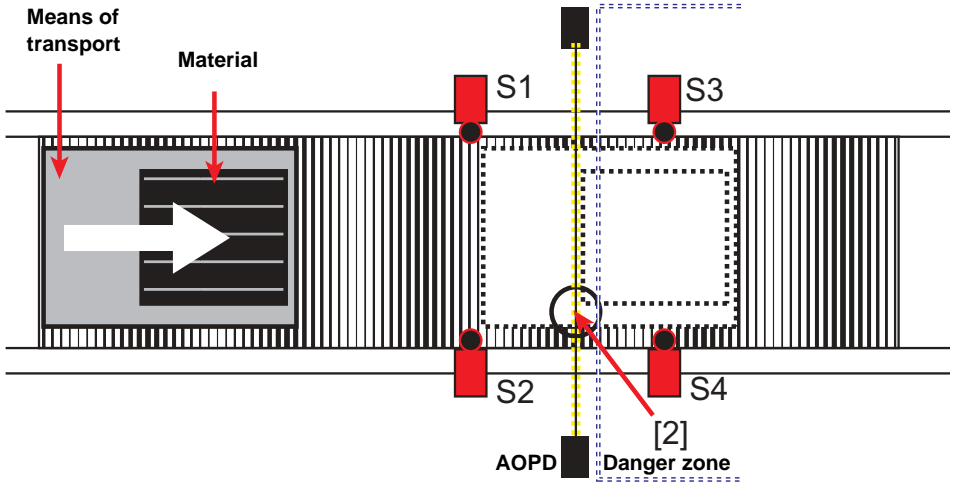
With the End muting by AOPD function, muting ends when the AOPD is clear again [2].

Information!
Material and transport means must be detected by the muting sensors and AOPD over their entire length.
*Detectable gaps will result in premature cancellation of **muting**.*

Sequence control

(Option: "Sequence control")

The **Sequence control** function requires a certain sequence in triggering/clearing the sensors. The material must pass completely through the AOPD so that there is no muting error.

Number of sensors	Conditions
1 sensor pair	No sequence control possible.
2 sensor pairs	**S1** before **S2** before **S3** before **S4** (Direction **S1** $\longrightarrow$ **S4**) or **S4** before **S3** before **S2** before **S1** (Direction **S4** $\longrightarrow$ **S1**).

For the muting conditions to be met, the object is only allowed to move through the muting sensors in the described direction and sequence.

Override function

(Option: **Override input** connected)

The **Override** function enables manual initiation of muting by momentarily simulating a valid muting condition, if the muting device is in the **Override required** state. This makes it possible for example to relieve the system.

There are two override states: **Override required** and **Override**.

Override required

The **Override required** state means that the switching outputs (OSSD) are in the OFF state and the device is waiting for the override input signal.

The muting device is in the **Override required** state if:

• An error has occurred (red flashing)
• The device is waiting for clearing of the sensors after a restart (yellow flashing)

Errors can be caused by:

• Triggering of the simultaneousness monitoring
• Triggering of the monitoring of the total muting time
• Triggering of the direction detection
• Triggering of the sequence control
• A sensor error.

Override

The **Override** state is activated by connecting and setting the **Override input signal**.

> ⚠️ **Attention!**
> *Be sure that the control for **Override** is located where it's visible from all directions.*
> *Activate Override only if you have verified that the system is in proper condition.*
> *If for two successive muting cycles it is necessary to actuate the Override button, you should check the muting arrangement and the sensors.*
> *During an **Override** the synchronization time is not monitored.*

The **Override** function can only be started in the **Override required** state by a rising edge of the **Override Signal**. The system resumes muting at the point which suits the current sensor signals.

Safety input slaves

(Option: "2 sensors on one module")

Instead of using 4 separate sensor signals (e.g. using standard slaves), it's possible to connect a sensor pair using a safety input slave.

For this you must first select the option "2 sensors on one module". Then only devices of type "double channel muting input" (see description for the device "Double channel independent" on page 125) can be connected to the sensor inputs "Sensor 1/2" and "Sensor 3/4". The two sensor signals are sent using the two half-sequences of the safety input.

> **Information!**
> *If an error occurs in the safety input slave, the muting device may switch off delayed by 150 ms.*

Configuration log

Example: Muting device

```
0063 Index:        8 = "Muting"                                              3
0064 Type:        57 = muting                                                4
0065 Subtype:     4 sensors, both directions                                 5
0066 Subtype:     muting enable support                                      6
0067 Subtype:     muting sensors not on saw modules                          7
0068 Subtype:     AOPD monitor enabled                                       8
0069 Subtype:     sequence control enabled                                   9
0070 Subtype:     no muting end by AOPD                                      0
0071 Subtype:     local acknowledge: AS-i 1, slave 31, bit in-0 noninv       1
0072 Assigned:    to no OSSD                                                 2
0073 Muting Duration:      30 sec                                            3
0074 Synchronization:      4 sec                                             4
0075 Accepted interruption:  0.000 sec                                       5
0076 AOPD Device:            6 = "AOPD"                                      6
0077 Muting Enable Device:   1 = "Muting Enable"                            7
0078 Override Device:        7 = "Override"                                  8
0079 Sensor 1 Device:        2 = "Sensor 1"                                  9
0080 Sensor 2 Device:        3 = "Sensor 2"                                  0
0081 Sensor 3 Device:        4 = "Sensor 3"                                  1
0082 Sensor 4 Device:        5 = "Sensor 4"                                  2
```

4.3.3 EDM circuit devices

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "EDM circuit devices", on page 15.

External device monitoring circuit devices (also called EDM devices - External Device Monitor) are used for realizing dynamic contactor monitoring for a configuration of the AS-i Safety Monitor. If no EDM circuit device is configured, contactor monitoring is deactivated.

Information!
Multiple EDM circuit devices can be integrated in an OSSD.

For example, with dynamic contactor monitoring, the motor contactors connected downstream of the safety monitor for the potentially dangerous movement are connected to the safety switching outputs of the AS-i Safety Monitor. Via an EDM circuit, the state of the contactors is monitored by the contactor monitor input on the AS-i Safety Monitor.

Information!
Additional information about the electrical design and connection of a contactor monitor can be found in the operating manual of the AS-i Safety Monitor.

Switching off the relay supply voltage

Information!

If the voltage supply of the external relay can be switched off by the PLC, an EDM error will occur when the release circuit is switched on in this state. In order to prevent this from happening, an additional signal, sent by the PLC ("PLC lock signal" in the example), must be used to inhibit the activation of the release circuits.
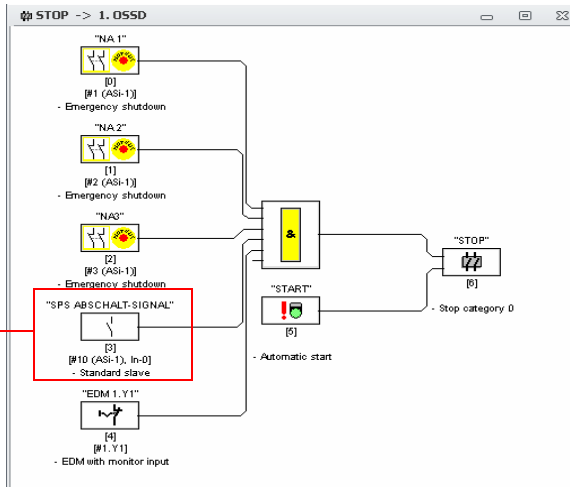
Fig.: Switching off the relay supply voltage

Error unlock

If a device detects an error, the AS-i Safety Monitor enters the error state. The error state is locked (error lock).

• Software versions of the AS-i Safety Monitor < 2.0

The error state can only be reset by resetting the AS-i Safety Monitor, power cycling the AS-i Safety Monitor, or pushing the Service button on the AS-i Monitor.

• Software versions of the AS-i Safety Monitor > 2.0

It is possible to release the error lock (reset) on the device level individually for each release circuit: The error lock can be released by using an AS-i single/A/B slave, for instance a push button (see chap. 3.1).

Overview of EDM circuit devices

Symbol	Type	Functional device
	60/78	**EDM circuit with monitor input**
	62/77	**EDM circuit with standard slave**
	61/78	**EDM circuit with monitor input, dependent OSSD**
	63/77	**EDM circuit with standard slave, dependent OSSD**

EDM circuit with monitor input

ℹ️ *Information!*
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "EDM circuit devices", on page 15.

Symbol

Functional device   **EDM circuit with monitor input**

Type	Designation in the configuration log
60/78	external device monitor
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameter

Name: max. 29 ASCII characters plaintext

Switching time: Switching time of the contactor:
10 … 1000 ms (up to Safety Version 'SV4.0')
10 … 2000 ms (Safety Version 'SV4.1')
10 … 10000 ms (from Safety Version 'SV4.2' on)

Limited error lock: with / without

Monitor input: 1.Y1, 1.Y2, 2.Y1 or 2.Y2 (except 'Safety Basis Monitor')
S12 … S81 ('Safety Basis Monitor' only)

inverted / not inverted (only ''Generation II V4.x'' or higher)

Output diagnostics (from Safety Version 'SV4.3' on)

Specification of the reference to be used for the EDM circuit is made under Output diagnostics (see "Output diagnostics" on page 230).

OSSD: Relay state of the OSSD is being used

Standard slave bit: Relay state of unsafe slave bit

Slave type: Single/A/B-Slave

Address: Address of the output diagnostics
AS-i circuit and AS-i bus address (1 … 31)
also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)

Bit address: In-0 … In-3 or Out-0 … Out-3

inverted / not inverted

Type 1 diagnostics safety output: State of the B+W output slave.

Inverted dependent OSSD: The relay state of an inverted dependent OSSD (e.g. door lock) is monitored.

Input mask

Input mask[*1]

*1 Input mask in the 'Safety Basis Monitor' setting

Description

As long as the safety outputs are switched off, the input contactor monitor on the AS-i Safety Monitor must be active = ON . After the safety outputs have been switched on (validation), the input contactor monitor is not relevant for set switching time. Afterward, the input must be inactive = OFF. The state of the contactor monitor is active = ON (switched on).

After the safety outputs have been switched off, the state of the contactor monitor returns to inactive = OFF (switched off) and the input contactor monitor is not queried for the set switching time. Afterward, the input contactor monitor must again be active = ON.

Example:

Information!
Feedback loop for the Safety Monitor is designed as a normally closed or normally open contact on the safety contactor!

Error lock

If the input is inactive when the safety outputs are switched off or active when the safety outputs are switched on, the system switches to the error state and locks.

Example:

Information!
With dynamic contactor monitoring with error lock, series connection of the contactor controller with operational switches is not possible.

Limited error lock

If the input is inactive = OFF when the safety outputs are switched off, the system switches to the error state and locks. If the input remains active after the safety outputs are switched active = ON, e.g. when

the contactor no longer engages due to a blown fuse, the contactor monitor switches the safety outputs of the OSSD back off.

Example:

1.14 $\begin{smallmatrix}1\\0\end{smallmatrix}$ ⎯⎯⎯⎯⌐‾‾⌐⎯⎯⎯⎯ Output is switched off

EDM $\begin{smallmatrix}1\\0\end{smallmatrix}$ ⎯⎯⎯⎯⎯⎯⎯⎯

⚠ *Attention!*
The combination of the dynamic contactor monitoring with limited error lock together with automatic start is not permitted, as in this combination it is possible for the safety outputs of the AS-i Safety Monitor to be continuously switched on and off.

Output diagnostics

With the **output diagnostics** item, it is possible to select the manner in which the relay state is to be determined. The following options are available:

• Via the state of the release circuit (OSSD)
• Via an AS-i standard bit (from Safety Version 'SV4.3' on)
• Via the diagnostic slave of a type 1 output module (from Safety Version 'SV4.3' on).

Using **Inverted dependent OSSD**, the relay state of an inverted dependent OSSD (e.g. door lock) can be monitored.

Configuration log

Example: Error lock

(Generation II and lower)

```
0020 INDEX:       32 = "Name"                                         0
0021 TYPE:        60 = external device monitor                        1
0022 SUBTYPE:     none                                                2
0023 ASSIGNED:    channel one                                         3
0024 OFF TIME:    0.100 Sec                                           4
```

('Generation II V4.x' or higher)

Example: Error lock

(Generation II and lower)

```
0028 Index:       1 = "Name"                                    8
0029 Type:       60 = external device monitor                   9
0030 Subtype:    none                                           0
0031 Assigned:   to OSSD 1                                      1
0032 Input:      1.Y2 not inverted                              2
0033 Off Time:   0.100 sec                                      3
```

(Safety Basic Monitor)

```
0028 Index:       1 = "Name"                                    8
0029 Type:       60 = external device monitor                   9
0030 Subtype:    none                                           0
0031 Assigned:   to OSSD 1                                      1
0032 Input:      S2 not inverted                                2
0033 Off Time:   0.100 sec                                      3
```

Example: Limited error lock

(Generation II and lower)

```
0020 INDEX:      32 = "Name"                                    0
0021 TYPE:       60 = external device monitor                   1
0022 SUBTYPE:    limited error lock                             2
0023 ASSIGNED:   channel one                                    3
0024 OFF TIME:   0.100 Sec                                      4
```

('Generation II V4.x' or higher)

```
0035 Index:       2 = "Name"                                    5
0036 Type:       60 = external device monitor                   6
0037 Subtype:    limited error lock                             7
0038 Assigned:   to OSSD 1                                      8
0039 Input:      2.Y1 inverted                                  9
0040 Off Time:   0.100 sec                                      0
```

(Safety Basic Monitor)

```
0035 Index:       2 = "Name"                                    5
0036 Type:       60 = external device monitor                   6
0037 Subtype:    limited error lock                             7
0038 Assigned:   to OSSD 1                                      8
0039 Input:      S2 inverted                                    9
0040 Off Time:   0.100 sec                                      0
```

Standard slave bit

(Safety Version 'SV4.3' or higher)

```
0098 Index:       9 = "Name"                                    8
0099 Type:       78 = external device monitor with output diagnosis   9
0100 Subtype:    standard slave diagnosis                       0
0101 Assigned:   to OSSD 2                                      1
0102 output diagnosis Address:    AS-i 1, slave 1, bit out-0 noninv   2
0103 Input:      1.Y1 not inverted                              3
0104 Off Time:   0.100 sec                                      4
```

Type 1 diagnostics safety output

(Safety Version 'SV4.3' or higher)

```
0098 Index:        9 = "Name"                                            8
0099 Type:        78 = external device monitor with output diagnosis     9
0100 Subtype:    Typ 1 diagnosis                                         0
0101 Assigned:   to OSSD 2                                               1
0102 output diagnosis Address:    AS-i 1, slave 26                       2
0103 Input:       1.Y1 not inverted                                      3
0104 Off Time:    0.100 sec                                              4
```

EDM circuit with standard slave

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "EDM circuit devices", on page 15.

Symbol

Functional device   **EDM circuit with standard slave**

Type	Designation in the configuration log
62/77	external device monitor standard slave
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameter

Name:	max. 29 ASCII characters plaintext
Switching time:	Switching time of the contactor:
	10 … 1000 ms (up to Safety Version 'SV4.0')
	10 … 2000 ms (Safety Version 'SV4.1')
	10 … 10000 ms (from Safety Version 'SV4.2' on)
Limited error lock:	With / without
Slave type:	Single/A/B-Slave
Address:	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted

Output diagnostics (from Safety Version 'SV4.3' on)

Specification of the reference to be used for the EDM circuit is made under Output diagnostics (see "Output diagnostics" on page 230).

OSSD:	Relay state of the OSSD is being used
Standard slave bit:	Relay state of unsafe slave bit
Slave type:	Single/A/B-Slave

Address:	Address of the local acknowledgment
	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted
Type 1 diagnostics safety output:	State of the B+W output slave.
Inverted dependent OSSD:	The relay state of an inverted dependent OSSD (e.g. door lock) is monitored.

Description

Input mask

The EDM circuit with standard slave is functionally identical to the normal EDM circuit.

As long as the safety outputs are switched off, the single A/B slave must be in the state active = ON. After the safety outputs have been switched on (validation), the state of the single/A/B slave is not relevant for set switching time. Afterward, the single/A/B slave must be in the inactive = OFF state again. The state of the contactor monitor is active = ON (switched on).

After the safety outputs have been switched off, the state of the contactor monitor returns to inactive = OFF (switched off) and the state of the single/A/B slave is not queried for the set switching time. Afterward, the single/A/B slave must be in the state active = ON again.

Example:
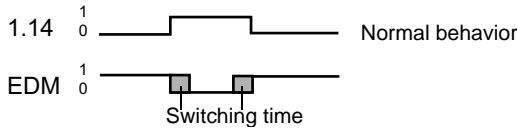
1.14 $\begin{smallmatrix}1\\0\end{smallmatrix}$ ⊓___⊓ Normal behavior

EDM $\begin{smallmatrix}1\\0\end{smallmatrix}$ ___▬___▬___

Switching time

Contactor monitoring prevents the monitor from being switched back on for the duration of the set switching time after it is switched off. This should allow all downstream contactors to reach the idle state before contactor monitoring again queries the input signal, thereby preventing an error lock.

Information!
Feedback loop for the Safety Monitor is designed as a normally closed or normally open contact on the safety contactor!

Error lock

If the input is inactive = OFF when the safety outputs are switched off or active = ON when the safety outputs are switched on, the system switches to the error state and locks.

Example:

1.14 $\begin{smallmatrix}1\\0\end{smallmatrix}$ _____ Error lock

EDM $\begin{smallmatrix}1\\0\end{smallmatrix}$ _____

1.14 $\begin{smallmatrix}1\\0\end{smallmatrix}$ __⊓__⊓__ Output is switched off, additional error lock

EDM $\begin{smallmatrix}1\\0\end{smallmatrix}$ _____

Information!
With dynamic contactor monitoring with error lock, series connection of the contactor controller with operational switches is not possible.

Limited error lock

If the input is inactive = OFF when the safety outputs are switched off, the system switches to the error state and locks. If the input remains active after the safety outputs are switched active = ON, e.g. when the contactor no longer engages due to a blown fuse, the contactor monitor switches the safety outputs of the OSSD back off.

Example:

1.14 $\begin{smallmatrix}1\\0\end{smallmatrix}$ __⊓__⊓__ Output is switched off

EDM $\begin{smallmatrix}1\\0\end{smallmatrix}$ _____

> ⚠️ ***Attention!***
> *The combination of the dynamic contactor monitoring with limited error lock together with automatic start is not permitted, as in this combination it is possible for the safety outputs of the AS-i Safety Monitor to be continuously switched on and off.*

Output diagnostics

With the **output diagnostics** item, it is possible to select the manner in which the relay state is to be determined. The following options are available:

• Via the state of the release circuit (OSSD)
• Via an AS-i standard bit (from Safety Version 'SV4.3' on)
• Via the diagnostic slave of a B+W output module (from Safety Version 'SV4.3' on).

Using **Inverted dependent OSSD**, the relay state of an inverted dependent OSSD (e.g. door lock) can be monitored.

Configuration log

Example: Error lock

(Generation II and lower)

```
0026 INDEX:      33 = "Name"                                               6
0027 TYPE:       62 = external device monitor standard slave               7
0028 SUBTYPE:    none                                                      8
0029 ASSIGNED:   channel one                                               9
0030 ADDRESS:    10   BIT:  In-0 noninv                                    0
0031 OFF TIME:   0.100 Sec                                                 1
```

('Generation II V4.x' or higher)

```
0028 Index:      1 = "Name"                                               8
0029 Type:       62 = external device monitor standard slave              9
0030 Subtype:    none                                                     0
0031 Assigned:   to OSSD 1                                                1
0032 Address:    AS-i 1, slave 10, bit in-0 noninv                        2
0033 Off Time:   0.100 sec                                                3
```

Example: Limited error lock

(Generation II and lower)

```
0026 INDEX:      33 = "Name"                                               6
0027 TYPE:       62 = external device monitor standard slave               7
0028 SUBTYPE:    limited error lock                                        8
0029 ASSIGNED:   channel one                                               9
0030 ADDRESS:    10   BIT:  In-0 noninv                                    0
0031 OFF TIME:   0.100 Sec                                                 1
```

('Generation II V4.x' or higher)

```
0035 Index:       2 = "Name"                                              5
0036 Type:       62 = external device monitor standard slave              6
0037 Subtype:    limited error lock                                       7
0038 Assigned:   to OSSD 1                                                8
0039 Address:    AS-i 1, slave 10, bit in-0 noninv                        9
0040 Off Time:   0.100 sec                                                0
```

Standard slave bit

(Safety Version 'SV4.3' or higher)

```
0098 Index:       9 = "Name"                                              8
0099 Type:       77 = external device monitor standard slave with output diagno-
sis 9
0100 Subtype:    standard slave diagnosis                                 0
0101 Assigned:   to OSSD 1                                                1
0102 edm readback Address:    AS-i 1, slave 1, bit out-0 noninv           2
0103 output diagnosis Address:   AS-i 1, slave 1, bit out-0 noninv        3
0104 Off Time:   0.100 sec                                                4
```

Type 1 diagnostics safety output

(Safety Version 'SV4.3' or higher)

```
0098 Index:        9 = "Name"                                              8
0099 Type:        77 = external device monitor standard slave with output diagno-
sis 9
0100 Subtype: Typ 1 diagnosis                                              0
0101 Assigned:   to OSSD 1                                                 1
0102 edm readback Address:    AS-i 1, slave 1, bit out-0 noninv           2
0103 output diagnosis Address:   AS-i 2, slave 13                         3
0104 Off Time:   0.100 sec                                                4
```

EDM circuit with monitor input for dependent, second OSSD

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "EDM circuit devices", on page 15.

Information!
This EDM circuit device can only be used in independent OSSDs of a configuration with two dependent output groups.

Symbol

Functional device   **EDM circuit with monitor input for dependent, second OSSD**

Type	Designation in the configuration log
61/78	external device monitor channel two
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameter

Name: max. 29 ASCII characters plaintext

Switching time: Switching time of the contactor:
10 … 1000 ms (up to Safety Version 'SV4.0')
10 … 2000 ms (Safety Version 'SV4.1')
10 … 10000 ms (from Safety Version 'SV4.2' on)

Limited error lock: with / without

Monitor input: 1.Y1, 1.Y2, 2.Y1 or 2.Y2 (except 'Safety Basis Monitor')
S12 … S81 ('Safety Basis Monitor' only)

inverted / not inverted (only ''Generation II V4.x'' or higher)

Output diagnostics (from Safety Version 'SV4.3' on)
Specification of the reference to be used for the EDM circuit is made under Output diagnostics (see "Output diagnostics" on page 230).

OSSD: Relay state of the OSSD is being used

Standard slave bit: Relay state of unsafe slave bit

Slave type: Single/A/B-Slave

Address:	Address of the output diagnostics
	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted
Type 1 diagnostics safety output:	State of the B+W output slave.
Inverted dependent OSSD:	The relay state of an inverted dependent OSSD (e.g. door lock) is monitored.

Input mask

Input mask[*1]

*1   Input mask in the 'Safety Basis Monitor' setting

Description

The EDM circuit with monitor input for a second, dependent OSSD is functionally identical with a normal EDM circuit. It monitors the downstream contactor on the second channel, but acts on the validation of channel 1.

As long as the safety outputs are switched off, the input contactor monitor on the AS-i Safety Monitor must be active = ON . After the safety outputs have been switched on (validation), the input contactor monitor is not relevant for set switching time. Afterward, the input must be inactive = OFF. The state of the contactor monitor is active = ON (switched on).

After the safety outputs have been switched off, the state of the contactor monitor returns to inactive = OFF (switched off) and the input contactor monitor is not queried for the set switching time. Afterward, the input contactor monitor must again be active = ON.

Example:

Contactor monitoring prevents the monitor from being switched back on for the duration of the set switching time after it is switched off. This should allow all downstream contactors to reach the idle state before contactor monitoring again queries the input signal, thereby preventing an error lock.

Information!
Feedback loop for the Safety Monitor is designed as a normally closed or normally open contact on the safety contactor!

Error lock

If the input is inactive when the safety outputs are switched off or active when the safety outputs are switched on, the system switches to the error state and locks.

Example:

Information!
With dynamic contactor monitoring with error lock, series connection of the contactor controller with operational switches is not possible.

Limited error lock

If the input is inactive = OFF when the safety outputs are switched off, the system switches to the error state and locks. If the input remains active after the safety outputs are switched active = ON, e.g. when the contactor no longer engages due to a blown fuse, the contactor monitor switches the safety outputs of the OSSD back off.

Example:

1.14 $\begin{smallmatrix}1\\0\end{smallmatrix}$ ⎯⎯⎯⎯⎯⏋_____⎤⎯⎯⎯⎯⎯ Output is switched off

EDM $\begin{smallmatrix}1\\0\end{smallmatrix}$ ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

⚠️ **Attention!**
The combination of the dynamic contactor monitoring with limited error lock together with automatic start is not permitted, as in this combination it is possible for the safety outputs of the AS-i Safety Monitor to be continuously switched on and off.

Output diagnostics

With the **output diagnostics** item, it is possible to select the manner in which the relay state is to be determined. The following options are available:

• Via the state of the release circuit (OSSD)
• Via an AS-i standard bit (from Safety Version 'SV4.3' on)
• Via the diagnostic slave of a B+W output module (from Safety Version 'SV4.3' on).

Using **Inverted dependent OSSD**, the relay state of an inverted dependent OSSD (e.g. door lock) can be monitored.

Configuration log

Example: Error lock

(Generation II and lower)

```
0033 INDEX:       34 = "Name"                                          3
0034 TYPE:        61 = external device monitor channel two             4
0035 SUBTYPE:     none                                                 5
0036 ASSIGNED:    channel one                                          6
0037 OFF TIME:     0.100 Sec                                           7
```

('Generation II V4.x' or higher)

```
0028 Index:        1 = "Name"                                          8
0029 Type:        61 = external device monitor channel two             9
0030 Subtype:     none                                                 0
0031 Assigned:    to OSSD 1                                            1
0032 Assigned:    to OSSD 2 (dependent OSSD)                           2
0033 Input:       1.Y2 not inverted                                    3
0034 Off Time:    0.100 sec                                            4
```

(Safety Basic Monitor)

```
0028 Index:        1 = "Name"                                          8
0029 Type:        61 = external device monitor channel two             9
0030 Subtype:     none                                                 0
0031 Assigned:    to OSSD 1                                            1
0032 Assigned:    to OSSD 2 (dependent OSSD)                           2
0033 Input:       S2 not inverted                                      3
0034 Off Time:    0.100 sec                                            4
```

Example: Limited error lock

(Generation II and lower)

```
0033 INDEX:       34 = "Name"                                          3
0034 TYPE:        61 = external device monitor channel two             4
0035 SUBTYPE:     limited error lock                                   5
0036 ASSIGNED:    channel one                                          6
0037 OFF TIME:     0.100 Sec                                           7
```

('Generation II V4.x' or higher)

```
0036 Index:        2 = "Name"                                          6
0037 Type:        61 = external device monitor channel two             7
0038 Subtype:     limited error lock                                   8
0039 Assigned:    to OSSD 1                                            9
0040 Assigned:    to OSSD 2 (dependent OSSD)                           0
0041 Input:       2.Y1 inverted                                        1
0042 Off Time:    0.100 sec                                            2
```

(Safety Basic Monitor)

```
0036 Index:        2 = "Name"                                          6
0037 Type:        61 = external device monitor channel two             7
0038 Subtype:     limited error lock                                   8
0039 Assigned:    to OSSD 1                                            9
0040 Assigned:    to OSSD 2 (dependent OSSD)                           0
0041 Input:       S2 inverted                                          1
0042 Off Time:    0.100 sec                                            2
```

Standard slave bit

(Safety Version 'SV4.3' or higher)

```
0098 Index:        9 = "Name"                                              8
0099 Type:        78 = external device monitor with output diagnosis       9
0100 Subtype:    standard slave diagnosis                                  0
0101 Assigned:   to OSSD 2                                                  1
0102 output diagnosis Address:    AS-i 1, slave 1, bit out-0 noninv        2
0103 Input:      1.Y1 not inverted                                         3
0104 Off Time:   0.100 sec                                                 4
```

Type 1 diagnostics safety output

(Safety Version 'SV4.3' or higher)

```
0098 Index:        9 = "Name"                                              8
0099 Type:        78 = external device monitor with output diagnosis       9
0100 Subtype:    Typ 1 diagnosis                                           0
0101 Assigned:   to OSSD 2                                                  1
0102 output diagnosis Address:    AS-i 1, slave 26                         2
0103 Input:      1.Y1 not inverted                                         3
0104 Off Time:   0.100 sec                                                 4
```

EDM circuit with standard slave for dependent, second OSSD

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "EDM circuit devices", on page 15.

Information!
This EDM circuit device can only be used in independent OSSDs of a configuration with two dependent output groups.

Symbol

Functional device   **EDM circuit with standard slave for dependent, second OSSD**

Type	Designation in the configuration log
63/77	external device monitor channel two standard slave
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameter

Name: max. 29 ASCII characters plaintext

Switching time: Switching time of the contactor:
10 … 1000 ms (up to Safety Version 'SV4.0')
10 … 2000 ms (Safety Version 'SV4.1')
10 … 10000 ms (from Safety Version 'SV4.2' on)

Limited error lock: with / without

Slave type: Single/A/B-Slave

Address: AS-i circuit and AS-i bus address (1 … 31)
also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)

Bit address: In-0 … In-3 or Out-0 … Out-3

inverted / not inverted (only ''Generation II V4.x'' or higher)

Output diagnostics (from Safety Version 'SV4.3' on)

Specification of the reference to be used for the EDM circuit is made under Output diagnostics (see "Output diagnostics" on page 230).

OSSD: Relay state of the OSSD is being used

Standard slave bit: Relay state of unsafe slave bit

Slave type:	Single/A/B-Slave
Address:	Address of the output diagnostics
	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted
Type 1 diagnostics safety output:	State of the B+W output slave.
Inverted dependent OSSD:	The relay state of an inverted dependent OSSD (e.g. door lock) is monitored.

Description

Input mask

The EDM circuit with standard slave for the second, dependent OSSD is functionally identical with a normal EDM circuit for the second, dependent OSSD.

As long as the safety outputs are switched off, the single A/B slave must be in the state active = ON. After the safety outputs have been switched on (validation), the state of the single/A/B slave is not relevant for set switching time. Afterward, the single/A/B slave must be in the inactive = OFF state again. The state of the contactor monitor is active = ON (switched on).

After the safety outputs have been switched off, the state of the contactor monitor returns to inactive = OFF (switched off) and the state of the single/A/B slave is not queried for the set switching time. Afterward, the single/A/B slave must be in the state active = ON again.

Contactor monitoring prevents the monitor from being switched back on for the duration of the set switching time after it is switched off. This should allow all downstream contactors to reach the idle state before contactor monitoring again queries the input signal, thereby preventing an error lock.

> *Information!*
> *Feedback loop for the Safety Monitor is designed as a normally closed or normally open contact on the safety contactor!*

Output diagnostics

With the **output diagnostics** item, it is possible to select the manner in which the relay state is to be determined. The following options are available:

- Via the state of the release circuit (OSSD)
- Via an AS-i standard bit (from Safety Version 'SV4.3' on)
- Via the diagnostic slave of a B+W output module (from Safety Version 'SV4.3' on).

Using **Inverted dependent OSSD**, the relay state of an inverted dependent OSSD (e.g. door lock) can be monitored.

Configuration log

Example: Error lock

(Generation II and lower)

```
0039 INDEX:       35 = "Name"                                              9
0040 TYPE:        63 = external device monitor channel two standard slave  0
0041 SUBTYPE:     none                                                     1
0042 ASSIGNED:    channel one                                              2
0043 ADDRESS:     10   BIT:  In-0 noninv                                   3
0044 OFF TIME:       0.100 Sec                                             4
```

('Generation II V4.x')

```
0028 Index:        1 = "Name"                                             8
0029 Type:        63 = external device monitor channel two standard slave 9
0030 Subtype:     none                                                    0
0031 Assigned:    to OSSD 1                                               1
0032 Assigned:    to OSSD 2 (dependent OSSD)                              2
0033 Address:     AS-i 1, slave 10, bit in-0 noninv                       3
0034 Off Time:    0.100 sec                                               4
```

Example: Limited error lock

(Generation II and lower)

```
0039 INDEX:       35 = "Name"                                              9
0040 TYPE:        63 = external device monitor channel two standard slave  0
0041 SUBTYPE:     limited error lock                                       1
0042 ASSIGNED:    channel one                                              2
0043 ADDRESS:     10   BIT:  In-0 noninv                                   3
0044 OFF TIME:       0.100 Sec                                             4
```

('Generation II V4.x')

```
0036 Index:        2 = "Name"                                             6
0037 Type:        63 = external device monitor channel two standard slave 7
0038 Subtype:     limited error lock                                      8
0039 Assigned:    to OSSD 1                                               9
0040 Assigned:    to OSSD 2 (dependent OSSD)                              0
0041 Address:     AS-i 1, slave 10, bit in-0 noninv                       1
0042 Off Time:    0.100 sec                                               2
```

Standard slave bit

(Safety Version 'SV4.3' or higher)

```
0098 Index:        9 = "Name"                                             8
0099 Type:        77 = external device monitor standard slave with output diagno-
sis 9
0100 Subtype:     standard slave diagnosis                                0
0101 Assigned:    to OSSD 1                                               1
0102 edm readback Address:    AS-i 1, slave 1, bit out-0 noninv           2
0103 output diagnosis Address:   AS-i 1, slave 1, bit out-0 noninv        3
0104 Off Time:    0.100 sec                                               4
```

Type 1 diagnostics safety output

(Safety Version 'SV4.3' or higher)

```
0098 Index:        9 = "Name"                                              8
0099 Type:        77 = external device monitor standard slave with output diagno-
sis 9
0100 Subtype: Typ 1 diagnosis                                              0
0101 Assigned:    to OSSD 1                                                1
0102 edm readback Address:    AS-i 1, slave 1, bit out-0 noninv            2
0103 output diagnosis Address:    AS-i 2, slave 13                         3
0104 Off Time:    0.100 sec                                               4
```

4.3.4 Start devices

○
∐   *Information!*
     Availability of the individual devices depends on the device type and the safety version.
     Further information can be found in tab. "Start devices", on page 15.

In the course of the evaluation, after all monitoring, logic and EDM circuit devices have been processed, the result of the AND link of all device states is determined for each OSSD. In the start devices, this result is analyzed together with a possible start condition.

For each independent OSSD, at least one start device is required. If multiple start devices are present in an OSSD, they are linked with one another by means of an OR function. Thus, for the validation of an OSSD, it is sufficient when one of the start devices fulfills the condition for the validation.

Possible start conditions are:

• Automatic start (no additional start condition)
• Monitored start by means of an AS-i standard slave
• Monitored start by means of start input on the AS-i Safety Monitor
• Monitored start by means of a safe AS-i slave
• Activation via standard slave
• Activation via monitor input
• Start by device
• Activation by device

○
∐   *Information!*
     A start device can only be assigned to one OSSD. If, for example, both OSSDs are to be started with one button, a start device is to be configured for each OSSD. Both of the devices, however, use the same button.

Overview of start devices

Symbol	Type	Functional device
	80	**Automatic start**
	81	**Monitored start - standard slave**
	82	**Monitored start - monitor input**
	83	**Monitored start - safe input slave**
	84	**Activation via standard slave**
	85	**Activation via monitor input**
	97	**Start by device**
	98	**Activation by device**

Automatic start

Information!

Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Start devices", on page 15.

Symbol

Functional device   **Automatic start**

Type	Designation in the configuration log
80	automatic start
Variants	
None	

 Parameter   Name: max. 29 ASCII characters plaintext

Input mask
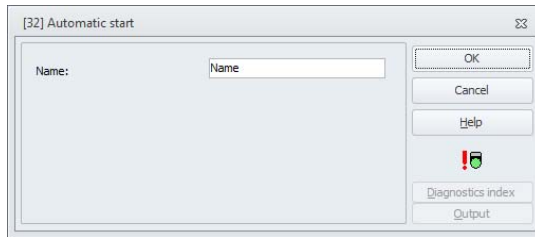
Description

The "Automatic start" start device requires no additional start condition. If the AND link for all monitoring, logic and EDM circuit devices of an OSSD returns the result ON, the "Automatic start" start device releases the OSSD via the respectively configured output device.

Attention!

Danger! In the event of an automatic start, the OSSD switches on as soon as all conditions are fulfilled! The machine can, in this case, start unexpectedly!

Configuration log

Example:

(Generation II and lower)

```
0106 INDEX:      45 = "Name"                                      6
0107 TYPE:       80 = automatic start                             7
0108 ASSIGNED:   channel one                                      8
```

('Generation II V4.x' or higher)

```
0028 Index:       1 = "Name"                                      8
0029 Type:       80 = automatic start                             9
0030 Assigned:   to OSSD 1                                        0
```

Information!
The combination of the **Automatic start** *start device with other start devices is not useful, as a start would occur in every case.*

Monitored start - standard slave

○
工 *Information!*
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Start devices", on page 15.

Symbol

Functional device   **Monitored start - standard slave**

Type	Designation in the configuration log
81	manual start standard slave
Variants	
None	

Parameter

Name:	max. 29 ASCII characters plaintext
Slave type:	Single/A/B-Slave
Address:	AS-i circuit and AS-i bus address (1 … 31)
	also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
	or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted

Input mask
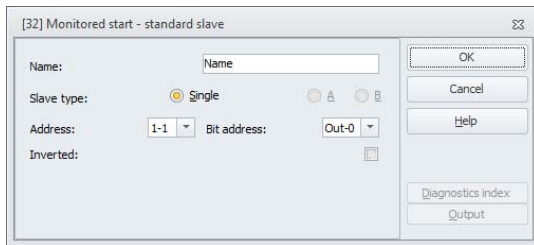
Description

The "Monitored start - single slave" start device requires as additional start condition the ON state of a standard/A/B slave on the AS-i bus (e.g. start button via AS-i standard slave module). If the AND link of all monitoring, logic and EDM circuit devices of an OSSD returns the result ON and the start condition is fulfilled, the "Monitored start - standard slave" start device passes on the validation request to the output device.

> *Information!*
> *Between the occurrence of the ON state of the AND link of all monitoring, logic and EDM circuit devices of an OSSD and the activation of the single/A/B slave, at least 50 ms must pass. The single/A/B slave must be activated **for at least 50 ms and at most 2 s**. 50 ms after activation of the single/A/B slave has concluded, the validation request is performed.*

Configuration log

Example:

(Generation II and lower)

```
0027 INDEX:       33 = "Name"                               7
0028 TYPE:        81 = manual start standard slave          8
0029 ASSIGNED:    channel one                               9
0030 ADDRESS:     10   BIT:  In-0 noninv                    0
```

('Generation II V4.x' or higher)

```
0028 Index:        1 = "Name"                               8
0029 Type:        81 = manual start standard slave          9
0030 Assigned:    to OSSD 1                                 0
0031 Address:     AS-i 1, slave 10, bit in-0 noninv         1
```

Monitored start - monitor input

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Start devices", on page 15.

Symbol

Functional device   **Monitored start - monitor input**

Type	Designation in the configuration log
82	manual start monitor input
Variants	
None	

Parameter

Name: max. 29 ASCII characters plaintext

Monitor input: 1.Y1, 1.Y2, 2.Y1 or 2.Y2 (except 'Safety Basis Monitor')
S12 … S81 ('Safety Basis Monitor' only)

inverted / not inverted
(only ''Generation II V4.x'' or higher)
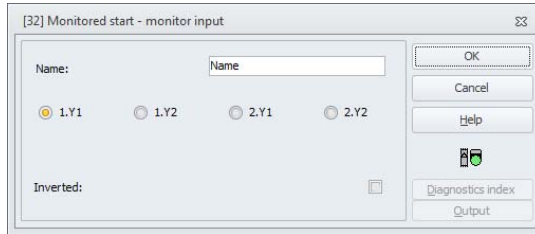
Input mask
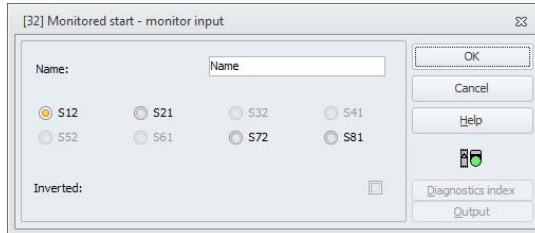
Input mask[*1]

*1   Input mask in the 'Safety Basis Monitor' setting

Description

The "Monitored start - monitor input" start device requires as additional start condition the activation of the start input of the corresponding OSSD. If the AND link of all monitoring, logic and EDM circuit devices of an OSSD returns the result ON and the start condition is fulfilled, the "Monitored start - monitor input" start device passes on the validation request to the output device.

> *Information!*
> *Between the occurrence of the ON state of the AND link of all monitoring, logic and EDM circuit devices of an OSSD and the activation of the start input, at least 50ms must pass. The start input must be activated **at least 50ms and at most 2s**. 50ms after deactivation of the input, the validation request is performed.*

Configuration log

Example:

(Generation II and lower)

```
0115 INDEX:       47 = "Name"                                          5
0116 TYPE:        82 = manual start monitor input                     6
0117 ASSIGNED:    channel one                                          7
```

('Generation II V4.x' or higher)

```
0028 Index:        1 = "Name"                                          8
0029 Type:        82 = manual start monitor input                     9
0030 Assigned:    to OSSD 1                                            0
0031 Input:       1.Y2 not inverted                                    1


0033 Index:        2 = "Name"                                          3
0034 Type:        82 = manual start monitor input                     4
0035 Assigned:    to OSSD 1                                            5
0036 Input:       2.Y1 inverted                                        6
```

(Safety Basic Monitor)

```
0028 Index:        1 = "Name"                                          8
0029 Type:        82 = manual start monitor input                     9
0030 Assigned:    to OSSD 1                                            0
0031 Input:       S2 not inverted                                      1


0033 Index:        2 = "Name"                                          3
0034 Type:        82 = manual start monitor input                     4
0035 Assigned:    to OSSD 1                                            5
0036 Input:       S3 inverted                                          6
```

Monitored start - safe input slave

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Start devices", on page 15.

Symbol

Functional device   **Monitored start - safe input slave**

Type	Designation in the configuration log
83	manual start safe input
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext
                Address: AS-i circuit and AS-i bus address (1 … 31)

Input mask
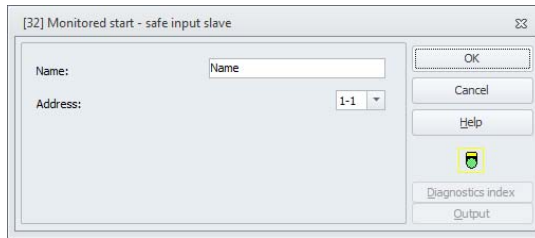
Description

The "Monitored start - safe input slave" start device requires as additional start condition the ON state of a safe input slave on the AS-i bus. If the AND link of all monitoring, logic and EDM circuit devices of an OSSD returns the result ON and the start condition is fulfilled, the "Monitored start - safe input slave" start device passes on the validation request to the output device.

Information!
*Between the occurrence of the ON state of the AND link of all monitoring, logic and EDM circuit devices of an OSSD and the activation of the safe input slave, at least 50ms must pass. The safe input slave must be activated for **at least 50ms and at most 2s**. 50ms after activation of the safe input slave has concluded, the validation request is performed.*

Configuration log

Example:

(Generation II and lower)

```
0119 INDEX:      48 = "Name"                              9
0120 TYPE:       83 = manual start safe input             0
0121 ASSIGNED:   channel one                              1
0122 SAFE SLAVE:  5                                        2
```

('Generation II V4.x' or higher)

```
0028 Index:       1 = "Name"                              8
0029 Type:       83 = manual start safe input             9
0030 Assigned:   to OSSD 1                                0
0031 Safe Slave: AS-i 1, slave 5                          1
```

Activation via standard slave

○
∏ *Information!*
Availability of the individual devices depends on the device type and the safety version.
*Further information can be found in tab. "Start devices", on page 15.*

Symbol

Functional device   **Activation via standard slave**

Type	Designation in the configuration log
84	enable start standard slave
Variants	
None	

Parameter

	Name:	max. 29 ASCII characters plaintext
	Slave type:	Single/A/B-Slave
	Address:	AS-i circuit and AS-i bus address (1 … 31)
		also S12…S81 ('Safety Basic Monitor' only from 'SV4.3' on)
		or 1.Y1, 1.Y2, 2.Y1, 2.Y2 (from 'SV4.3' on)
	Bit address:	In-0 … In-3 or Out-0 … Out-3
		inverted / not inverted

Input mask
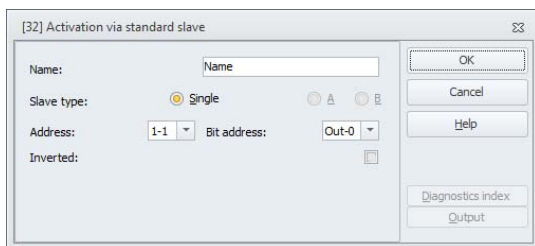
Description

The **Activation via standard slave** start device is used to implement a start function via an AS-i input (Start signal) or an AS-i PLC output. Unlike the **Monitored start - standard slave** start device, this start device is not pulse-sensitive, but rather level-sensitive. The start signal must be applied for at least 100 ms before the device switches to the ON state and sends the validation request to the output device.

⚠️ **Attention!**
Danger! Upon activation via a standard slave, the OSSD switches on as soon as all condi-tions are fulfilled and the activating level is reached! When the level is frozen while in the activated state, the machine can, thus, start unexpectedly!

ℹ️ **Information!**
*A combination with the **Automatic start** start device is not permitted.*

Configuration log

Example:

(Generation II and lower)

```
0027 INDEX:      33 = "Name"                                    7
0028 TYPE:       84 = enable start standard slave               8
0029 ASSIGNED:   channel one                                    9
0030 ADDRESS:    10   BIT:  In-0 noninv                         0
```

('Generation II V4.x' or higher)

```
0028 Index:       1 = "Name"                                    8
0029 Type:       84 = enable start standard slave               9
0030 Assigned:   to OSSD 1                                      0
0031 Address:    AS-i 1, slave 10, bit in-0 noninv              1
```

Activation via monitor input

O
Ⅱ

Information!
Availability of the individual devices depends on the device type and the safety version.
*Further information can be found in tab. "Start devices", on page 15.*

Symbol

Functional device   **Activation via monitor input**

Type	Designation in the configuration log
85	enable start monitor input
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext

Monitor input: 1.Y1, 1.Y2, 2.Y1 or 2.Y2 (except 'Safety Basis Monitor')

S12 … S81 ('Safety Basis Monitor' only)

inverted / not inverted
(only ''Generation II V4.x'' or higher)
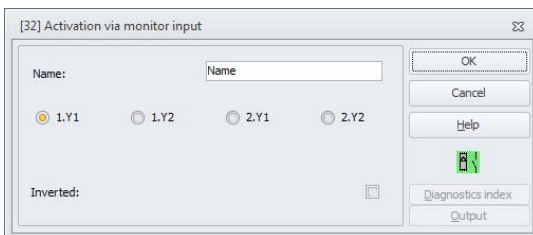
Input mask
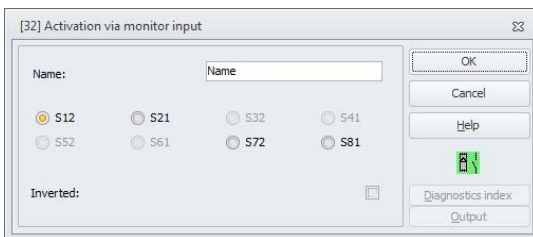
Input mask[*1]

*1   Input mask in the 'Safety Basis Monitor' setting

Description

The **Activation via monitor input** start device is used to implement a start function via the monitor input. Unlike the **Monitored start - monitor input** start device, this start device is not pulse-sensitive, but rather level-sensitive. The start signal must be applied for at least 100 ms before the device switches to the ON state and sends the validation request to the output device.

Attention!
Danger! Upon activation via a monitor input, the OSSD switches on as soon as all conditions are fulfilled and the activating level is reached! When the level is frozen while in the activating state, the machine can, thus, start unexpectedly!

Information!
*A combination with the **Automatic start** start device is not permitted.*

Configuration log

Example:
(Generation II and lower)

```
0115 INDEX:        47 = "Name"                                        5
0116 TYPE:         85 = enable start monitor input                    6
0117 ASSIGNED:     channel two                                        7
```

('Generation II V4.x' or higher)

```
0028 Index:         1 = "Name"                                        8
0029 Type:         85 = enable start monitor input                    9
0030 Assigned:     to OSSD 1                                          0
0031 Input:        1.Y2 not inverted                                  1

0033 Index:         2 = "Name"                                        3
0034 Type:         85 = enable start monitor input                    4
0035 Assigned:     to OSSD 1                                          5
0036 Input:        2.Y1 inverted                                      6
```

(Safety Basic Monitor)

```
0028 Index:         1 = "Name"                                        8
0029 Type:         85 = enable start monitor input                    9
0030 Assigned:     to OSSD 1                                          0
0031 Input:        S2 not inverted                                    1

0033 Index:         2 = "Name"                                        3
0034 Type:         85 = enable start monitor input                    4
0035 Assigned:     to OSSD 1                                          5
0036 Input:        S3 inverted                                        6
```

Start by device

ⓘ *Information!*
Availability of the individual devices depends on the device type and the safety version.
*Further information can be found in tab. "Start devices", on page 15.*

Symbol

Functional device   **Start by device**

Type	Designation in the configuration log
97	Start any
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext

Input mask

[32] Monitored start - device

Name: Name
Input:

OK
Cancel
Help

Diagnostics index
Output

Description

Using this start device, arbitrary start condition may be generated by connecting other devices.

If the AND link of all monitoring, logic and EDM circuit devices of an OSSD returns the result ON and the start condition is fulfilled, the start device passes on the validation request to the output device.

ⓘ *Information!*
*A combination with the **Automatic start** start device is not permitted.*

Configuration log

Example:

```
0102 Index:      10 = "Name"                                                    2
0103 Type:       97 = start any                                                 3
0104 Assigned:   to OSSD 1                                                       4
0105 In Device:   4 = "safety guard"                                            5
```

,

Activation by device

○
Ⅱ
Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Start devices", on page 15.
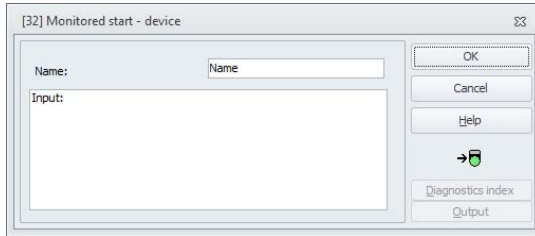
Symbol

Functional device　　　**Activation by device**

Type	Designation in the configuration log
98	Start any
Variants	
None	

Parameter　　　　　　　Name:　max. 29 ASCII characters plaintext

Input mask

Description

Using this start device, arbitrary start condition may be generated by connecting other devices.

If the AND link of all monitoring, logic and EDM circuit devices of an OSSD returns the result ON and the start condition is fulfilled, the start device passes on the validation request to the output device.

Unlike the **Start by device** this start device is not pulse-sensitive, but rather level-sensitive.

The start signal must be applied for at least 100 ms before the device switches to the ON state and sends the validation request to the output device.

⚠ ***Attention!***
Upon activation via a monitor input, the OSSD switches on as soon as all conditions are fulfilled and the activating level is reached! When the level is frozen while in the activating state, the machine can, thus, start unexpectedly!

○
⊥∏⊥ **Information!**
*A combination with the **Automatic start** start device is not permitted.*

Configuration log

Example:
(Safety Version 'SV4.3' or higher)

```
0110 Index:      11 = "Name"                                        0
0111 Type:       98 = enable start any                              1
0112 Assigned:   to OSSD 1                                          2
0113 In Device:   9 = "key switch"                                  3
```

4.3.5 Output devices

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Output devices", on page 16.

The output devices set the validation of the start devices according to their function in the logical nominal states of the output circuits and message outputs.

In the AS-i Safety Monitor, a shut-off system consists of a redundantly constructed relay output and a message output. If two shut-off systems are present in one monitor, the second shut-off system can be operated dependently or independently of the first. The output devices differ from one another at this point.
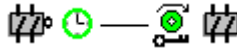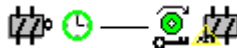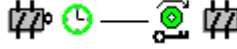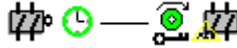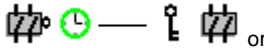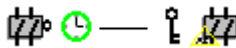
Information!
For two independent OSSDs, exactly one output device must be present for each OSSD.
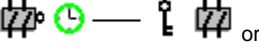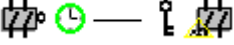
For two dependent OSSDs, exactly one output device in the independent OSSD establishes the dependence.

The conversion of the logical to the physical switching state for relays, message outputs and LEDs is then performed in the hardware of the AS-i Safety Monitor. A false switching state in the hardware detected when reading the data back in also results in the switching of the affected output device to the error state.

Whenever safe AS-i output slaves are connected to an output device, it is advantageous to use a "Remote output diagnostics" device for each slave (see device block <Remote output diagnostics>).

Overview of output devices

Symbol	Type	Functional device
 or	100	**Stop category 1 - message and delayed relay output**
 or 	101	**Stop category 0**
 or or	102	**Stop category 1 - two relay outputs**
 or or	103	**Door lock** Door lock by means of zero-speed relay and delay time
 or or	104	**Door lock** Door lock by means of zero-speed relay and delay time with stop category 1
 or or 	103	**Door lock** Door lock by means of delay time

Symbol	Type	Functional device
	104	**Door lock**
or or		Door lock by means of delay time with stop category 1
	110	**Input F-CPU**
		Data transfer to PROFIsafe

Stop category 1 - message and delayed relay output

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Output devices", on page 16.

Symbol

Functional device   **Stop category 1 - message and delayed relay output**

Type	Designation in the configuration log
100	stop category 1 with delayed relay
Variants	
None	

Parameter   Name: max. 29 ASCII characters plaintext
                    Switch-off delay: 0ms … 300s in multiples of 100ms

Input mask

Description

Upon validation of the circuit, ON state, the message output and the output circuit are simultaneously activated by the **Stop category 1 - message and delayed relay output** output device. If the circuit is switched off, OFF state, the message output is switched off immediately and the output circuit is switched off after the set switch-off delay has elapsed. The switch-off delay can be set to values between 0s and 300s in increments of 100ms. The circuit can be switched back on only after both output circuits have been switched off.

Restart/Error unlock option for safe AS-i output (safe actuator)

If a safe output is specified as an **Actuator**, the devices for the **Error unlock** and the **Restart** of the actuator must be configured separately. After inserting the output device in the configuration, this is apparent from the 2 dummies for the restart and Error unlock devices.

For **Actuators** it is also possible to specify the AS-i circuit and the address of a safety AS-i output. If the respective release circuit is controlling a relay that is integrated in the safety monitor, it will be switched at the same time as the AS-i output.

Information!
In order to achieve better diagnostics of the safety AS-i outputs, the device "Remote output diagnostics" is available (see device <Remote output diagnostics>).

Under **Coupling slave** it is possible to specify the AS-i circuit and address of a safety input slave used to safety couple AS-i circuits.

Information!
These two options are only available for "Generation II V4.x" or higher.

The safe AS-i output has monitoring functions which are independent of the safety monitor and can detect an error state independently of the monitor. To unlock this state, you need the **Error unlock** signal. This signal must be in a state change.

Assign the desired devices to the placeholders for **Restart** and **Error unlock** by **dragging** the devices from the icon library to the placeholders.

Information!
*For an automatic restart, simply assign the **Restart** dummy the TRUE system device.*

○
⊥̧   *Information!*
*If you do not wish to use **Error unlock,** you do not need to fill the placeholder. In case of error you can only unlock by using the AS-i Power OFF/ON.*

Once the dummies are assigned the appropriate devices, you can make further settings for the **Error unlock** and for **Restart** by reopening the input mask of the output device.

To do this, click the output device with the right mouse button, select the **Edit** command from the pop-up menu which opens.

In the **Error unlock** and **Restart** areas in the Help signals part of the window, you can define in detail which signals result in an activation of the **Error unlock** and in **Restart** of the safe actuator.

The signal **Error unlock** is activated by the following events:

Signal	Description
"Once on OFF --> ON"	Signal change of the Error unlock device from "non-green" to "green"
"Once on ON --> OFF"	Signal change of the Error unlock device from "green" to "non-green"
"Once on change of state"	Signal change of the Error unlock device from "non-green" to "green" or of "green" to "non-green"

The signal **Restart** is activated by the following events:

Signal	Description
"Continuous while ON"	Signal in the Restart device "green"
"Continuous while OFF"	Signal in the Restart device "non-green"
"Continuous while ON and OFF"	Signal is sent permanently
"Once on OFF --> ON"	Signal change in the Restart device from "non-green" to "green"
"Once on ON --> OFF"	Signal change in the Restart device from "green" to "non-green"
"Once on change of state"	Signal change in the Restart device from "non-green" to "green" or from "green" to "non-green"

Define the events for activating the **Error unlock** and **Restart** and confirm your entry with OK in the respective selection menu.

○
⊥̧   *Information!*
*With the **Error unlock** signal, the safe output is reset after an error. With the **Restart** the safe output is activated again after an interruption of the AS-i communication.*

Diagnostics output option (from Safety Version 'SV4.3')

The state of the OSSD can additionally be reported via an unsafe AS-i output bit with the **Diagnostics output** option. This is primarily of interest for diagnostic purposes.

⚠️ *Attention!*
The message output is not safety-oriented. A safe maximum switch-off delay only exists for the output circuits.
In the event of an internal error in the AS-i Safety Monitor, the output circuits are switched off immediately. For all other errors, e.g. communication interruption, the set switch-off delay is retained.

Configuration log

Example:

(Generation II and lower)
```
0124 INDEX:        49 = "Name"                                    4
0125 TYPE:        100 = stop category 1 with delayed relay        5
0126 ASSIGNED:   channel one                                      6
0127 DELAY TIME:  10,000 Sec                                      7
```

('Generation II V4.x' or higher)
```
0032 Index:         2 = "Name"                                    2
0033 Type:        100 = stop category 1 with delayed relay        3
0034 Assigned:   to OSSD 1                                        4
0035 Delay Time: 10,000 sec                                       5
```

Stop category 0

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Output devices", on page 16.

Symbol

Functional device　　**Stop category 0**

Type	Designation in the configuration log
101	stop category 0
Variants	
None	

Parameter　　　　　　Name:　max. 29 ASCII characters plaintext

Input mask

Description

Upon validation of the circuit, ON state, the message output and the output circuit are simultaneously activated by the **stop category 0** or **Global Variable** output device. If the circuit is switched off, OFF state, the message output and the output circuit are switched off immediately without delay.

The **Global Variable** device is mainly identical to the device **Stop category 0**. The difference is that the OSSD with the highest number (per default) begins. One can only select a coupling slave and not a **safe output** (actuator). The device serves for coupling safety monitors.

Restart/Error unlock option for safe AS-i output (safe actuator)

If a safe output is specified as an **Actuator**, the devices for the **Error unlock** and the **Restart** of the actuator must be configured separately. After inserting the output device in the configuration, this is apparent from the 2 dummies for the restart and Error unlock devices.

For **Actuators** it is also possible to specify the AS-i circuit and the address of a safety AS-i output. If the respective release circuit is controlling a relay that is integrated in the safety monitor, it will be switched at the same time as the AS-i output.

> **Information!**
> *In order to achieve better diagnostics of the safety AS-i outputs, the device "Remote output diagnostics" is available (see device <Remote output diagnostics>).*

Under **Coupling slave** it is possible to specify the AS-i circuit and address of a safety input slave used to safety couple AS-i circuits.

> **Information!**
> *These two options are only available for "Generation II V4.x" or higher.*

Dummy

The safe AS-i output has monitoring functions which are independent of the safety monitor and can detect an error state independently of the monitor. To unlock this state, you need the **Error unlock** signal. This signal must be in a state change.

Assign the desired devices to the placeholders for **Restart** and **Error unlock** by **dragging** the devices from the icon library to the placeholders.

Information!
For an automatic restart, simply assign the **Restart** *dummy the TRUE system device.*

Information!
If you do not wish to use **Error unlock,** *you do not need to fill the placeholder. In case of error you can only unlock by using the AS-i Power OFF/ON.*

Once the dummies are assigned the appropriate devices, you can make further settings for the **Error unlock** and for **Restart** by reopening the input mask of the output device.

To do this, click the output device with the right mouse button, select the **Edit** command from the pop-up menu which opens.

In the **Error unlock** and **Restart** areas in the Help signals part of the window, you can define in detail which signals result in an activation of the **Error unlock** and in **Restart** of the safe actuator.

The signal **Error unlock** is activated by the following events:

Signal	Description
"Once on OFF --> ON"	Signal change of the Error unlock device from "non-green" to "green"
"Once on ON --> OFF"	Signal change of the Error unlock device from "green" to "non-green"
"Once on change of state"	Signal change of the Error unlock device from "non-green" to "green" or of "green" to "non-green"

The signal **Restart** is activated by the following events:

Signal	Description
"Continuous while ON"	Signal in the Restart device "green"
"Continuous while OFF"	Signal in the Restart device "non-green"
"Continuous while ON and OFF"	Signal is sent permanently
"Once on OFF --> ON"	Signal change in the Restart device from "non-green" to "green"
"Once on ON --> OFF"	Signal change in the Restart device from "green" to "non-green"
"Once on change of state"	Signal change in the Restart device from "non-green" to "green" or from "green" to "non-green"

Define the events for activating the **Error unlock** and **Restart** and confirm your entry with OK in the respective selection menu.
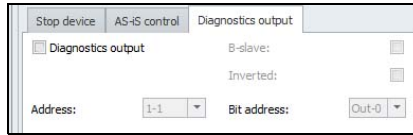
Information!
*With the **Error unlock** signal, the safe output is reset after an error. With the **Restart** the safe output is activated again after an interruption of the AS-i communication.*

Diagnostics output option (from Safety Version 'SV4.3')

The state of the OSSD can additionally be reported via an unsafe AS-i output bit with the **Diagnostics output** option. This is primarily of interest for diagnostic purposes.

Information!
In the event of an error in the AS-i Safety Monitor, the state of the message output is undefined. The output circuit is switched off.

Configuration log

Example:

(Generation II and lower)

```
0129 INDEX:       50 = "Name"                                    9
0130 TYPE:       101 = stop category 0                           0
0131 ASSIGNED:   channel one                                     1
```

('Generation II V4.x' or higher)

```
0032 Index:        2 = "Name"                                    2
0033 Type:       101 = stop category 0                           3
0034 Assigned:   to OSSD 1                                       4
```

Stop category 1 - two relay outputs

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Output devices", on page 16.

Symbol
/ or
in the dependent OSSD

Functional device **Stop category 1 - two relay outputs**

Type	Designation in the configuration log
102	stop category 1 with two relay
Variants	
None	

Parameter Name: max. 29 ASCII characters plaintext
Switch-off delay: 0 ms … 300 s in multiples of 100 ms

Input mask

Description

Upon validation of the circuit, ON state, the output circuits (two relays each) of both OSSDs are simultaneously activated by the **stop category 1 - two relay outputs** output device. If the circuit is switched off, OFF state, the output circuit of the independent OSSD is switched off immediately without delay. The output circuit of the dependent OSSD is switched off with the set switch-off delay. The switch-off delay can be set to values between 0 s and 300 s in increments of 100 ms. The circuit can be switched back on only after both output circuits have been switched off.

Restart/Error unlock option for safe AS-i output (safe actuator)

If a safe output is specified as an **Actuator**, the devices for the **Error unlock** and the **Restart** of the actuator must be configured separately. After inserting the output device in the configuration, this is apparent from the 2 dummies for the restart and Error unlock devices.

For **Actuators** it is also possible to specify the AS-i circuit and the address of a safety AS-i output. If the respective release circuit is controlling a relay that is integrated in the safety monitor, it will be switched at the same time as the AS-i output.

Information!
In order to achieve better diagnostics of the safety AS-i outputs, the device "Remote output diagnostics" is available (see device <Remote output diagnostics>).

Under **Coupling slave** it is possible to specify the AS-i circuit and address of a safety input slave used to safety couple AS-i circuits.

Information!
These two options are only available for "Generation II V4.x" or higher.

Dummy

The safe AS-i output has monitoring functions which are independent of the safety monitor and can detect an error state independently of the monitor. To unlock this state, you need the **Error unlock** signal. This signal must be in a state change.

Assign the desired devices to the placeholders for **Restart** and **Error unlock** by **dragging** the devices from the icon library to the placeholders.

Information!
For an automatic restart, simply assign the **Restart** *dummy the TRUE system device.*

Information!
*If you do not wish to use **Error unlock,** you do not need to fill the placeholder. In case of error you can only unlock by using the AS-i Power OFF/ON.*

Once the dummies are assigned the appropriate devices, you can make further settings for the **Error unlock** and for **Restart** by reopening the input mask of the output device.

To do this, click the output device with the right mouse button, select the **Edit** command from the pop-up menu which opens and click the **AS-iS control** tab in the input mask.

Input mask

In the **Error unlock** and **Restart** areas in the Help signals part of the window, you can define in detail which signals result in an activation of the **Error unlock** and in **Restart** of the safe actuator.

The signal **Error unlock** is activated by the following events:

Signal	Description
"Once on OFF --> ON"	Signal change of the Error unlock device from "non-green" to "green"
"Once on ON --> OFF"	Signal change of the Error unlock device from "green" to "non-green"
"Once on change of state"	Signal change of the Error unlock device from "non-green" to "green" or of "green" to "non-green"

The signal **Restart** is activated by the following events:

Signal	Description
"Continuous while ON"	Signal in the Restart device "green"
"Continuous while OFF"	Signal in the Restart device "non-green"
"Continuous while ON and OFF"	Signal is sent permanently
"Once on OFF --> ON"	Signal change in the Restart device from "non-green" to "green"
"Once on ON --> OFF"	Signal change in the Restart device from "green" to "non-green"
"Once on change of state"	Signal change in the Restart device from "non-green" to "green" or from "green" to "non-green"

Define the events for activating the **Error unlock** and **Restart** and confirm your entry with OK in the respective selection menu.
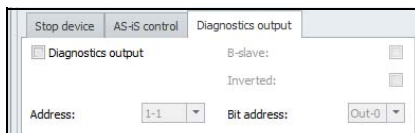
Information!
*With the **Error unlock** signal, the safe output is reset after an error. With the **Restart** the safe output is activated again after an interruption of the AS-i communication.*

Diagnostics output option (from Safety Version 'SV4.3')

The state of the OSSD can additionally be reported via an unsafe AS-i output bit with the **Diagnostics output** option. This is primarily of interest for diagnostic purposes.

Information!
The number of the dependent release circuit is always by one higher than the number of the independent release circuit.
The number of the release circuit can only be set in the independent release circuit.

Information!
In the event of an internal error in the AS-i Safety Monitor, all output circuits are switched off
immediately. For all other errors, e.g. communication interruption, the set switch-off delay is
retained.

Configuration log

Example:

(Generation II and lower)

```
0042 INDEX:       36 = "Name"                                              2
0043 TYPE:       102 = stop category 1 with two relay                      3
0044 ASSIGNED:   channel one                                               4
0045 DELAY TIME:  1,000 Sec                                                5
```

('Generation II V4.x' or higher)

```
0032 Index:        2 = "Name"                                             2
0033 Type:       102 = stop category 1 with two relays                    3
0034 Assigned:   to OSSD 1                                                 4
0035 Assigned:   to OSSD 2 (dependent OSSD)                                5
0036 Delay Time:  1,000 sec                                                6
```

Door lock by means of zero-speed relay and delay time

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Output devices", on page 16.

Symbol

in the dependent OSSD
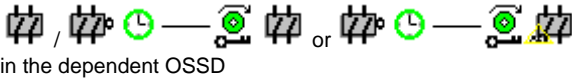
Functional device   **Door lock**

Type	Designation in the configuration log
103	door lock
Variants	
Zero-speed relay and delay time	SUBTYPE: input or time

Parameter

Name: max. 29 ASCII characters plaintext
Release time: 1s … 300s in multiples of 1s
Unlocking device: with / without
Slave type: single/A/B-Slave
Address: AS-i circuit and AS-i bus address (1 … 31)
Bit address: In-0 … In-3 or Out-0 … Out-3
inverted / not inverted

Input mask

Description

After the independent release circuit is **switched off**, the second output circuit is **switched on** if the zero-speed relays report that machine standstill has occurred. Zero-speed relays are to be assigned as devices to the second output circuit.

In order to also facilitate the release of the door lock during communication disturbances and other errors, the set release time is adhered to for inactive zero-speed relays. This release time is the time between the switching off of the first output circuit and the switching on of the second. The release time can be set between 1 s and 300 s in increments of 1 s.

Before the first output circuit is switched on, the second must be switched off. If the validation, ON state, is performed again before the second output circuit is switched on, the first output circuit is switched back on and the second remains switched off.

Information!
After the AS-i Safety Monitor is switched on, the second output circuit is inactive until the monitored movement has come to a standstill, however for no longer than the duration of the set release time.

Information!
The number of the dependent release circuit is always by one higher than the number of the independent release circuit.
The number of the release circuit can only be set in the independent release circuit.

Unlocking device function

After the first output circuit was switched off (for instance by an emergency shutdown), the second output circuit is switched on after the user defined release time has expired (or by means of zero-speed relays) and, thus, the doors are unlocked. This unlocking process is not always desirable. By activating the **Unlocking** device (check-box activated) a standard slave can be defined. The state (lock signal) of the standard slave defines if the lock state is maintained even after the expiration of the defined release time or not. Therefore, using the LOCK signal, the door lock can be arbitrarily switched on or off once the machine has been turned off.

Restart/Error unlock option for safe AS-i output (safe actuator)

If a safe output is specified as an **Actuator**, the devices for the **Error unlock** and the **Restart** of the actuator must be configured separately. After inserting the output device in the configuration, this is apparent from the 2 dummies for the restart and Error unlock devices.

For **Actuators** it is also possible to specify the AS-i circuit and the address of a safety AS-i output. If the respective release circuit is controlling a relay that is integrated in the safety monitor, it will be switched at the same time as the AS-i output.

Information!
In order to achieve better diagnostics of the safety AS-i outputs, the device "Remote output diagnostics" is available (see device <Remote output diagnostics>).

Under **Coupling slave** it is possible to specify the AS-i circuit and address of a safety input slave used to safety couple AS-i circuits.

○
Ⅱ
Information!
These two options are only available for "Generation II V4.x" or higher.

Dummy

The safe AS-i output has monitoring functions which are independent of the safety monitor and can detect an error state independently of the monitor. To unlock this state, you need the **Error unlock** signal. This signal must be in a state change.

Assign the desired devices to the placeholders for **Restart** and **Error unlock** by **dragging** the devices from the icon library to the placeholders.

○
Ⅱ
Information!
For an automatic restart, simply assign the **Restart** *dummy the TRUE system device.*

○
Ⅱ
Information!
If you do not wish to use **Error unlock,** *you do not need to fill the placeholder. In case of error you can only unlock by using the AS-i Power OFF/ON.*

Once the dummies are assigned the appropriate devices, you can make further settings for the **Error unlock** and for **Restart** by reopening the input mask of the output device.

To do this, click the output device with the right mouse button, select the **Edit** command from the pop-up menu which opens and click the **AS-iS control** tab in the input mask.

Input mask

In the **Error unlock** and **Restart** areas in the Help signals part of the window, you can define in detail which signals result in an activation of the **Error unlock** and in **Restart** of the safe actuator.

The signal **Error unlock** is activated by the following events:

Signal	Description
"Once on OFF --> ON"	Signal change of the Error unlock device from "non-green" to "green"
"Once on ON --> OFF"	Signal change of the Error unlock device from "green" to "non-green"
"Once on change of state"	Signal change of the Error unlock device from "non-green" to "green" or of "green" to "non-green"

The signal **Restart** is activated by the following events:

Signal	Description
"Continuous while ON"	Signal in the Restart device "green"
"Continuous while OFF"	Signal in the Restart device "non-green"
"Continuous while ON and OFF"	Signal is sent permanently
"Once on OFF --> ON"	Signal change in the Restart device from "non-green" to "green"
"Once on ON --> OFF"	Signal change in the Restart device from "green" to "non-green"
"Once on change of state"	Signal change in the Restart device from "non-green" to "green" or from "green" to "non-green"

Define the events for activating the **Error unlock** and **Restart** and confirm your entry with OK in the respective selection menu.

> **Information!**
> With the **Error unlock** signal, the safe output is reset after an error. With the **Restart** the safe output is activated again after an interruption of the AS-i communication.

Diagnostics output option (from Safety Version 'SV4.3')

The state of the OSSD can additionally be reported via an unsafe AS-i output bit with the **Diagnostics output** option. This is primarily of interest for diagnostic purposes.

Configuration log

Example: with unlocking device

(Generation II and lower)

```
0036 INDEX:        35 = "Name"                                    6
0037 TYPE:         103 = door lock                                7
0038 ASSIGNED:     channel one                                    8
0039 SUBTYPE:      input or time                                  9
0040 LOCK:         yes     ADDRESS:      10   BIT:  In-0 noninv   0
0041 DELAY TIME:   20.000 Sec                                     1
```

('Generation II V4.x' or higher)

```
0056 Index:         6 = "Name"                                    6
0057 Type:         103 = door lock                                7
0058 Assigned:     to OSSD 3                                      8
0059 Assigned:     to OSSD 4 (dependent OSSD)                     9
0060 Subtype:      input or time                                  0
0061 Unlock:       AS-i 1, slave 10, bit in-0 noninv              1
0062 Delay Time: 20,000 sec                                       2
```

Example: without unlocking device

(Generation II and lower)

```
0036 INDEX:        35 = "Name"                                    6
0037 TYPE:         103 = door lock                                7
0038 ASSIGNED:     channel one                                    8
0039 SUBTYPE:      input or time                                  9
0040 LOCK:         no                                             0
0041 DELAY TIME:   20.000 Sec                                     1
```

('Generation II V4.x' or higher)

```
0048 Index:         5 = "Name"                                    8
0049 Type:         103 = door lock                                9
0050 Assigned:     to OSSD 1                                      0
0051 Assigned:     to OSSD 2 (dependent OSSD)                     1
0052 Subtype:      input or time                                  2
0053 Unlock:       no                                             3
0054 Delay Time: 20,000 sec                                       4
```

Example: without unlocking device, safe AS-i output

(Generation II and lower)

```
0053 INDEX:           37 = "Name"                                            3
0054 TYPE:           103 = door lock                                         4
0055 ASSIGNED:     channel one                                              5
0056 SUBTYPE:      input or time                                            6
0057 LOCK:         no                                                       7
0058 DELAY TIME:   20.000 Sec                                               8
0059 SAFE ACTUATOR ADDRESS  27                                             9
0060 Help Signal   1 from Device  35 at switching ON                       0
0061 Help Signal   2 from Device   1 at switching ON                       1
```

('Generation II V4.x' or higher)

```
0064 Index             7 = "Name"                                           4
0065 Type            103 = door lock                                        5
0066 Assigned        to OSSD 5                                             6
0067 Assigned        to OSSD 6 (dependent OSSD)                            7
0068 Subtype         input or time                                         8
0069 Unlock          no                                                    9
0070 Delay Time      20,000 sec                                            0
...
0155 ------------------------------------------------------------------------ 5
0156 OSSD 5:                                                               6
0157 Coupling Slave: AS-i 2, slave 10                                      7
0158 Actuator Slave: AS-i 1, slave 27                                      8
0159     auxiliary signal 1 active during OFF->ON transitions on           9
0160                     device    1 = "Name"                              0
0161     auxiliary signal 2 active during OFF->ON transitions on           1
0162                     device   S-1 = true - static on                   2
0163 ------------------------------------------------------------------------ 3
```

Door lock by means of zero-speed relay and delay time with stop category 1

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Output devices", on page 16.

Symbol

in the dependent OSSD

Functional device   **Door lock**

Type	Designation in the configuration log
104	door lock and stop 1 with delayed relay
Variants	
Delay time	SUBTYPE: input or time

Parameter

Name: max. 29 ASCII characters plaintext
Release time: 1 s … 250 s in multiples of 1 s
Unlocking device: with / without
Slave type: single/A/B-Slave
Address: AS-i circuit and AS-i bus address (1 … 31)
Bit address: In-0 … In-3 or Out-0 … Out-3
inverted / not inverted

Input mask

Description

After the first output circuit is **switched off**, the second output circuit is **switched on** if the zero-speed relays report that machine standstill has occurred. Zero-speed relays are to be assigned as devices to the second output circuit.

In order to also facilitate the release of the door lock during communication disturbances and other errors, the set release time is adhered to for inactive zero-speed relays. This release time is the time between the switching off of the first output circuit and the switching on of the second. The release time can be set between 1 s and 250 s in increments of 1 s.

The first output circuit is switched off after the set relay delay time has elapsed; the corresponding message output is switched off immediately (stop category 1). The message output of the second output circuit is switched at the same time as the corresponding relay output.

Attention!
The message output is not safety-oriented. A safe maximum switch-off delay only exists for the output circuits.
In the event of an internal error in the AS-i Safety Monitor, the output circuits are switched off immediately. For all other errors, e.g. communication interruption, the set switch-off delay is retained.

Before the first output circuit is switched on, the second must be switched off. If the validation, ON state, is performed again before the second output circuit is switched on, the first output circuit is switched back on and the second remains switched off.

Information!
After the AS-i Safety Monitor is switched on, the second output circuit is inactive until the monitored movement has come to a standstill, however for no longer than the duration of the set release time.

Information!
The number of the dependent release circuit is always by one higher than the number of the independent release circuit.
The number of the release circuit can only be set in the independent release circuit.

Unlocking device function

After the first output circuit was switched off (for instance by an emergency shutdown), the second output circuit is switched on after the user defined release time has expired (or by means of zero-speed relays) and, thus, the doors are unlocked. This unlocking process is not always desirable. By activating the **Unlocking** device (check-box activated) a standard slave can be defined. The state (lock signal) of the standard slave defines if the lock state is maintained even after the expiration of the defined Release time or not. Therefore, using the LOCK signal, the door lock can be arbitrarily switched on or off once the machine has been turned off.

Restart/Error unlock option for safe AS-i output (safe actuator)

If a safe output is specified as an **Actuator**, the devices for the **Error unlock** and the **Restart** of the actuator must be configured separately. After inserting the output device in the configuration, this is apparent from the 2 dummies for the restart and Error unlock devices.

For **Actuators** it is also possible to specify the AS-i circuit and the address of a safety AS-i output. If the respective release circuit is controlling a relay that is integrated in the safety monitor, it will be switched at the same time as the AS-i output.

Information!
In order to achieve better diagnostics of the safety AS-i outputs, the device "Remote output diagnostics" is available (see device <Remote output diagnostics>).

Under **Coupling slave** it is possible to specify the AS-i circuit and address of a safety input slave used to safety couple AS-i circuits.

Information!
These two options are only available for "Generation II V4.x" or higher.

Dummy

The safe AS-i output has monitoring functions which are independent of the safety monitor and can detect an error state independently of the monitor. To unlock this state, you need the **Error unlock** signal. This signal must be in a state change.

Assign the desired devices to the placeholders for **Restart** and **Error unlock** by **dragging** the devices from the icon library to the placeholders.

Information!
*For an automatic restart, simply assign the **Restart** dummy the TRUE system device.*

Information!
*If you do not wish to use **Error unlock,** you do not need to fill the placeholder. In case of error you can only unlock by using the AS-i Power OFF/ON.*

Once the dummies are assigned the appropriate devices, you can make further settings for the **Error unlock** and for **Restart** by reopening the input mask of the output device.

To do this, click the output device with the right mouse button, select the **Edit** command from the pop-up menu which opens and click the **AS-iS control** tab in the input mask.

Input mask

In the **Error unlock** and **Restart** areas in the Help signals part of the window, you can define in detail which signals result in an activation of the **Error unlock** and in **Restart** of the safe actuator.

The signal **Error unlock** is activated by the following events:

Signal	Description
"Once on OFF --> ON"	Signal change of the Error unlock device from "non-green" to "green"
"Once on ON --> OFF"	Signal change of the Error unlock device from "green" to "non-green"
"Once on change of state"	Signal change of the Error unlock device from "non-green" to "green" or of "green" to "non-green"

The signal **Restart** is activated by the following events:

Signal	Description
"Continuous while ON"	Signal in the Restart device "green"
"Continuous while OFF"	Signal in the Restart device "non-green"
"Continuous while ON and OFF"	Signal is sent permanently
"Once on OFF --> ON"	Signal change in the Restart device from "non-green" to "green"
"Once on ON --> OFF"	Signal change in the Restart device from "green" to "non-green"
"Once on change of state"	Signal change in the Restart device from "non-green" to "green" or from "green" to "non-green"

Define the events for activating the **Error unlock** and **Restart** and confirm your entry with OK in the respective selection menu.

Information!
*With the **Error unlock** signal, the safe output is reset after an error. With the **Restart** the safe output is activated again after an interruption of the AS-i communication.*

Diagnostics output option (from Safety Version 'SV4.3')

The state of the OSSD can additionally be reported via an unsafe AS-i output bit with the **Diagnostics output** option. This is primarily of interest for diagnostic purposes.

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Configuration log

Example: with unlocking device

(Generation II and lower)

```
0053 INDEX:       37 = "Name"                                        3
0054 TYPE:        104 = door lock and stop 1 with delayed relay      4
0055 ASSIGNED:    channel one                                        5
0056 SUBTYPE:     input or time                                      6
0057 STOP1 DELAY:     2.000 Sec                                      7
0058 UNLOCK DLY :    20.000 Sec                                      8
0059 LOCK:        yes       ADDRESS:    10   BIT: In-0 noninv         9
```

('Generation II V4.x' or higher)

```
0057 Index:           6 = "Name"                                     7
0058 Type:        104 = door lock and stop 1 with delayed relay      8
0059 Assigned:    to OSSD 3                                          9
0060 Assigned:    to OSSD 4 (dependent OSSD)                         0
0061 Subtype:     input or time                                      1
0062 Stop1 Delay: 2.000 sec                                          2
0063 Unlock Dly:  20.000 sec                                         3
0064 Unlock:      AS-i 1, slave 10, bit in-0 noninv                  4
```

Example: without unlocking device

(Generation II and lower)

```
0053 INDEX:       37 = "Name"                                        3
0054 TYPE:        104 = door lock and stop 1 with delayed relay      4
0055 ASSIGNED:    channel one                                        5
0056 SUBTYPE:     input or time                                      6
0057 STOP1 DELAY:     2.000 Sec                                      7
0058 UNLOCK DLY :    20.000 Sec                                      8
0059 LOCK:        no                                                 9
```

('Generation II V4.x' or higher)

```
0048 Index:           5 = "door lock with stop 1"                    8
0049 Type:        104 = door lock and stop 1 with delayed relay      9
0050 Assigned:    to OSSD 1                                          0
0051 Assigned:    to OSSD 2 (dependent OSSD)                         1
0052 Subtype:     input or time                                      2
0053 Stop1 Delay: 2,000 sec                                          3
0054 Unlock Dly:  20,000 sec                                         4
0055 Unlock:      no                                                 5
```

Example: without unlocking device, safe AS-i output

(Generation II and lower)

```
0053 INDEX:        37 = "Name"                                          3
0054 TYPE:        104 = door lock and stop 1 with delayed relay         4
0055 ASSIGNED:    channel one                                           5
0056 SUBTYPE:     input or time                                         6
0057 STOP1 DELAY:      2.000 Sec                                        7
0058 UNLOCK DLY :     20.000 Sec                                        8
0059 LOCK:        no                                                    9
0060 SAFE ACTUATOR ADDRESS  27                                          0
0061 Help Signal   1 from Device   35 at switching ON                   1
0062 Help Signal   2 from Device    1 at switching ON                   0
```

('Generation II V4.x' or higher)

```
0066 Index:         7 = "door lock with stop 3"                         6
0067 Type:        104 = door lock and stop 1 with delayed relay         7
0068 Assigned:    to OSSD 5                                             8
0069 Assigned:    to OSSD 6 (dependent OSSD)                           9
0070 Subtype:     input or time                                         0
0071 Stop1 Delay: 2,000 sec                                            1
0072 Unlock Dly:  20,000 sec                                           2
0073 Unlock:      no                                                    3
...
0158 ------------------------------------------------------------------ 8
0159 OSSD 5:                                                            9
0160 Coupling Slave: AS-i 2, slave 10                                   0
0161 Actuator Slave: AS-i 1, slave 27                                   1
0162     auxiliary signal 1 active during OFF->ON transitions on        2
0163                    device     1 = "Emergency shutdown#1"           3
0164     auxiliary signal 2 active during OFF->ON transitions on        4
0165                    device     S-1 = true - static on               5
0166 ------------------------------------------------------------------ 6
```

Door lock by means of delay time

Information!
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "Output devices", on page 16.

Symbol
in the dependent OSSD

Functional device   **Door lock**

Type	Designation in the configuration log
103	door lock
Variants	
Delay time	SUBTYPE: time

Parameter

Name:	max. 29 ASCII characters plaintext
Release time:	1 s … 300 s in multiples of 1 s
Unlocking device:	with / without
Slave type:	single/A/B-Slave
Address:	AS-i circuit and AS-i bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted

Input mask

Description

After the first output circuit is **switched off**, the second output circuit is **switched on** after the set delay time has elapsed. The delay time can be set between 1 s and 300 s in increments of 1 s. The second output circuit needs to be switched off before the first one can be switched on.

If the validation, ON state, is performed again before the second output circuit is switched on, the first output circuit is switched back on and the second remains switched off.

○
工 *Information!*
After the AS-i Safety Monitor is switched on, the second output circuit is inactive for at least the duration of the set release time.

○
工 *Information!*
The number of the dependent release circuit is always by one higher than the number of the independent release circuit.
The number of the release circuit can only be set in the independent release circuit.

Unlocking device function

After the first output circuit was switched off (for instance by an emergency shutdown), the second output circuit is switched on after the user defined release time has expired and, thus, the doors are unlocked. This unlocking process is not always desirable. By enabling **Unlocking** device (check box activated), a standard slave can be specified. The state (LOCK signal) of this standard slave determines whether or not the locking is to be retained even after the delay time has passed. Therefore, using the LOCK signal, the door lock can be arbitrarily switched on or off once the machine has been turned off.

Restart/Error unlock option for safe AS-i output (safe actuator)

If a safe output is specified as an **Actuator**, the devices for the **Error unlock** and the **Restart** of the actuator must be configured separately. After inserting the output device in the configuration, this is apparent from the 2 dummies for the restart and Error unlock devices.

For **Actuators** it is also possible to specify the AS-i circuit and the address of a safety AS-i output. If the respective release circuit is controlling a relay that is integrated in the safety monitor, it will be switched at the same time as the AS-i output.

○
工 *Information!*
In order to achieve better diagnostics of the safety AS-i outputs, the device "Remote output diagnostics" is available (see device <Remote output diagnostics>).

Under **Coupling slave** it is possible to specify the AS-i circuit and address of a safety input slave used to safety couple AS-i circuits.

○
工 *Information!*
These two options are only available for "Generation II V4.x" or higher.

Dummy

The safe AS-i output has monitoring functions which are independent of the safety monitor and can detect an error state independently of the monitor. To unlock this state, you need the **Error unlock** signal. This signal must be in a state change.

Assign the desired devices to the placeholders for **Restart** and **Error unlock** by **dragging** the devices from the icon library to the placeholders.

Information!
For an automatic restart, simply assign the **Restart** *dummy the TRUE system device.*

Information!
If you do not wish to use **Error unlock,** *you do not need to fill the placeholder. In case of error you can only unlock by using the AS-i Power OFF/ON.*

Once the dummies are assigned the appropriate devices, you can make further settings for the **Error unlock** and for **Restart** by reopening the input mask of the output device.

To do this, click the output device with the right mouse button, select the **Edit** command from the pop-up menu which opens and click the **AS-iS control** tab in the input mask.

Input mask

In the **Error unlock** and **Restart** areas in the Help signals part of the window, you can define in detail which signals result in an activation of the **Error unlock** and in **Restart** of the safe actuator.

The signal **Error unlock** is activated by the following events:

Signal	Description
"Once on OFF --> ON"	Signal change of the Error unlock device from "non-green" to "green"
"Once on ON --> OFF"	Signal change of the Error unlock device from "green" to "non-green"
"Once on change of state"	Signal change of the Error unlock device from "non-green" to "green" or of "green" to "non-green"

The signal **Restart** is activated by the following events:

Signal	Description
"Continuous while ON"	Signal in the Restart device "green"
"Continuous while OFF"	Signal in the Restart device "non-green"
"Continuous while ON and OFF"	Signal is sent permanently
"Once on OFF --> ON"	Signal change in the Restart device from "non-green" to "green"
"Once on ON --> OFF"	Signal change in the Restart device from "green" to "non-green"
"Once on change of state"	Signal change in the Restart device from "non-green" to "green" or from "green" to "non-green"

Define the events for activating the **Error unlock** and **Restart** and confirm your entry with OK in the respective selection menu.

Information!
*With the **Error unlock** signal, the safe output is reset after an error. With the **Restart** the safe output is activated again after an interruption of the AS-i communication.*

Diagnostics output option (from Safety Version 'SV4.3')

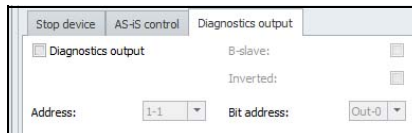The state of the OSSD can additionally be reported via an unsafe AS-i output bit with the **Diagnostics output** option. This is primarily of interest for diagnostic purposes.

Configuration log

Example: with unlocking device

(Generation II and lower)

```
0036 INDEX:       35 = "Name"                                    6
0037 TYPE:        103 = door lock                                7
0038 ASSIGNED:    channel one                                    8
0039 SUBTYPE:     time                                           9
0040 LOCK:        yes      ADDRESS:    10   BIT:  In-0 noninv     0
0041 DELAY TIME:    20.000 Sec                                   1
```

('Generation II V4.x' or higher)

```
0048 Index:        5 = "Name"                                    8
0049 Type:        103 = door lock                                9
0050 Assigned:    to OSSD 3                                      0
0051 Assigned:    to OSSD 4 (dependent OSSD)                     1
0052 Subtype:     time                                           2
0053 Unlock:      AS-i 1, slave 10, bit in-0 noninv              3
0054 Delay Time: 20,000 sec                                      4
```

Example: without unlocking device

(Generation II and lower)

```
0036 INDEX:       35 = "Name"                                    6
0037 TYPE:        103 = door lock                                7
0038 ASSIGNED:    channel one                                    8
0039 SUBTYPE:     time                                           9
0040 LOCK:        no                                             0
0041 DELAY TIME:    20.000 Sec                                   1
```

('Generation II V4.x' or higher)

```
0040 Index:        4 = "Name"                                    0
0041 Type:        103 = door lock                                1
0042 Assigned:    to OSSD 1                                      2
0043 Assigned:    to OSSD 2 (dependent OSSD)                     3
0044 Subtype:     time                                           4
0045 Unlock:      no                                             5
0046 Delay Time: 20,000 sec                                      6
```

Example: without unlocking device, safe AS-i output

(Generation II and lower)

```
0053 INDEX:        37 = "Name"                                          3
0054 TYPE:        103 = door lock                                       4
0055 ASSIGNED:   channel one                                            5
0056 SUBTYPE:    time                                                   6
0057 LOCK:       no                                                     7
0058 DELAY TIME:    20.000 Sec                                          8
0059 SAFE ACTUATOR ADDRESS  27                                          9
0060 Help Signal  1 from Device  35 at switching ON                    0
0061 Help Signal  2 from Device   1 at switching ON                    1
```

('Generation II V4.x' or higher)

```
0056 Index:        6 = "Name"                                          6
0057 Type:       103 = door lock                                       7
0058 Assigned:   to OSSD 5                                             8
0059 Assigned:   to OSSD 6 (dependent OSSD)                            9
0060 Subtype:    time                                                  0
0061 Unlock:     no                                                    1
0062 Delay Time: 20,000 sec                                            2
...
0158 ----------------------------------------------------------------- 8
0159 OSSD 5:                                                           9
0160 Coupling Slave: AS-i 2, slave 10                                  0
0161 Actuator Slave: AS-i 1, slave 27                                  1
0162     auxiliary signal 1 active during OFF->ON transitions on       2
0163                     device    1 = "Name"                          3
0164     auxiliary signal 2 active during OFF->ON transitions on       4
0165                     device   S-1 = true - static on               5
0166 ----------------------------------------------------------------- 6
```

Door lock by means of delay time with stop category 1

Symbol

in the dependent OSSD

Functional device   **Door lock**

Type	Designation in the configuration log
104	door lock and stop 1 with delayed relay
Variants	
Delay time	SUBTYPE: time

Parameter

Name:	max. 29 ASCII characters plaintext
Release time:	1s … 250s in multiples of 1s
Unlocking device:	with / without
Slave type:	single/A/B-Slave
Address:	AS-i circuit and AS-i bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3
	inverted / not inverted
Relay delay:	0ms … 300s in multiples of 100ms

Input mask

Description

After the first output circuit is **switched off**, the second output circuit is **switched on** after the set delay time has elapsed. The delay time can be set between 1 s and 250 s in increments of 1 s. The second output circuit needs to be switched off before the first one can be switched on.

The first output circuit is switched off after the set relay delay time has elapsed; the corresponding message output is switched off immediately (stop category 1). The message output of the second output circuit is switched at the same time as the corresponding relay output.

⚠ *Attention!*
The message output is not safety-oriented. A safe maximum switch-off delay only exists for the output circuits.
In the event of an internal error in the AS-i Safety Monitor, the output circuits are switched off immediately. For all other errors, e.g. communication interruption, the set switch-off delay is retained.

If the validation, ON state, is performed again before the second output circuit is switched on, the first output circuit is switched back on and the second remains switched off.

ⓘ *Information!*
After the AS-i Safety Monitor is switched on, the second output circuit is inactive for at least the duration of the set release time.

ⓘ *Information!*
The number of the dependent release circuit is always by one higher than the number of the independent release circuit.
The number of the release circuit can only be set in the independent release circuit.

Unlocking device function

After the first output circuit was switched off (for instance by an emergency shutdown), the second output circuit is switched on after the user defined release time has expired and, thus, the doors are unlocked. This unlocking process is not always desirable. By enabling **Unlocking** device (check box activated), a standard slave can be specified. The state (LOCK signal) of this standard slave determines whether or not the locking is to be retained even after the delay time has passed. Therefore, using the LOCK signal, the door lock can be arbitrarily switched on or off once the machine has been turned off.

Restart/Error unlock option for safe AS-i output (safe actuator)

If a safe output is specified as an **Actuator**, the devices for the **Error unlock** and the **Restart** of the actuator must be configured separately. After inserting the output device in the configuration, this is apparent from the 2 dummies for the restart and Error unlock devices.

For **Actuators** it is also possible to specify the AS-i circuit and the address of a safety AS-i output. If the respective release circuit is controlling a relay that is integrated in the safety monitor, it will be switched at the same time as the AS-i output.

> **Information!**
> *In order to achieve better diagnostics of the safety AS-i outputs, the device "Remote output diagnostics" is available (see device <*Remote output diagnostics*>).*

Under **Coupling slave** it is possible to specify the AS-i circuit and address of a safety input slave used to safety couple AS-i circuits.

> **Information!**
> *These two options are only available for "Generation II V4.x" or higher.*

Dummy

The safe AS-i output has monitoring functions which are independent of the safety monitor and can detect an error state independently of the monitor. To unlock this state, you need the **Error unlock** signal. This signal must be in a state change.

Assign the desired devices to the placeholders for **Restart** and **Error unlock** by **dragging** the devices from the icon library to the placeholders.

> **Information!**
> *For an automatic restart, simply assign the* **Restart** *dummy the TRUE system device.*

> **Information!**
> *If you do not wish to use* **Error unlock,** *you do not need to fill the placeholder. In case of error you can only unlock by using the AS-i Power OFF/ON.*

Once the dummies are assigned the appropriate devices, you can make further settings for the **Error unlock** and for **Restart** by reopening the input mask of the output device.

To do this, click the output device with the right mouse button, select the **Edit** command from the pop-up menu which opens and click the **AS-iS control** tab in the input mask.

Input mask

In the **Error unlock** and **Restart** areas in the Help signals part of the window, you can define in detail which signals result in an activation of the **Error unlock** and in **Restart** of the safe actuator.

The signal **Error unlock** is activated by the following events:

Signal	Description
"Once on OFF --> ON"	Signal change of the Error unlock device from "non-green" to "green"
"Once on ON --> OFF"	Signal change of the Error unlock device from "green" to "non-green"
"Once on change of state"	Signal change of the Error unlock device from "non-green" to "green" or of "green" to "non-green"

The signal **Restart** is activated by the following events:

Signal	Description
"Continuous while ON"	Signal in the Restart device "green"
"Continuous while OFF"	Signal in the Restart device "non-green"
"Continuous while ON and OFF"	Signal is sent permanently
"Once on OFF --> ON"	Signal change in the Restart device from "non-green" to "green"
"Once on ON --> OFF"	Signal change in the Restart device from "green" to "non-green"
"Once on change of state"	Signal change in the Restart device from "non-green" to "green" or from "green" to "non-green"

Define the events for activating the **Error unlock** and **Restart** and confirm your entry with OK in the respective selection menu.

Information!
*With the **Error unlock** signal, the safe output is reset after an error. With the **Restart** the safe output is activated again after an interruption of the AS-i communication.*

Diagnostics output option (from Safety Version 'SV4.3')

The state of the OSSD can additionally be reported via an unsafe AS-i output bit with the **Diagnostics output** option. This is primarily of interest for diagnostic purposes.

Configuration log

Example: with unlocking device

(Generation II and lower)

```
0043 INDEX:       36 = "Name"                                          3
0044 TYPE:        104 = door lock and stop 1 with delayed relay        4
0045 ASSIGNED:    channel one                                          5
0046 SUBTYPE:     time                                                 6
0047 STOP1 DELAY:    10.000 Sec                                        7
0048 UNLOCK DLY :    20.000 Sec                                        8
0049 LOCK:        yes     ADDRESS:    20   BIT: In-0 noninv            9
```

('Generation II V4.x' or higher)

```
0049 Index:        5 = "Name"                                          9
0050 Type:        104 = door lock and stop 1 with delayed relay        0
0051 Assigned:    to OSSD 3                                            1
0052 Assigned:    to OSSD 4 (dependent OSSD)                          2
0053 Subtype:     time                                                 3
0054 Stop1 Delay: 10,000 sec                                          4
0055 Unlock Dly:  20,000 sec                                          5
0056 Unlock:      AS-i 1, slave 20, bit in-0 noninv                   6
```

Example: without unlocking device

(Generation II and lower)

```
0043 INDEX:       36 = "Name"                                          3
0044 TYPE:        104 = door lock and stop 1 with delayed relay        4
0045 ASSIGNED:    channel one                                          5
0046 SUBTYPE:     time                                                 6
0047 STOP1 DELAY:    10.000 Sec                                        7
0048 UNLOCK DLY :    20.000 Sec                                        8
0049 LOCK:        no                                                   9
```

('Generation II V4.x' or higher)

```
0040 Index:        4 = "Name"                                          0
0041 Type:        104 = door lock and stop 1 with delayed relay        1
0042 Assigned:    to OSSD 1                                            2
0043 Assigned:    to OSSD 2 (dependent OSSD)                          3
0044 Subtype:     time                                                 4
0045 Stop1 Delay: 10,000 sec                                          5
0046 Unlock Dly:  20,000 sec                                          6
0047 Unlock:      no                                                   7
```

Example: without unlocking device, safe AS-i output

(Generation II and lower)

```
0053 INDEX:        37 = "Name"                                              3
0054 TYPE:        104 = door lock and stop 1 with delayed relay             4
0055 ASSIGNED:   channel one                                                5
0056 SUBTYPE:    time                                                       6
0057 STOP1 DELAY:     10.000 Sec                                            7
0058 UNLOCK DLY :     20.000 Sec                                            8
0059 LOCK:        no                                                        9
0060 SAFE ACTUATOR ADDRESS  27                                              0
0061 Help Signal  1 from Device  35 at switching ON                        1
0062 Help Signal  2 from Device   1 at switching ON                        0
```

('Generation II V4.x' or higher)

```
0058 Index:         6 = "Name"                                             8
0059 Type:        104 = door lock and stop 1 with delayed relay            9
0060 Assigned:   to OSSD 5                                                  0
0061 Assigned:   to OSSD 6 (dependent OSSD)                                 1
0062 Subtype:    time                                                      2
0063 Stop1 Delay: 10,000 sec                                               3
0064 Unlock Dly:  20,000 sec                                               4
0065 Unlock:     no                                                        5
...
0158 ------------------------------------------------------------------- 8
0159 OSSD 5:                                                               9
0160 Coupling Slave: AS-i 2, slave 10                                      0
0161 Actuator Slave: AS-i 1, slave 27                                      1
0162     auxiliary signal 1 active during OFF->ON transitions on           2
0163                     device    1 = "Name"                              3
0164     auxiliary signal 2 active during OFF->ON transitions on           4
0165                     device   S-1 = true - static on                   5
0166 ------------------------------------------------------------------- 6
```

Input F-CPU

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "Output devices", on page 16.

Information!
Beginning with PROFIsafe 'SV4.3', this device is no longer available. Instead, the PROFIsafe output bits must be linked in the output assignment (see chapter 6.4).

Symbol

Functional device   Input F-CPU

Type	Designation in the configuration log
110	PROFIsafe output device
Variants	
None	

 Parameter   Name: max. 29 ASCII characters plaintext

Input mask

Description

The output device **input F-CPU** sets data only sent via the PROFIsafe. The first 4 release circuits additionally act on the corresponding relay. The OSSD number has no further significance for all other OSSDs.

8-bytes of safe data are available (per direction) for the PROFIsafe. The desired bit can be selected in the drop-down menu of the input mask.

The first bit of the data area is reserved and shows the state when no yellow, no red flashing devices are available.
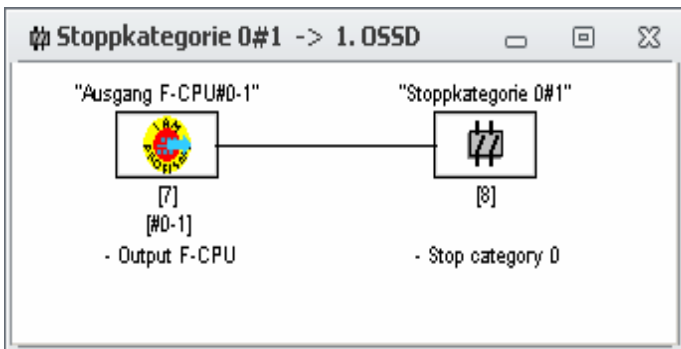
Information!
In the event of an error in the AS-i Safety Monitor, the state of the message output is undefined. The output circuit is switched off.

Coupling example:

• AS-i Safety Emergency Shutdown at **input F-CPU**

Configuration log

Example:

(PROFIsafe Gateway)

```
0060 ----------------------------------------------------------------------- 0
0061 Index:        7 = "Input F-CPU"                                          1
0062 Type:       110 = PROFIsafe output device                               2
0063 F-Input:    byte 0, bit 1                                               3
0064 Assigned:   to OSSD 1                                                   4
0065 ----------------------------------------------------------------------- 5
```

4.3.6 System devices

⊙
🛉 *Information!*
Availability of the individual devices depends on the device type and the safety version.
Further information can be found in tab. "System devices", on page 17.

System devices are internal variables which the user can use to access intermediate results. During the calculation timespan (cycle time of the bus system), their values are constant. They are edited before the configured device is calculated, i.e. they contain the values from the previous calculation.

⊙
🛉 *Information!*
Within a configuration, system devices can only be used as auxiliary variables for the logical
linking of states in the logic devices.

System devices for setup Basic or Enhanced/Generation II.

System device	Symbol	Index	Description
TRUE	ON	1 = static on	Always ON state
FALSE	OFF	17 = static off	Always OFF state
State of output switching element 1		2 = main output one	State of the output switching element of OSSD 1
Negated state of output switching element 1	-1⊳	18 = not main output one	Negated state of output switching element of OSSD 1
State of output switching element 2		3 = main output two	State of the output switching element of OSSD 2
Negated state of output switching element 2	-1⊳	19 = not main output two	Negated state of output switching element of OSSD 2
State of message output 1		4 = notify output one	State of the message output of OSSD 1
Negated state of message output 1	-1⊳	20 = not notify output one	Negated state of the message output of OSSD 1
State of message output 2		5 = notify output two	State of the message output of OSSD 2
Negated state of message output 2	-1⊳	21 = not notify output two	Negated state of the message output of OSSD 2

System device	Symbol	Index	Description
State of OSSD 1		6 = devices started one	Result of the OR link of all start devices of OSSD 1
Negated state of OSSD 1		22 = not devices started one	Negated result of the OR link of all start devices of OSSD 1
State of OSSD 2		7 = devices started two	Result of the OR link of all start devices of OSSD 2
Negated state of OSSD 2		23 = not devices started two	Negated result of the OR link of all start devices of OSSD 2
State of devices before start 1		8 = dev before start one	Result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 1
Negated state of devices before start 1		24 = not dev before start one	Negated result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 1
State of devices before start 2		9 = dev before start two	Result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 2
Negated state of devices before start 2		25 = not dev before start two	Negated result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 2

System devices for setup equal to "Generation II V4.x"

System device	Symbol	Index	Description
TRUE	ON	S-1 = true - static on	Always ON state
FALSE	OFF	S-129 =false - static off	Always OFF state
State of output switching element OSSD 1 … 16		S-16 … S-31 = main output OSSD 1 … 16	State of output switching element OSSD 1 … 16
Negated state of output switching element OSSD 1 … 16		S-144 … S-159 = not main output OSSD 1 … 16	Negated state of output switching element OSSD 1 … 16
State of message outputs OSSD 1 … 16		S-32 … S-47 = notify output OSSD 1 … 16	State of message outputs OSSD 1 … 16
Negated state of message outputs OSSD 1 … 16		S-160 … S-175 = not notify output OSSD 1 … 16	Negated state of message outputs OSSD 1 … 16
State of OSSD 1 … 16		S-48 … S-63 = device started OSSD 1 … 16	State of OSSD 1 … 16
Negated state of OSSD 1 … 16		S-176 … S-191 = not device started OSSD 1 … 16	Negated result of the OR link of all start devices of OSSD 1 … 16
State of devices before start of OSSD 1 … 16		S-64 … S-79 = Device before start OSSD 1 … 16	Result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 1 … 16
Negated state of devices before start of OSSD 1 … 16		S-192 … S-207 = not device before start of OSSD 1…16	Negated result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 1 … 16

The number of the OSSD (if present) and the inversion can be selected via the device dialog. After a new system device has been inserted, the OSSD 1 is still selected and not the inversion.
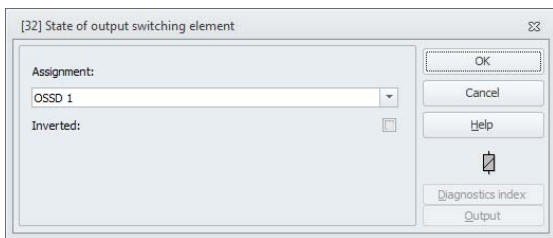
System devices for setup PROFIsafe Gateway *(Safety Version < 'SV4.3')*

Only the devices **True** and **False** are available in this type of configuration.

System device	Symbol	Index	Description
TRUE	ON	S-1 = true - static on	Always ON state
FALSE	OFF	S-129 = false - static off	Always OFF state

System devices Safety Version 'SV4.4'

System device	Symbol	Index	Description
TRUE	ON	S-1 = true - static on	Always ON state
FALSE	OFF	S-65 = false - static off	Always OFF state
AS-i config error		S-4 = system device config error	Configuration error of the internal master
AS-i periphery error		S-5 = system device periphery error	Periphery error in the AS-i network[*1]
State of output switching element OSSD 1 … 8		S-64 … S-95 = main output OSSD 1 … 8	State of output switching element OSSD 1 … 8
Negated state of output switching element OSSD 1 … 8		S-576 … S-607 = not main output OSSD 1 … 8	Negated state of output switching element OSSD 1 … 8
State of message outputs OSSD 1 … 8		S-128… S-159 = notify output OSSD 1 … 8	State of message outputs OSSD 1 … 8
Negated state of message outputs OSSD 1 … 8		S-640 … S-671 = not notify output OSSD 1 … 8	Negated state of message outputs OSSD 1 … 8
State of OSSD 1 … 8		S-192 … S-223 = device started OSSD 1 … 8	State of OSSD 1 … 8
Negated state of OSSD 1 … 8		S-704 … S-735 = not device started OSSD 1 … 8	Negated result of the OR link of all start devices of OSSD 1 … 8
State of devices before start of OSSD 1 … 8		S-256 … S-287 = Device before start OSSD 1 … 16	Result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 1 … 8

System device	Symbol	Index	Description
Negated state of devices before start of OSSD 1 … 8		S-768 … S-799 = not device before start OSSD 1 … 8	Negated result of the AND link of the states of all monitoring, logic and EDM circuit devices of OSSD 1 … 8
Colors of all devices[2]		S16 … S21	Device switches ON if at least one device takes on the selected color
		S528 … S533	Device switches OFF if at least one device takes on the selected color

*1 Internal master must be activated.

*2 Available only from Safety Version 'SV4.3' on.

The number of the OSSD (if present) and the inversion can be selected via the device dialog. After a new system device has been inserted, the OSSD 1 is still selected and not the inversion. If the used OSSD is already present in the configuration, the name of the output device is also specified.

Colors of all devices

Information!
Availability of the individual devices depends on the device type and the safety version. Further information can be found in tab. "System devices", on page 17.

Description

With this system device, it is possible to monitor and output the color of all devices (see chapter 6.4 "Output assignment"). The device becomes active (ON) if at least one device takes on the selected color (yellow flashing, red flashing, gray/yellow, green/yellow, green flashing).
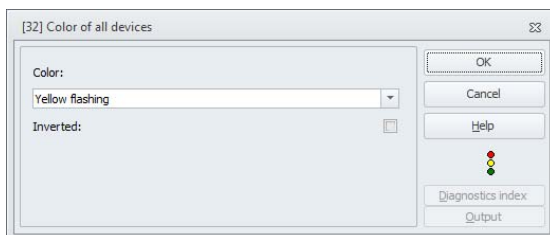
Information!
Additional information on color diagnostics can be found in the color tables in paragraphs "Remote output diagnostics" on page 151 and "Diagnostics configuration loaded" on page 365.

4.3.7   User devices

By defining user devices, you can simplify the multiple use of logical devices within a configuration.

A logical unit consisting of any combination of monitoring devices, logic devices, EDM circuit devices and system devices can be defined as a user device. To do this, all components of a user device must be logically linked to one another, i.e. a user device has exactly one logical output value.

Once defined, user devices are available in the icon library behind the system devices with a select-able symbol (icon); they can be used multiple times in configuration/OSSD windows.
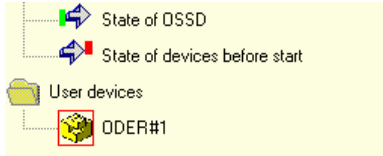
Fig.: User devices in the icon library

Defining user devices

A user device is defined by selecting the device which supplies the logical result of a logical unit of devices, clicking this device with the right mouse button and then selecting the **Create user device** command from the pop-up window which opens.
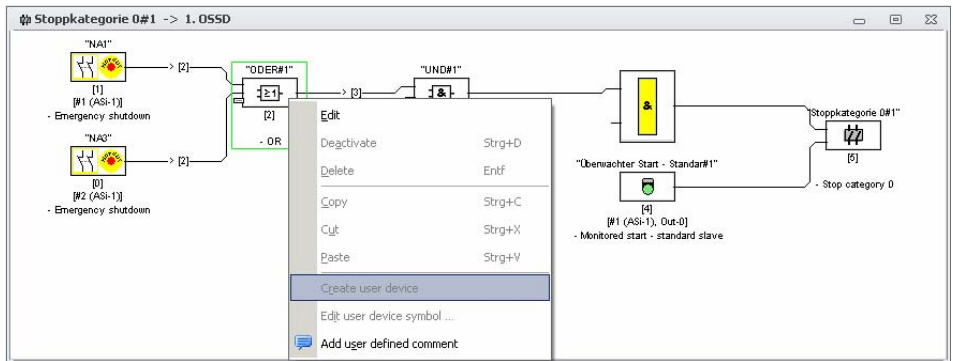
Fig.: Example: Creating a user device

The user device is then displayed in a separate window with its components and in the configuration windows as a single device and is added to the icon library by name.

User device in the configuration window

Window for the user device with its logical components

User device in the icon library
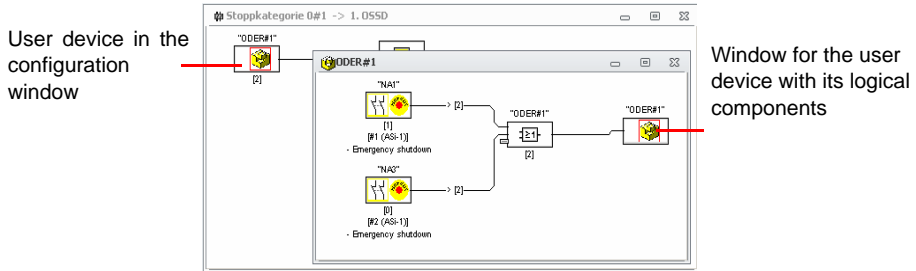
Fig.: Example: Created user device

Edit user device symbol

Click a user device with the right mouse button and select the **Edit user device symbol …** command to assign the device a different device icon. Select the desired new symbol for the device from the window which opens and confirm with OK.
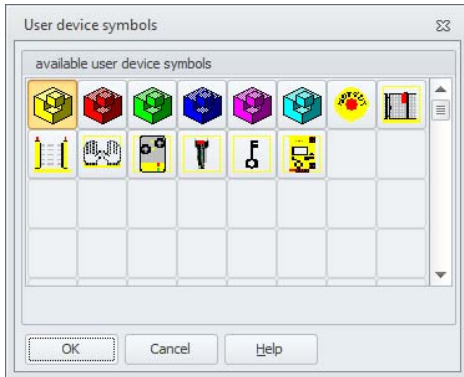
Fig.: Changing the symbol of the user device

The new symbol is now displayed in the configuration windows and in the icon library.

Edit device type

Click a safe monitoring device with the right mouse button and select the **Edit device type icon …** command to assign the device a different device icon. Select the desired new symbol for the device from the window which opens and confirm with OK.
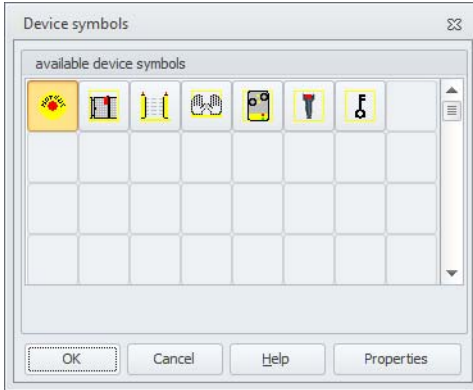
Fig.: Edit device type symbol

The type of the device can be changed pressing the push button **Properties**, because only the symbols that are available for the current type, are displayed.

Change of address type

If an AS-i standard address is used by several devices, the slave type in the device dialog can no longer be changed between single and A.

	Device parameters ...	
	Deactivate	Strg+D
🗑	Delete	Entf
📋	Copy	Strg+C
✂	Cut	Strg+X
📋	Paste	Strg+V
	Create user device	
	Edit user device symbol ...	
	Change address 11 to type single	
	Add user comment	
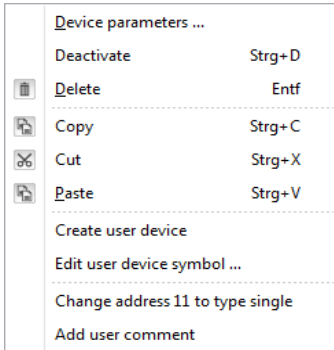
If this change is necessary, however, item **Change address X to type A** or **Change address X to type single** can be called up from the device context menu. (This menu item is only displayed when a standard address is configured in the device).

This changes the address type of all devices with the displayed standard address. However, the menu item only exists and is active if the change is possible.

4.3.8 Activating and deactivating devices

Changing the state of the devices

○
∐ **Information!**
This functionality is only available in AS-i Safety Monitors starting with version 2.0.

AS-i Safety Monitors starting with version 2.0 offer the possibility to activate and deactivate devices. As a result, it is possible to configure all conceivable options in the safety-relevant design of a machine. Through targeted deactivation of devices, the configuration can be adapted to the actual situation.

Deactivating devices

⚠ **Attention!**
Observe all safety regulations when you deactivate a device. This must only be performed by an authorized safety technician.

When you select a device with the mouse and click the right mouse button, the following pop-up menu opens:

	Device parameters ...	
	Deactivate	Strg+D
🗑	Delete	Entf
📋	Copy	Strg+C
✂	Cut	Strg+X
📋	Paste	Strg+V
	Create user device	
	Edit user device symbol ...	
	Change address 11 to type single	
	Add user comment	
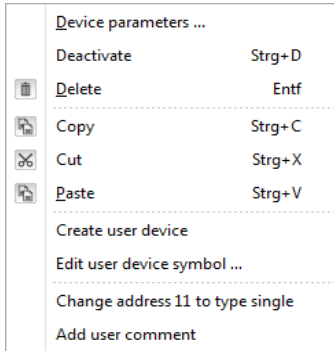
Select "**Deactivate**". This opens a window where the value that will be used to replace the deactivated device in the configuration is set. Select **TRUE** for devices that are within an AND, even on the highest configuration level, and **FALSE** for devices that are within an OR.

[32] Emergency shutdown

Name: Name

Value: ○ True   ○ False

Is used in

Information about bus for address 1-3
● Delete   ○ Retain

OK
Cancel
Help
Diagnostics index
Output
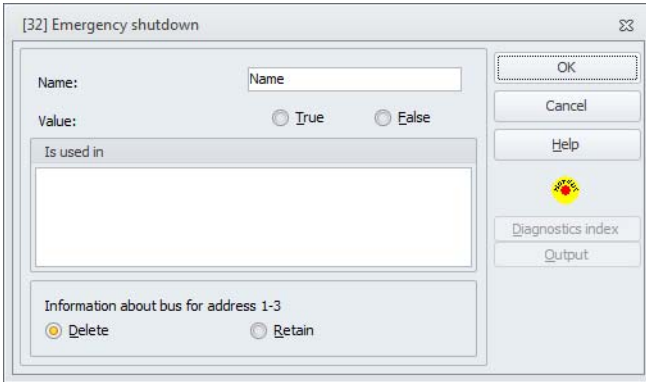
This device then always delivers the preset value regardless of whether the safe slave is installed on the bus.

This option can also be used for commissioning when the safe slave is not yet installed but parts of the configuration are to be put into operation.

If the safe AS-i address of the device to be deactivated is no longer used in any other device [1], you can decide during deactivation how this address should be used:

1. **Information about bus for address … Delete**:
   The address should be removed from the bus information (results in no check mark for this address - neither under "Safe" nor "Standard") if the safe slave is also physically removed from the AS-i bus.
2. **Information about bus for address … Retain**:
   The address is retained as an unused safe address (results in a deselectable check mark for this address in the "Safe" column) if the safe slave physically remains in the AS-i bus.

Background:

As long as they remain on the bus, the code sequences of all safe slaves must be known to the monitor for safety reasons. The code sequences are, therefore, also queried when teaching the safe configuration (teach) in this case. If, on the other hand, a safe slave is removed from the bus but not from the bus information, an error message which requests that the configuration procedure be re-performed does not appear until teaching the safe configuration.

After deactivating a device, the device is displayed in gray. Within logic devices, deactivated devices are represented with green-gray color (value **TRUE**) or with red-gray color (value **FALSE**) depending on their value.

---

1. Such multiple usage is, however, only possible with the "Zero sequence detection" device.

Deactivated device
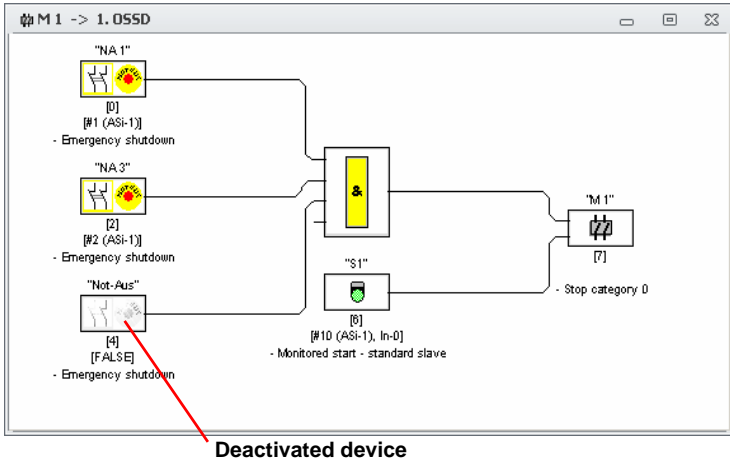
Fig.: Display of a deactivated device

> *Information!*
> *When you deactivate a logic device, you can no longer see the devices used within the logic function, and you can also no longer display the logic device. When editing a deactivated device, you can only change the names and the value.*

Activating devices

In order to reactivate a deactivated device, click the right mouse button on the deactivated device. The following pop-up menu opens.

	Device parameters ...	
	Deactivate	Strg+D
🗑	Delete	Entf
📋	Copy	Strg+C
✂	Cut	Strg+X
📋	Paste	Strg+V
	Create user device	
	Edit user device symbol ...	
	Change address 11 to type single	
	Add user comment	
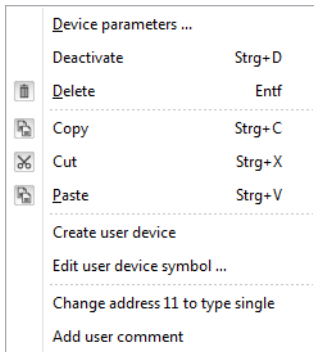
Select the **Activate** command. The device is again displayed as a full-color image.

The safe address is reset to "safe" upon activation in the bus information and marked as "used" in the configuration. This is represented by grayed-out fields and a check mark which cannot be deselected in the "Safe" column.

If the safe address of the deactivated device was removed from the bus information during deactivation, it is first re-registered.

If, in the meantime, the address in question was assigned to a different, newly configured device, an address conflict may result. In this case, the input window of the device which is to be activated appears together with an info window which is attached to the edge of the window. Select either a different safe address from those which are available or ensure (after canceling activation) that the address of the deactivated device is again available.

4.4   Saving / loading a configuration

With the **Open…** command in the **File** menu, you can load a configuration saved on a data carrier into the **ASIMON 3 G2** program. This is also possible by double-clicking on the configuration file or using drag & drop to move it into the main window.

In **ASIMON 3 G2** it is only possible to edit one configuration, not several in different windows.

If you are working with an unsaved configuration and would like to use the **Open…** command to open a different configuration from a data carrier, you are first asked if you would like to save the current configuration. If you do not save here, these data are lost.
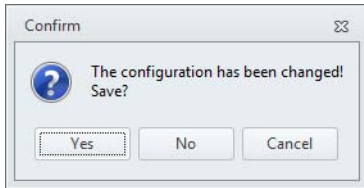
Fig.: Confirmation dialog upon opening a configuration

To save a configuration, select either the **Save** or **Save as…** command from the **File** menu. Configurations are saved in the accustomed Windows® manner.

> ***Information!***
> **ASIMON** *configuration files have the extension* ***.ASI** *(version 1 AS-i safety monitors),* ***.AS2** *(version 2 AS-i safety monitors),* ***.AS3** (**ASIMON3** *consortium version),* ***.AS3BW** (**ASIMON 3 G2** *B+W version).*
>
> *Saving a configuration on a data carrier does not ensure a useful, correct and functioning configuration. For further information, refer to chap. 5.*

4.5   Checking the configuration

Click on **Check configuration** ✔ in the **Application** ribbon to check the configuration for logical errors; if present, these are displayed in a separate window.

In addition, another window opens in which the monitors for which the current configuration is suitable are displayed.

Status	Article number	From ID	Device name	Monitor version	Safety version
✔	BWU2598	All	AS-i 3.0 Gateways, PROFIsafe via PROFIBUS	08.00	4.3
✔	BWU2615	All	AS-i 3.0 Gateways, PROFIsafe via PROFIBUS	08.00	4.3
✔	BWU2647	All	AS-i 3.0 Gateways, PROFIsafe via PROFINET	08.00	4.3
✔	BWU2798	All	AS-i 3.0 Gateways, PROFIsafe via PROFINET	08.01	4.3
✘	BWU2000	13840	AS-i Safety Monitor in Stainless Steel	04.02	4.2
✘	BWU2001	All	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2002	All	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2003	All	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2004	13738	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2186	13841	AS-i Safety Monitor in Stainless Steel	04.02	4.2
✘	BWU2187	All	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2188	All	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2202	13787	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2204	All	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2205	13839	AS-i Safety Monitors in Stainless Steel	04.02	4.2
✘	BWU2206	13793	AS-i 3.0 PROFIBUS Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2214	14404	AS-i 3.0 Gateways, PROFIsafe via PROFIBUS	05.01	4.0
✘	BWU2215	14403	AS-i 3.0 Gateways, PROFIsafe via PROFIBUS	05.01	4.0
✘	BWU2237	13855	AS-i 3.0 PROFINET Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2267	13886	AS-i 3.0 EtherNet/IP + Modbus TCP Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2273	13885	AS-i 3.0 EtherNet/IP + Modbus TCP Gateways with integrated Safety Monitor	04.02	4.2
✘	BWU2281	13936	AS-i 3.0 EtherCAT Gateways with integrated Safety Monitor	04.02	4.2

Explanation of the columns (the data can be sorted by clicking on the column):

- **Status**: A green ✔ check in the Status column indicates which configuration is suitable. These are the same messages that are displayed if the monitor is declined during the download. For unsuitable monitors ✘, the reasons for the rejection are displayed in the note or after double-clicking the line.
- **Article number**: Order number for the monitor (see sticker on side).
- **From ID**: For lines with a green check, this column indicates the smallest ID number from which the configuration is suitable for the monitor. "All" means that the configuration is suitable for all monitors with the specified order number. If the configuration is not suitable for the monitor, the largest ID number that is available is displayed (or all if there is only a single monitor available).
- **Device name**: Plain text name of the device.
- **Monitor version**: Internal monitor version of the displayed device.
- **Safety version**: Safety version of the device (see sticker on side).

5. Commissioning the AS-i Safety Monitor

5.1 Procedure

⚠️ *Attention!*
As the commissioning of the AS-i Safety Monitor involves safety-relevant work steps, the commissioning must be performed by the safety officer responsible for the application.

For reasons of safety, the commissioning of the AS-i Safety Monitor is performed step by step according to a fixed procedure.

Step 1 - Call up and edit configuration (optional)

If you would like to change the configuration of a previously configured AS-i Safety Monitor, you have the option of reading the configuration saved in the AS-i Safety Monitor into **ASIMON 3 G2**. This is particularly useful when no configuration file has been saved on a data carrier, or when a configuration file has been lost, e.g. due to data loss.

When configuring an AS-i safety monitor for the first time, or if you would like to completely reconfigure an AS-i safety monitor, continue with Step 2.

To call up the configuration, proceed as follows:

- If the AS-i safety monitor is in protective operation, you must first switch it to configuration operation by clicking the ■ button or by using the **Stop** command in the **Application** menu (password protection) (see chapter 5.8 "Stopping the AS-i Safety Monitor").
- Then transfer the current AS-i safety monitor configuration to **ASIMON 3 G2** using the **Monitor -> PC …** command in the **Application** menu (see chapter 5.2 "Reading in a configuration from the AS-i Safety Monitor").
- Change the configuration in **ASIMON 3 G2** as described in chap. 4.

○ *Information!*
By querying the diagnostic information of an AS-i safety monitor used in protective operation, you can reconstruct an unknown configuration (see "Option Diagnostics" on page 28).

Step 2 - Transfer the configuration to the AS-i Safety Monitor

After you have created a valid configuration for the connected AS-i Safety Monitor, you must then transfer it to the AS-i Safety Monitor.

⚠️ **Attention!**
The existing configuration on the AS-i Safety Monitor is overwritten during a new configuration. If you are not certain whether this configuration will be needed again in the future, please read it into **ASIMON 3 G2** *and save it to a data carrier before performing a new configuration.*

If you would like to reconfigure the AS-i Safety Monitor, **you must first change the default password to a new password**, *which is known only to you as the safety officer (see chapter 5.13 "Entering and changing the password").*

Proceed as follows:

• If the AS-i safety monitor is in protective operation, you must first switch it to configuration operation by clicking the ■ button or by using the **Stop** command in the **Application** menu (password protection) (see chapter 5.8 "Stopping the AS-i Safety Monitor").
• Then transfer the current configuration from **ASIMON 3 G2** to the AS-i safety monitor using the **PC -> Monitor …** command (see chapter 5.3 "Transferring a configuration to the AS-i Safety Monitor").
• Following successful transfer to the AS-i safety monitor, the configuration must be taught in (teaching in the code sequence of the safe AS-i slaves to be monitored). A dialog window appears after the configuration has been transferred, asking whether you would now like to do this.

Step 3 - Teach safe configuration

After you have transferred your configuration to the connected AS-i Safety Monitor, you must then teach it in.

This is performed for the purpose of verifying the transferred configuration and for a functional check of the safe AS-i slaves which are to be monitored.

Proceed as follows:

• Put the AS-i bus into operation, including all safe AS-i slaves which are to be monitored.
• Where possible, set all of the safe AS-i slaves which are to be monitored to the switched-on state (ON).

ℹ️ **Information!**
To teach in the safe configuration, the respective AS-i bus must be in full operation and the safe AS-i slaves which are to be monitored should, if possible, be in the switched-on state (ON). Otherwise, the AS-i Safety Monitor cannot receive code sequences.

Alternatively, you can also enter the code sequences manually.

• Confirm the query "**Would you like to teach the code sequences?**" with the **Yes** button or select on the **Monitor** menu the **Teach safe configuration…** command (see chapter 5.4 "Selecting the

interface for SafeLink").

- The code sequences are now taught in. If, due to the system design, not all of the safe AS-i slaves which are to be monitored can simultaneously be set to the switched-on state (ON), teaching in of the code sequences is repeated in steps until the code sequences of all of the slaves which are to be monitored have been read in correctly. To do this, set all of the safe AS-i slaves which are to be monitored to the switched-on state (ON) in sequence. Alternatively, you can also enter the code sequences manually.

If the code sequences of all safe AS-i slaves which are to be monitored could reliably be read in, the provisional configuration log is then immediately transferred to **ASIMON 3 G2** for review by the safety officer responsible for the application.

Step 4 - Check the configuration log and validate the configuration

Carefully check the provisional configuration log transferred from the AS-i Safety Monitor. To do this, you can print out the log or save it as a text file. The structure of the configuration log is described in detail in chap. 5.12. After doing this, you must validate the configuration in the Validate window which opens (password protection).

⚠️ ***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. To do this, select the **Validate…** command from the **Application -> Monitor functions** menu (see chapter 5.6 "Validating the configuration").*

Following validation of the AS-i safety monitor configuration, the final configuration log must be transferred to **ASIMON 3 G2** as part of the application documentation to be maintained by the responsible safety officer.

Print out this log and file it together with the other safety-relevant documentation for your application. In addition, you can also save the log as a text file. The structure of the configuration log is described in detail in chap. 5.12.

Step 5 - Start the AS-i Safety Monitor

In the final step of the commissioning, you must start the AS-i Safety Monitor, i.e. switch from configuration operation to protective operation. To do this, click the ▶ button or select the **Start** command from the **Application** menu (password protection, see chapter 5.7 "Starting the AS-i Safety Monitor").

You must now check that your application functions properly (see chapter 6. "Diagnostics and error handling"). For this purpose, **ASIMON 3 G2** automatically switches to the diagnostics view after startup (see chapter 6. "Diagnostics and error handling").

5.2 Reading in a configuration from the AS-i Safety Monitor

First switch the AS-i Safety Monitor from protective operation to configuration operation (see chapter 5.8 "Stopping the AS-i Safety Monitor").

To read in the configuration currently saved in the AS-i safety monitor, select in the **Application** menu the **Monitor -> PC …** command. The configuration is then transmitted to **ASIMON 3 G2**. The transmission takes several seconds. The progress is displayed in a window.
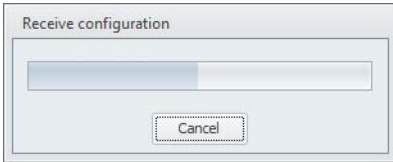
Upon successful conclusion of the data transmission from the AS-i Safety Monitor, the configuration is available in **ASIMON 3 G2** for further editing.

If an error occurs during the data transmission, an error message is output.
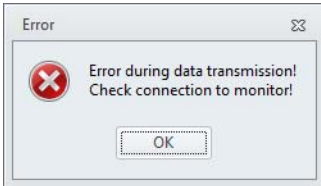
5.3   Transferring a configuration to the AS-i Safety Monitor

First switch the AS-i Safety Monitor from protective operation to configuration operation (see chapter 5.8 "Stopping the AS-i Safety Monitor").

To transfer the configuration currently located in **ASIMON 3 G2** to the connected AS-i safety monitor, select on the **Application** menu the **PC -> Monitor…** command. The configuration is then transmitted to the AS-i Safety Monitor. The transmission takes several seconds. The progress is displayed in a window.

Upon successful conclusion of the data transmission to the AS-i Safety Monitor, the configuration is saved in the AS-i Safety Monitor.

If an error occurs during the data transmission, an error message is output.
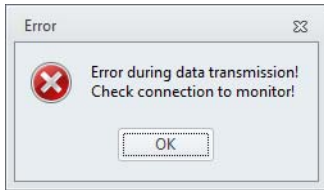
5.4   Selecting the interface for SafeLink

If the interface for SafeLink has not yet been selected and several possible interfaces are present in the monitor, a selection dialog for the safe coupling interface appears during the transmission of the configuration.
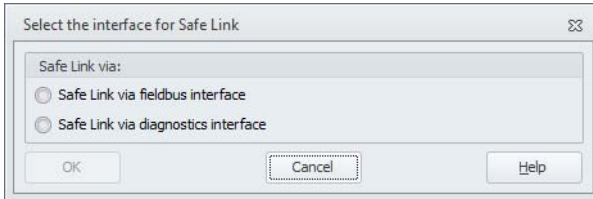
Select the interface over which the safe coupling data is to be transmitted.

> **Information!**
> *If you want to change this selection later, switch the **Use SafeLink** option in the **SafeLink tab** off and then back on one time (see chapter "SafeLink tab") and leave the dialog by pressing OK.*

5.5 Teach safe configuration

After you have transferred your configuration to the connected AS-i Safety Monitor, you must then teach in the safe configuration. For this purpose, the code sequences of the safe AS-i slaves to be monitored by the AS-i are read in. The code sequence of each safe AS-i slave which is to be monitored is saved in the configuration log.

○
ㅛ
Information!
Additional information on code sequences and secure AS-i transmission can be found in the operating manual for the AS-i Safety Monitor.

Before teaching in the safe configuration, you must commission the AS-i bus including all safe AS-i slaves which are to be monitored and, where possible, set all safe AS-i slaves which are to be monitored to the switched-on state (ON).

If a gateway is used and if a configuration error is present after downloading the safety program, a query appears as to whether the AS-i circuit of the gateway is to be switched over to configuration mode.

If, due to the system design, not all of the safety AS-i slaves which are to be monitored can simultaneously be set to the switched-on state (ON) (e.g. for a wicket gate in a material air lock in which a switch with safety AS-i slave is located at each of the end positions), teaching in of the code sequences is repeated in steps until the code sequences of all of the slaves which are to be monitored have been read in correctly. To do this, set all of the safe AS-i slaves which are to be monitored to the switched-on state (ON) in sequence.

To teach in the code tables, select from the **Application** -> **Monitor functions** menu the **Teach safe configuration** command or confirm when prompted "**Would you like to teach the code sequences?**" with the **Yes** button.

The code tables are then taught in by the AS-i Safety Monitor. The teach-in process takes several seconds. The progress is displayed in a window.

If not all of the safe AS-i slaves which are to be monitored can be set to the switched-on state (ON) simultaneously, the following window appears in which the progress of the teach-in process is graphically depicted.
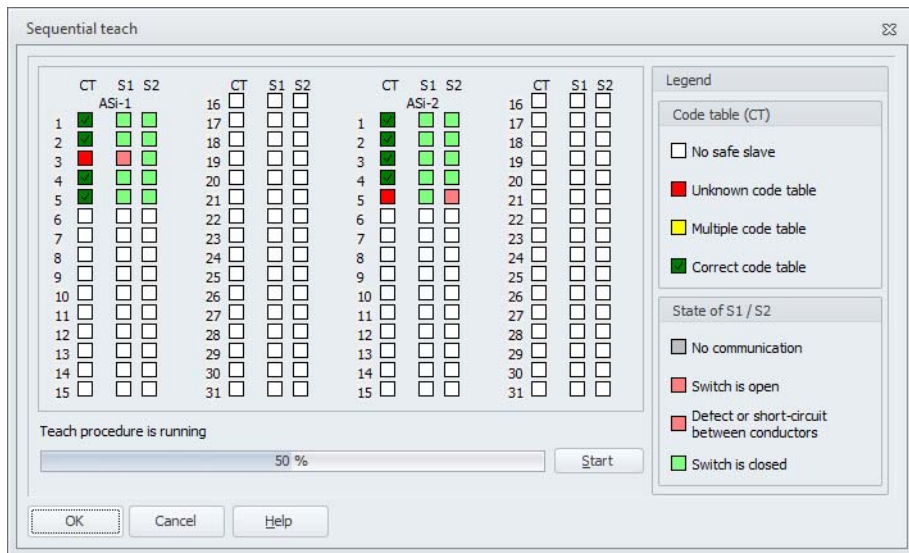
At this point any safety AS-i slave, whose code sequence could not be read so far, must be switched ON (released state) for a few seconds. The AS-i Safety Monitor continuously reads the configuration and updates the display of the already taught and the to-be taught safety AS-i slaves regularly.

As an alternative to this, you can also manually enter the code sequence of a safety AS-i slave. To do this, double-click the check box of the respective safety AS-i slave in the CT column (code table). The following window for manual input of the code sequence opens:
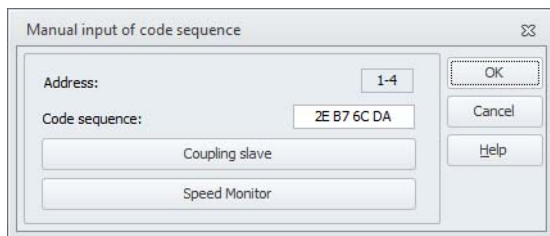
Enter the correct code sequence and confirm your entry with OK.

If the slave is a coupling slave of a Safety Monitor, the code sequence can be assigned by using the "Coupling Slave" button. If coupling slaves are present in the configuration (device type "coupling"), then a suitable code sequence is automatically entered for these slave addresses.

Upon successful conclusion of the teach-in process or after entering all code sequences, click OK. Immediately afterward, the preliminary configuration log is transmitted to **ASIMON 3 G2**.

Information!
In the **Sequential teach-in** *window, switch states S1 and S2 are displayed for the respective slaves in addition to the teach states. In this way, you can also detect possible device malfunctions or communication faults from a single screen.*

Sequential teach-in of the code sequences also functions with older AS-i Safety Monitor models, but takes longer as the entire configuration must always be loaded into the safety monitor between two successive teach operations.

The progress of the transmission of the provisional configuration log is displayed in a window.
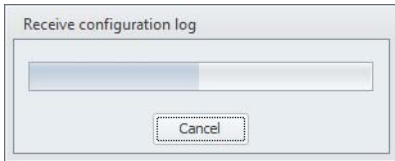
An info window then prompts you to have the configuration reviewed by the safety officer responsible for the application using the configuration log.

The provisional configuration log is displayed in **ASIMON 3 G2** in a separate window.

○
⫲ *Information!*
The configuration log is always written in English.

"**NOT VALIDATED**" (line 10):
indicates a provisional configuration log

You can print out this provisional configuration log and/or save it as a file, as long as the protocol window remains open. To do this, select the appropriate command on the **Configuration log** submenu on the **Application** -> **Monitor functions** menu.

With the **Save as…** command, the standard Windows® dialog window for saving files is opened; with the **Print…** command, the file is printed directly on the set printer.
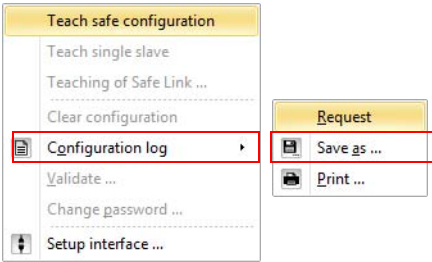
After you have successfully checked the configuration using the provisional configuration log, you can validate the configuration in the AS-i Safety Monitor.

5.6   Validating the configuration

Information!
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.

To validate a configuration, select on the **Application** -> **Monitor functions** menu the **Validate…** command. A window appears in which you can validate a configuration by entering your name and the password.
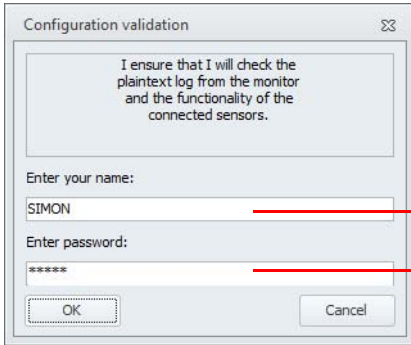
Configuration validation

I ensure that I will check the plaintext log from the monitor and the functionality of the connected sensors.

Enter your name:

SIMON

2 … 8 alphanumerical characters;
A … Z, a … z, 0 … 9

Enter password:

*****

4 … 8 alphanumerical characters;
A … Z, a … z, 0 … 9, default: "SIMON"

OK   Cancel

Information!
Configuration validation is, as are several other safety-related commands, password pro-tected. The default password of a brand-new AS-i safety monitor is "SIMON". You must change this default password to a password known only to the safety officer responsible for the application (see chapter 5.13 "Entering and changing the password").

Confirm your entry with the **OK** button. An info window then confirms successful configuration valida-tion.
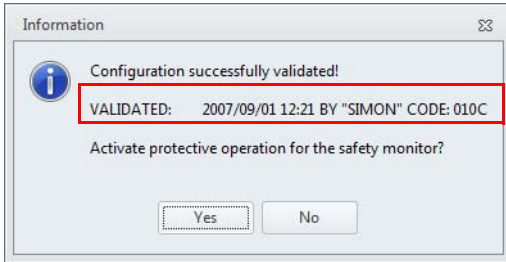
Validation information:
- date and time
- name
- code

Information!

*Following successful validation, save the configuration again on the PC. In this way you ensure that the download time and the taught-in code sequences are also saved in the configuration file and the **ASIMON 3 G2** diagnostics recognize the correct configuration.*

Note the validation information in addition to the password, however, in a different location. Using this information, the manufacturer can generate a generic password which can be used to re-enable the AS-i Safety Monitor should the password be lost.

The validation information can also be found in line 10 of the final configuration log.

Immediately afterward, the final configuration log is transmitted to **ASIMON 3 G2**. The progress of the transmission of the final configuration log is displayed in a window.
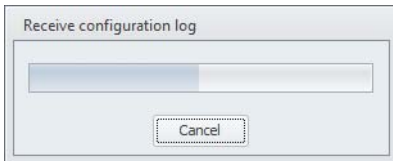
The final configuration log is displayed in **ASIMON 3 G2** in a separate window. As an indication of a validated configuration and to differentiate from a provisional configuration log, the validation information is now displayed in line 10.

○
Ⅱ
Information!
The configuration log is always written in English.


```
Plaintext log from monitor                                              ─  □  ☒
0000 **************************************************************** 0 ▲
0001 CONFIGURATION AS-INTERFACE SAFETY MONITOR                        1
0002 Ident: "Configuration 1"                                         2 ▤
0003 **************************************************************** 3
0004 Monitor Section                                                  4
0005 **************************************************************** 5
0006 Monitor Version:  4.0                                            6
0007 Config Structure: 3.0                                            7
0008 PC Version:       2.3                                            8
0009 Download Time:    2008-05-16 16:32                               9
0010 Validated:        2008-05-16 16:33 by: "SIMON" code: C876 count: 81  0
0011 Monitor Address:  AS-i 1: 28 - 31  Diagnosis: assigned devices   1
0012                   AS-i 2: none                                   2
0013 Diag Freeze:      no                                             3
0014 Error Unlock:     no                                             4
0015 **************************************************************** 5
0016 Device Section                                                   6
0017 **************************************************************** 7
0018 Number of Devices: 8                                             8
0019 ------------------------------------------------------------     9
0020 Index:        0 = "NA1"                                          0
0021 Type:        20 = double channel forced safety input            1 ▼
◄                                                              ►
```

"**VALIDATED...**" (line 10):
indicates a final configuration log with validation
information
- date and time
- name
- code
- consecutive number of the configuration

You can print out the final configuration log and/or save it as a file. To do this, select the appropriate command on the **Configuration log** submenu on the **Application** -> **Monitor functions** menu.

Select the **Save as…** command to open the standard Windows® dialog box for saving files; use the **Print…** command to open the print manager (see chapter 5.12.3 "Print manager").
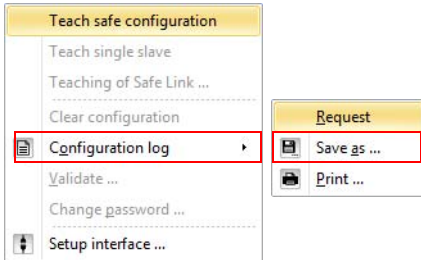
The final configuration log serves as safety-relevant application documentation to be maintained by the responsible safety officer.

Print out this log and file it together with the other safety-relevant documentation for your application. The structure of the configuration log is described in detail in chap. 5.12.

After you have successfully validated the configuration, you can start the AS-i Safety Monitor, i.e. put it into protective operation.

If a gateway is used and if a configuration error is present after the download, or if configuration mode is active, a query appears as to whether the current AS-i configuration of the AS-i circuit is to be adopted and whether a switchover is to take place to the protected operating mode.

5.7   Starting the AS-i Safety Monitor

If a valid, validated configuration is present in the AS-i safety monitor, you can switch the AS-i safety monitor from configuration operation to protective operation by clicking the ▶ button or with the **Start** command in the **Application** menu.

After starting protective operation, the state bar informs you of the change to the new operating mode and **ASIMON 3 G2** automatically switches to the diagnostics view (see chapter 6. "Diagnostics and error handling").

The change from protective operation to configuration operation is then possible only by means of a stop command (see chapter 5.8 "Stopping the AS-i Safety Monitor").

5.8   Stopping the AS-i Safety Monitor

If the AS-i safety monitor is in protective operation, it can only be switched to configuration operation by **ASIMON 3 G2** with the **Stop** command in the **Application** menu or by clicking the ▪ button.

A Stop command is accepted by the AS-i Safety Monitor when

• the valid password is entered.
• no AS-i telegrams are present on the bus, even without password.

ASIMON allows the AS-i safety monitor to be stopped even with the incorrect password and during active AS-i communication after a warning notice has been confirmed.

> *Information!*
>
> *When replacing a defective safe input slave, it is possible to change from protective operation to configuration operation even without a connected PC by using the AS-i Safety Monitor service button. Further information can be found in the operating manual for the AS-i Safety Monitor.*

A Stop command is treated similarly to the activation (switch off) of a monitoring device, i.e. depending on the configured output device, it may take up to one minute before the AS-i Safety Monitor switches off the safety switching outputs and switches to configuration operation.

Following execution of the stop command, the state bar provides information about the change to configuration operation.

5.9   Teach single slave

○
Ⅱ   ***Information!***
This function is only available from monitor version 4.0 onwards!

If a monitor is in protective operation, individual slaves can be "re-taught" via the function "Teach single slave". This function can also be called up from the diagnosis screen, as it is easily visible here which slaves use a false code sequence (red flashing). The monitor is automatically stopped and re-started after each teach-in process. For this reason the respective process requires time to be completed.

The following functions are available in this window:

• **Address**: The address of the slave which is to be taught in must be selected here. Only addresses having used safety input slaves in the monitor configuration are offered.
• **Coupling slave**: A coupling slave code sequence is saved for the selected slave.
• **Teaching in**: The code sequence of the selected slave is taught in. The process can be followed in the state window (e.g. switch on slave not closed …).
• **Cancel**: The current teach-in process can be interrupted via this button. It is not intended to exit the window.
• **OK**: Exit the window.

5.10 Teaching of SafeLink

○
╥ *Information!*
   This function is available from Safety Version 'SV4.3' on!
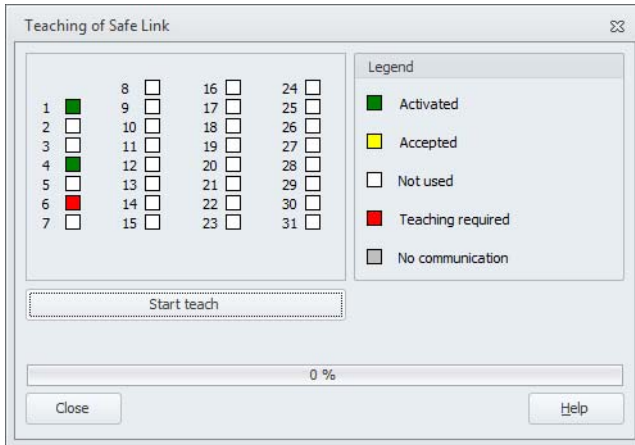
After all (or all currently available) participants of the safe coupling have been configured and started, the manager of the respective group must still be taught.

SafeLink is not otherwise possible.

Participants marked in red must still be taught. In this case, the **Start teach** button is active. After pressing the button and confirming the confirmation request, teaching is started.

Following the teach process, the participants switch briefly to the yellow state; the SafeLink is active in the green state.

○
╥ *Information!*
   The menu item for this window is only available if SafeLink is active in the monitor.

5.11 Clear configuration

○
⅄ *Information!*
This function is only available from monitor version Generation II (or higher) onwards!
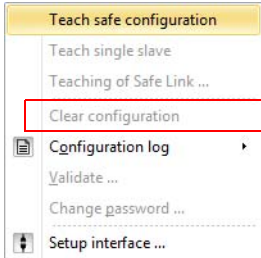
The entire configuration of the monitor can be deleted with this menu item.

○
⅄ *Information!*
The monitor is reset to factory settings and the password is lost!

5.12 Configuration documentation

5.12.1 Configuration log

The configuration log serves as safety-relevant documentation of the application (see chap. 5.5 and chap. 5.6). It contains all information about the configuration of the AS-i Safety Monitor.

The provisional configuration log is to be used by the safety officer for reviewing the configuration of the AS-i Safety Monitor and the safety-relevant AS-i application.

The final configuration log is to be used by the safety officer for documenting the configuration of the AS-i Safety Monitor and the safety-relevant AS-i application. It is an important part of the safety-relevant documentation of your application and must be filed with the safety-relevant documentation.

Information!
The configuration log is always written in English.

The structure is explained below using an example.

Example of a final configuration log
(Generation II and lower)

```
0000 ************************************************************************0
0001 CONFIGURATION AS-i SAFETY MONITOR                                       1
0002 IDENT: "Configuration 1"                                                2
0003 ************************************************************************3
0004 MONITOR SECTION                                                         4
0005 ************************************************************************5
0006 MONITOR VERSION:  03.00 enhanced                                        6
0007 CONFIG STRUCTURE: 02.01                                                 7
0008 PC VERSION:       02.03                                                 8
0009 DOWNLOAD TIME:    2007/09/10 12:54                                      9
0010 VALIDATED:        2007/09/10 12:54 BY: "SIMON" CODE: CCB5 COUNT:  0011  0
0011 MONITOR ADDRESS:   28 - 31  DIAGNOSIS: all devices                      1
0012 MODE:             two independent output groups                        2
0013 DIAG FREEZE:      no                                                    3
0014 ERROR UNLOCK:     no                                                    4
0015 OUTPUT CH1:       relay                                                 5
0016 OUTPUT CH2:       relay, AS-i          CODE:      16 CD A9 E5           6
0017 ************************************************************************7
0018 DEVICE SECTION                                                          8
0019 ************************************************************************9
0020 NUMBER OF DEVICES:   8                                                  0
0021 ------------------------------------------------------------------------1
0022 INDEX:       32 = "NA 1"                                                2
0023 TYPE:        20 = double channel forced safety input                   3
0024 SUBTYPE:    no startup test                                            4
0025 SUBTYPE:    no local acknowledge                                       5
0026 ASSIGNED:   channel one                                                6
0027 SAFE SLAVE:  1                                                          7
0028 ------------------------------------------------------------------------8
0029 INDEX:       33 = "NA 3"                                                9
0030 TYPE:        20 = double channel forced safety input                   0
0031 SUBTYPE:    no startup test                                            1
0032 SUBTYPE:    no local acknowledge                                       2
0033 ASSIGNED:   channel one                                                3
0034 SAFE SLAVE:  2                                                          4
0035 ------------------------------------------------------------------------5
0036 INDEX:       34 = "NA 2"                                                6
0037 TYPE:        20 = double channel forced safety input                   7
0038 SUBTYPE:    no startup test                                            8
0039 SUBTYPE:    no local acknowledge                                       9
0040 ASSIGNED:   channel two                                                0
0041 SAFE SLAVE:  4                                                          1
0042 ------------------------------------------------------------------------2
0043 INDEX:       35 = "AOPD 1"                                              3
0044 TYPE:        20 = double channel forced safety input                   4
0045 SUBTYPE:    no startup test                                            5
0046 SUBTYPE:    no local acknowledge                                       6
0047 ASSIGNED:   both channels                                              7
0048 SAFE SLAVE:  3                                                          8
```

**Example of a final configuration log
(Generation II and lower)**

```
0049 -----------------------------------------------------------------------9
0050 INDEX:       36 = "S 2"                                                 0
0051 TYPE:        81 = manual start standard slave                           1
0052 ASSIGNED:    channel two                                                2
0053 ADDRESS:     10   BIT: In-1 noninv                                      3
0054 -----------------------------------------------------------------------4
0055 INDEX:       37 = "S 1"                                                 5
0056 TYPE:        81 = manual start standard slave                           6
0057 ASSIGNED:    channel one                                                7
0058 ADDRESS:     10   BIT: In-0 noninv                                      8
0059 -----------------------------------------------------------------------9
0060 INDEX:       38 = "M 1"                                                 0
0061 TYPE:        101 = stop category 0                                      1
0062 ASSIGNED:    channel one                                                2
0063 -----------------------------------------------------------------------3
0064 INDEX:       39 = "M 2"                                                 4
0065 TYPE:        101 = stop category 0                                      5
0066 ASSIGNED:    channel two                                                6
0067 ***********************************************************************7
0068 SUBDEVICE SECTION                                                       8
0069 ***********************************************************************9
0070 ADDRESS:      1 used safety input     CODE:       15 64 9E A7           0
0071 ADDRESS:      2 used safety input     CODE:       36 A8 BD 57           1
0072 ADDRESS:      3 used safety input     CODE:       39 6B ED 5C           2
0073 ADDRESS:      4 used safety input     CODE:       1B DE CA 76           3
0074 ADDRESS:      5 not used safety input CODE:       1D AE 74 5B           4
0075 ADDRESS:      6 no entry                                                5
0076 ADDRESS:      7 no entry                                                6
0077 ADDRESS:      8 no entry                                                7
0078 ADDRESS:      9 no entry                                                8
0079 ADDRESS:     10 used standard                                          9
0080 ADDRESS:     11 no entry                                                0
0081 ADDRESS:     12 no entry                                                1
0082 ADDRESS:     13 no entry                                                2
0083 ADDRESS:     14 no entry                                                3
0084 ADDRESS:     15 no entry                                                4
0085 ADDRESS:     16 no entry                                                5
0086 ADDRESS:     17 no entry                                                6
0087 ADDRESS:     18 no entry                                                7
0088 ADDRESS:     19 no entry                                                8
0089 ADDRESS:     20 not used standard                                      9
0090 ADDRESS:     21 no entry                                                0
0091 ADDRESS:     22 no entry                                                1
0092 ADDRESS:     23 no entry                                                2
0093 ADDRESS:     24 no entry                                                3
0094 ADDRESS:     25 no entry                                                4
0095 ADDRESS:     26 no entry                                                5
0096 ADDRESS:     27 no entry                                                6
0097 ADDRESS:     28 not used standard                                      7
0098 ADDRESS:     29 not used standard                                      8
0099 ADDRESS:     30 not used standard                                      9
0100 ADDRESS:     31 not used standard                                      0
```

Example of a final configuration log
(Generation II and lower)

```
0101 **********************************************************************1
0102 INFO SECTION                                                         2
0103 **********************************************************************3
0104 INACTIVE:    none                                                    4
0105 **********************************************************************5
0106 VALIDATED:        2007/09/10 12:54 BY: "SIMON" CODE: CCB5 COUNT:  0011   6
0107 END OF CONFIGURATION                                                 7
0108 **********************************************************************8
```

Line 0000 … 0003: Header information of the configuration log
                       Line 0002: Configuration title in quotation marks

Line 0004 … 0015: Information about the AS-i safety monitor
                       Line 0006:   Software version of the AS-i safety monitor
                       Line 0007:   Version of the configuration structure (firmware)
                       Line 0008:   Version of the **ASIMON** PC software
                       Line 0009:   Time at which the saved configuration was transmitted
                       Line 0010:   Time at which the saved configuration was validated
                       Line 0011:   AS-i bus address(es) of the safety monitor / device diagnostics
                       Line 0012:   Operating mode
                       Line 0013:   Diagnostics stop yes/no
                       Line 0014:   Error unlock yes/no
                       Line 0015:   Type of output of OSSD 1
                       Line 0016:   Type of output of OSSD 2

Line 0018 … 0021: Start of the device descriptions
                       Line 0020: Number of configured devices

Line 0022 … 0028: Description of the device with index 32
                       Line 0022: Index and name of the device
                       Line 0023: Type of device
                       Line 0024: Device variant
                       Line 0025: Device variant
                       Line 0026: OSSD assignment
                       Line 0027: AS-i bus address of the corresponding, safe AS-i slave

○
∏   *Information!*
    The detailed descriptions of the devices as well as an example of their respective entries in
    the configuration log can be found in chap. 4.3.

Line 0029 … 0035: Description of the device with index 33

Line 0036 … 0042: Description of the device with index 34

       :   :

Line 0064 … 0067:   Description of the device with index 39

Line 0068 … 0101:   Information about the AS-i bus
Line 0070: Table of the AS-i bus addresses with designation of their assignment, see following explanation
Line 0100:

Line 0102 … 0108:   Footer information of the configuration log
Line 0104: Designation of inactive slaves
Line 0106: Repetition of the validation information
Line 0107: Designation of configuration log end

Explanation of the table entries for the AS-i bus address assignments

no entry	No entry present.
not used standard	Bus address is occupied by an AS-i standard slave which is, however, not monitored by the AS-i safety monitor.
used standard	Bus address is occupied by an AS-i standard slave which is monitored by the AS-i safety monitor, e.g. local acknowledgment / reset, manual start etc.
not used safety input	Bus address is occupied by a safe AS-i slave which is, however, not monitored by the AS-i safety monitor. Also listed is the code table for this safe AS-i slave.
used safety input	Bus address is occupied by a safe AS-i slave which is monitored by the AS-i Safety Monitor, e.g. emergency shutdown, contact-less active protective device (AOPD), safety guard, safe AS-i output etc. Also listed is the code table for this safe AS-i slave.

Example of a final configuration log
(Generation II V4.x or higher)

```
0000 ********************************************************************** 0
0001 CONFIGURATION AS-INTERFACE SAFETY MONITOR                            1
0002 Ident: "Configuration 1"                                             2
0003 ********************************************************************** 3
0004 Monitor Section                                                      4
0005 ********************************************************************** 5
0006 Monitor Version:  4.0                                                6
0007 Config Structure: 3.0                                                7
0008 PC Version:       2.3                                                8
0009 Download Time:    2008-05-16 16:32                                   9
0010 Validated:        2008-05-16 16:33 by: "SIMON" code: C876 count: 81  0
0011 Monitor Address:  AS-i 1: 28 - 31   Diagnosis: assigned devices      1
0012                   AS-i 2: none                                       2
0013 Diag Freeze:      no                                                 3
0014 Error Unlock:     no                                                 4
0015 ********************************************************************** 5
0016 Device Section                                                       6
0017 ********************************************************************** 7
0018 Number of Devices: 8                                                 8
```

Example of a final configuration log
(Generation II V4.x or higher)

```
0019 ---------------------------------------------------------------------- 9
0020 Index:        0 = "NA1"                                               0
0021 Type:        20 = double channel forced safety input                 1
0022 Subtype:   no startup test                                           2
0023 Subtype:   no local acknowledge                                      3
0024 Assigned:   to OSSD 1                                                4
0025 Safe Slave: AS-i 1, slave 1                                          5
0026 ---------------------------------------------------------------------- 6
0027 Index:        1 = "NA3"                                               7
0028 Type:        20 = double channel forced safety input                 8
0029 Subtype:   no startup test                                           9
0030 Subtype:   no local acknowledge                                      0
0031 Assigned:   to OSSD 1                                                1
0032 Safe Slave: AS-i 1, slave 2                                          2
0033 ---------------------------------------------------------------------- 3
0034 Index:        2 = "NA2"                                               4
0035 Type:        20 = double channel forced safety input                 5
0036 Subtype:   no startup test                                           6
0037 Subtype:   no local acknowledge                                      7
0038 Assigned:   to OSSD 2                                                8
0039 Safe Slave: AS-i 1, slave 4                                          9
0040 ---------------------------------------------------------------------- 0
0041 Index:        3 = "AOPD 1"                                            1
0042 Type:        20 = double channel forced safety input                 2
0043 Subtype:   no startup test                                           3
0044 Subtype:   no local acknowledge                                      4
0045 Assigned:   to OSSDs 1, 2                                            5
0046 Safe Slave: AS-i 1, slave 3                                          6
0047 ---------------------------------------------------------------------- 7
0048 Index:        4 = "S 2"                                               8
0049 Type:        81 = manual start standard slave                        9
0050 Assigned:   to OSSD 2                                                0
0051 Address:    AS-i 1, slave 10, bit in-1 noninv                       1
0052 ---------------------------------------------------------------------- 2
0053 Index:        5 = "S 1"                                               3
0054 Type:        81 = manual start standard slave                        4
0055 Assigned:   to OSSD 1                                                5
0056 Address:    AS-i 1, slave 10, bit in-0 noninv                       6
0057 ---------------------------------------------------------------------- 7
0058 Index:        6 = "M 1"                                               8
0059 Type:       101 = stop category 0                                    9
0060 Assigned:   to OSSD 1                                                0
0061 ---------------------------------------------------------------------- 1
0062 Index:        7 = "M 2"                                               2
0063 Type:       101 = stop category 0                                    3
0064 Assigned:   to OSSD 2                                                4
0065 ********************************************************************** 5
0066 Subdevice Section                                                     6
0067 ********************************************************************** 7
0068 AS-i 1                                                                8
0069 ---------------------------------------------------------------------- 9
```

Example of a final configuration log
(Generation II V4.x or higher)

```
0070 Address:  1 used safety input      Code:  25 D9 8E B6                          0
0071 Address:  2 used safety input      Code:  3D A8 57 E9                          1
0072 Address:  3 used safety input      Code:  1A B8 75 D6                          2
0073 Address:  4 used safety input      Code:  3E C6 A5 D7                          3
0074 Address:  5 not used safety input  Code:  39 B7 5A 6C                          4
0075 Address:  6 no entry                                                           5
0076 Address:  7 no entry                                                           6
0077 Address:  8 no entry                                                           7
0078 Address:  9 no entry                                                           8
0079 Address: 10 used standard                                                      9
0080 Address: 11 no entry                                                           0
0081 Address: 12 no entry                                                           1
0082 Address: 13 no entry                                                           2
0083 Address: 14 no entry                                                           3
0084 Address: 15 used safety actuator                                               4
0085 Address: 16 used coupling slave                                                5
0086 Address: 17 no entry                                                           6
0087 Address: 18 no entry                                                           7
0088 Address: 19 no entry                                                           8
0089 Address: 20 not used standard                                                  9
0090 Address: 21 no entry                                                           0
0091 Address: 22 no entry                                                           1
0092 Address: 23 no entry                                                           2
0093 Address: 24 no entry                                                           3
0094 Address: 25 no entry                                                           4
0095 Address: 26 no entry                                                           5
0096 Address: 27 no entry                                                           6
0097 Address: 28 not used standard                                                  7
0098 Address: 29 not used standard                                                  8
0099 Address: 30 not used standard                                                  9
0100 Address: 31 not used standard                                                  0
```

**Example of a final configuration log
(Generation II V4.x or higher)**

```
0101 --------------------------------------------------------------------- 1
0102 AS-i 2                                                                  2
0103 --------------------------------------------------------------------- 3
0104 Address:  1 no entry                                                    4
0105 Address:  2 no entry                                                    5
0106 Address:  3 no entry                                                    6
0107 Address:  4 no entry                                                    7
0108 Address:  5 no entry                                                    8
0109 Address:  6 no entry                                                    9
0110 Address:  7 no entry                                                    0
0111 Address:  8 no entry                                                    1
0112 Address:  9 no entry                                                    2
0113 Address: 10 no entry                                                    3
0114 Address: 11 no entry                                                    4
0115 Address: 12 no entry                                                    5
0116 Address: 13 no entry                                                    6
0117 Address: 14 no entry                                                    7
0118 Address: 15 no entry                                                    8
0119 Address: 16 no entry                                                    9
0120 Address: 17 no entry                                                    0
0121 Address: 18 no entry                                                    1
0122 Address: 19 no entry                                                    2
0123 Address: 20 no entry                                                    3
0124 Address: 21 no entry                                                    4
0125 Address: 22 no entry                                                    5
0126 Address: 23 no entry                                                    6
0127 Address: 24 no entry                                                    7
0128 Address: 25 no entry                                                    8
0129 Address: 26 no entry                                                    9
0130 Address: 27 no entry                                                    0
0131 Address: 28 no entry                                                    1
0132 Address: 29 no entry                                                    2
0133 Address: 30 no entry                                                    3
0134 Address: 31 no entry                                                    4
0135 ********************************************************************** 5
0136 OSSD Section                                                            6
0137 ********************************************************************** 7
0138 OSSD 1:                                                                 8
0139 Terminals:      1.13, 1.14                                              9
0140 --------------------------------------------------------------------- 0
0141 OSSD 2:                                                                 1
0142 Terminals:      2.13, 2.14                                              2
0143 Coupling Slave: AS-i 1, slave 16                                        3
0144 Actuator Slave: AS-i 1, slave 15                                        4
0145 ********************************************************************** 5
0146 Info Section                                                            6
0147 ********************************************************************** 7
0148 Inactive Devices: none                                                  8
0149 ********************************************************************** 9
0150 Validated:       2008-05-16 16:33 by: "SIMON" code: C876 count: 81     0
0151 End of Configuration                                                    1
0152 ********************************************************************** 2
```

Line 0000 … 0003:	Header information of the configuration log
	Line 0002: Configuration title in quotation marks

Line 0004 … 0015:	Information about the AS-i safety monitor	
	Line 0006:	Software version of the AS-i safety monitor
	Line 0007:	Version of the configuration structure (firmware)
	Line 0008:	Version of the **ASIMON** PC software
	Line 0009:	Time at which the saved configuration was transmitted
	Line 0010:	Time at which the saved configuration was validated
	Line 0011 … 12:	AS-i bus address(es) of the safety monitor / device diagnostics
	Line 0013:	Diagnostics stop yes/no
	Line 0014:	Error unlock yes/no
	Line 0016 … 0019:	Start of the device description
	Line 0018:	Number of configured devices

Line 0020 … 0028:	Description of the device with index 0
	Line 0020: Index and name of the device
	Line 0021: Type of device
	Line 0022: Device variant
	Line 0023: Device variant
	Line 0024: OSSD assignment
	Line 0025: AS-i bus address of the corresponding, safe AS-i slave

○
Ⅱ
Information!
The detailed descriptions of the devices as well as an example of their respective entries in the configuration log can be found in chap. 4.3.

Line 0027 … 0032:	Description of the device with index 1
Line 0034 … 0039:	Description of the device with index 2
:	:
Line 0062 … 0064:	Description of the device with index 7
Line 0068 … 0101:	Information about the AS-i bus 1
	Line 0070: Table of the AS-i bus addresses with designation of their assignment, see following explanation
	Line 0100:
Line 00102 … 0135:	Information about the AS-i bus 2
	Line 0104: Table of the AS-i bus addresses with designation of their assignment, see following explanation
Line 0134:	

Line 0136 … 0144:   OSSD information
                          Line 0138: OSSD 1
                          Line 0139: Connections of the OSSD 1
                          Line 0141: OSSD 2
                          Line 0142: Connections of the OSSD 2
                          Line 0143: Safe AS-i coupling slave for OSSD 2
                          Line 0144: Safe AS-i output slave for OSSD 2

Line 0146 … 0152:   Footer information of the configuration log

                          Line 0148: Designation of inactive slaves

                          Line 0150: Repetition of the validation information

                          Line 0151: Designation of configuration log end

Explanation of the table entries for the AS-i bus address assignments

no entry	No entry present.
not used standard	Bus address is occupied by an AS-i standard slave which is, however, not monitored by the AS-i safety monitor.
used standard	Bus address is occupied by an AS-i standard slave which is monitored by the AS-i safety monitor, e.g. local acknowledgment / reset, manual start etc.
not used safety input	Bus address is occupied by a safe AS-i slave which is, however, not monitored by the AS-i safety monitor. Also listed is the code table for this safe AS-i slave.
used safety input	Bus address is occupied by a safe AS-i slave which is monitored by the AS-i Safety Monitor, e.g. emergency shutdown, contact-less active protective device (AOPD), safety guard, safe AS-i output etc. Also listed is the code table for this safe AS-i slave.
used safety actuator	Bus-address is occupied by a safe AS-i output.
used coupling slave	Bus address is occupied by a safe AS-i coupling slave.

Example of a provisional configuration log (excerpt)
(Generation II and lower)

```
0000 ************************************************************************0
0001 CONFIGURATION AS-i SAFETY MONITOR                                      1
0002 IDENT: "Configuration 1"                                               2
0003 ************************************************************************3
0004 MONITOR SECTION                                                        4
0005 ************************************************************************5
0006 MONITOR VERSION:  02.12 enhanced                                       6
0007 CONFIG STRUCTURE: 02.01                                                7
0008 PC VERSION:       02.02                                                8
0009 DOWNLOAD TIME:    2005/08/05 19:07                                     9
0010 NOT VALIDATED                                                          0
0011 MONITOR ADDRESS:   28 - 31  DIAGNOSIS: all devices                     1
0012 MODE:             two independent output groups                       2
0013 DIAG FREEZE:      no                                                   3
0014 ERROR UNLOCK:     no                                                   4
0015 OUTPUT CH1:       relay                                                5
0016 OUTPUT CH2:       relay, AS-i         CODE:       16 CD A9 E5          6
0017 ************************************************************************5
  :
  :
```

Example of a provisional configuration log (excerpt)
(Generation II V4.x or higher)

```
0000 ************************************************************************ 0
0001 CONFIGURATION AS-INTERFACE SAFETY MONITOR                              1
0002 Ident: "Configuration 1"                                               2
0003 *********************************************************************** 3
0004 Monitor Section                                                        4
0005 *********************************************************************** 5
0006 Monitor Version:  4.0                                                  6
0007 Config Structure: 3.0                                                  7
0008 PC Version:       2.3                                                  8
0009 Download Time:    2008-05-09 18:46                                     9
0010 Not Validated                                                          0
0011 Monitor Address:  AS-i 1: 28 - 31  Diagnosis: assigned devices        1
0012                   AS-i 2: none                                         2
0013 Diag Freeze:      no                                                   3
0014 Error Unlock:     no                                                   4
0015 *********************************************************************** 5
```

A provisional configuration log can be identified by the entry "**NOT VALIDATED**" in line 10

Example configuration log (excerpt) of a faulty configuration
(Generation II and lower)

```
  :
  :
0075 **********************************************************************5
0076 SUBDEVICE SECTION                                                    6
0077 **********************************************************************7
0078 ADDRESS:      1 used standard                                        8
0079 ADDRESS:      2 used safety input      CODE:        00 00 00 00

**** CONFIG ERROR ******************************
****               error in code
**** CONFIG ERROR ******************************

                                                                          9
0080 ADDRESS:      3 no entry                                             0
0081 ADDRESS:      4 no entry                                             1
  :
  :
  :
0107 ADDRESS:     30 no entry                                             7
0108 ADDRESS:     31 no entry                                             8
0109 **********************************************************************9
0110 INFO SECTION                                                         0
0111 **********************************************************************1
0112 INACTIVE:    none                                                    2
0113 **********************************************************************3
0114 NOT VALIDATED                                                        4
0115

**** CONFIG ERROR ******************************
****               ERROR IN CONFIGURATION
**** CONFIG ERROR ******************************
```

The configuration log of a faulty configuration contains error entries.

Example configuration log (excerpt) of a faulty configuration
(Generation II V4.x or higher)

```
0066 Subdevice Section                                                    6
0067 ********************************************************************* 7
0068 AS-i 1                                                               8
0069 -------------------------------------------------------------------- 9
0070 Address:  1 used safety input      Code:  D9 25 8E B6                0

**** CONFIG ERROR ******************************
****               error in code
**** CONFIG ERROR ******************************

0071 Address:  2 used safety input      Code:  3D A8 57 E9                1
0072 Address:  3 used safety input      Code:  1A B8 75 D6                2
0073 Address:  4 used safety input      Code:  3E C6 A5 D7                3
0074 Address:  5 not used safety input  Code:  39 B7 5A 6C                4
...
```

Example configuration log (excerpt) of a faulty configuration
(Generation II V4.x or higher)

```
0144 ********************************************************************* 4
0145 Info Section                                                         5
0146 ********************************************************************* 6
0147 Inactive Devices: none                                               7
0148 ********************************************************************* 8
0149 Not Validated                                                        9
0150


**** CONFIG ERROR ******************************
****               ERROR IN CONFIGURATION
**** CONFIG ERROR ******************************
```

In the above examples, line 79 (Function range 'Basic'), and/or 70 (Function range 'Enhanced' or higher) contains the error message indicating that the code table of the safe AS-i slave is faulty. The code "`00 00 00 00`" indicates that this safe AS-i slave was not switched on (ON state) during the teaching of the safe configuration. Line 115 (Function range 'Basic') and/or line 150 (Function range 'Enhanced' or higher) at the end of the configuration log also contains the error message indicating that the configuration is faulty.

5.12.2 AS-i diagnostics indices

○
👤 *Information!*
If the standard assignment of the diagnostics indices is changed (see chapter 7.2 "Assign-ment of the AS-i diagnostics indices") and this configuration is loaded into the AS-i safety monitor, the current assignments of the device indices to the AS-i diagnostics indices is included in the configuration log as an assignment list.

Example configuration log with AS-i diagnostics index assignment
(Generation II and lower)

```
0101 *********************************************************************1
0102 INACTIVE:    none                                                   2
0103 ---------------------------------------------------------------------3
0104 AS-i DIAGNOSIS REFERENCE LIST                                        4
0105 DIAG INDEX: 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15          5
0106 DEVICE:     -- 32 33 35 34 -- -- -- -- -- -- -- -- -- -- --          6
0107                                                                      7
0108 DIAG INDEX: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31          8
0109 DEVICE:     -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --          9
0110                                                                      0
0111 DIAG INDEX: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47          1
0112 DEVICE:     -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --          2
0113 *********************************************************************3
```

Example configuration log with AS-i diagnostics index assignment (Generation II V4.x or higher)

```
0146 ************************************************************************* 6
0147 Inactive Devices: none                                                   7
0148 ----------------------------------------------------------------------- 8
0149 AS-Interface Diagnosis Reference List                                    9
0150                                                                          0
0151 Diag Index:   0   1   2   3   4   5   6   7   8   9                       1
0152 Device:       -   0   1   2   3   -   -   -   -   -                       2
0153                                                                          3
0154 Diag Index:  10  11  12  13  14  15  16  17  18  19                      4
0155 Device:       -   -   -   -   -   -   -   -   -   -                       5
...
0220 Diag Index: 230 231 232 233 234 235 236 237 238 239                      0
0221 Device:       -   -   -   -   -   -   -   -   -   -                       1
0222                                                                          2
0223 Diag Index: 240 241 242 243 244 245 246 247 248 249                      3
0224 Device:       -   -   -   -   -   -   -   -   -   -                       4
0225                                                                          5
0226 Diag Index: 250 251 252 253 254 255                                      6
0227 Device:       -   -   -   -   -   -                                      7
0228 ************************************************************************* 8
```

Local terminals

**Overview of settings for local terminals
(only Safety Basic Monitor)**

```
0216 ----------------------------------------------------------------------- 6
0217 Local Input Terminals:                                                   7
0218 S1/S2: input for dry contacts                                           8
0219 S3/S4: standard I/O                                                      9
0220 S5/S6: standard I/O                                                      0
0221 S7/S8: input for OSSD                                                    1
0222 ----------------------------------------------------------------------- 2
```

Message outputs

**Overview of selected assignment of message outputs
(only Safety Basic Monitor)**

```
0222 ----------------------------------------------------------------------- 2
0223 Diagnostic Outputs:                                                      3
0224 S31: Device     3 = "Emergency shutdown#1"                              4
0225 S42: Device     8 = "Emergency shutdown#2"                              5
0226 S51: Device     2 = "Emergency shutdown#3"                              6
0227 S62: Device     5 = "Emergency shutdown#4"                              7
0228 ----------------------------------------------------------------------- 8
```

5.12.3 Print manager

The print manager can be opened with the **Print -> Open print manager** command as well as with the 🖨 printer icon in the toolbar.
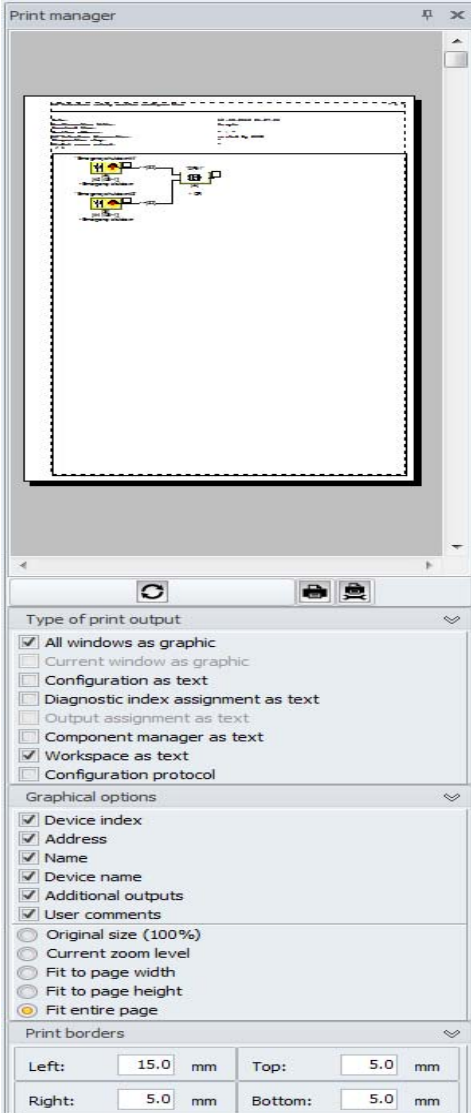
Print manager toolbar

Refresh preview:	Before a printout can be started, the preview for the currently set options must be updated.
Printing:	This starts the printout on the printer. It is important that the printer settings made when updating the last preview are also used for the printout. This function is only active if the print preview is current.
Printer setup:	The setup for the printout can be specified with this. It is imperative to do this before generating the preview.

Options for the type of printout

Only those options can be selected that are possible for the current state in ASIMON.

All windows as graphic:	All windows are printed out as graphics (page 353).
Active window as graphic:	The currently active window is printed out as a graphic (page 353).
Configuration as text:	Text output of the current configuration (page 351).
Diagnostic index assignment as text:	Text output of the diagnostics index assignment (page 360).
Output assignment as text:	Text output of the output assignment (page 360).
Component manager as text:	Text output of the component manager (page 356).
Workspace as text:	Text output of the workspace (page 355).
Configuration log:	Output of the current configuration log of the monitor (chap. 5.1). This option is only available if the configuration log window is open.

Graphical options

These options only influence the display of **All windows as graphic** and **Active window as graphic.** This involves the same options as in the window **Options** (page 46).
If the display options are changed, the associated **print options** are adjusted too.

Device index:	The internal position number of the device.
Address:	The AS-i addresses used.
Name:	The device name specified by the user.
Device name:	Name of the device type.
Additional outputs:	The assigned outputs of the output assignment (page 46) also accessible via the toolbar.
User comments:	Freely placeable, user-defined comments. Additionally, the print scaling can be modified (options also present in the **Options** menu (page 74).
Original size (100%):	The output is carried out unscaled.

Current zoom level: The output is carried out with the same scaling as on the monitor screen.

Fit to page width: The scaling is adjusted so that the output is determined by the width of the sheet.

Fit to page height: The scaling is adjusted so that the output is determined by the height of the sheet.

Fit entire page: The scaling is adjusted so that the output fits on one sheet.

Printing margins

With these settings, the printing margins can be modified (represented by the dashed line in the preview). These options will not be permanently saved, however.

Printing the configuration as text

Following is an example of such a configuration hardcopy:

(Generation II and lower)

```
                                                      - 1 -
            AS-interface safety monitor configuration



            Date:                            08.12.2009 10:17:42
            Configuration title:             Configuration 1
            Download time:                   16.Mai 2008  .  16:32
            Monitor address (ASi-1):         28 / 29 / 30 / 31
            Monitor address (ASi-2):         -
            AS-interface diagnostics:        sorted by OSSD
            Diagnostics stop:                -
            Reset of error condition:        -

            [32]  Emergency shutdown
                  Name:                      "NA1"
                  Type:                      forced
                  Start-up test:             No
                  Local acknowledgement:     No
                  OSSD:                      1
                  Address:                   1 (ASi-1)

            [33]  Emergency shutdown
                  Name:                      "NA3"
                  Type:                      forced
                  Start-up test:             No
                  Local acknowledgement:     No
                  OSSD:                      1
                  Address:                   2 (ASi-1)

            [34]  Emergency shutdown
                  Name:                      "NA2"
                  Type:                      forced
                  Start-up test:             No
                  Local acknowledgement:     No
                  OSSD:                      2
                  Address:                   4 (ASi-1)

            [35]  Emergency shutdown
                  Name:                      "BWS 1"
                  Type:                      forced
                  Start-up test:             No
                  Local acknowledgement:     No
                  OSSD:                      1 2
                  Address:                   3 (ASi-1)

            [36]  Monitored start - standard slave
                  Name:                      "S 2"
                  OSSD:                      2
                  Address:                   10     In-1 (ASi-1)   not inverted

            [37]  Monitored start - standard slave
                  Name:                      "S 1"
                  OSSD:                      1
                  Address:                   10     In-0 (ASi-1)   not inverted

            [38]  Stop category 0
                  Name:                      "M 1"
                  OSSD:                      1

            [39]  Stop category 0
                  Name:                      "M 2"
                  OSSD:                      2
```

(Generation II V4.x or higher)

```
                                          - 1 -
        AS-interface safety monitor configuration


        Date:                           08.12.2009 10:15:20
        Configuration title:            Configuration 1
        Download time:                  16.Mai 2008  .  16:32
        Monitor address (ASi-1):        28 / 29 / 30 / 31
        Monitor address (ASi-2):        -
        AS-interface diagnostics:       sorted by OSSD
        Diagnostics stop:               -
        Reset of error condition:       -

        [0]   Emergency shutdown
              Name:                     "NA1"
              Type:                     forced
              Start-up test:            No
              Local acknowledgement:    No
              OSSD:                     1
              Address:                  1 (ASi-1)

        [1]   Emergency shutdown
              Name:                     "NA3"
              Type:                     forced
              Start-up test:            No
              Local acknowledgement:    No
              OSSD:                     1
              Address:                  2 (ASi-1)

        [2]   Emergency shutdown
              Name:                     "NA2"
              Type:                     forced
              Start-up test:            No
              Local acknowledgement:    No
              OSSD:                     2
              Address:                  4 (ASi-1)

        [3]   Emergency shutdown
              Name:                     "BWS 1"
              Type:                     forced
              Start-up test:            No
              Local acknowledgement:    No
              OSSD:                     1 2
              Address:                  3 (ASi-1)

        [4]   Monitored start - standard slave
              Name:                     "S 2"
              OSSD:                     2
              Address:                  10      In-1 (ASi-1)   not inverted

        [5]   Monitored start - standard slave
              Name:                     "S 1"
              OSSD:                     1
              Address:                  10      In-0 (ASi-1)   not inverted

        [6]   Stop category 0
              Name:                     "M 1"
              OSSD:                     1

        [7]   Stop category 0
              Name:                     "M 2"
              OSSD:                     2
              Actuator address:         15 (ASi-1)
              Input slave address:      16 (ASi-1)
```

Graphical printout

With the **All windows as graphic** or **Active window as graphic** output, the graphical window contents are printed along with some supplemental information.

Shown below is an example of a graphical printout of a configuration window.

(Generation II and lower)

Check-boxes for commissioning

(Generation II V4.x or higher)

```
AS-interface safety monitor configuration


Date:                               08.12.2009 09:58:49
Configuration title:                Configuration 1
Download time:                      13.Mai 2008  .  15:47
Monitor address:                    28 / 29 / 30 / 31-
AS-interface diagnostics:           sorted by OSSD
Diagnostics stop:                   -
Reset of error condition:           -
M 1  ->  1. OSSD
```


Check-boxes for commissioning
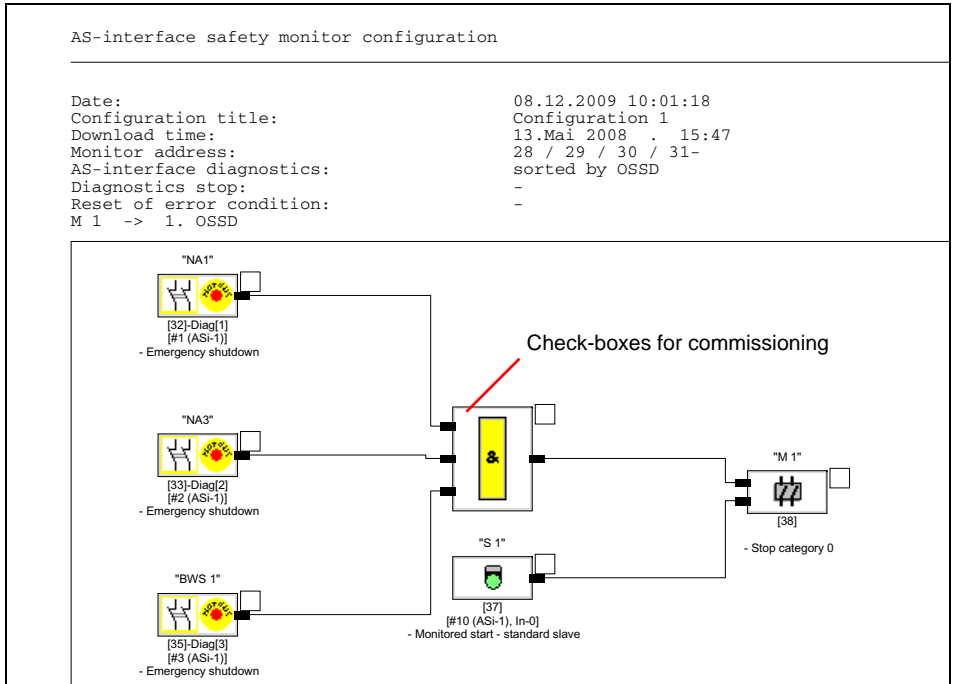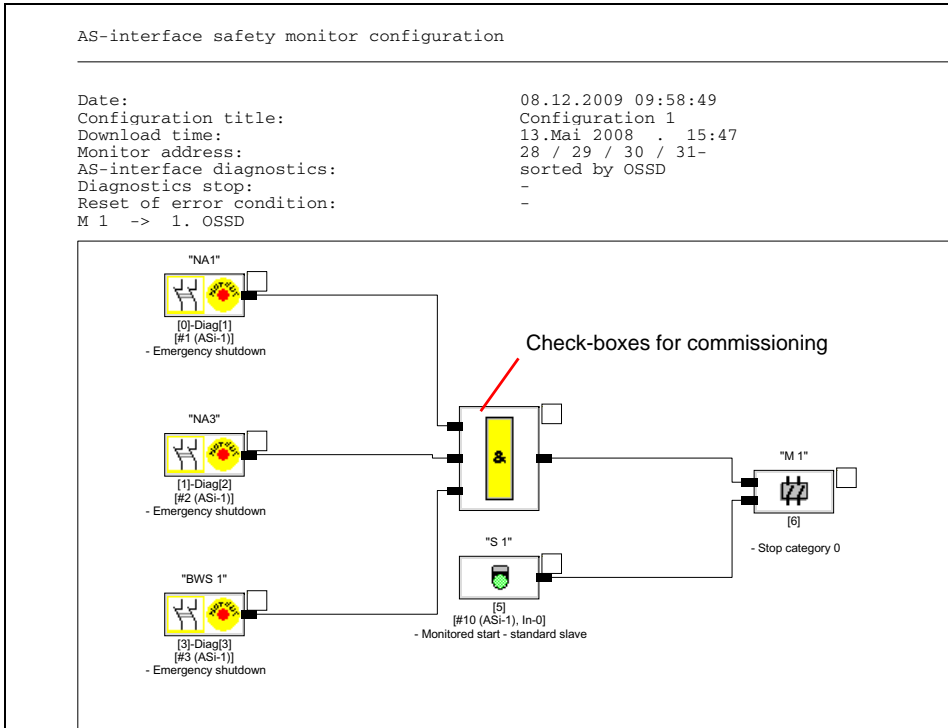
Information!
The printout of the configuration window does not replace the configuration log. It serves only as a good documentation aid in the set program language.

TIP:
The printout of a configuration window contains check-boxes located to the upper right of each device which you can use to tick off the commissioning of each device.

Printing the workspace as text

A summary of all configurations present in the workspace will be printed. Additionally to the global configuration information all AS-i slave addresses used in the configuration are exported.

```
                                         - 1 -
          AS-interface safety monitor configuration




          Date:                          15.07.2008 16:23:16
          Workspace:                     SampleWorkspace


          Configuration title:           Configuration 1

          Interface:                     COM5


          [0]   Emergency shutdown
                Name:                     "NA1"
                Address:                  1 (ASi-1)
          [1]   Emergency shutdown
                Name:                     "NA3"
                Address:                  2 (ASi-1)
          [3]   Emergency shutdown
                Name:                     "BWS 1"
                Address:                  3 (ASi-1)
          [2]   Emergency shutdown
                Name:                     "NA2"
                Address:                  4 (ASi-1)
          [4]   Monitored start - standard slave
                Name:                     "S 2"
                Address:                  10      In-1 (ASi-1)   not inverted
          [5]   Monitored start - standard slave
                Name:                     "S 1"
                Address:                  10      In-0 (ASi-1)   not inverted


          Configuration title:           Configuration 1

          Interface:                     COM5


          [32]  Emergency shutdown
                Name:                     "NA1"
                Address:                  1 (ASi-1)
          [33]  Emergency shutdown
                Name:                     "NA3"
                Address:                  2 (ASi-1)
          [35]  Emergency shutdown
                Name:                     "BWS 1"
                Address:                  3 (ASi-1)
          [34]  Emergency shutdown
                Name:                     "NA2"
                Address:                  4 (ASi-1)
          [36]  Monitored start - standard slave
                Name:                     "S 2"
                Address:                  10      In-1 (ASi-1)   not inverted
          [37]  Monitored start - standard slave
                Name:                     "S 1"
                Address:                  10      In-0 (ASi-1)   not inverted
```

The first part of the printout contains a configuration for **'Generation II V4.x'** (or higher) monitors. The second one for **Generation II** (and lower) monitors.

Printing the component manager as text

Following is an example of such a configuration hardcopy:

(Generation II and lower)

```
                                           - 1 -
        Component manager



        Date:                            08.12.2009 09:36:39
        Configuration title:             Configuration 1
        Sort:                            Device
========================================================================

[32][#1 (ASi-1)]"NA1" - Emergency shutdown
M 1  ->  1. OSSD

[33][#2 (ASi-1)]"NA3" - Emergency shutdown
M 1  ->  1. OSSD

[34][#4 (ASi-1)]"NA2" - Emergency shutdown
M 2  ->  2. OSSD

[35][#3 (ASi-1)]"BWS 1" - Emergency shutdown
M 1  ->  1. OSSD
M 2  ->  2. OSSD

[36][#10 (ASi-1), In-1]"S 2" - Monitored start - standard slave
M 2  ->  2. OSSD

[37][#10 (ASi-1), In-0]"S 1" - Monitored start - standard slave
M 1  ->  1. OSSD

[38]"M 1" - Stop category 0
M 1  ->  1. OSSD

[39]"M 2" - Stop category 0
M 2  ->  2. OSSD
```

```
                                              - 2 -
          Component manager




          Date:                              08.12.2009 09:36:39
          Configuration title:              Configuration 1
          Sort:                             Address


          #1 (ASi-1): [32]"NA1" - Emergency shutdown
          M 1  ->  1. OSSD

          #2 (ASi-1): [33]"NA3" - Emergency shutdown
          M 1  ->  1. OSSD

          #3 (ASi-1): [35]"BWS 1" - Emergency shutdown
          M 1  ->  1. OSSD
          M 2  ->  2. OSSD

          #4 (ASi-1): [34]"NA2" - Emergency shutdown
          M 2  ->  2. OSSD

          #10 (ASi-1): [36]"S 2" - Monitored start - standard slave
          M 2  ->  2. OSSD

          #10 (ASi-1): [37]"S 1" - Monitored start - standard slave
          M 1  ->  1. OSSD
```

```
                                              - 3 -
          Component manager




          Date:                              08.12.2009 09:36:39
          Configuration title:              Configuration 1
          Sort:                             OSSD


          M 1  ->  1. OSSD
          [32][#1 (ASi-1)]"NA1" - Emergency shutdown
          [33][#2 (ASi-1)]"NA3" - Emergency shutdown
          [35][#3 (ASi-1)]"BWS 1" - Emergency shutdown
          [37][#10 (ASi-1), In-0]"S 1" - Monitored start - standard slave
          [38]"M 1" - Stop category 0

          M 2  ->  2. OSSD
          [34][#4 (ASi-1)]"NA2" - Emergency shutdown
          [35][#3 (ASi-1)]"BWS 1" - Emergency shutdown
          [36][#10 (ASi-1), In-1]"S 2" - Monitored start - standard slave
          [39]"M 2" - Stop category 0
```

(Generation II V4.x or higher**)**

```
                                                    - 1 -
        Component manager



        Date:                           08.12.2009 09:22:03
        Configuration title:            Configuration 1
        Sort:                           Device
    ─────────────────────────────────────────────────────────────────

    [0][#1 (ASi-1)]"NA1" - Emergency shutdown
    M 1  ->  1. OSSD

    [1][#2 (ASi-1)]"NA3" - Emergency shutdown
    M 1  ->  1. OSSD

    [2][#4 (ASi-1)]"NA2" - Emergency shutdown
    M 2  ->  2. OSSD

    [3][#3 (ASi-1)]"BWS 1" - Emergency shutdown
    M 1  ->  1. OSSD
    M 2  ->  2. OSSD

    [4][#10 (ASi-1), In-1]"S 2" - Monitored start - standard slave
    M 2  ->  2. OSSD

    [5][#10 (ASi-1), In-0]"S 1" - Monitored start - standard slave
    M 1  ->  1. OSSD

    [6]"M 1" - Stop category 0
    M 1  ->  1. OSSD

    [7][A#15 (ASi-1) / C#16 (ASi-1)]"M 2" - Stop category 0
    M 2  ->  2. OSSD
```

```
                                                      - 2 -
            Component manager



            Date:                     08.12.2009 09:22:03
            Configuration title:      Configuration 1
            Sort:                     Address
            ===================================================================

            #1 (ASi-1): [0]"NA1" - Emergency shutdown
            M 1  ->  1. OSSD

            #2 (ASi-1): [1]"NA3" - Emergency shutdown
            M 1  ->  1. OSSD

            #3 (ASi-1): [3]"BWS 1" - Emergency shutdown
            M 1  ->  1. OSSD
            M 2  ->  2. OSSD

            #4 (ASi-1): [2]"NA2" - Emergency shutdown
            M 2  ->  2. OSSD

            #10 (ASi-1): [4]"S 2" - Monitored start - standard slave
            M 2  ->  2. OSSD

            #10 (ASi-1): [5]"S 1" - Monitored start - standard slave
            M 1  ->  1. OSSD

            #15 (ASi-1): [7]"M 2" - Stop category 0
            M 2  ->  2. OSSD

            #16 (ASi-1): [7]"M 2" - Stop category 0
            M 2  ->  2. OSSD
```

```
                                                      - 3 -
            Component manager



            Date:                     08.12.2009 09:22:03
            Configuration title:      Configuration 1
            Sort:                     OSSD
            ===================================================================

            M 1  ->  1. OSSD
            [0][#1 (ASi-1)]"NA1" - Emergency shutdown
            [1][#2 (ASi-1)]"NA3" - Emergency shutdown
            [3][#3 (ASi-1)]"BWS 1" - Emergency shutdown
            [5][#10 (ASi-1), In-0]"S 1" - Monitored start - standard slave
            [6]"M 1" - Stop category 0

            M 2  ->  2. OSSD
            [2][#4 (ASi-1)]"NA2" - Emergency shutdown
            [3][#3 (ASi-1)]"BWS 1" - Emergency shutdown
            [4][#10 (ASi-1), In-1]"S 2" - Monitored start - standard slave
            [7][A#15 (ASi-1) / C#16 (ASi-1)]"M 2" - Stop category 0
```

Print diagnostic index assignment

Following is an example of such a configuration hardcopy:

(Generation II and lower)

```
                                              - 1 -
          Device index assignment for AS-interface diagnostics




          Date:                             08.12.2009 08:58:31
          Configuration title:              Configuration 1
          Download time:                    13.Mai 2008  .  15:47
          Monitor address (ASi-1):          28 / 29 / 30 / 31
          Monitor address (ASi-2):          -
          AS-interface diagnostics:         sorted by OSSD
          Diagnostics stop:                 -
          Reset of error condition:         -

          Diagnostics  index Device   index     Address              Name
          1                32          [#1-1]               NA1
          2                33          [#1-2]               NA3
          3                35          [#1-3]               BWS 1
          4                34          [#1-4]               NA2
```

(Generation II V4.x or higher**)**

```
                                              - 1 -
          Device index assignment for AS-interface diagnostics




          Date:                             08.12.2009 08:55:41
          Configuration title:              Configuration 1
          Download time:                    13.Mai 2008  .  15:47
          Monitor address (ASi-1):          28 / 29 / 30 / 31
          Monitor address (ASi-2):          -
          AS-interface diagnostics:         sorted by OSSD
          Diagnostics stop:                 -
          Reset of error condition:         -

          Diagnostics  index Device   index     Address              Name
          1                0           [#1-1]               NA1
          2                1           [#1-2]               NA3
          3                3           [#1-3]               BWS 1
          4                2           [#1-4]               NA2
```

5.13   Entering and changing the password

The following safety-relevant, important commands are protected in **ASIMON 3 G2** by a password:

• **PC -> Monitor…**
• **Teach safe configuration**
• **Validate…**
• **Stop**
• **Change password…**

After calling up a password-protected command, a password dialog box opens in which the password is entered and the authorization for executing the command is checked.
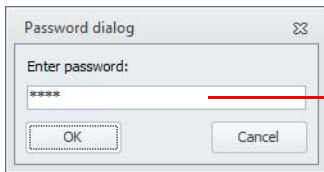
4 … 8 alphanumerical characters;
A … Z, a … z, 0 … 9, default: "SIMON"

Password is case-sensitive!

If an incorrect password is entered, an error message is output and command execution is interrupted.
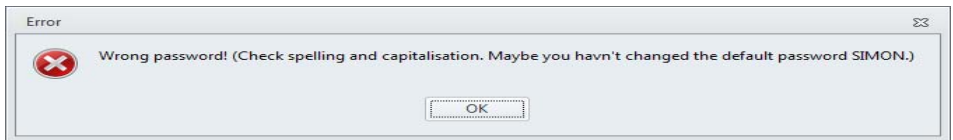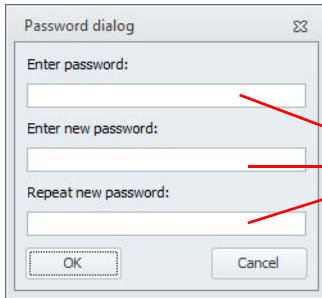
Information!
*When a correct password is entered, **ASIMON 3 G2** remembers the password for 5 minutes. If you execute other password-protected commands during this period, you do not need to re-enter the password. Each time a password-protected command is executed, the internal marker time is reset to 5 minutes.*

This makes working with the software easier, as you do not need to constantly enter the password. It should, however, not lead to careless use of the password.

The default password (factory setting) of the AS-i Safety Monitor is "**SIMON**". If you would like to reconfigure the AS-i Safety Monitor, you **must first change this default password to a new one** known only to you as safety officer.

With the **Change password…** command in the **Monitor** menu, you can change the password of the connected AS-i Safety Monitor in configuration operation.

The following dialog box opens:

Password dialog	
Enter password:	
	4 … 8 alphanumerical characters; A … Z, a … z, 0 … 9
Enter new password:	
	Password is case-sensitive!
Repeat new password:	
OK Cancel	

Confirm your entry with the **OK** button. The new password is now saved in the AS-i Safety Monitor and must be used for all password-protected commands from now on.

5.14 Start ACT

With the command **Application** –> **Extras** -> **Start ACT with AS-i circuit 1/2**, the AS-i master configuration program **ACT** is started. It automatically connects to the AS-i master and displays the selected AS-i circuit.

As long as **ACT** is running, **ASIMON 3 G2** cannot be used. Only after **ACT** is closed **ASIMON 3 G2** can be accessed again.

Information!
This function is only available if a gateway with integrated safety monitor is connected.

6. Diagnostics and error handling

6.1 Diagnostics

Use the **Diagnostics** command in the **Monitor** menu or click on the ∞ button to call up the diagnostics view of the configuration saved in the AS-i safety monitor.

Information!
The Diagnostics command is available only when the AS-i Safety Monitor is in protective operation!

Should **ASIMON 3 G2** not be able to detect the configuration of the monitor in the list of recently used files or the workspace, the configuration is uploaded from the monitor. This process is very time intensive, and a state bar displays the progress:

CV 4.00E 01 23 00 67BB (SV4.3)	Loading diagnostics configuration 51%

If the configuration was found or the downloading process is finished the following is displayed:

CV 4.00E 01 23 00 67BB (SV4.3)	Diagnostics configuration loaded

Diagnostics configuration loaded

For the diagnostics view, these data are converted to virtual LEDs (tree structure display) for each device in the configuration or represented as colored device outlines and device connections (circuit diagram display) which provide a quick overview of the state of the OSSD(s).

Example 1 (circuit diagram display): both OSSDs are validated
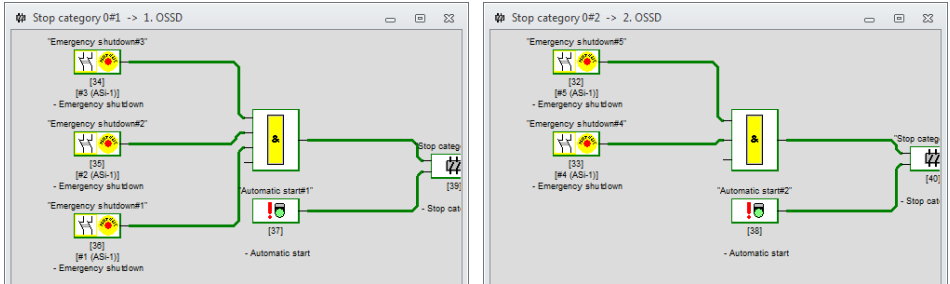
Example 1 (tree structure display): both OSSDs are validated
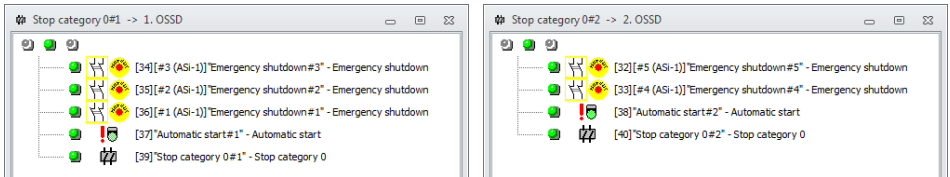
An LED or outline/line color is assigned to each configured device which indicates its state.

In addition, each OSSD also has three LEDs (only in the tree structure display) which correspond to the device LEDs on the AS-i safety monitor: **1**, **2** and **3** (for a description of the states, refer to the operating manual of the AS-i safety monitor).

The devices or device LEDs can have the following states:

Display or color		Meaning
	Green continuous	Device is in the ON state (switched on)
	Green flashing	Device is in the ON state (switched on), but already in the process of being switched to the OFF state, e.g. switch-off delay
	Yellow continuous	Device is ready, but is still waiting for another condition, e.g. local acknowledgment / reset, diagnostics stop or start button
	Yellow flashing	A (start) test must be performed
	Red continuous	Device is in the OFF state (switched off)
	Red flashing	The error lock is active, release by means of one of the following actions: • Error unlock with the Service button • Actuate slave for error unlock • Power OFF/ON • AS-i bus OFF/ON
	Gray off	No communication with the AS-i slave

If Type 1 is selected, the following table applies to the device "Remote output diagnostics"
(only Generation II V4.x or higher) (see device <Remote output diagnostics>):

| Value	Display or color		Description	Change of state	LED "Out"
0/8		Green	Output on		On
1/9		Green flashing	–		–
2/10		Yellow	Restart-disable	Auxiliary signal 2	1 Hz
3/11		Yellow flashing	–		–
4/12		Red	Output off		Off
5/13		Red flashing	Waiting for error unlock	Auxiliary signal 1	8 Hz
6/14		Gray	Internal error, for instance "fatal error"	Only through turning power "on" on the device	All LEDs are flashing
7/15		Green/yellow	Output validated but not switched on	Switched "on" by setting O1	Off

Information!
Additional diagnostic information can be obtained via the AS-i bus and the device LEDs on the AS-i safety monitor and, if applicable, the participating AS-i slaves. Additional information on diagnostics can be found in chap. 7.
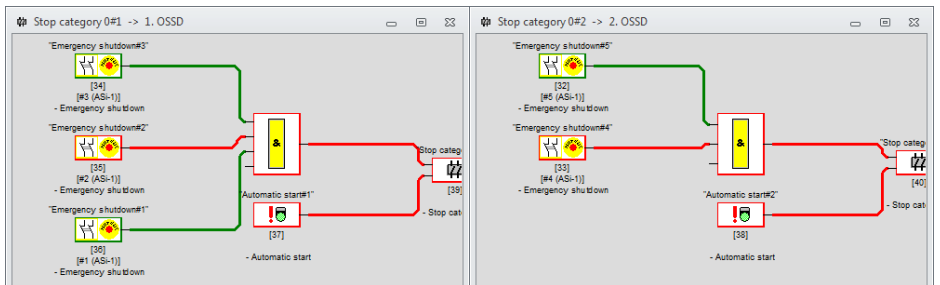
Examples of typical diagnostic states follow.

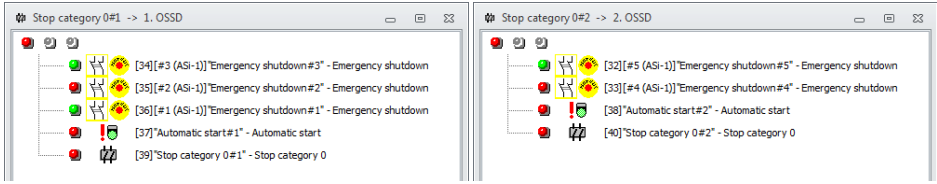Example 2 (circuit diagram display):
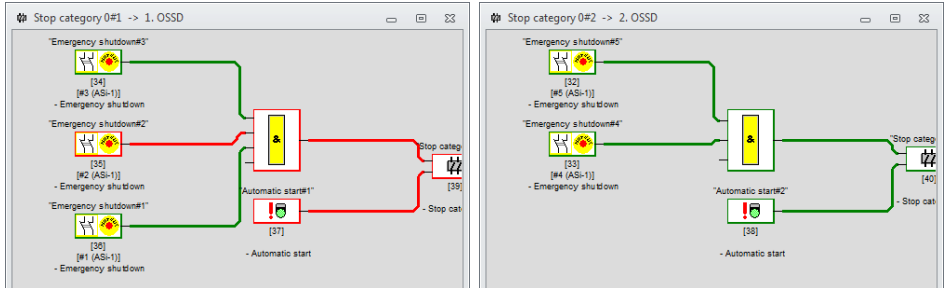
Example 2 (tree structure display):
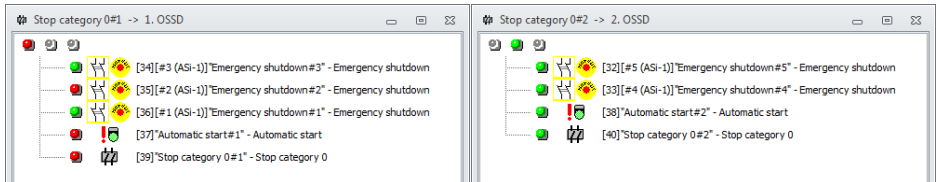
Example 3 (circuit diagram display):

Example 3 (tree structure display):

6.2   Switch-off history

If diagnostics mode is active, the switch-off history for individual OSSDs can be displayed via **Application** -> **Diagnostics** -> **Switch-off history**.

For this purpose, the correct OSSD must be selected in the list of the **Switch-off history** menu item (the suggested value is the OSSD of the currently open window). If the menu item is selected, the color at shut-off time of the corresponding OSSD is displayed instead of the current diagnostics data. If every device is gray, the release circuit was switched off since the last start of the AS-i Safety Monitor.

If the device color has changed during the OSSD shut-off, the device text is displayed red. This way it's easier to find the source of the shut-off.

Information!
In this mode, system devices are always gray, since their state is not saved at the time of the shut-off.

To display the switch-off history of another release circuit (OSSD), it's necessary to go back to the diagnostics mode first by selecting the menu entry or clicking the button.

6.3   Error report

Should errors in AS-i communication or SafeLink occur during the online diagnostics, ASIMON opens a spontaneous message window in which all current errors are listed. The buttons in the window footer have the following functions:

• **ACT circ 1**: calls up AS-i control tools with AS-i circuit 1 to analyze AS-i circuit 1.
• **ACT circ 2**: calls up AS-i control tools with AS-i circuit 2 to analyze AS-i circuit 2.
• **SafeLink diagnostics**: for configurations with SafeLink, the **SafeLink diagnostics** window can be opened here (see chap. 6.6) to enable a more accurate analysis of SafeLink.
• **Close for this session**: closes the window until the next time the online diagnostics is started. If the window is closed normally, it re-opens when the error text is changed.

6.4 Output assignment

You can assign devices to message outputs in the Safety Basis Monitor. Use the dialog **output assignment** for this purpose.

Depending on the monitor type, outputs can be assigned to devices in order to transfer their respective state. The output type must be selected before the assignment is made.

Depending on the selected monitor type, various types of outputs are available:

• Message output (Safety Basic Monitor only), local unsafe output
• SafeLink (only Generation II 4.x 'SV4.3' with active SafeLink), safe bit of the safe coupling
• PROFIsafe (from Safety Version 'SV4.3' on) safe output bit for PROFIsafe
• Fieldbus bit (from Safety Version 'SV4.3' on, only combi-devices), unsafe bit in the fieldbus data.
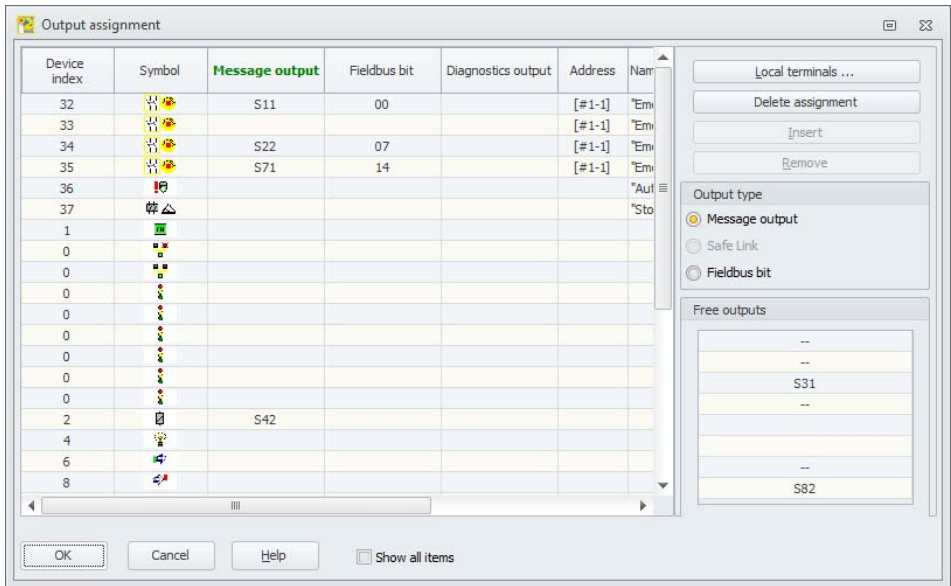
As **Message Outputs** you can only assign outputs, which have been configured as **Standard Input/ Message Output**. With the **Local terminals** button the connection type can be changed.

Outputs from the section **Free outputs** can be assigned to the device via drag&drop, double-click or the **Insert** button.

They can also be removed via drag&drop, double-click or the button Remove.

You can cancel all assignments via the button **Delete assignment**.

In the **Diagnostics output** column, the assigned AS-i diagnostics outputs are displayed, but they can only be changed in the dialog of the corresponding output device.

6.5 Troubleshooting and error rectification

The **ASIMON 3 G2** software provides information for most errors and operating states via

- the state bar
- message and info window
- the diagnostics
- error report on AS-i errors and errors in SafeLink
- SafeLink diagnostics (chap. 6.6)

Additional information on troubleshooting can be obtained:

- through diagnostics via the AS-i bus (see chap. 7.)
- the device LEDs on the AS-i Safety Monitor
  (see operating manual of the AS-i Safety Monitor)
- the device LEDs on the participating AS-i slaves (where present).

If you should still have problems during troubleshooting, please first consult the online help and the handbooks/operating manuals of the participating devices.

If necessary, check the bus addresses and cable connections of the participating devices.

6.6   SafeLink diagnostics

With SafeLink, it is possible to exchange signals across many devices (nodes) via complex network structures. So that SafeLink works efficiently, certain basic conditions are necessary:

- The nodes that exchange signals must be able to reach each other on the network level in the multicast group.
- The node which is the manager of the SafeLink must be able to reach all devices involved in the multicast group.
- The propagation time of the network packets should not be subject to large fluctuations (whereby the absolute duration is not relevant).

The diagnostics of the SafeLink aids in the search for connection errors or problems caused when the above-mentioned points interfere with data exchange. It is used for:

- Finding bad / missing data connections between individual nodes
- Detecting of not activated / missing nodes
- Detecting of incorrectly configured nodes

After the monitor diagnostics has been started, ASIMON gathers additional information on SafeLink from the devices in the background. When faulty states are detected in this process, a corresponding note appears in the error report. The error report provides the **SafeLink diagnostics** button to start a more accurate analysis.

When the diagnostics of the SafeLink starts, a comprehensive overview of the devices (nodes) involved first appears. All relationships between the devices are represented by colored lines.

The meanings of the symbols and colors are explained in the following using an example of a diagnostics of three nodes.

6.6.1   Example - three nodes
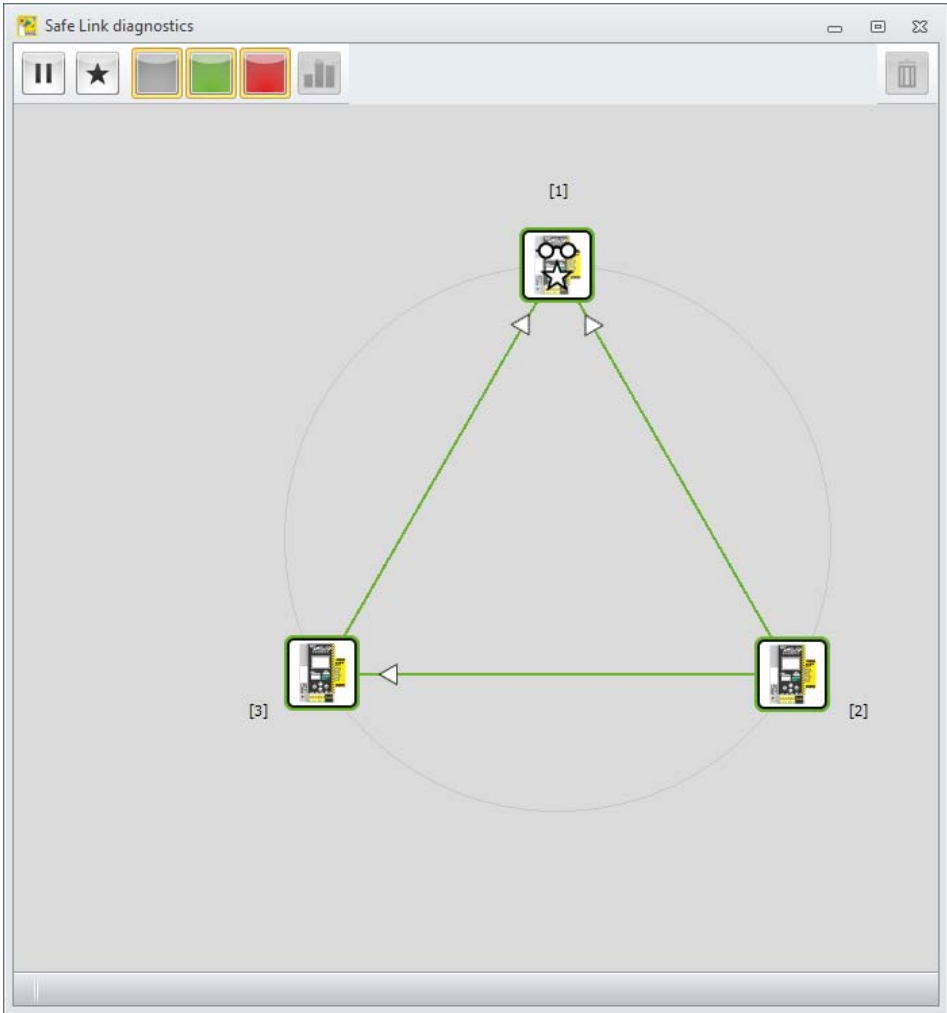
The diagnostics shows the three nodes and their connections to each other. Each node is represented with a symbol .

The symbol has a colorful border which specifies the current state of the node:

• green: the node is active
• red: the node is in 'init', 'pre-operational' state.

If the node cannot be detected directly before the diagnostics, it is shown in gray and cannot be selected in the following since no data exists.

The address of the SafeLink is located next to the symbol of the device. A star is added to the symbol of the manager node (node [1] here). The device which is currently being diagnosed by ASiMon has the "glasses" symbol.

The menu buttons in the upper border of the window are used to handle the rest of the diagnostics. The following functions are possible:

6.6.2   Operational controls

❚❚	This switch can be used to pause the diagnostics of the SafeLink. This can cause the current overview to "freeze".
★	If the manager node has been selected, this button can be used to switch between the node view and the manager view. In the manager view, devices can be detected which have not been put into operation or are not detected by the manager. The node view is the view of the data connections - this is also the case for other devices.
▮▮▮	These buttons are used to filter relationships between nodes based on their states. The relationships of the respective color are then suppressed. In the case of larger configurations, this allows the "intact" relationships to be suppressed, for example, making it easier to identify the problematic connection. The filter function does not refer to the connection, but exclusively to its state. If, for example, the green relationships are filtered out and one of these connections becomes "faulty", then it is again represented in red or gray.
▁▂▃	This button switches between the histogram view and the connection view.
🗑	This button resets all histogram values and error counters of all involved nodes.

A node is selected with a click of the mouse. It moves to the middle of the circle to make its relationships to other nodes easier to detect (particularly in the case of larger configurations).

> **Information!**
> When "Cross-communication input" is clicked on in the ASIMON monitor diagnostics, the
> selection changes to the corresponding node in the diagnostics of SafeLink.

The information on this node is now displayed in the upper left area of the window:

- The address and the name of the device
- The IP address
- The status reported by the node itself
- The status reported by the manager

Below is a listing of telegram error counters of the selected node:

Every line corresponds to the respective node address. If the node is present in the configuration of the SafeLink, a gray frame appears around the address. The nodes whose data is used by the selected device have a colored-in frame. The colors show the telegram error counters in traffic light form:

- white - no failure counters are accumulated
- green - single errors have occurred
- orange - double errors have occurred
- red - triple errors have occurred (shut-off).

The color of the critical event dominates the representation.

The data connections to other nodes are displayed as lines between the nodes. The direction of the data connection is indicated with an arrow on the line. In this example it can be seen that node 1 has relationships to the two other nodes. The arrows show that node 1 is the user of the data. The configuration of this device therefore has (at least one) 'Cross-communication input' device which refers to the other nodes. In other words, the node uses safe input bits from nodes 2 and 3.

Both relationships are represented in green. The input bits are correctly exchanged.

> **Information!**
> *Each node can only give information about which data it is expecting and if it receives it. Data is sent connectionless via the multicast protocols. The transmitter does not receive feedback for its transmit data.*

If a node has been selected, the ■■ button can be used to switch between the view of the connections and the histogram view.
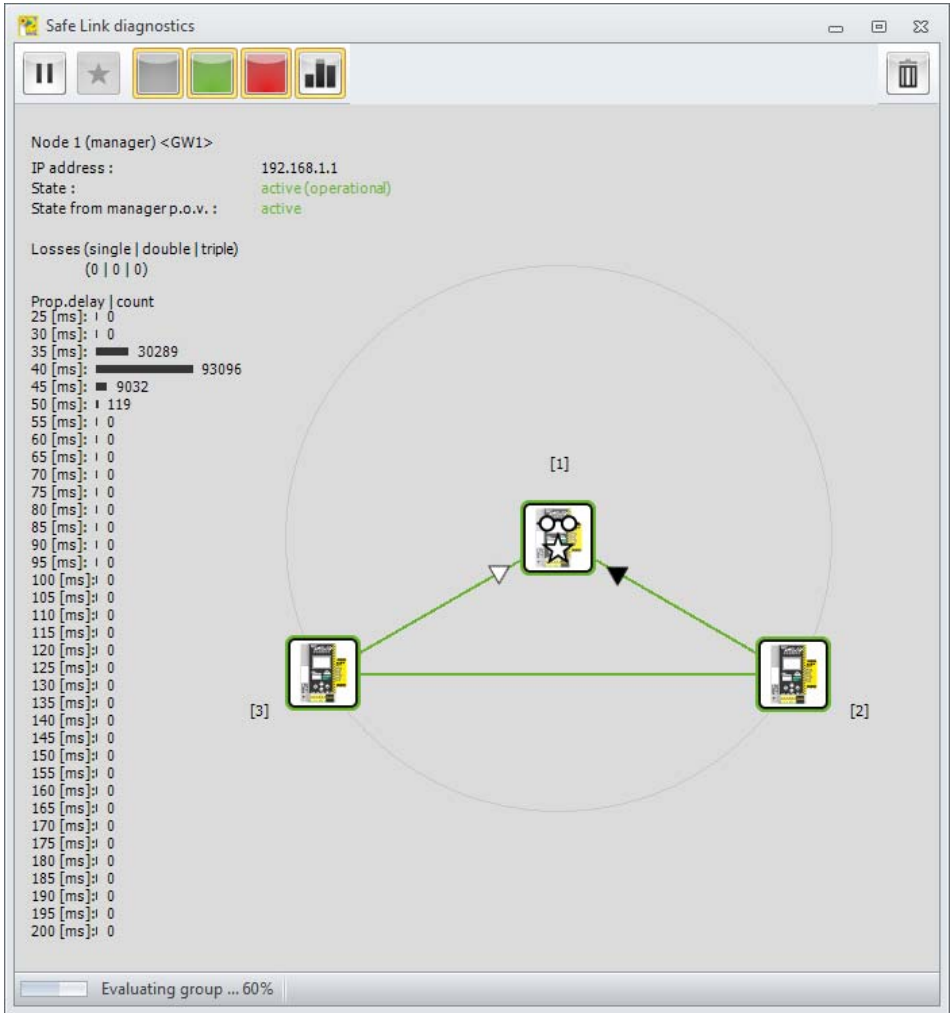
Now a connection between two nodes can be chosen in this representation by selecting the tip of the arrow of the connection. For this relationship, the estimated telegram propagation times from the perspective of the selected node now appear in the left-hand border of the image.

In addition, the telegram error counters for this one relationship are displayed above the histogram.

The colors of the nodes and their relationships have the following meanings in the histogram view:

Color of the node:

• green: all telegram error counters '0'
• orange: single and/or double error counter
• red: triple error counter (this node had shut-offs)

Color of the lines:

• green: no error on this connection
• orange: single and/or double error on this connection
• red: triple error on this connection (shut-off due to this connection).

Information!
*In this view, only the **incoming** data connections to the selected nodes are marked with arrows, since data from the selected device can only be requested for these relationships. All other relationships are displayed with simple lines.*

The button with the trash can 🗑 resets **all** histogram values and error counters.

The following graphic shows an example of a connection with the present error counters.
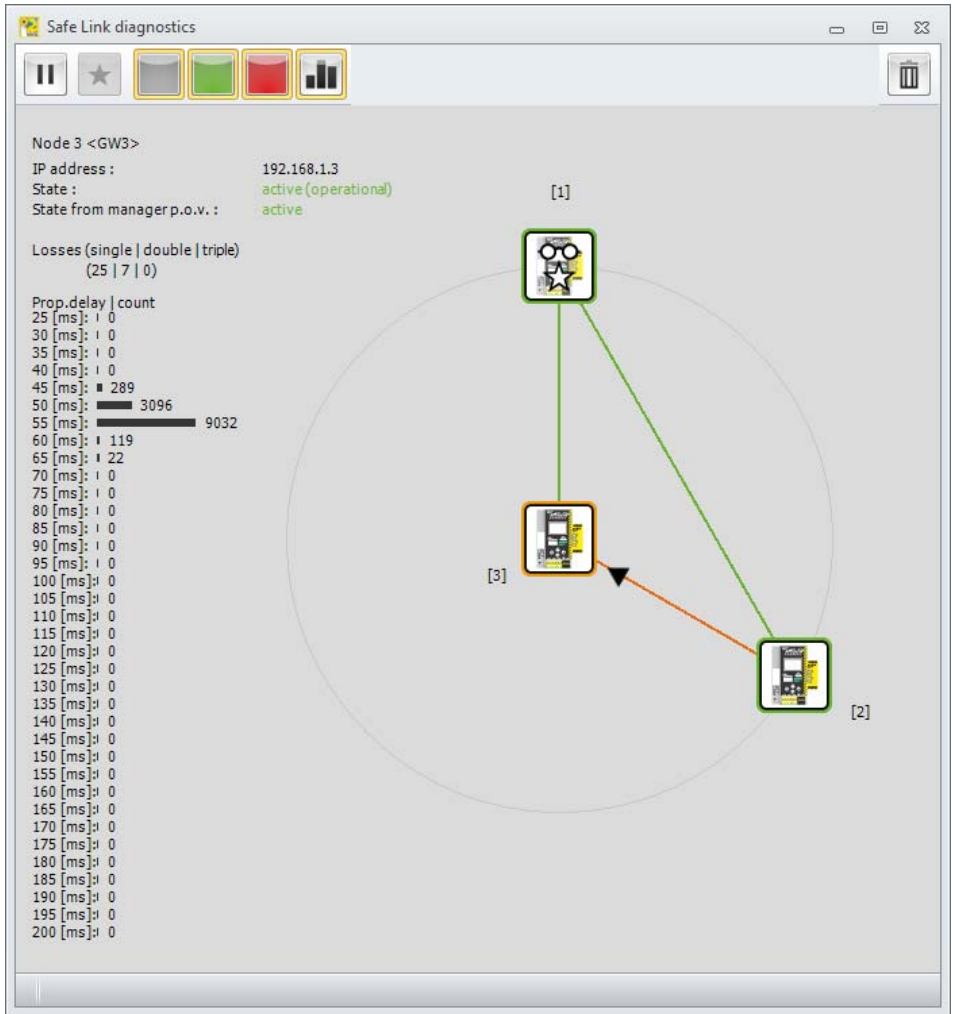
Information!
The term 'shut-off' in this chapter refers to shut-offs of the safety due to the connection quality of the SafeLink. Shut-offs due to safety-oriented participants are neither detected nor represented by this diagnostic form.

6.6.3   Example - 3 nodes, 1 node not taught

The following graphic shows the same setup, in which node 3 has not yet been taught / activated by the manager.

The overview shows node 3 with a red border and gray (missing) relationships.
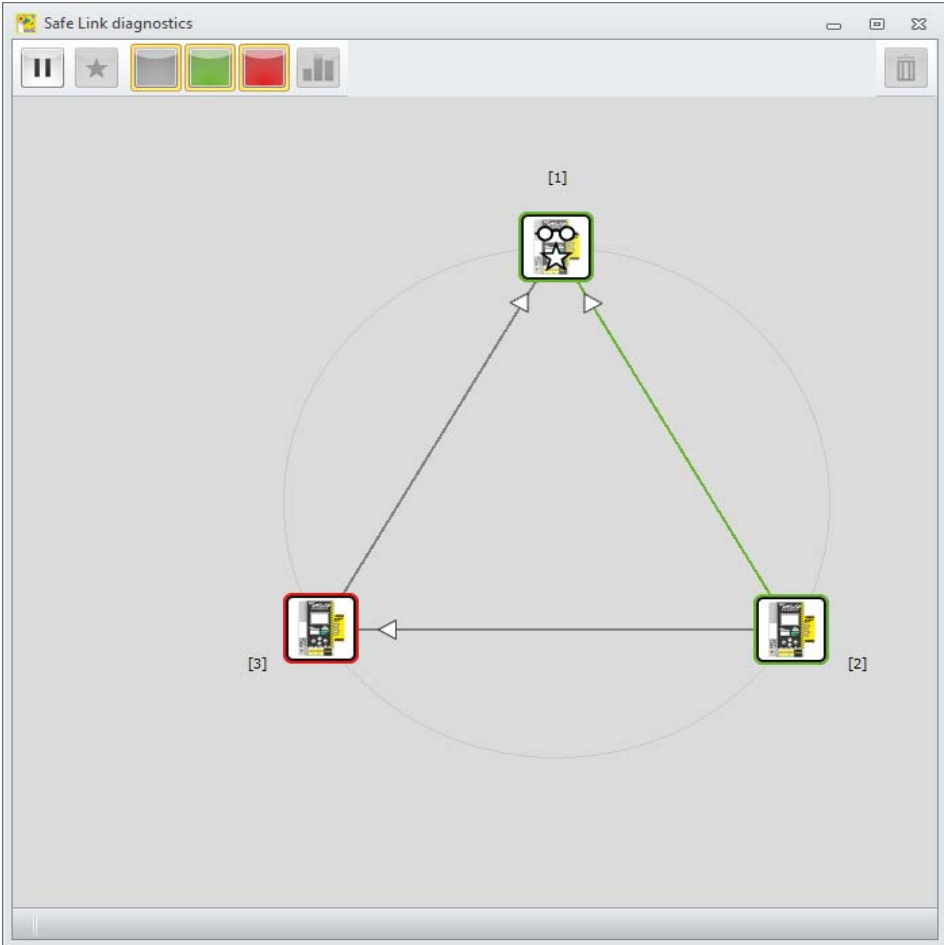
After the node has been selected, the corresponding information appears which, in this case, points directly to the problem.

The information view of the node displays that it is in the 'not taught' state.
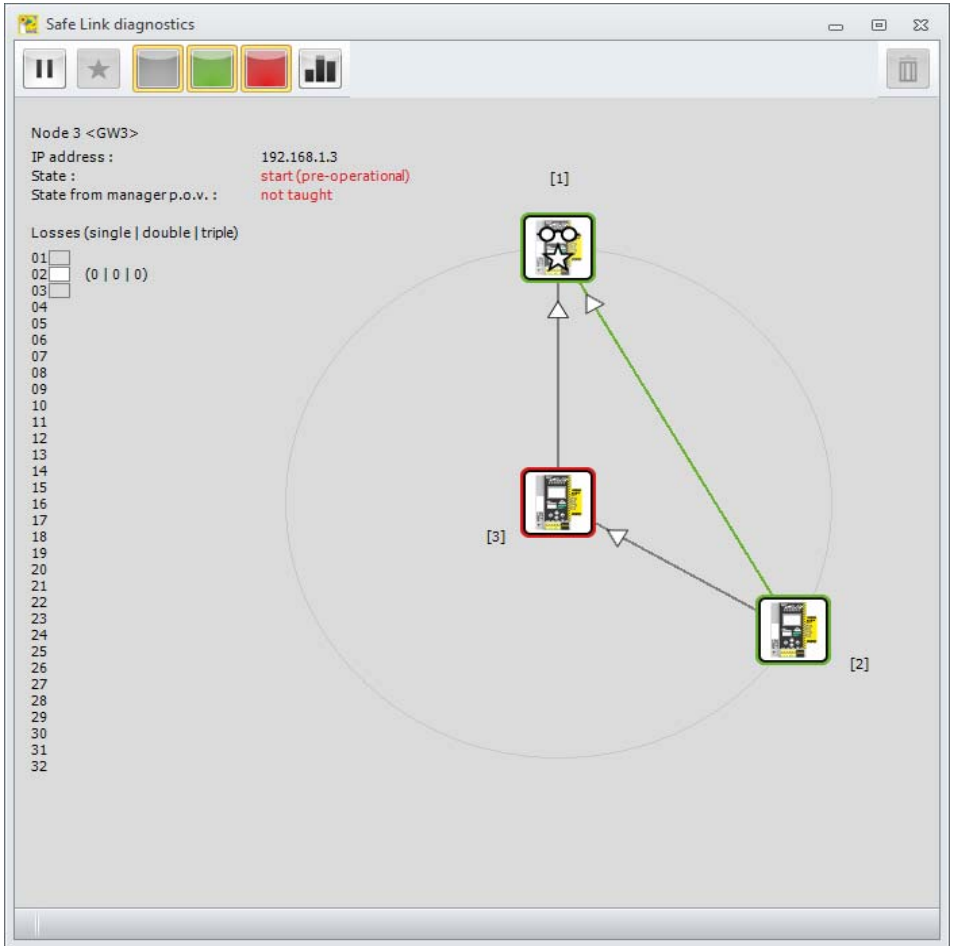
Selecting node 1 (manager) and switching to the 'Manager view' also results in the red connection to node 3 being displayed.

Ⓘ **Information!**
In the manager view, no data relationships are displayed via the lines; instead, only the status is displayed in which the manager administers the nodes. That is why no arrows are present on the lines in this view.

The colors of the manager view mean the following:

- green: 'active'
- gray: 'missing'
- red: 'present' but not activated.

6.6.4 Diagnostic procedure

The cause of interference often lies in individual nodes or connections. In this case, it is wise to first find out in the overall view which devices or connections are not functioning correctly.

> **Information!**
> *In the event that the configuration contains many nodes, it is wise to suppress the green lines with the corresponding button in the menu.*

To then observe individual nodes, select the node and switch to the individual view.

> **Information!**
> *It can happen that the data exchange between two nodes only works in one direction, meaning that both nodes can send data but only one node can also receive data. This then indicates the network communication is insufficient and is, for example, blocked by a switch, the multicast protocols.*

During diagnostics, it is important that the SafeLink uses a different 'network channel' than the diagnostic tools. Safe cross-communication uses the so-called multicast process in which all participants communicate via a certain target IP address and its packets from the network topology are distributed to the participants. Target-oriented protocols are used for diagnostics which are answered by the individual devices.

This makes it possible for the two types of data exchange to be handled differently by the network and for them to take different paths if necessary. Both of the following cases would be conceivable:

• Multicast protocols are partially blocked: SafeLink is not working or is incomplete. When the diagnostic communication is working, the participating nodes are nevertheless detected and their data is available. Some / all connections appear as faulty since the nodes could not establish cross-communication.
• Diagnostic protocols are blocked / do not reach all nodes. When the multicast domain is working, SafeLink can function, but the diagnostics fails. In this case, some nodes are displayed in gray and reported as missing.

6.7 Known problems

Problem:

The mouse cursor jumps erratically on the PC screen

The Microsoft Windows operating systems check by default whether a mouse is connected to a serial interface (COM1, COM2, …). If the serial connection exists between the safety monitor and the PC when the PC is started up, the AS-i Safety Monitor may be interpreted by the operating system as a mouse.

The result: The mouse cursor jumps erratically about the PC screen.

Remedy:

As a remedy, the connection to the monitor can be separated while the PC starts. In addition, the start behavior of the operating system can be changed. For details, refer to the user documentation provided by the manufacturer of your PC or operating system.

7. AS-i Safety Monitor diagnostics

The **ASIMON 3 G2** software communicates with AS-i safety monitors through corresponding protocols. The protocol type depends on the safety monitor type and its function range and configuration:

	Consortium diagnostics	Enhanced diagnostics Type I	Enhanced diagnostics Type II	Consortium diagnostics with S-7.3 extension[*1]
	chap. 7.3	chap. 7.4	chap. 7.5	chap. 7.6
Monitor version < 2.0	x	—	—	—
Basic	x	—	—	—
Safety Basic Monitor	x	—	x	x
Enhanced / Generation II, Safety Version SV3.0	x	x	—	—
Generation II / Safety Version 'SV4.x'	—	—	x	—

*1   This diagnostics type can be selected in ASIMON3 G2 under the menu item 'Monitor settings -> Diagnostics/Service -> Diagnostics type -> Compatibility mode with additional diag data'.

Information!
The consortium diagnostics of the consortium monitor is not supported by the monitors of Generation II V4.x (or higher) any longer. The basis monitor from Safety Version 'SV4.x' on is, however, an exception.

Information!
You can find the safety version of the device on the device sticker.

7.1 Monitor base address +1 and +2

Monitors with the function range 'Basic', 'Enhanced', 'Generation II' also reserve the monitor base address+1. For monitors with more than two OSSDs, base address +2 is also assigned [1].

If monitor slaves with base address +1 and +2 exist, the state of several OSSDs is transmitted there.

Monitor base address+1 assignment	
Data bit	Content
D0	State of output circuit 1
D1	State of message output 1
D2	State of output circuit 2
D3	State of message output 2

Monitor base address+2 assignment[1]	
Data bit	Content
D0	State of output circuit 3
D1	State of message output 3
D2	State of output circuit 4
D3	State of message output 4

[1] For Safety Basis Monitors in compatibility mode with additional diag data, the tables in chap. 7.6 "Consortium diagnostics with S-7.3 extension" on page 436 apply.

7.2   Assignment of the AS-i diagnostics indices

When performing diagnostics via the AS-i, the PLC is informed of the indices of the devices which are switched off. In earlier versions of the AS-i Safety Monitor, if a device was pasted to or deleted from the configuration, all subsequent indices were moved. As a result, it was necessary for the user to modify the diagnostics program in the PLC.

In the **Application** menu of **ASIMON** version 2.1, you can now use the **Diagnostics index assignment** menu item to freely assign diagnostics indices to the devices for AS-i diagnostics.

(Generation II and lower)
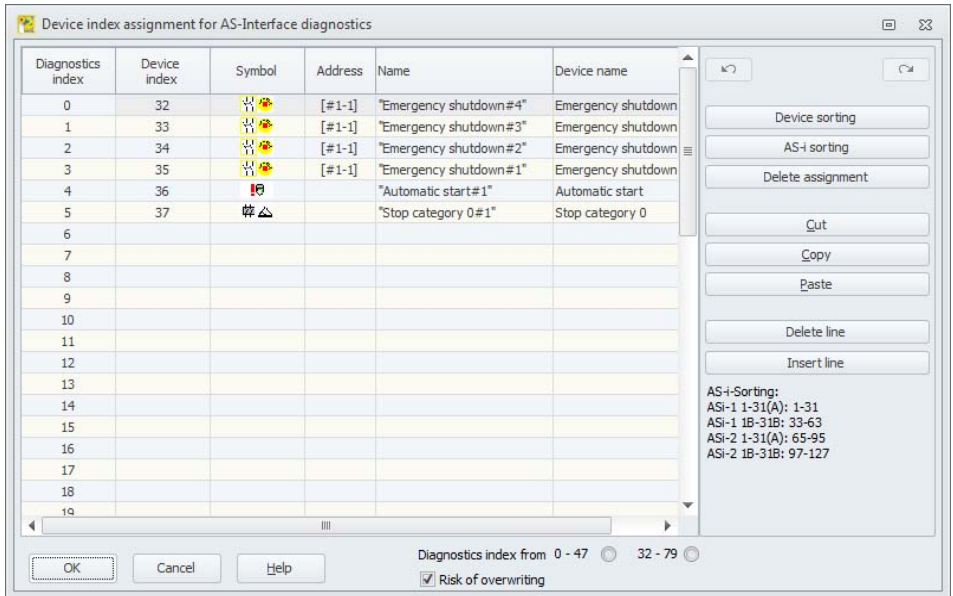
(Generation II V4.x or higher)
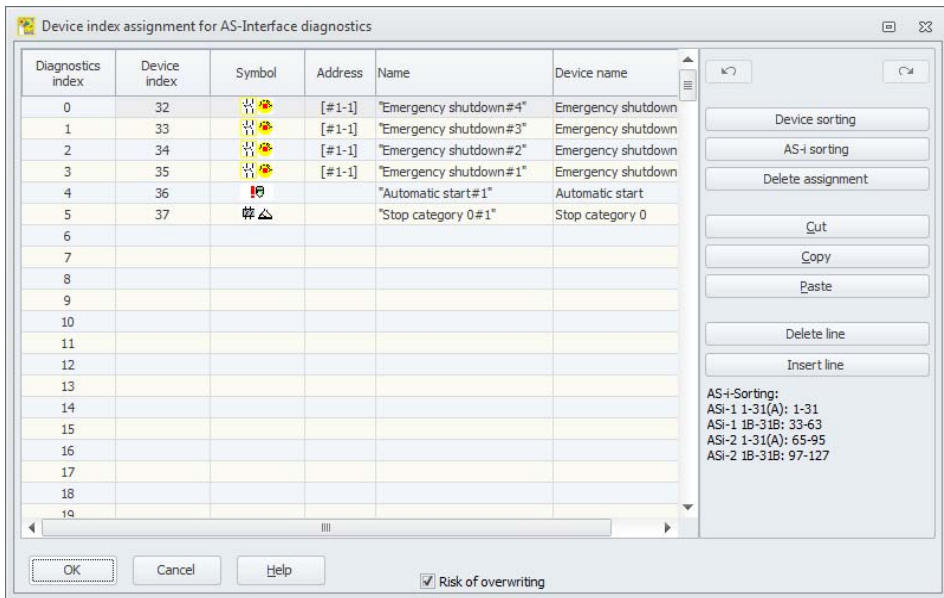
Information!

*You can also call up the diagnostics index assignment window by clicking the **Diagnostics index** button when creating or editing a device. When editing a device, the current diagnostics index of the device is also displayed below the **Diagnostics index** button.*

At the bottom right of the window **Diagnostics index assignment for AS-interface diagnostics** the user can select if the diagnostics indices range from 0 … 47 (standard setting) or, analogous to the module indices, from 32 … 79 (Generation II and lower). For Generation II V4.x (or higher) the diagnostics index always ranges from 0 … 255.

By activating the **Risk of overwriting** check box, **ASIMON 3 G2** will display the following info window to warn you if you attempt to assign an already assigned diagnostics index to a different device.
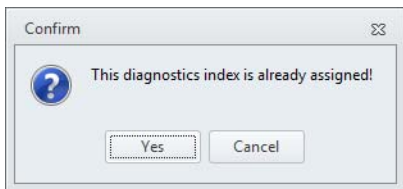
Editing assignments

By default, all configured devices are assigned sequentially increasing diagnostics indices. The device with index 32 is assigned diagnostics index 0, the device with index 33 is assigned diagnostics index 1, etc.

> **Information!**
> Use the **Device sorting** button to restore this original assignment at any time.
> If the standard assignment of the diagnostics indices is changed, the color of the table headings changes from gray to green.

If a device is not assigned to a diagnostics index, the diagnostics index assignment window is split horizontally and the unassigned devices appear in the lower window area.

(Generation II and lower)

(Generation II V4.x or higher)

Diagnostics index	Device index	Symbol	Address	Name	Device name		
0						↶	↷
1	32		[#1-1]	"Emergency shutdown#4"	Emergency shutdown	Device sorting	
2	33		[#1-1]	"Emergency shutdown#3"	Emergency shutdown	AS-i sorting	
3	34		[#1-1]	"Emergency shutdown#2"	Emergency shutdown	Delete assignment	
4	35		[#1-1]	"Emergency shutdown#1"	Emergency shutdown		
5						Cut	
6						Copy	
7						Paste	
8							
9						Delete line	
10						Insert line	
11							
12						AS-i-Sorting:	
13						ASi-1 1-31(A): 1-31	
14						ASi-1 1B-31B: 33-63	
						ASi-2 1-31(A): 65-95	
-	36			"Automatic start#1"	Automatic start	ASi-2 1B-31B: 97-127	
-	37			"Stop category 0#1"	Stop category 0		

OK   Cancel   Help   ☑ Risk of overwriting

When editing the assignment table, the following options are always available:

- **Assignment via drag&drop** with the mouse.
- **Direct editing** of the device indices in the upper window area in the **Device index** column.
- **Direct editing** of the diagnostics indices in the lower window area in the **Diagnostics index** column.
- Editing via the **AS-i sorting**, **Delete assignment**, **Cut**, **Copy**, **Paste**, **Delete line** and **Insert line** buttons.

- Editing with keyboard commands:

  Cursor buttons and <**Tab**> (Navigation)

<**Alt**>+<**B**>	(Device sorting)
<**Alt**>+<**A**>	(AS-i sorting)
<**Alt**>+<**I**>	(Delete assignment)
<**Ctrl**>+<**X**>	(Cut)
<**Ctrl**> + <**C**>	(Copy)
<**Ctrl**> + <**V**>	(Paste)
<**Delete**>	(Delete line)
<**Insert**>	(Insert line)
<**Ctrl**>+<**ZZ**>	(Undo)
<**Ctrl**>+<**Y**>	(Redo)

Use the **Undo** ⤺ and **Redo** ⤻ buttons to reverse or restore changes which you have made step-by-step.

Device sorting

The original sequentially increasing assignment of all configured devices to the diagnostics indices is restored.

AS-i sorting

All safe addresses of the monitoring devices and the addresses of the "Remote output diagnostics" devices are assigned to the diagnostics index which corresponds to the AS-i address.

The following schedule is used:

- AS-i Circ 1 A / single slaves: 1-31
- AS-i Circ 1 B slaves: 33-63
- AS-i Circ 2 A / single slaves: 65-95
- AS-i Circ 2 B slaves: 97-127

The remaining devices are listed in the lower window area by increasing device index.

Delete assignment

The assignment of the devices to the diagnostics indices is completely deleted and all devices are listed in the lower window area by increasing device index.

Cut

The contents of the marked line are cut and then added at the appropriate location in the lower window area; the line remains empty.

Copy

The contents of the marked line are copied to the clipboard.

Paste

The contents of the clipboard are added into the marked line.

Delete line

The marked line is deleted and the device added at the appropriate location in the lower window area; the lines which follow the deleted line are shifted up (diagnostics index minus one).

Insert line

A blank line is added above the marked line; the lines which follow the added line are shifted down (diagnostics index plus one).

After all changes have been made, click the **OK** button to accept the new device index assignment for the AS-interface diagnostics.

Information!
If the standard assignment of the diagnostics indices is changed (indicated by a change in the color of the table headings from gray to green) and this configuration is loaded into the AS-i Safety Monitor, the current assignment of the device indices to the AS-i diagnostics indices is included in the configuration log as an assignment list.

Example configuration log with AS-i diagnostics index assignment (Generation II and lower)

```
0101 **************************************************************************1
0102 INACTIVE:   none                                                         2
0103 ------------------------------------------------------------------------3
0104 AS-i DIAGNOSIS REFERENCE LIST                                            4
0105 DIAG INDEX: 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15              5
0106 DEVICE:     -- 32 33 35 34 -- -- -- -- -- -- -- -- -- -- --              6
0107                                                                          7
0108 DIAG INDEX: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31              8
0109 DEVICE:     -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --              9
0110                                                                          0
0111 DIAG INDEX: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47              1
0112 DEVICE:     -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --              2
0113 **************************************************************************3
```

Example configuration log with AS-i diagnostics index assignment (Generation II V4.x or higher)

```
0149 AS-Interface Diagnosis Reference List                                    9
0150                                                                          0
0151 Diag Index:  0   1   2   3   4   5   6   7   8   9                       1
0152 Device:      -   0   1   2   3   -   -   -   -   -                       2
0153                                                                          3
0154 Diag Index: 10  11  12  13  14  15  16  17  18  19                       4
0155 Device:      -   -   -   -   -   -   -   -   -   -                       5
0156                                                                          6
0157 Diag Index: 20  21  22  23  24  25  26  27  28  29                       7
0158 Device:      -   -   -   -   -   -   -   -   -   -                       8
```

7.3   Consortium diagnostics

7.3.1   General

The consortium diagnostic protocol (Legacy) is used by Generation II (and lower) monitors.

In Generation II monitors '**Legacy**' must be explicitly selected as profile in the monitor menu.

> *Information!*
> *For the Safety Basic Monitor, the setting is enabled in the 'Monitor settings -> Diagnostics/ Service -> Diagnostics type' dialog. Here, the selection '**Consortium monitor, for replacement**' must be chosen.*

7.3.2 Transmission and evaluation of the diagnostic data

Information!
*The assignment of an **AS-i slave address for the AS-i safety monitor** is a prerequisite for diagnosing the AS-i safety monitor on the AS-i master.*

Using the AS-i bus, diagnostics of the AS-i Safety Monitor and configured devices is possible from the AS-i master, normally a PLC with master module.

However, to ensure reliable transmission and efficient evaluation of the diagnostic data, a series of requirements must be satisfied:

• Relatively long telegram propagation times may occur, particularly when using an additional bus system between PLC and AS-i. Owing to the asynchronous transmission in the master in the case of two successive, identical data calls, the PLC may not necessarily know when the AS-i Safety Monitor is responding to the new call. Thus, the answers to two successive, different data calls should differ by at least one bit.
• The diagnostic data must be consistent, i.e. the state information sent by the AS-i Safety Monitor must match the actual device states, especially if the propagation time to the PLC is longer than the updating time in the AS-i Safety Monitor (approx. 30 … 150 ms).
• Whether a switched-off relay of an output circuit represents the normal state depends on the operating mode of the AS-i Safety Monitor. The diagnostics in the PLC should only be called in the event of a deviation from the normal state.

The diagnostic procedure described below satisfies these requirements and should therefore always be followed.

Diagnostic procedure

The PLC always queries the AS-i Safety Monitor alternately with two data calls (0) and (1). These data calls return the basic information (state of the output circuits, protective/configuration operation) to allow a diagnostics. The AS-i Safety Monitor answers the two calls with the same user data (3 bit, D2 … D0). Bit D3 is a control bit, similar (but not identical) to a toggle bit. D3 is 0 for all even data calls (0); D3 is 1 for all odd data calls (1). This enables the PLC to detect whether the answer has changed.

Data calls (0) and (1) return the answer X000 if the normal state exists (protective operation, everything OK). For devices with only one output circuit and with two dependent output circuits, output circuit 2 is always marked as OK. With two independent output circuits, an unconfigured circuit is also marked as OK. In order to be able to interpret what is OK and what is not OK, the user must be familiar with his configuration.

If the data call changes from (0) to (1), the data set is saved in the AS-i Safety Monitor. Bit D3 in the answer, however, remains reset until the process is concluded. As a result, the PLC thinks it has received answers to data call (0). If D3 is set, a consistent data set exists.

If, with the bit D3 set, the answer from the AS-i Safety Monitor signals deactivation of an output circuit, detailed diagnostic information can now be queried in the saved state with the specific data calls (2) … (B). Depending on the setting in the configuration of the AS-i safety monitor, data calls (4) … (B) return device diagnostic information sorted according to output circuit (see chap. 7.3.4) or unsorted (see chap. 7.3.5).

> **Information!**
> *If the AS-i Safety Monitor is in configuration operation, it is not possible to query the detailed diagnostic information using the data calls (2) … (B).*

A fresh data call (0) cancels the saved state again.

7.3.3   Diagnostics of AS-i Safety Monitor

State of output circuits, operating mode

Information!

The alternate sending of data calls (0) and (1) is essential for consistent data transmission (see "Diagnostic procedure").

The **binary values of the data calls relate to the AS-i level** and may possibly be inverted at PLC level.

Data call / Value	Answer D3 … D0	Meaning
(0) / 1111 State of monitor	0000	Protective operation, everything OK (non-existent, unconfigured or dependent output circuits are displayed as OK).
	0001	Protective operation, output circuit 1 off.
	0010	Protective operation, output circuit 2 off.
	0011	Protective operation, both output circuits off.
	0100	Configuration operation: Power On.
	0101	Configuration operation.
	0110	Reserved / not defined.
	0111	Configuration operation: fatal device error, RESET or device exchange required.
	1XXX	No up-to-date diagnostic information available, please wait.

Data call / Value	Answer D3 … D0	Meaning
(1) / 1110 Save diagnostic information (state of monitor)	1000	Protective operation, everything OK (non-existent, unconfigured or dependent output circuits are displayed as OK).
	1001	Protective operation, output circuit 1 off.
	1010	Protective operation, output circuit 2 off.
	1011	Protective operation, both output circuits off.
	1100	Configuration operation: Power On.
	1101	Configuration operation.
	1110	Reserved / not defined.
	1111	Configuration operation: fatal device error, RESET or device exchange required.

Coding of OSSD states

Code bit [3 … 0]	State resp. color	Description
0	Green continuous	Output on
1	Green flashing	Delay time is running at stop category 1
2	Yellow continuous	Start-up/restart-disable active
3	Yellow flashing	External test necessary / acknowledgment / switch-on delay active
4	Red continuous	Output off
5	Red flashing	Error
6	Gray off	Output not projected

Color coding

Information!
The color of a device corresponds to the color of the virtual LEDs in the diagnostic view of the ASIMON 3 G2 configuration software. A device which is not assigned to any output circuit is always shown in green.

Code CCC (D2 … D0)	Color	Meaning
000	Green continuous	Device is in the ON state (switched on)
001	Green flashing	Device is in the ON state (switched on), but already in the process of being switched to the OFF state, e.g. switch-off delay
010	Yellow continuous	Device is ready, but is still waiting for another condition, e.g. reset or start button
011	Yellow flashing	Time condition exceeded, action must be repeated, e.g. synchronization time exceeded
100	Red continuous	Device is in the OFF state (switched off)
101	Red flashing	The error lock is active, release by means of one of the following actions: • Acknowledge with the Service button • Power OFF/ON • AS-i bus OFF/ON
110	Gray off	No communication with the AS-i slave

Information!
During proper protective operation, there are also devices which are not in the green state. When searching for the cause of a shut-off, the device with the lowest device index is the most important. Others may just be subsequent effects (example: when the emergency shutdown button is pressed, the start device and timer are also in the OFF state).

By appropriately programming the functional device in the PLC, the user can be guided to the primary cause of the error. Detailed knowledge of the configuration and the function of the AS-interface Safety Monitor are necessary for the interpretation of additional information.

Because the device numbers can be moved if the configuration is changed, we recommend using the diagnostics index assignment.

Attention!
Settings in the ASIMON 3 G2 software and in the query of the safety monitor must be the same (sorted/unsorted); otherwise, incorrect diagnostics data is returned!

7.3.4 Diagnostics of devices, sorted by OSSD

With the appropriate configuration setting, data calls (4) … (B) return device diagnostic information sorted according to output circuit.

> *Information!*
> *Make sure that the correct diagnostics type is set for the AS-i safety monitor in the **Monitor settings** window of the **ASIMON 3 G2** configuration software.*
>
> *The values returned in calls (5) and (6) as well as (9) and (A) refer to the device diagnostics index in the configuration program and not to an AS-i address.*
>
> *Always execute data calls (4) … (7) and (8) … (B) together in sequence for each device.*

> *Attention!*
> *For the '**Devices sorted by OSSD**' diagnostics, the menu item '**Monitor settings** -> **Diagnostics/Service** -> **Data selection** -> **Sorted by OSSD**' must be selected!*

Sorted device diagnostics, output circuit 1

If answer to data call (1) = 10X1:

Data call / Value	Answer D3 … D0	Meaning
(4) / 1011 Number of devices not green, output circuit 1	0XXX	XXX = 0: no devices, answers to data calls (5) … (7) not relevant XXX = 1 … 6: number of devices in output circuit 1 XXX = 7: number of devices is > 6 in output circuit 1

Data call / Value	Answer D3 … D0	Meaning
(5) / 1010 Device address HIGH, output circuit 1	1HHH	HHH = I5,I4,I3: diagnostics index of device in output circuit 1 of configuration (HHHLLL = diagnostics index)

Data call / Value	Answer D3 … D0	Meaning
(6) / 1001 Device address LOW, output circuit 1	0LLL	LLL = I2,I1,I0: diagnostics index of device in output circuit 1 of configuration (HHHLLL = diagnostics index)

Data call / Value	Answer D3 … D0	Meaning
(7) / 1000 Color of device, output circuit 1	1CCC	CCC = color (see "Color coding")

Sorted device diagnostics, output circuit 2

If answer to data call (1) = 101X:

Data call / Value	Answer D3 … D0	Meaning
(8) / 0111 Number of devices not green, output circuit 2	0XXX	XXX = 0: no devices, answers to data calls (5) … (7) not relevant XXX = 1 … 6: number of devices in output circuit 2 XXX = 7: number of devices is > 6 in output circuit 2

Data call / Value	Answer D3 … D0	Meaning
(9) / 0110 Device address HIGH, output circuit 2	1HHH	HHH = I5,I4,I3: diagnostics index of device in output circuit 2 of configuration (HHHLLL = diagnostics index)

Data call / Value	Answer D3 … D0	Meaning
(A) / 0101 Device address LOW, output circuit 2	0LLL	LLL = I2,I1,I0: diagnostics index of device in output circuit 2 of configuration (HHHLLL = diagnostics index)

Data call / Value	Answer D3 … D0	Meaning
(B) / 0100 Color of device, output circuit 2	1CCC	CCC = color (see "Color coding")

Information!
Data calls (C) 0011 to (F) 0000 are reserved.

7.3.5 Diagnostics: unsorted devices

With the appropriate configuration setting, data calls (4) … (B) return unsorted device diagnostic information for all devices.

> **Information!**
> *Make sure that the correct diagnostics type is set for the AS-i safety monitor in the **Monitor settings** window of the **ASIMON 3 G2** configuration software.*
>
> *The values returned in calls (5) and (6) as well as (9) and (A) refer to the device diagnostics index in the configuration program and not to an AS-i address.*
>
> *Always execute data calls (4) … (7) and (8) … (B) together in sequence for each device.*

> **Attention!**
> *For the '**Unsorted devices**' diagnosis, the menu item '**Monitor**->**Diagnostics/Service**-> **Data selection** -> **All devices**' must be selected!*

Unsorted device diagnostics, all devices

If answer to data call (1) = 1001, 1010 or 1011:

Data call / Value	Answer D3 … D0	Meaning
(4) / 1011 Number of devices not green, continuous	0XXX	XXX = 0: no devices, answers to data calls (5) … (7) not relevant. XXX = 1 … 6: number of devices not green. XXX = 7: number of devices not green is > 6 (for colors, see table on page 399).

Data call / Value	Answer D3 … D0	Meaning
(5) / 1010 Device address HIGH	1HHH	HHH = I5,I4,I3: diagnostics index of device in configuration (HHHLLL = diagnostics index).

Data call / Value	Answer D3 … D0	Meaning
(6) / 1001 Device address LOW	0LLL	LLL = I2,I1,I0: diagnostics index of device in configuration (HHHLLL = diagnostics index).

Data call / Value	Answer D3 … D0	Meaning
(7) / 1000 Color of device	1CCC	CCC = color (see "Color coding").

Data call / Value	Answer D3 … D0	Meaning
(8) / 0111	0XXX	not used

Data call / Value	Answer D3 … D0	Meaning
(9) / 0110 Device address HIGH	1HHH	HHH = I5,I4,I3: diagnostics index of device in configuration (HHHLLL = diagnostics index).

Data call / Value	Answer D3 … D0	Meaning
(A) / 0101 Device address LOW	0LLL	LLL = I2,I1,I0: diagnostics index of device in configuration (HHHLLL = diagnostics index).

Data call / Value	Answer D3 … D0	Meaning
(B) / 0100 Assignment to output circuit	10XX	XX = 00:device from preprocessing XX = 01:device from output circuit 1 XX = 10:device from output circuit 2 XX = 11:device from both output circuits

O
⨆ **Information!**
Data calls (C) 0011 to (F) 0000 are reserved.

7.3.6 Example: Querying with diagnostics sorted by OSSD

State of output circuits, operating mode

```
       ┌─────────────┐
       │    Start    │
       └─────────────┘
              │
       ┌─────────────┐
       │ Data call (0)│
       │    State     │
       └─────────────┘

   Answer to (0) ≠ 0X00

       ┌─────────────┐
       │ Data call (1)│
       │ Freeze query │
       └─────────────┘

   Answer to (1) ≠ 1X00

       ┌─────────────┐
       │ Diagnostics │
       └─────────────┘
```

State of device LEDs

```
       ┌─────────────┐
       │ Diagnostics │
       └─────────────┘
              │
          Optional

       ┌─────────────┐
       │ Data call (2)│
       │ LEDs of Circ 1│
       └─────────────┘

       ┌─────────────┐
       │ Data call (3)│
       │ LEDs of Circ 2│
       └─────────────┘

       ┌─────────────┐
       │ Diagnostics │
       │  or start   │
       └─────────────┘
```

Device diagnostics, output circuit 1

```
       ┌─────────────┐
       │ Diagnostics │
       └─────────────┘

   Answer to (1) = 10X1

       ┌─────────────┐
       │ Data call (4)│
       │   Number     │
       └─────────────┘

       ┌─────────────┐
       │ Data call (5)│
       │ Address HIGH │           Next device
       └─────────────┘

       ┌─────────────┐
       │ Data call (6)│
       │ Address LOW  │
       └─────────────┘

       ┌─────────────┐
       │ Data call (7)│
       │    Color     │
       └─────────────┘

   Diagnostics index < previous diagnostics index

       ┌─────────────┐
       │ Diagnostics │
       │  or start   │
       └─────────────┘
```

Device diagnostics, output circuit 2

```
       ┌─────────────┐
       │ Diagnostics │
       └─────────────┘

   Answer to (1) = 101X

       ┌─────────────┐
       │ Data call (8)│
       │   Number     │
       └─────────────┘

       ┌─────────────┐
       │ Data call (9)│
       │ Address HIGH │           Next device
       └─────────────┘

       ┌─────────────┐
       │ Data call (A)│
       │ Address LOW  │
       └─────────────┘

       ┌─────────────┐
       │ Data call (B)│
       │    Color     │
       └─────────────┘

   Diagnostics index < previous diagnostics index

       ┌─────────────┐
       │ Diagnostics │
       │  or start   │
       └─────────────┘
```
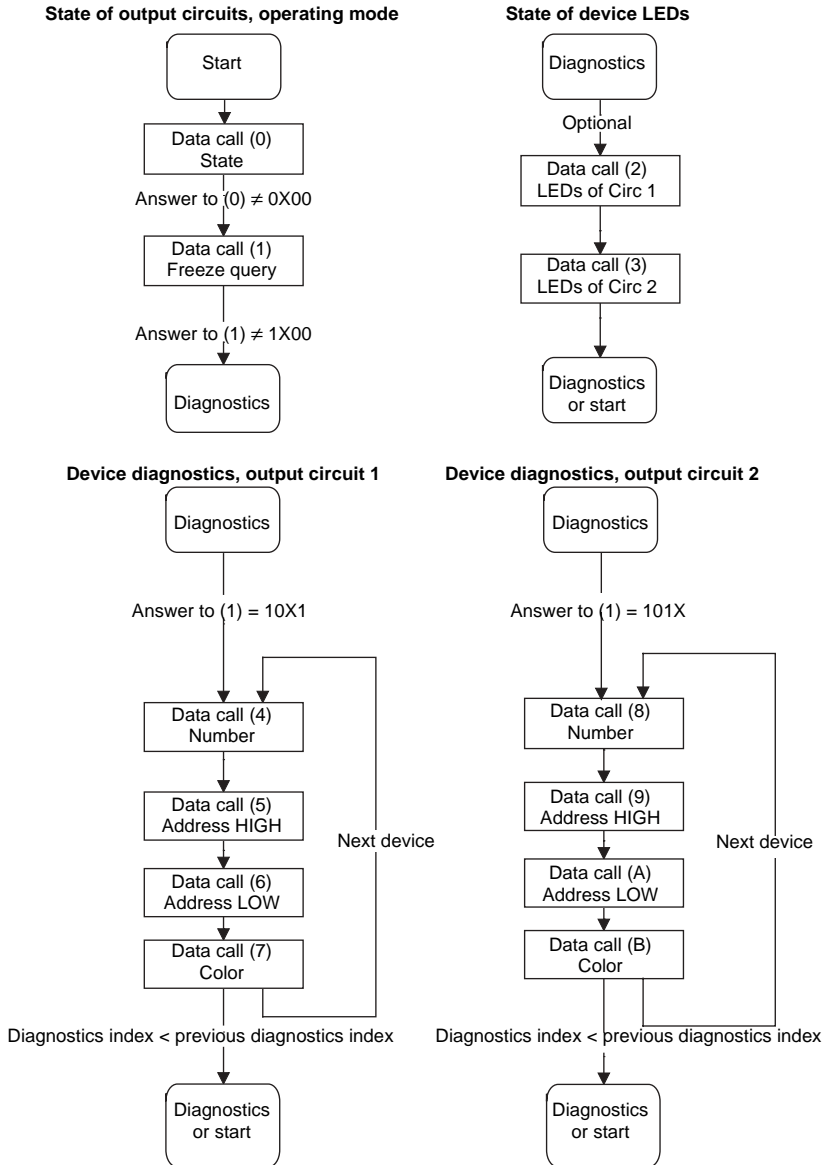
Fig.: Querying with diagnostics sorted according to output circuit

7.4 Enhanced Diagnostics (Profile S-7.5.5) Type I

(Monitor profile: extended)

7.4.1 General

Monitors of **Generation II** support diagnostics through **protocol S-7.5.5 Type I**.

Information!
*In order to process the diagnostics according to **protocol S-7.5.5 type I**, the profile in the monitor menu must be set explicitly to **Extended**.*
*If **Legacy** is set the **standard protocol** (see chap. 7.3) is always used!*

The safety monitor reports to the AS-i bus as a participant with the following attributes:

• Profile S-7.5.5
• ID1 Code 0xF (default)
• Vendor ID is 0x0002
• Product code is 0x0100

The device provides 4 words of transparent input data and receives 1 word of transparent output data.

7.4.2 Binary data

	D3	D2	D1	D0
Monitor -> Master (input)	Serial communication	Serial communication	State of switching contact 2	State of switching contact 1
Master -> Monitor (output)	Change from 0 to 1 resets the error-traffic light AS-i-S	Change from 0 to 1 resets the error-traffic light Circ 1	Serial communication	Serial communication

State of switching contact 1 + 2:

1: Switching contact is switched off or green flashing

0: Switching contact is switched on

7.4.3   Transparent input data

Via profile 7.5.5 it is possible to cyclically query the condition of the release circuits (OSSD Safety Control State) of the safety monitor (see the table below). For this, it is necessary to allocate an AS-i address (base address) to the safety monitor, and to reserve an 8-byte analog input slave in the control configuration for the base address of the safety monitor. In these 8 bytes the diagnostics data (transparent input data) is listed as in the following table:

Channel	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	AS-i Circ 1							
		RT	GE	GN		UA	DA	EF
1	State OSSD 2				State OSSD 1			
2	State OSSD 6				State OSSD 5			
3	OSSD 4		OSSD 3		OSSD 2		OSSD 1	
	RF	YF	RF	YF	RF	YF	RF	YF

Channel	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
0	AS-i-S circuit							
		RT	GE	GN		UA	DA	EF
1	State OSSD 4				State OSSD 3			
2	State OSSD 8				State OSSD 7			
3	OSSD 8		OSSD 7		OSSD 6		OSSD 5	
	RF	YF	RF	YF	RF	YF	RF	YF

Channel 0 of the transparent input data describes the state of both AS-i circuits. The upper 8 bits describe the states of the AS-i-S circuit and the lower the 1st AS-i circuit.

Channel 1 and 2 contain the colors of the OSSDs (at the moment only 2 OSSDs are supported).

Finally summary information on color of devices in the OSSDs follows in channel 3.

Following all items are described:

EF	Earth fault	Earth fault is present 1: earth fault is present 0: earth fault is *not* present
DA	Duplicate address	Duplicate address is present 1: duplicate address on AS-i 0: *no* duplicate address on AS-i
GN	Green	Error free or almost error free communication < 1% telegram repetitions

GE	Warning	More frequent repetitions, which should be clarified depending upon application 1% - 5% telegram repetitions
RT	Error	Fatal disturbances > 5% telegram repetitions
UA	UAS-i	AS-i voltage is sufficient 1: AS-i voltage is sufficient 0: AS-i voltage is *not* sufficient

Channel 1 and 2 describe the states of the respective OSSDs of the safety monitor. Coding of states and colors (see "Coding of OSSD states").

Chanel 3 contains information about warnings or disturbances at devices assigned to one or more OSSDs. Thereby means:

YF	Yellow flashing	At least one of devices assigned to this OSSD is in the yellow flashing state
RF	Red flashing	At least one of devices assigned to this OSSD is in the red flashing state

7.4.4   Transparent output data

Channel 0 of the cyclical output data offers the possibility to send signals for controlling the inputs X.Y1, X.Y2:

Channel	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
0	Start 8	EDM 8	Start 7	EDM 7	Start 6	EDM 6	Start 5	EDM 5

Channel	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	Start 4	EDM 4	Start 3	EDM 3	Start 2	EDM 2	Start 1	EDM 1

Thereby means:

EDM X : inverted bit is or gated with X.Y1 (EDM X) input.

START X: inverted bit is or gated with X.Y2 (Start X) input.

The transparent output data is transported from the unsafe unit to the safe unit and is available as unsafe auxiliary bits (for example for start buttons).

7.4.5   Acyclic data

7.4.5.1   Vendor Specific Object 1

Vendor Specific Object 1 - Analyzer state Circ 1

Read only

This object contains a bit pair for all possible 62 slaves, holding the state of the corresponding slave at this address:

Bit	Traffic light color	Description
11	Red	Error free or almost error free communication < 1% telegram repetitions
10	Yellow	More frequent repetitions, which should be clarified depending upon application 1% - 5% telegram repetitions
01	Green	Fatal disturbances > 5% telegram repetitions
00	No slave	

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	3/3A		2/2A		1/1A		–	–
2	7/7A		6/6A		5/5A		4/4A	
…	…							
16	31B		30B		29B		28B	

7.4.5.2   Vendor Specific Object 2

Vendor Specific Object 2 - Analyzer state AS-i-S circuit

Read only

This object contains a bit pair for all possible 62 slaves, holding the state of the corresponding slave at this address:

Bit	Traffic light color	Description
11	Red	Error free or almost error free communication < 1% telegram repetitions
10	Yellow	More frequent repetitions, which should be clarified depending upon application 1% - 5% telegram repetitions
01	Green	Fatal disturbances > 5% telegram repetitions
00	No slave	

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	3/3A		2/2A		1/1A		–	–
2	7/7A		6/6A		5/5A		4/4A	
…	…							
16	31B		30B		29B		28B	

7.4.5.3   Vendor Specific Object 3

Vendor Specific Object 3 - Device colors

Read only

This object contains the device colors and additional information about the OSSDs.

Byte	Meaning
1	Bit 0 0=configuration operation, 1=protective operation Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1
3	Relay state output 2
4	Reserved (0x80 is transmitted)
5	Reserved (0x80 is transmitted)
6	Color device 1
7 … 52	...
53	Color device 48

Coding of the states and colors

Code bit [3 … 0]	State resp. color
0	Green continuous
1	Green flashing
2	Yellow continuous
3	Yellow flashing
4	Red continuous
5	Red flashing
6	Gray off
7 … F	Reserved
Bit [6 ... 4]	**Reserved**
Bit 7	**Existence**
0	Device exists
1	Device does not exist

7.4.5.4   Vendor Specific Object 4

Vendor Specific Object 4 - Device colors with diagnostics index assignment

Read only

This object contains the device colors and additional information about the OSSDs together with the diagnostics index assignment from the configuration.

Byte	Meaning
1	Bit 0 0=configuration operation, 1=protective operation Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1
3	Relay state output 2
4	Reserved (0x80 is transmitted)
5	Reserved (0x80 is transmitted)
6	Color device 1
7 … 52	...
53	Color device 48

Coding of the states and colors (see "Coding of the states and colors").

7.4.5.5 Vendor Specific Object 5, 7

Vendor Specific Object 5, 7 - Switch-off history for OSSD 1 - 2

Read only

For the last shut-off the state of all safe AS-i slaves and devices is saved. This way it's easier to trace back a shut-off.

Data is saved at the output transition from "On" to "Off", separately for each output.

Byte	Meaning
1	Bit 0 0=configuration operation, 1=protective operation Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1
3	Relay state output 2
4	Reserved (0x80 is transmitted)
5	Reserved (0x80 is transmitted)
6	Color device 1
7 … 52	...
53	Color device 48

Coding of the states and colors

Code bit [3 … 0]	State resp. color
0	Green continuous
1	Green flashing
2	Yellow continuous
3	Yellow flashing
4	Red continuous
5	Red flashing
6	Gray off
7 … F	Reserved
Bit 4	Change
0	Device color *not* changed in the last step
1	Device color changed in the last step
Bit [6 … 5]	Reserved
Bit 7	Existence
0	Device exists
1	Device does *not* exist

7.4.5.6   Vendor Specific Object 6, 8

Vendor Specific Object 6, 8 -> Switch-off history for OSSD 1 - 2 with diagnostics index assignment from the configuration

Read only

For the last shut-off the state of all safe AS-i slaves and devices is saved together with the diagnostics index assignment from the configuration. This way it's easier to trace back a shut-off.

Byte	Meaning
1	Bit 0 0=configuration operation, 1=protective operation Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1
3	Relay state output 2
4	Reserved (0x80 is transmitted)
5	Reserved (0x80 is transmitted)
6	Color device 1
7 … 52	...
53	Color device 48

Coding of the states and colors (see "Coding of the states and colors").

7.5 Enhanced diagnostics (Profile S-7.5.5) Type II

For the diagnostics of **Generation II V4.x** (or higher) monitors **protocol S-7.5.5 type II** is used exclusively.

Information!
Generation II V4.x (or higher) monitors no longer support the consortium diagnostics of the consortium monitor.

7.5.1 General

Generation II V4.x (or higher) monitors not only offer a superior on-site operation and diagnostic support, but they also allow an access to these over the network. All diagnostics data is available on the monitor display.

These monitors use the binary input/output data as well as the transparent input/output data (analog channels) to provide diagnostic data. They can be queried from the base address of the monitor.

7.5.2 Binary data

The table shows the usage of the respective 4 binary input/output bits:

	D3	**D2**	**D1**	**D0**
Monitor -> Master (input)	Serial communication	Serial communication	1: output 2 is switched off or green flashing	1: output 1 is switched off or green flashing
Master -> Monitor (output)	Change from 0 to 1 resets the error-traffic light AS-i 2	Change from 0 to 1 resets the error-traffic light Circ 1	Serial communication	Serial communication

7.5.3 Transparent input data

The table shows the coding of the diagnostic data in the 4 analog input channels:

Channel	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}
0	AS-i circuit 2							
		AU	RT	GE	GN		UA	DA	EF
1	State OSSD 4				State OSSD 3			
2	State OSSD 8				State OSSD 7			
3	OSSD 8		OSSD 7		OSSD 6		OSSD 5	
	RF	YF	RF	YF	RF	YF	RF	YF

Channel	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
0	AS-i circuit 1							
		RT	GE	GN		UA	DA	EF
1	State OSSD 2				State OSSD 1			
2	State OSSD 6				State OSSD 5			
3	OSSD 4		OSSD 3		OSSD 2		OSSD 1	
	RF	YF	RF	YF	RF	YF	RF	YF

Channel 0 of the transparent input data describes the state of both AS-i circuits. The upper 8 bits describe the states of the AS-i circuit 2 and the lower the states of the AS-i circuit 1.

Channel 1 and 2 contain the colors of the OSSDs (at the moment only 2 OSSDs are supported).

Finally summary information on color of devices in the OSSDs follows in channel 3.

Following all items are described:

EF	Earth fault	Earth fault is present 1: earth fault is present 0: earth fault is *not* present
DA	Duplicate address	Duplicate address is present 1: duplicate address on AS-i 0: *no* duplicate address on AS-i
GN	Green	Error free or almost error free communication < 1% repeated telegrams on AS-i
GE	Warning	More frequent repetitions, which should be clarified depending upon application 1% - 5% repeated telegrams on AS-i

RT	Error	Fatal disturbances > 5% repeated telegrams on AS-i
UA	UAS-i	AS-i voltage is sufficient 1: AS-i voltage is sufficient 0: AS-i voltage is *not* sufficient
AU	AUX 24V	24V to supply safe outputs is available 1: 24V to supply safe outputs is available 0: 24V to supply safe outputs is not available

Channel 1 and 2 describe the states of the respective OSSDs of the safety monitor. Coding of the states and colors (see "Coding of OSSD states").

Channel 3 contains information about warnings or disturbances at devices assigned to one or more OSSDs. Thereby means:

YF	Yellow flashing	At least one of devices assigned to this OSSD is in the yellow flashing state
RF	Red flashing	At least one of devices assigned to this OSSD is in the red flashing state

7.5.3.1 Coding of OSSD states

Code bit [3 … 0]	State resp. color	Description
0	Green continuous	Output on
1	Green flashing	Delay time is running at stop category 1
2	Yellow continuous	Start-up/restart-disable active
3	Yellow flashing	External test necessary / acknowledgment / switch-on delay active
4	Red continuous	Output off
5	Red flashing	Error
6	Gray off	Output not projected
7 … F	Reserved	

Information!
Monitors, supporting less than 8 release circuits, will show all non-existing release circuits in "gray".

7.5.4 Transparent output data

The values of the monitor inputs can be controlled via the output channel '0'. The transparent output data is available for the safety unit as unsafe auxiliary data bits (e.g. for start buttons).

Ch	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	Reserved												Start 2	EDM 2	Start 1	EDM 1

7.5.5   Acyclic data

The protocol 7.5.5. Type II also offers the possibility of sending data via acyclical requests. The datasets are embedded in objects by the devices. A distinction is made between standard objects and manufacturer-specific objects. The extended diagnostics type II offers the manufacturer-specific objects described in the following.

7.5.5.1 Vendor Specific Object 1 - Analyzer state AS-i circuit 1

Read only

This object contains a bit pair for all possible 62 slaves, holding the state of the corresponding slave at this address:

Bit	Traffic light color
11	Red
10	Yellow
01	Green
00	No slave

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	3/3A	3/3A	2/2A	2/2A	1/1A	1/1A	–	–
2	7/7A	7/7A	6/6A	6/6A	5/5A	5/5A	4/4A	4/4A
…				…				
16	31B	31B	30B	30B	29B	29B	28B	28B

7.5.5.2   Vendor Specific Object 2 - Analyzer state AS-i circuit 2

Read only

This object contains a bit pair for all possible 62 slaves, holding the state of the corresponding slave at this address:

Bit	Traffic light color
11	Red
10	Yellow
01	Green
00	No slave

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	3/3A	3/3A	2/2A	2/2A	1/1A	1/1A	–	–
2	7/7A	7/7A	6/6A	6/6A	5/5A	5/5A	4/4A	4/4A
…				…				
16	31B	31B	30B	30B	29B	29B	28B	28B

7.5.5.3 Vendor Specific Object 7 - Device colors OSSD 1

Read only

This object contains colors for all devices assigned to OSSD 1 plus additional information for all other OSSDs.

○
⨅ *Information!*
In situation where not all 255 device indices are used, the monitor can shorten the S-7.5.5 telegram to save transfer time.

Coding of the states and colors	
Byte	**Meaning**
1	Bit 0 0=configuration operation, 1=protective operating mode Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1+2 Bit 3 … 0 state output 1, `diag_pc.ossd[0].relay-state` Bit 7 … 4 state output 2, `diag_pc.ossd[1].relay-state`
3 … 8	...
9	Relay state output 15+16 Bit 3 … 0 state output 15, `diag_pc.ossd[14].relay-state` Bit 7 … 4 state output 16, `diag_pc.ossd[15].relay-state`
10	Bit fields for existing devices. Device 7 … 0
11 … 40	...
41	Bit fields for existing devices. Device 248 … 255
42	Color device 1+2 Bit 3 … 0 color device 1, `diag_pc.device[0].color` Bit 7 … 4 color device 2, `diag_pc.device[1].color`
43 … 168	...
169	Device 255+256 Bit 3 … 0 color device 255, `diag_pc.device[254].color` Bit 7 … 4 color device 256, `diag_pc.device[255].color`

Bit-field coding for existing devices:

The numbers show the position of the bit for the corresponding device.

0: Device does not exist

1: Device exists

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…				…				
32	255	254	253	252	251	250	249	248

7.5.5.4   Vendor Specific Object 8 - Device colors OSSD 1 with diagnostics index assignment

Read only

This object contains for all devices assigned to OSSD 2 the device colors and additional information about all OSSDs together with the diagnostics index assignment from the configuration.

Coding of the states and colors	
Byte	**Meaning**
1	Bit 0 0=configuration operation, 1=protective operating mode Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1+2 Bit 3 … 0 state output 1, `diag_pc.ossd[0].relay-state` Bit 7 … 4 state output 2, `diag_pc.ossd[1].relay-state`
3 … 8	...
9	Relay state output 15+16 Bit 3 … 0 state output 15, `diag_pc.ossd[14].relay-state` Bit 7 … 4 state output 16, `diag_pc.ossd[15].relay-state`
10	Bit fields for existing devices. Device 7 … 0
11 … 40	...
41	Bit fields for existing devices. Device 248 … 255
42	Color device 1+2 Bit 3 … 0 color device 1, `diag_pc.device[0].color` Bit 7 … 4 color device 2, `diag_pc.device[1].color`
43 … 168	...
169	Device 255+256 Bit 3 … 0 color device 255, `diag_pc.device[254].color` Bit 7 … 4 color device 256, `diag_pc.device[255].color`

Bit-field coding for existing devices:

The numbers show the position of the bit for the corresponding device.

0: Device does not exist

1: Device exists

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
2	15	14	13	12	11	10	9	8
…				…				
32	255	254	253	252	251	250	249	248

7.5.5.5 Vendor Specific Object 9 - Device Colors at switch off OSSD 1

Read only

This object contains the device colors and additional information about all release circuits at the time of the most recent switch-off of release OSSD 1. Additionally, information identifying all devices assigned to release OSSD 1 is transferred.

Coding of the states and colors	
Byte	Meaning
1	Bit 0 0=configuration operation, 1=protective operating mode Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1+2 Bit 3 … 0 state output 1, `diag_pc.ossd[0].relay-state` Bit 7 … 4 state output 2, `diag_pc.ossd[1].relay-state`
3 … 8	...
9	Relay state output 15+16 Bit 3 … 0 state output 15, `diag_pc.ossd[14].relay-state` Bit 7 … 4 state output 16, `diag_pc.ossd[15].relay-state`
10	Bit fields for existing devices. Device 7 … 0
11 … 40	...
41	Bit fields for existing devices. Device 248 … 255
42	Bit-fields for devices that changed during the last step. Device 7 … 0
43 … 72	...
73	Bit-fields for devices that changed during the last step. Device 248 … 255
74	Color device 1+2 Bit 3 … 0 color device 1, `diag_pc.device[0].color` Bit 7 … 4 color device 2, `diag_pc.device[1].color`
75 … 200	...
201	Device 255+256 Bit 3 … 0 color device 255, `diag_pc.device[254].color` Bit 7 … 4 color device 256, `diag_pc.device[255].color`

Bit-field coding for devices that changed during the last step:

The numbers show the position of the bit for the corresponding device.

0: Device not changed in the last step

1: Device changed in the last step

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…				…				
32	255	254	253	252	251	250	249	248

Bit-field coding for existing devices:

The numbers show the position of the bit for the corresponding device.

0: Device does not exist

1: Device exists

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…				…				
32	255	254	253	252	251	250	249	248

7.5.5.6 Vendor Specific Object 10 - Device colors at switch off OSSD 1 with diagnostics index assignment

Read only

This object contains the device colors and additional information about all OSSDs at the time of the most recent switch-off of release OSSD 1, sorted by the diagnostics assignment index. Additionally, information identifying all devices assigned to release OSSD 1 is transferred.

Coding of the states and colors	
Byte	**Meaning**
1	Bit 0 0=configuration operation, 1=protective operating mode Bit 3 … 1 reserved, 0 Bit 4 state 1.Y1, EDM1 (0=open) Bit 5 state 1.Y2, Start1 (0=open) Bit 6 state 2.Y1, EDM2 (0=open) Bit 7 state 2.Y2, Start2 (0=open)
2	Relay state output 1+2 Bit 3 … 0 state output 1, `diag_pc.ossd[0].relay-state` Bit 7 … 4 state output 2, `diag_pc.ossd[1].relay-state`
3 … 8	...
9	Relay state output 15+16 Bit 3 … 0 state output 15, `diag_pc.ossd[14].relay-state` Bit 7 … 4 state output 16, `diag_pc.ossd[15].relay-state`
10	Bit fields for existing devices. Device 7 … 0
11 … 40	...
41	Bit fields for existing devices. Device 248 … 255
42	Bit-fields for devices that changed during the last step. Device 7 … 0
43 … 72	...
73	Bit-fields for devices that changed during the last step. Device 248 … 255
74	Color device 1+2 Bit 3 … 0 color device 1, `diag_pc.device[0].color` Bit 7 … 4 color device 2, `diag_pc.device[1].color`
75 … 200	...
201	Device 255+256 Bit 3 … 0 color device 255, `diag_pc.device[254].color` Bit 7 … 4 color device 256, `diag_pc.device[255].color`

Bit-field coding for existing devices:

The numbers show the position of the bit for the corresponding device.

0: Device does not exist

1: Device exists

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…				…				
32	255	254	253	252	251	250	249	248

Bit-field coding for devices that changed during the last step:

The numbers show the position of the bit for the corresponding device.

0: Device not changed in the last step

1: Device changed in the last step

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…				…				
32	255	254	253	252	251	250	249	248

7.5.5.7   Vendor Specific Object 11 … 70

The objects 11 … 70 correspond to the objects 7 … 10, but refer to the following release circuits. The table displays the associations

OSSD	Device colors	Device colors with diagnostics index	Device colors at switch off	Device colors at switch off with diagnostics index
Preprocessing	Object 3	Object 4	-	-
1	Object 7	Object 8	Object 9	Object 10
2	Object 11	Object 12	Object 13	Object 14
3	Object 15	Object 16	Object 17	Object 18
4	Object 19	Object 20	Object 21	Object 22
5	Object 23	Object 24	Object 25	Object 26
6	Object 27	Object 28	Object 29	Object 30
7	Object 31	Object 32	Object 33	Object 34
8	Object 35	Object 36	Object 37	Object 38
9	Object 39	Object 40	Object 41	Object 42
10	Object 43	Object 44	Object 45	Object 46
11	Object 47	Object 48	Object 49	Object 50
12	Object 51	Object 52	Object 53	Object 54
13	Object 55	Object 56	Object 57	Object 58
14	Object 59	Object 60	Object 61	Object 62
15	Object 63	Object 64	Object 65	Object 66
16	Object 67	Object 68	Object 69	Object 70

7.6 Consortium diagnostics with S-7.3 extension

Compatibility mode with additional diag data diagnostics type for the Safety Basic Monitor.

Address	Meaning
Base address	Consortium diagnostics (see chap. 7.3), limited to 48 devices
Simulated slave 1	State of OSSD 1 and OSSD 2
Simulated slave 2	S-7.3 OSSD diagnostics, 4 channel transparent input, profile S-7.3.0.C
Simulated slave 3	S-7.3 SaW slave diagnostics, 4 channel transparent input, profile 7.3.1.C

Simulated slave 1: State of OSSD 1 and OSSD 2 (binary data)	
Data bit	**Content**
D0	State of relay output 1
D1	State of message output 1
D2	State of relay output 2
D3	State of message output 2

Simulated slave 2: OSSD diagnostics																
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
CH1	Safety state OSSD 2								Safety state OSSD 1							
CH2	Safety state OSSD 4								Safety state OSSD 3							
CH3	Safety state OSSD 6								Safety state OSSD 5							
CH4	S8	S7	S6	S5	S4	S3	S2	S1	Safety state OSSD 7							

For a closed switch **S1** … **S8**, a '1' is entered at the corresponding position.

The safety state is defined as follows:

Bit	7	6	5	4	3	2	1	0
	1: at least one red flashing device	1: at least one yellow flashing device	n/a	n/a	Color of the OSSD (see Tab. <*See "Coding of OSSD states (OSSD)" on page 438*>)			

Simulated slave 3: SaW slave diagnostics																
	15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
CH1	Slv 7		Slv 6		Slv 5		Slv 4		Slv 3		Slv 2		Slv 1			
CH2	Slv 15		Slv 14		Slv 13		Slv 12		Slv 11		Slv 10		Slv 9		Slv 8	
CH3	Slv 23		Slv 22		Slv 21		Slv 20		Slv 19		Slv 18		Slv 17		Slv 16	
CH4	Slv 31		Slv 30		Slv 29		Slv 28		Slv 27		Slv 26		Slv 25		Slv 24	

For each safe slave (ID=B), the state of the code sequence is entered as seen by the master. Code sequence errors are not recognized here. For unsafe slaves, '00' is entered.

Bit combination	Meaning
00	No safe slave or safe slave with zero sequence, both switches are open
01	Safe slave, switch for upper bits open
10	Safe slave, switch for lower bits open
11	Safe slave, both switches are closed

7.6.1 Coding of OSSD states (OSSD)

Code bit [3 … 0]	State resp. color	Description
0	Green continuous	Output on
1	Green flashing	Delay time is running at stop category 1
2	Yellow continuous	Start-up/restart-disable active
3	Yellow flashing	External test necessary / acknowledgment / switch-on delay active
4	Red continuous	Output off
5	Red flashing	Error
6	Gray off	Output not projected
7 … F	Reserved	

Information!
Monitors, supporting less than 8 release circuits, will show all non-existing release circuits in "gray".

8. Speed monitors

In this section, a distinction is made between internal and external speed monitors. Beginning with Safety Version 'SV4.4', a speed monitor is integrated in the Safety Basic Monitor. The standard Safety Basic Monitor supports rotational speeds of 400 Hz, the 'Safety Basic Monitor with fast inputs' supports rotational speeds of up to 4900 Hz.

An internal speed monitor monitors a maximum of four axes and can monitor multiple thresholds per axis and, as a device in the safety configuration, make them available for evaluation.

An external speed monitor monitors the rotational speed of up to two axes and sends a safe signal to the AS-i bus if the speed is below a set threshold.

Via the **Extras->Speed monitor** menu, three modes for the configuration and diagnostics of speed monitors are available:

• Configure
• Configure all
• Test.
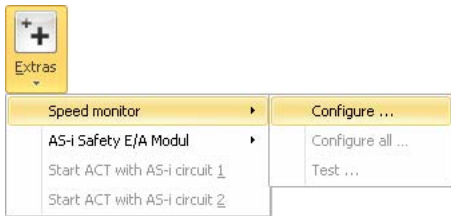
> *Information!*
> *Only speed monitors from the Bihl+Wiedemann GmbH company can be configured.*

The configuration created in the windows described in the following is saved in a file in the same directory as the **ASIMON 3 G2** configuration. It also has the same file name as the ASIMON configuration, except the file extension is '.SM3'. As a result, the speed monitor configuration is permanently linked to the **ASIMON 3 G2** configuration. This file contains the configuration of the external speed monitors; the internal speed monitors are stored in the **ASIMON 3 G2** configuration.

> *Information!*
> *If you manually copy an **ASIMON 3 G2** configuration (.AS3BW), you must also copy the corresponding speed monitor configuration (.SM3)!*

8.1 Configuring the external speed monitor
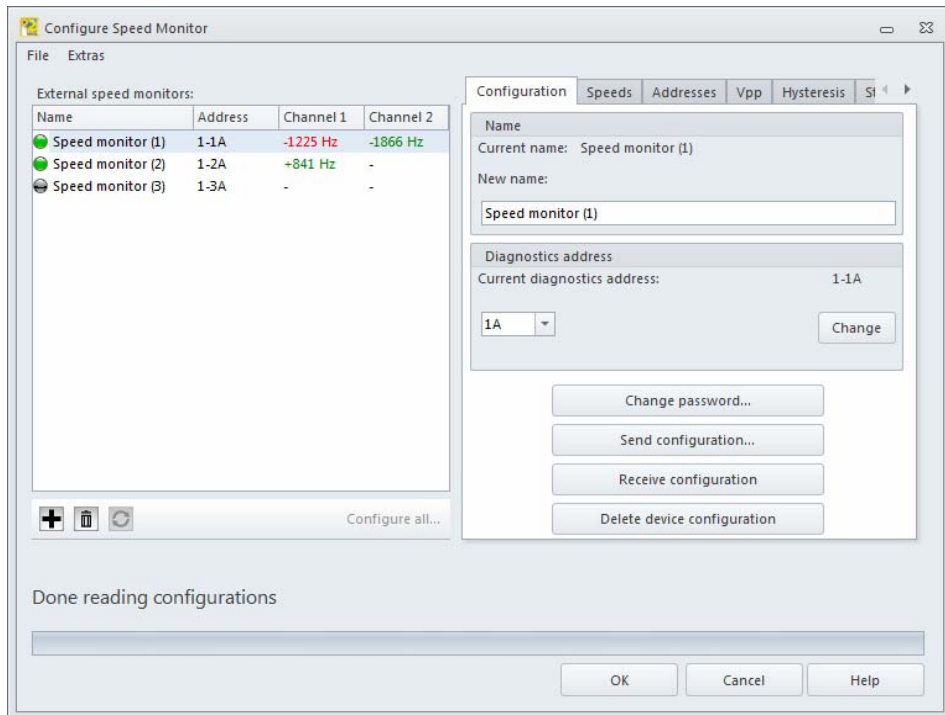
In the **Configure speed monitor** window, both connected as well as unconnected (offline) speed monitors can be configured on the AS-i master. All settings necessary for commissioning speed monitors are made here.

The general procedure during the commissioning of an external speed monitor is as follows:

- Configure the speed monitor with **ASIMON 3 G2**
- Send the configuration to the speed monitor
- Validate the sent configuration
- Check the configuration for correctness.

The **Configure speed monitor** window is divided into a left, a right and a lower area and a **File menu**. Located in the left area is a **list of speed monitors**. The right area is used for the **configuration** of the speed monitor selected in the list. **Status messages** and the progress are displayed in the lower area.

Upon opening the window, all speed monitors that are connected to the AS-i master and all saved speed monitors are loaded and displayed in the list. A connected speed monitor is indicated by a green dot ; an unconnected speed monitor is indicated by a gray dot .

To configure a speed monitor, the speed monitor is selected in the **list of speed monitors**; the desired settings are made in the **configuration area**.

8.1.1 List of the external speed monitors

The list of speed monitors consists of four columns: **Name, Address, Channel 1 and Channel 2**.

- **Name** contains the name of the speed monitor. This can be freely assigned during configuration and is used to better identify the speed monitor. If a speed monitor is not yet configured, it is displayed as **Speed monitor (address)**.
- The **Address** column displays the AS-i diagnosis address of the speed monitor. The speed monitor can be configured on the AS-i bus under this address. The used format has the following structure: (AS-i circuit)-(AS-i address)(A/B-slave).
- In columns **Channel 1** and **Channel 2**, the currently measured rotational speeds of axes 1 and 2 of the speed monitor are displayed. If limit values for the rotational speeds are already configured in the speed monitor, the displayed rotational speeds appear green if they are below the limit value or red if they are above the limit value. Depending on the type of speed monitor, the system detects whether or not a rotary encoder signal is connected. If no rotary encoder is connected to an axis, – is displayed as the rotational speed. The sign of the measured rotational speed indicates the direction of rotation. See the following table for further information.

Sign	Clockwise	Direction
-	Clockwise	Right
+	Counterclockwise	Left

Located below the list of speed monitors are the **Add** ➕, **Delete** 🗑, **Reload Load** ↻ and **Configure all...** buttons.

Use the **Add** button to add a speed monitor to the configuration. Click **Add** to open the window for adding a new speed monitor. First select whether this is an internal or an external speed monitor.

- **External speed monitor**:

  In this window, select to which AS-i circuit of the AS-i master the speed monitor 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 speed monitors before they are connected to the AS-i bus.

- **Internal speed monitor**

  This area is only available if a safety monitor is used that supports internal speed monitors.

  For the internal speed monitor, the terminal is selected here whose rotational speed is to be monitored. A new monitoring device is added in the ASIMON component manager that represents the new internal speed monitor.
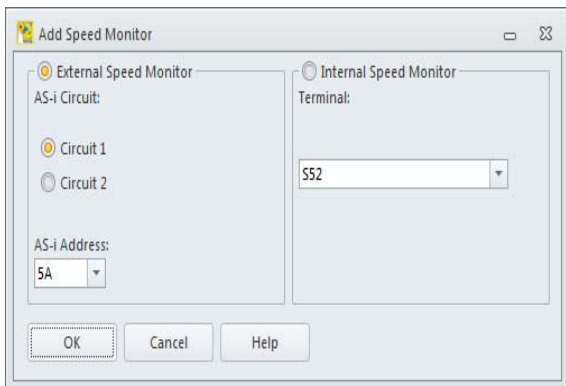
The **Delete** button is only available if a speed monitor is selected in the list. Clicking **Delete** removes the selected speed monitor from the current configuration.

If **Reload** is clicked, the AS-i bus again searches for external speed monitors; all found speed monitors are displayed in the **list of speed monitors**.

The **Configure all...** button is used to send the configurations to all external speed monitors. This takes place in the background; work on the configuration may continue. Click **Configure all...** to open a window for each speed monitor for validating and releasing the configuration. The **Validator name** and the **Password** configured in the speed monitor must be entered here. The settings can be accepted for the subsequent speed monitors 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 speed monitor, the **configuration log** appears in a separate window with the option to save or print it.

> **Information!**
> *Internal speed monitors are not included by this function.*

> **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!*

8.1.2 Configuration

In the configuration area, the external speed monitor currently selected in the list is configured. If no speed monitor is selected in the list, the configuration area is deactivated.

Grayed-out options are not supported by the connected speed monitor. You need a speed monitor with a new software version to be able to use this option.

The configuration area is divided into the tabs: **Configuration, Rotational speeds, Addresses, Vpp, Hysteresis and Standstill**.

Configuration
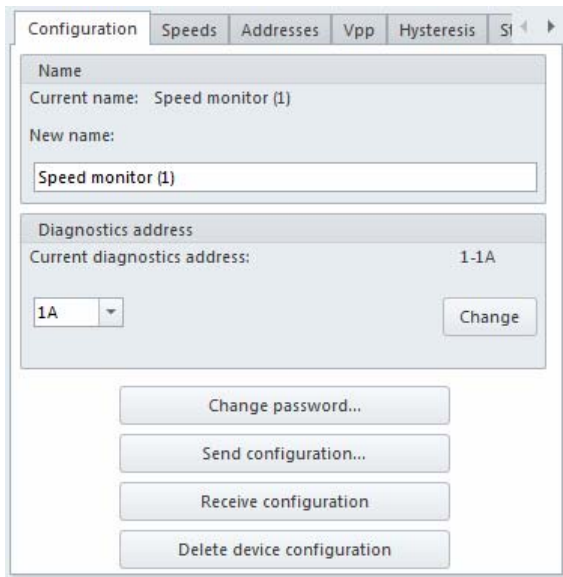
- In the **Name** area, the name currently assigned to the speed monitor is displayed and can be changed. The name of the speed monitor is used to better distinguish between multiple speed monitors.
- The speed monitor can be configured on the AS-i bus under the **diagnosis address**. The diagnosis address 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 speed monitor. 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.
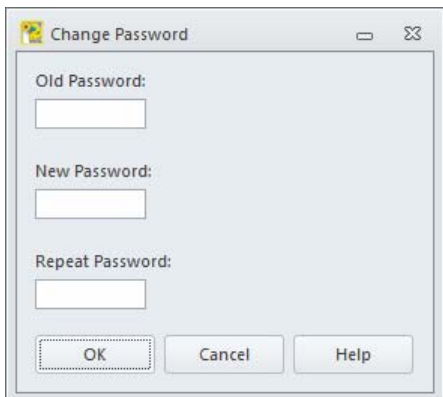
• The **Configure all...** button sends the current configuration to the speed monitor, validates it and releases it so that the speed monitor can start in safe operation. Click the button to open a window for entering the **Validator name** and the **Password**. After the configuration has been sent 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!*
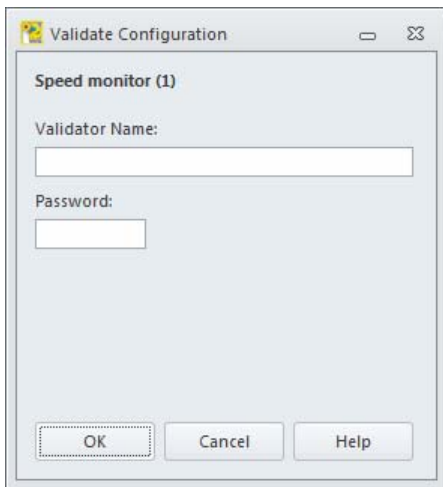
The **Receive configuration** button is used to load the configuration currently saved in the speed monitor and display it in the user interface. In addition, the configuration log is received and displayed in a separate window. The log can be saved there in a file or printed on a printer.

```
Protocol                              ⬚  ▣  ☒

0000 ******************************** 0    ▲
0001 PARAMETER SAFE SPEED MONITOR     1
0002 IDENT: Speed Monitor             2
0003 ******************************** 3
0004 DEVICE SECTION                   4
0005 ******************************** 5
0006 Monitor Version:  0.3            6
0007 Config Structure: 1.1            7
0008 Config Tool:      ASIMON DLL     8    ≡
0009 Download Time: 2011-10-28 09:50  9
0010 Validated:     2011-10-28 09:50  0
0011 by: SIMON                        1
0012 Security Code: FDE7, Count: 262  2
0013 ******************************** 3
0014 CHANNEL SECTION                  4
0015 ******************************** 5
0016 Channel 1, f1:   Active, Addr: 16 6
0017 f1max:             1000 Hz       7
0018 -------------------------------- 8
0019 Channel 2, f1:   Active, Addr: 18 9
0020 f1max:             2000 Hz       0
0021 -------------------------------- 1
0022 Channel 1, f2:   Active, Addr: 17 2
0023 f2max:               25 Hz       3
0024 -------------------------------- 4
0025 Channel 2, f2:   Active, Addr: 19 5  ▼

  [   OK   ]    [  Save...  ]    [  Print...  ]    [   Help   ]
```
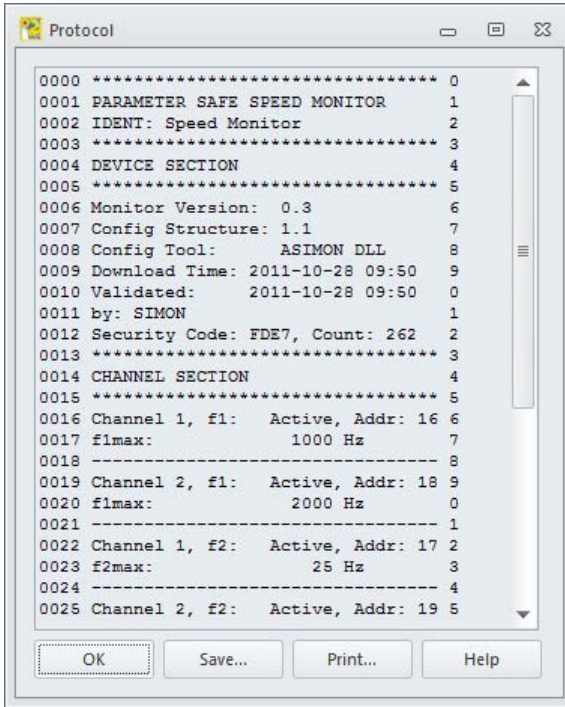
○ *Information!*
ⅠⅠ *The configuration log serves as safety-relevant documentation of the application. It contains*
    all information about the configuration of the speed monitor.

Example of a speed monitor configuration log:

```
0000 *******************************                                  0
0001 PARAMETER SAFE SPEED MONITOR                                     1
0002 IDENT: Achsen 1+2                                                2
0003 *******************************                                  3
0004 DEVICE SECTION                                                   4
0005 *******************************                                  5
0006 Monitor Version:  0.2                                            6
0007 Config Structure: 1.0                                            7
0008 Config Tool:    ASIMON DLL                                       8
0009 Download Time: 2011-10-28 09:50                                  9
0010 Validated:     2011-10-28 09:50                                  0
0011 by: SIMON                                                        1
0012 Security Code: EC11, Count: 277                                  2
0013 *******************************                                  3
0014 CHANNEL SECTION                                                  4
0015 *******************************                                  5
0016 Channel 1, f1:   Active, Addr: 5                                 6
0017 f1max:          1000 Hz                                          7
0018 -------------------------------                                  8
0019 Channel 2, f1:   Inactive                                        9
0020 f1max:          ------ Hz                                        0
0021 -------------------------------                                  1
0022 Channel 1, f2:   Inactive                                        2
0023 f2max:          ------ Hz                                        3
0024 -------------------------------                                  4
0025 Channel 2, f2:   Inactive                                        5
0026 f2max:          ------ Hz                                        6
0027 *******************************                                  7
0028 Validated:     2011-10-28 09:50                                  8
0029 by: SIMON                                                        9
0030 Security Code: EC11, Count: 277                                  0
0031 *******************************                                  1
0032 END OF CONFIGURATION                                             2
0033 *******************************                                  3
```

Line 0000 … 0003: Header information of the configuration log

    Line 0002: Name of the speed monitor

Line 0004...0013: Information about the speed monitor

    Line 0006: Hardware version of the speed monitor

    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 speed monitor

Line 0014...0027: Configuration of the channels

Line 0016: Configuration of channel 1 and safe AS-i address

Line 0017: Limit frequency for channel 1

Line 0018-0027: No other safe addresses configured

Line 0028...0031: Validation data repeated

Line 0032...0033: End of the configuration log

Rotational speeds
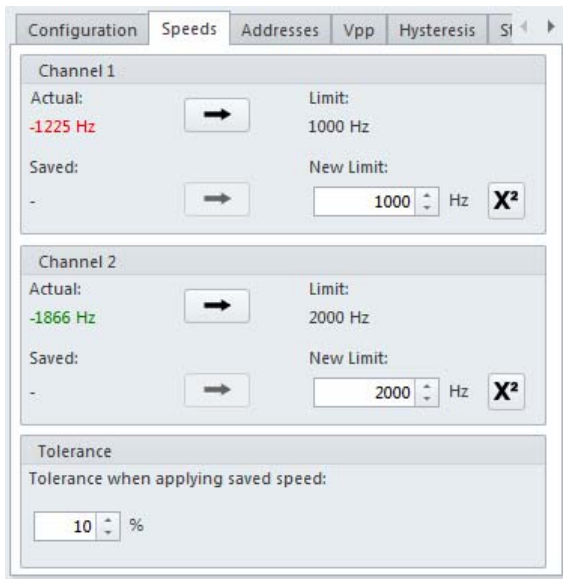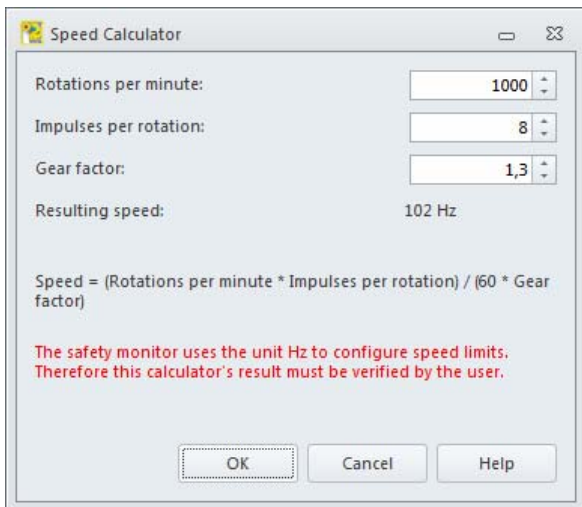
On this tab, the **limit frequencies** for channels 1 and 2 of the speed monitor are configured. The currently measured rotational speeds are displayed to assist in setting the correct limit frequency. The current rotational speed can be accepted via the **Apply** button ➡ taking the set **Tolerance** into account.

Upon pressing the **PRJ** button on the speed monitor (see the system manual for the speed monitor), the speed monitor temporarily saves the current rotational speeds. These rotational speeds are displayed here under **Saved** and can be accepted by clicking the **Apply** ➡ button. When applying the values, a potential tolerance can be included; this is set in the lower area of the tab under Tolerance.

Example: A frequency of 3000 Hz is measured at channel 1 and the **PRJ** button is pressed on the speed monitor. The speed monitor temporarily saves the frequency. This value is displayed in the configuration under **Saved**. For **Tolerance when applying saved speed**, 10% is displayed. After clicking **Apply**, 3300 Hz is entered as the **New Limit**.

A calculator for determining the rotational speed from the parameters of the encoder can be opened via the **Rotational speed calculator** button x^2.

Rotational speed calculator

Using the rotational speed calculator, a rotational speed can be calculated from the parameters of the encoder. To do this, the **Rotations per minute**, **Pulses per minute** and **Gear factor** parameters are entered. The result is displayed directly in the **Calculated rotational speed** field.

The formula used for calculation is:

Rotational speed = (rotations per minute $*$ pulses per rotation) / (60 $*$ gear factor)

The result calculated is entered in the configuration as the new frequency and the parameters are saved for the next use via the **OK** button.

Addresses

Depending on the function range, a speed monitor can simulate up to eight safe AS-i slaves. Depending on the measured rotational speed and direction of rotation, such a simulated safe AS-i slave sends a safe code sequence or a zero sequence. On the **Addresses** tab, the AS-i addresses for the simulated slaves are configured. If a '0' is entered as the address, no AS-i slave is simulated for this event.

Only AS-i addresses can be used which are configured as safe input slaves and free in the ASIMON bus information. The bus information can be called up and edited via the **New...** list entry of the address selection box.

There are four categories for each of the two channels to be monitored:

- **Safety-Limited Speed**: As long as the limit frequency is not exceeded, the safe AS-i slave configured at this address sends a safe code sequence. If the configured limit frequency is exceeded, the safe AS-i slave configured at this address switches off; it sends a zero sequence.
- **Hold**: As long as the hold frequency of 25 Hz is not exceeded, the safe AS-i slave configured at this address sends a safe code sequence. If the hold frequency of 25 Hz is exceeded, the safe AS-i slave configured at this address switches off; it sends a zero sequence.
- **Direction right (-)**: As long as the direction of rotation is to the right (-), the safe AS-i slave configured at this address sends a safe code sequence. If the direction of rotation changes to the left (+), the safe AS-i slave configured at this address switches off; it sends a zero sequence.
- **Direction left (+)**: As long as the direction of rotation is to the left (+), the AS-i slave configured at this address sends a safe code sequence. If the direction of rotation changes to the right (-), the safe AS-i slave configured at this address switches off; it sends a zero sequence.

Several categories can also be grouped together and set on one AS-i address (linked with logical AND). To do this, the categories that are to be grouped together are assigned the same AS-i address. A safe code sequence is then only produced at this address if all categories are fulfilled. Grouping over all categories and over both axes is possible within a speed monitor.

Example: The limit frequency for axis 1 is set to 1000 Hz, for axis 2 it is set to 2000 Hz. In the **Safety-Limited Speed** category, address 10 is selected for both axes. A safe code sequence is now produced at address 10 if the rotational speed at axis 1 is less than 1000 Hz and the rotational speed at axis 2 is less than 2000 Hz. If just one of the two rotational speeds is exceeded, a zero sequence is sent to address 10.

Certain speed monitors offer the **Synchronous mode (2 rotary encoders / 4 sensors per axis)** option. With this option, both inputs of the speed monitor are compared to one another. If the difference is less than 10%, the signals are treated as one signal and evaluated according to the configuration. If the difference is greater than 10%, a zero sequence is output at all configured AS-i addresses. Thus, it is possible to monitor one axis with two rotary encoders and thereby achieve a higher safety level through this redundancy.

Vpp

Information!

*This page is only visible if it has been activated via the **Extras menu** in **Setup**.*

Information!

These parameters are only relevant for the sine/cosine rotary encoder .

The boundaries for the peak-to-peak voltage (Vpp) of the sine/cosine signal can be adjusted here.

The pre-set range of 0.7 – 1.3 Vpp is suitable for most rotary encoders with nominal 1 Vpp. Should a rotary encoder exhibit another voltage level or should the damping be so strong that the speed monitor incorrectly assesses the signal as invalid, the tolerance range can be adjusted here.

Information!

When changing these parameters, make sure that the safety requirements of the rotary encoder used are observed. The boundaries must be small enough that a possible rotary encoder defect is detected by the speed monitor.

Hysteresis

| Configuration | Speeds | Addresses | Vpp | Hysteresis | S◄ ► |

Hysteresis

	Actual	New
Channel 1 SLS:	5 %	5 ▲▼ %
Channel 1 Halt:	5 %	5 ▲▼ %
Channel 2 SLS:	5 %	5 ▲▼ %
Channel 2 Halt:	5 %	5 ▲▼ %

| Restore defaults |

Information!
*This page is only visible if it has been activated via the **Extras menu** in **Setup**.*

On this page, the hysteresis can be set percentually for all four rotational speeds. The hysteresis describes the difference from the configured rotational speed which must be undercut so that a safe signal can be generated again.

Example: For channel 1 SLS, 1000 Hz and a hysteresis of 5% are configured. A rotational speed of 1010 Hz is measured, the safe AS-i slave configured at this address thereby does not send a safe code sequence. The rotational speed then sinks to 990 Hz. A safe code sequence is not sent since the frequency must first undercut 950 Hz (1000 Hz - 5%) before a safe code sequence is sent again.

Standstill

Speeds	Addresses	Vpp	Hysteresis	Stop Speeds	◀ ▶

Stop Speeds

	Actual	New	
Channel 1 Halt:	25 Hz	25 ⬍	Hz
Channel 2 Halt:	25 Hz	25 ⬍	Hz

Restore defaults

◯
Ⅱ   *Information!*
*This page is only visible if it has been activated via the **Extras menu** in **Setup**.*

The standstill frequencies of both axes are configured here. By default, 25 Hz are configured as the frequency for detecting the standstill. If necessary, the standstill frequencies can be changed to monitor a second rotational speed threshold per axis, for example.

8.1.3   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.
• File menu.

8.1.4 File menu

The **File menu** offers two menu entries:

- With **Import...**, an existing speed monitor configuration can be loaded and thereby assigned to the current **ASIMON 3 G2** configuration.
- With **Clear configuration**, all entries in the speed monitor configuration are cleared. After confirming with **OK** or **Cancel**, the '.SM3' file is removed and the symbol in the workspace disappears.

File	Extras
	Import...
	Delete configuration
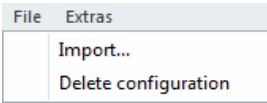
8.1.5 Extras menu

The **Extras menu** contains a menu item:

• Under **Setup**, a new window opens to change the program setup. Various configuration options can be displayed or suppressed.
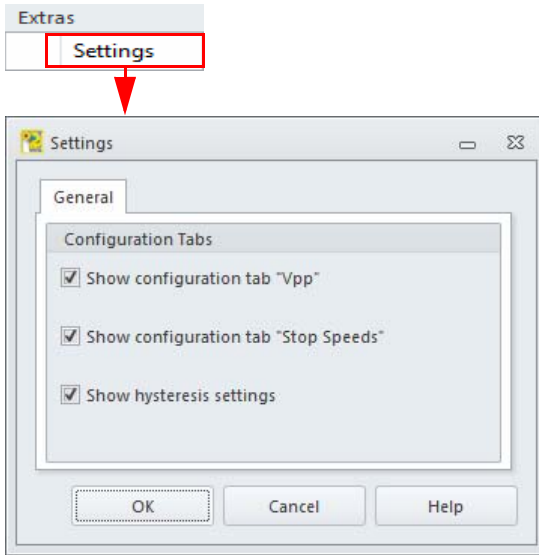
8.1.6 Configure all

Information!
This mode is only available if a speed monitor configuration has already been created.

In **Configure all** mode, an already created configuration for one or more external speed monitors is automatically sent to the speed monitors, 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 speed monitors 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 **Configure all** mode is started, the user is prompted to disconnect all speed monitors from the bus. Once that has been done, click **Continue** to advance to the next step. You must now connect the speed monitors to the bus in sequence.
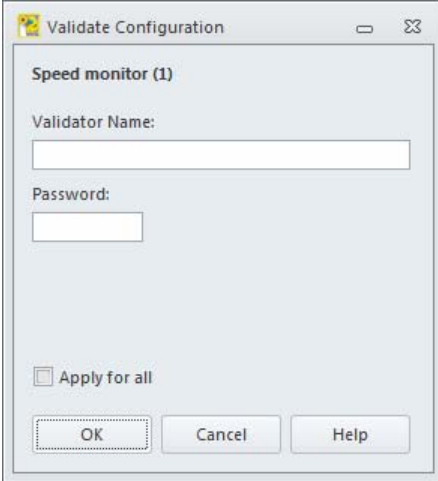
Information!

The speed monitors must either be in the state in which they were received on delivery (diagnosis address is '0') or already set to the correct diagnosis address. If a different diagnosis address is set, the speed monitor cannot be found!

The **Validator name** and the **Password** are queried for each speed monitor. The settings made here can be applied to all other speed monitors that are to be configured.

After all speed monitors have been connected, the program begins to write and validate the configurations in the speed monitors. Afterward, the **configuration log** is read for each speed monitor and displayed in a separate window. Depending on the number of speed monitors and AS-i slaves on the bus, the configuration process may take some time, but occurs automatically upon connection of the last speed monitor 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 speed monitors, the window can be closed with **Quit** or you may switch to test mode with **Test**.
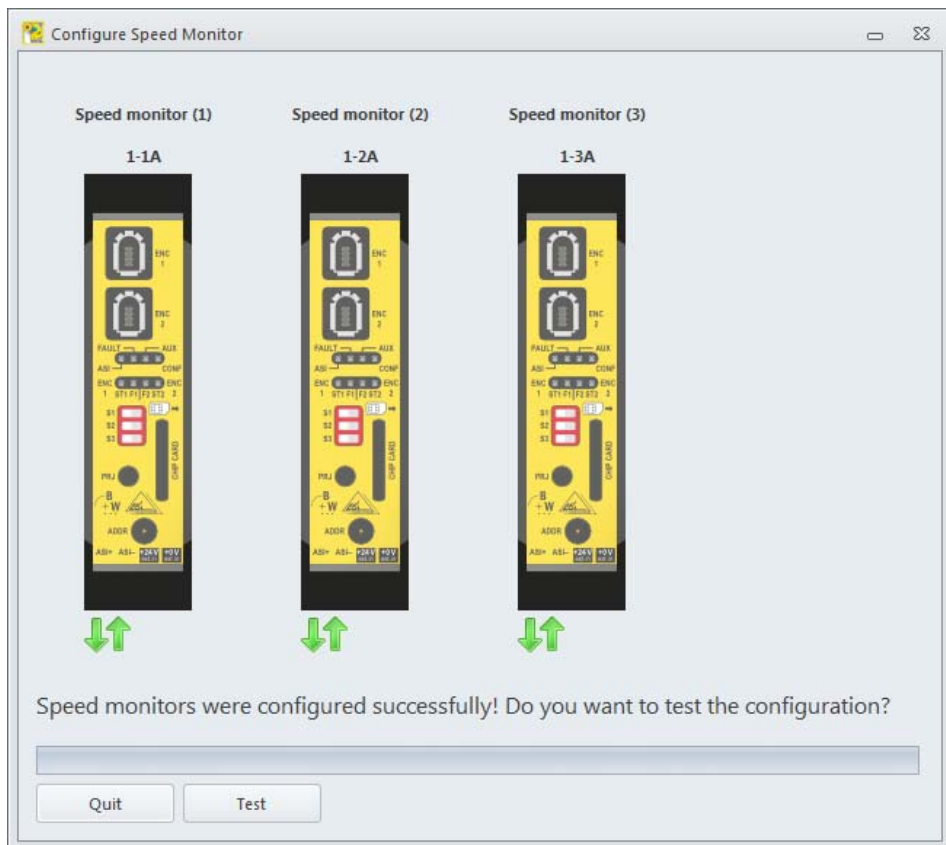
8.2 Configuring the internal speed monitor

If the safety monitor has the capability of configuring internal speed monitors, two lists are displayed in the **Configure speed monitor** window. The top list contains the external speed monitors, the lower list contains the internal speed monitors.

Internal speed monitors are represented as devices in ASIMON.
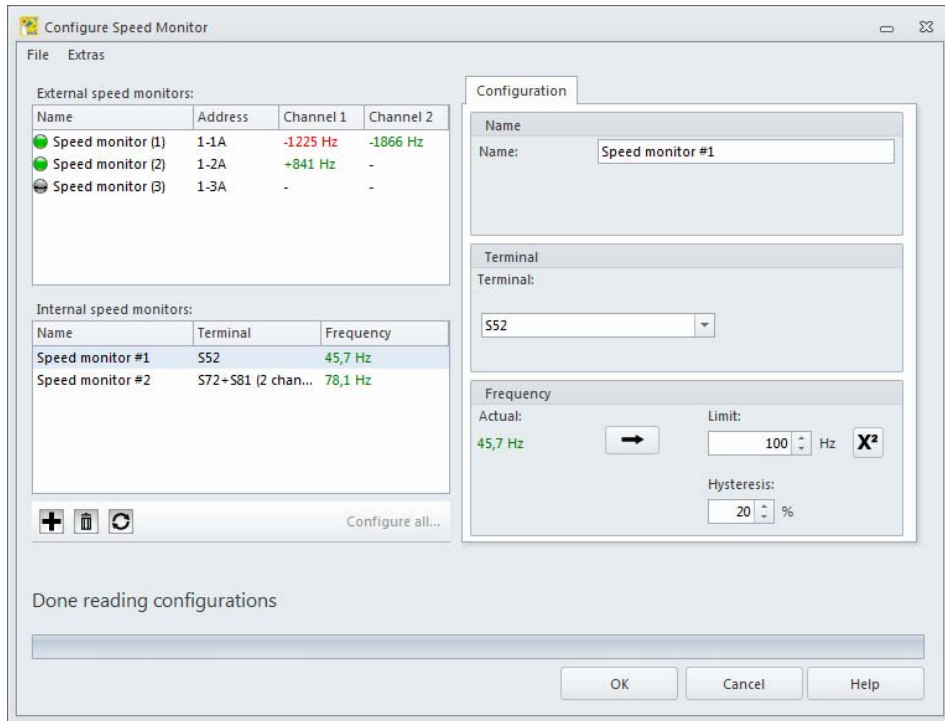
8.2.1   List of the internal speed monitors

The list of speed monitors consists of three columns: name, terminal, and frequency.

The name of the internal speed monitor corresponds to the name of the associated device. The name can be freely selected and is used to more easily identify the monitored axis.

The terminal indicates for which input terminal of the safety monitor the internal speed monitor is configured.

In the Frequency column, the frequency currently measured at the terminal is displayed.

A calculator for determining the rotational speed from the parameters of the encoder can be opened via the **Rotational speed calculator** button x^2.

Use the **Apply** button ➡ to accept the currently measured frequency as the new limit.

The buttons below the list of speed monitors have the same function as for external speed monitors. Their function has already been described in chapter 8.1.1 "List of the external speed monitors".
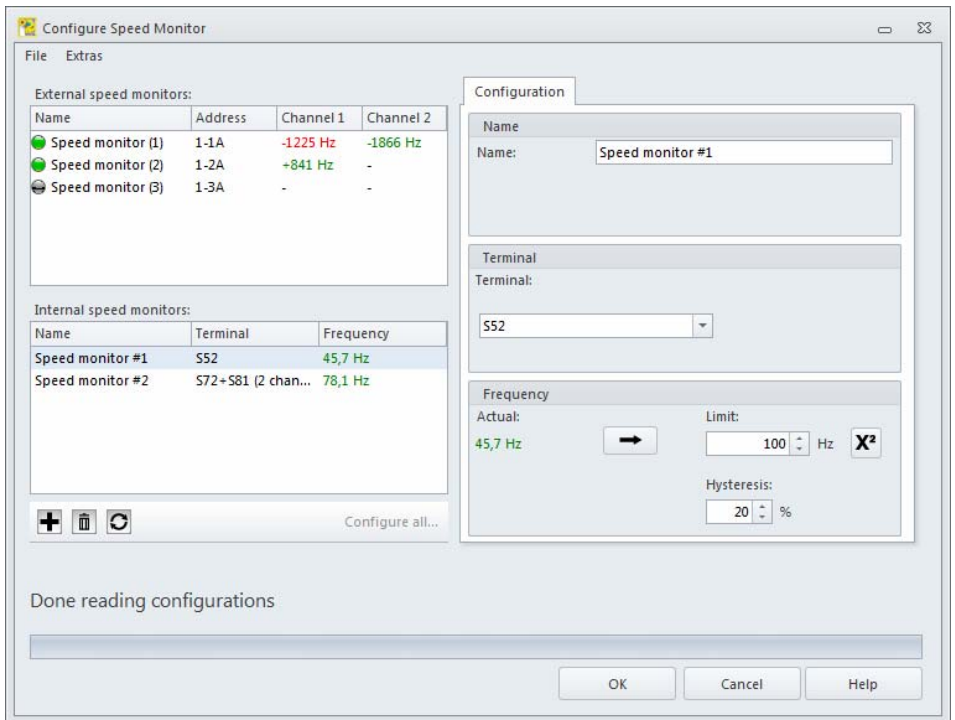
8.2.2   Configuration

In the configuration area, the internal speed monitor currently selected in the list is configured. If no speed monitor is selected in the list, the configuration area is deactivated.

Configuration

Configuration

Name

Name: Speed monitor #1

Terminal

Terminal:

S52

Frequency

Actual: Limit:

45,7 Hz   →   100 Hz X^2

Hysteresis:

20 %

- In the **Name** area, the name currently assigned to the speed monitor is displayed and can be changed. The name is identical to the name of the assigned monitoring device in the **ASIMON 3 G2** configuration.
- Under **Terminal**, the terminal is set for which the rotational speed is to be monitored. For double-channel monitoring, two adjacent terminals are selected here.

⚠ *Attention!*
Not all terminals are suitable for speed monitoring!

- In the **Frequency** area, the frequency to be monitored on the set terminal is configured.
- The single-channel monitoring device is not capable of reliably detecting a standstill. At a frequency less than 0.5 Hz, this device switches off. Validation is, therefore, only possible in the range from 0.5 Hz to the set limit value. The **reaction time** of the device is:

$$\frac{1}{\textbf{limit value}} + 36.9\,\text{ms}$$

- The double-channel monitoring device can also reliably detect a standstill. Validation is, therefore, possible from 0 Hz to the set limit value. The reaction time of the device is:

$$\frac{1}{\text{limit value}} + 51.\overline{9}\,\text{ms}$$

- Use the **Apply** ➞ button to set the currently measured frequency as the new limit.
- Use the **Hysteresis** input field to determine the switch-on threshold. This is near the set percentage below the limit value.

8.3   Test
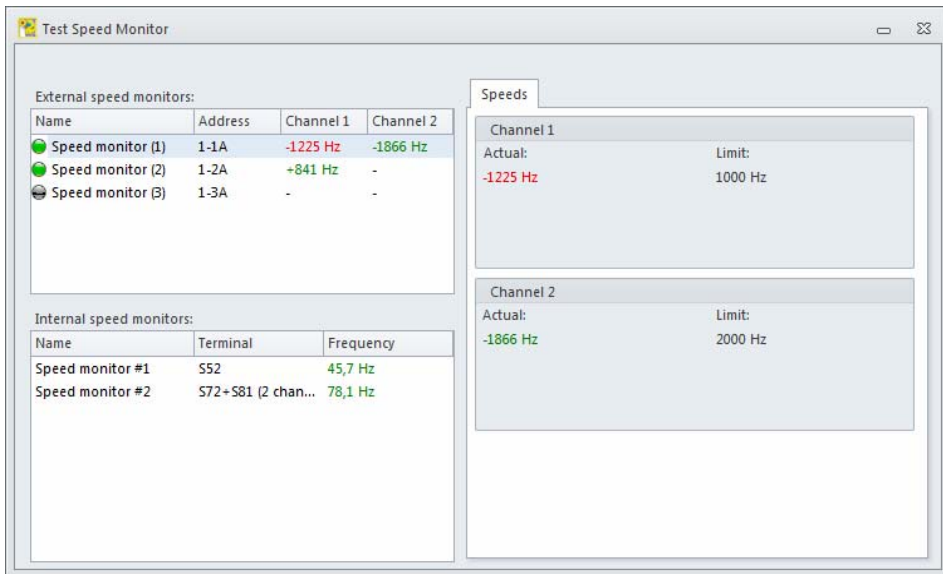
The window for testing the speed monitors is used to test configured speed monitors and to check whether the desired functionality is achieved. This also includes checking whether the rotary encoders were correctly connected to the speed monitors or if axes are interchanged.

The window displays a list of speed monitors as in configuration mode. To the right of the list are the currently measured rotational speeds of the selected speed monitor as well as the configured limit values. If limit values are configured in the speed monitor, the currently measured rotational speed is displayed in red or green depending on whether the value is above or below the limit.

No settings can be made in this window. It is used only to test the speed monitors that are connected to the AS-i master and to test their configuration.

9.   AS-i Safety I/O Module

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.
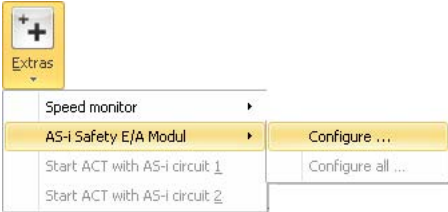
> **Information!**
> *Only AS-i Safety I/O Modules from Bihl+Wiedemann GmbH can be configured. To be able to configure the Safety I/O Modules, the dial of each must be set to position "E".*

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)!*

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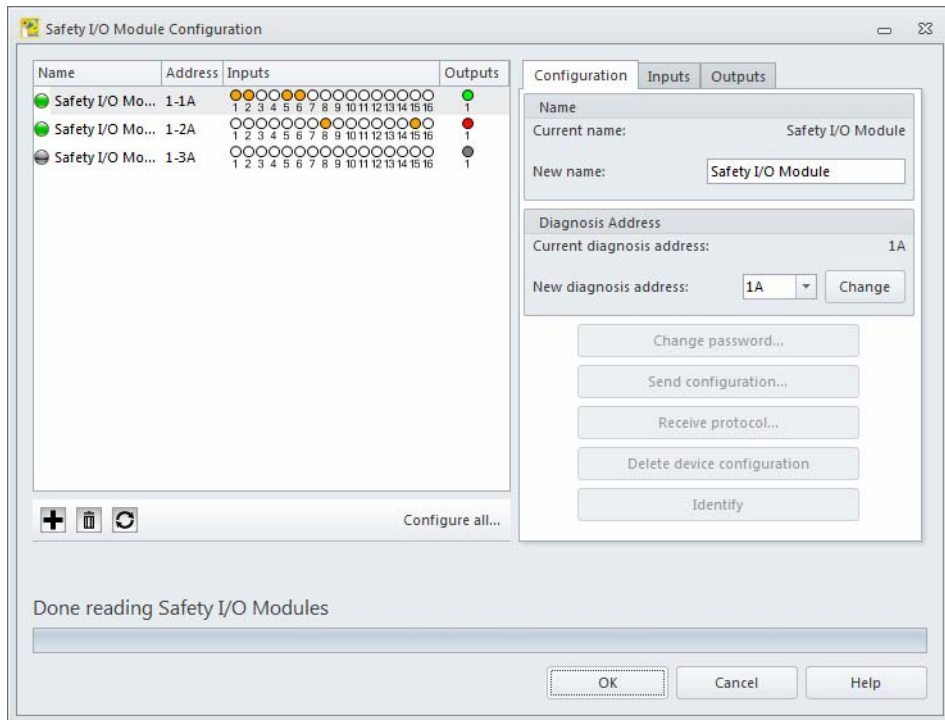
In the **Safety I/O Module configuration** window, both connected as well as unconnected (offline) Safety I/O Modules can be configured on the AS-i master. All settings necessary for commissioning Safety I/O Modules are made here.

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**.

9.1.1   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 diagnosis 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.
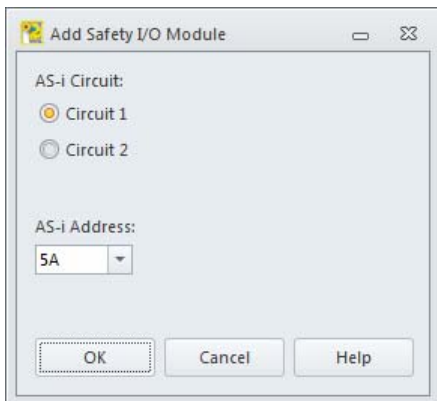
- The **Delete** button is only available if a Safety I/O Module is selected in the list. Click on Delete to remove the selected Safety I/O Module from the current configuration.

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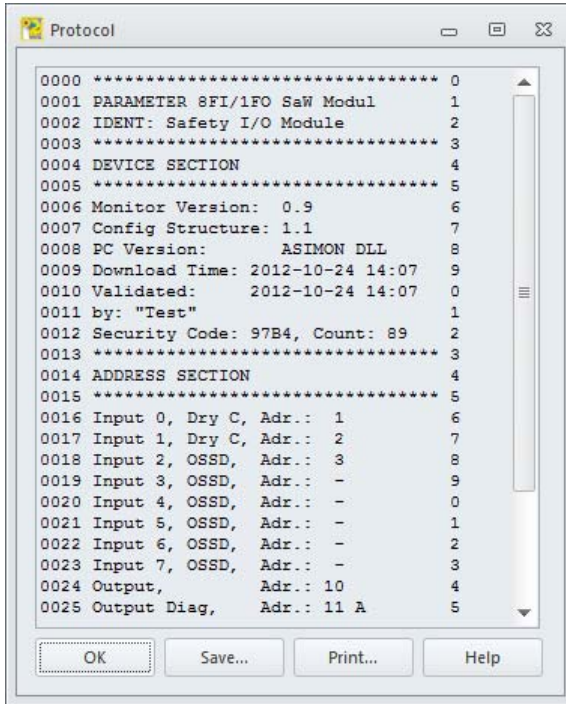
> ⚠️ **Attention!**
> *By validating the configuration, you confirm as safety officer that the system is set up correctly and all safety-relevant regulations and standards for the application have been adhered to!*

9.1.2 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

- 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 diagnosis address. The diagnosis 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.
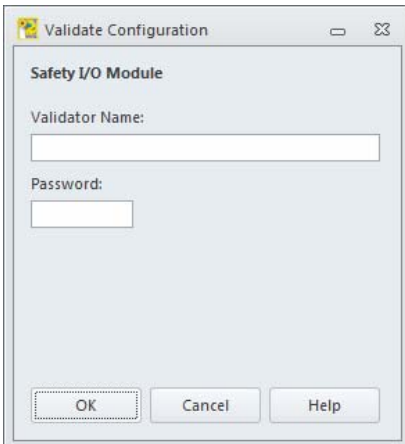
- The **Send configuration...** button sends the current configuration to the Safety I/O Module, validates it and releases it so that the Safety I/O Module can start in safe operation. Click the button to open a window for entering the Validator name and the Password. After the configuration has been 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!*

- 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

```
Protocol                              ☐  ▣  ☒

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   ▼

   OK        Save...     Print...      Help
```

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	
Line 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

Input Terminals	Actual	OSSD	AS-i Address
S1/2	10	☐	10
S3/4	11 (OSSD)	☑	11
S5/6	12 (OSSD)	☑	12
S7/8	-	☐	0
S9/10	-	☐	0
S11/12	-	☐	0
S13/14	-	☐	0
S15/16	-	☐	0

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

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.

9.1.3   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.

9.2   Configure all

Safety I/O Module Configuration Wizard

Safety I/O Module Configuration Wizard

Welcome the the Safety I/O Module configuration wizard

This wizard will help you configure all Safety I/O modules. Press "Next" to start.

Next >   Cancel
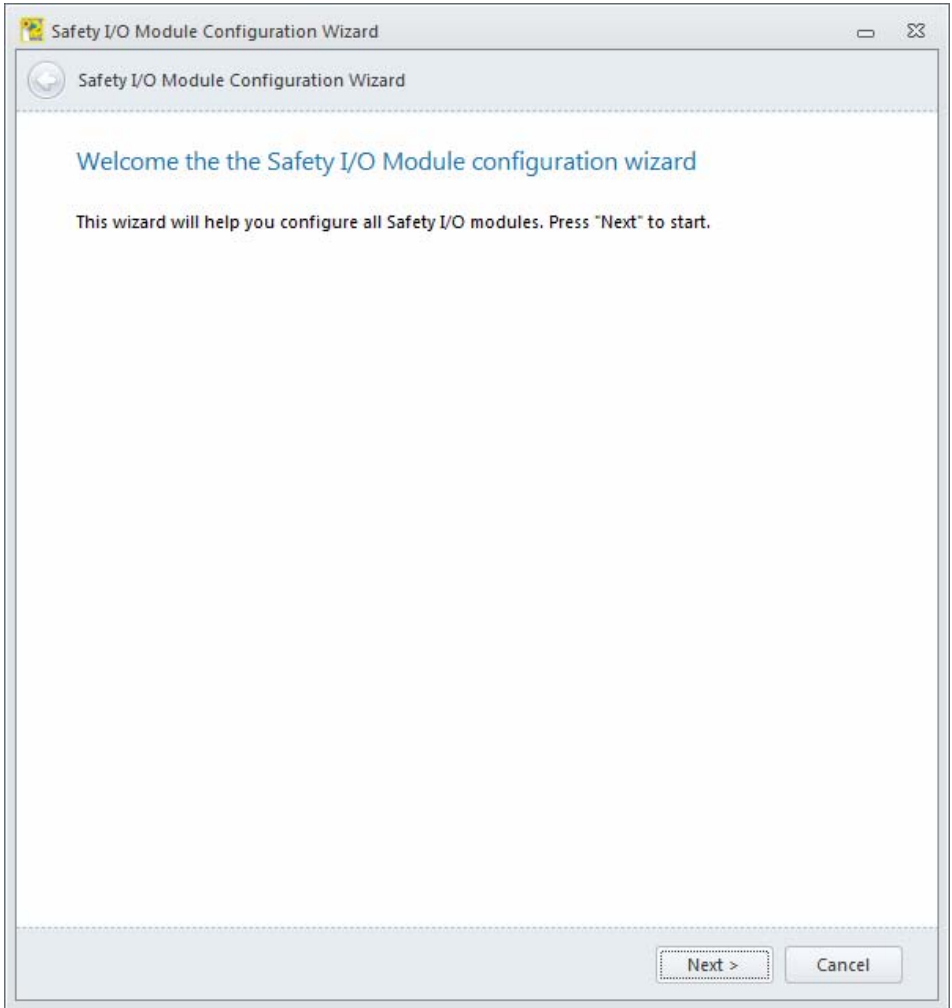
Information!
This mode is only available if a Safety I/O Module configuration has already been created.

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.
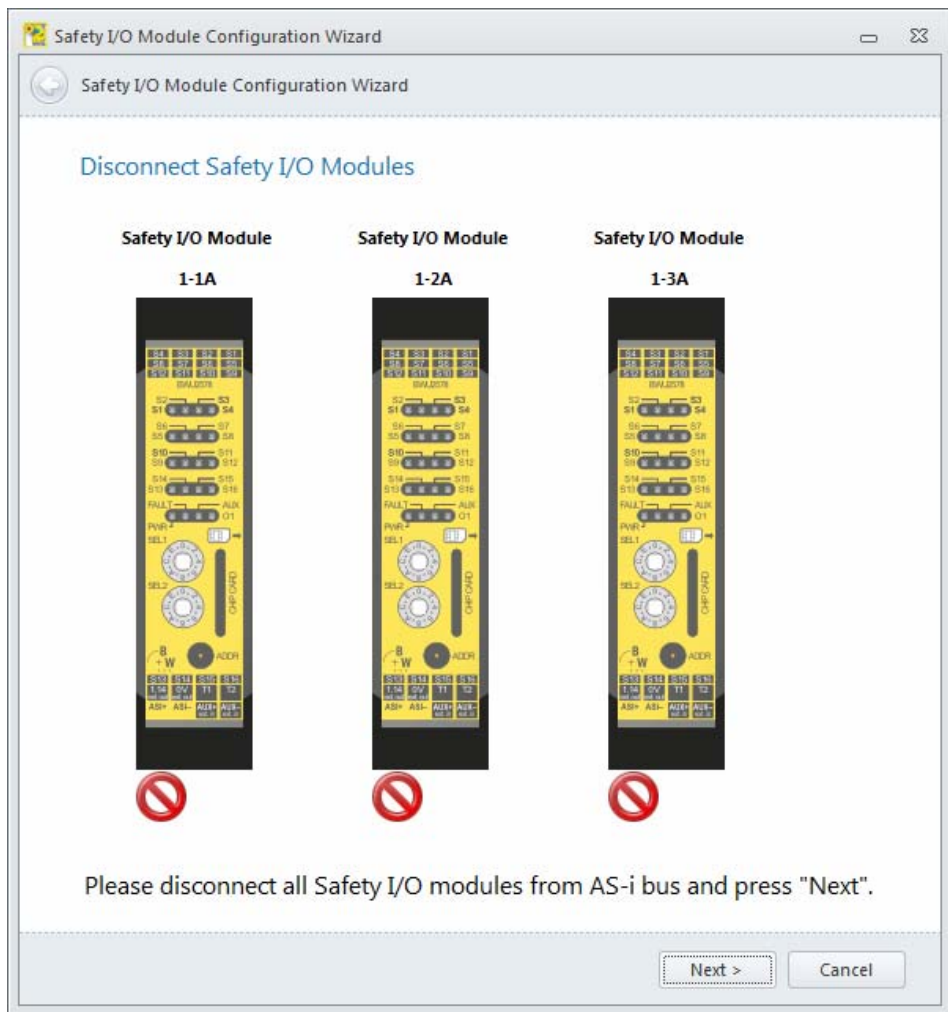
Connect module "Safety I/O Module" and turn both switches to setting "E".

○
⊥⊥ *Information!*
The Safety I/O Modules must either be in the state in which they were received on delivery (diagnosis address is 0) or already set to the correct diagnosis address. The Safety I/O Module cannot be found under a different diagnosis address! In addition, both dials must be set to position "E"; the diagnostic slave is not visible otherwise.

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!

Safety I/O Module Configuration Wizard

Safety I/O Module Configuration Wizard

Send configuration(s)

Sending configuration(s), please wait...

Remaining time: 00:00:34

Next >   Cancel
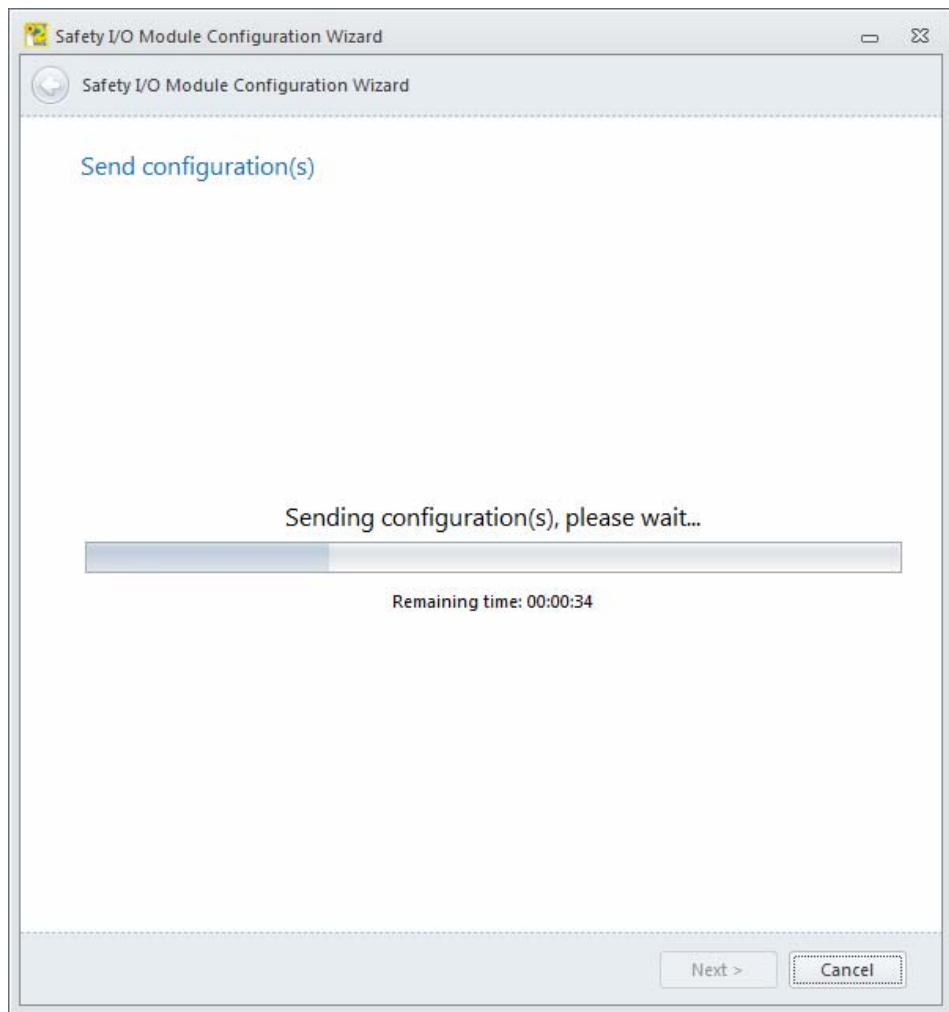
After configuring all Safety I/O Modules, the window can be closed via Finish.
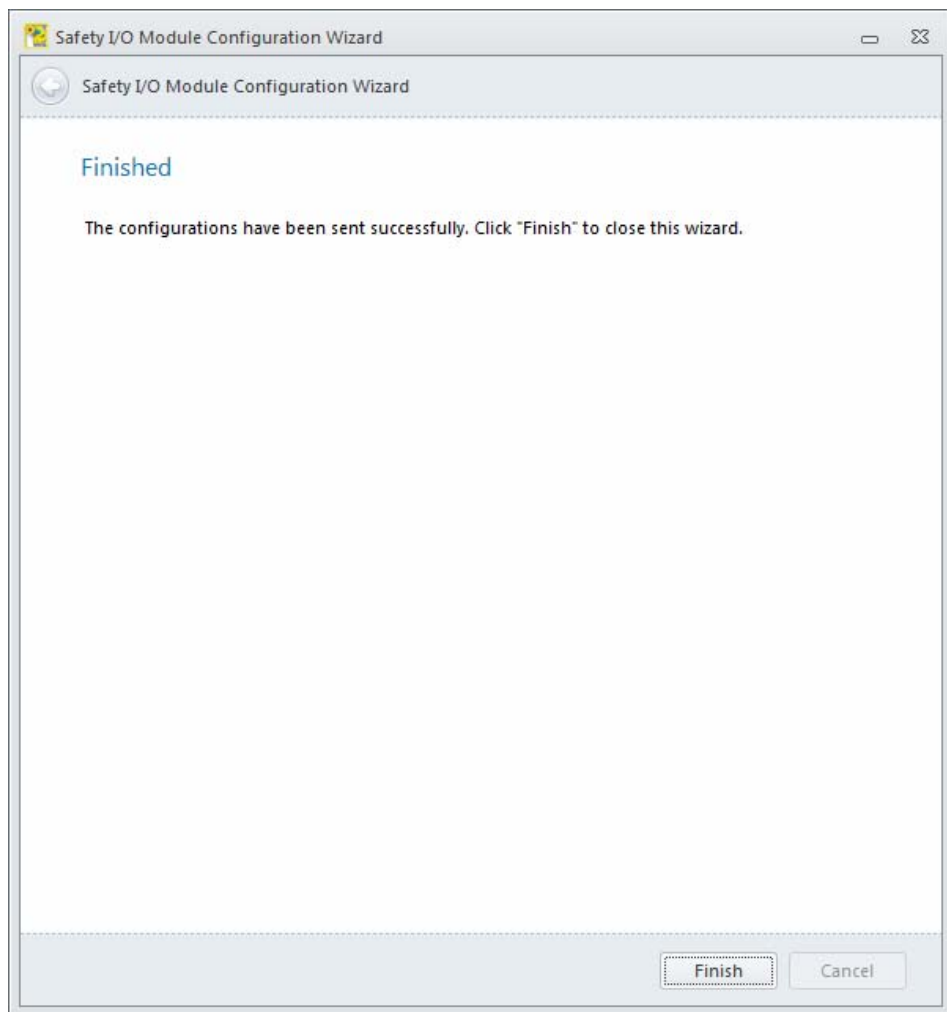
10. Examples

Validation via AS-i Safety, control via standard PLC

AS-i Safety is continuous, all information can be accessed from any point in the system. The AS-i safety monitor is designed to access all standard AS-i I/O data as well as the safety data. Likewise, the standard PLC can access all safety data as well. The standard PLC can access the data of the safety AS-i slaves like the I/O data of the standard slaves via the I/O data image. All safety and standard I/O data are automatically available at every point in the system, without additional configuration.

10.1 Example: Switching using monitor contact (monitor with 2 relay contacts)
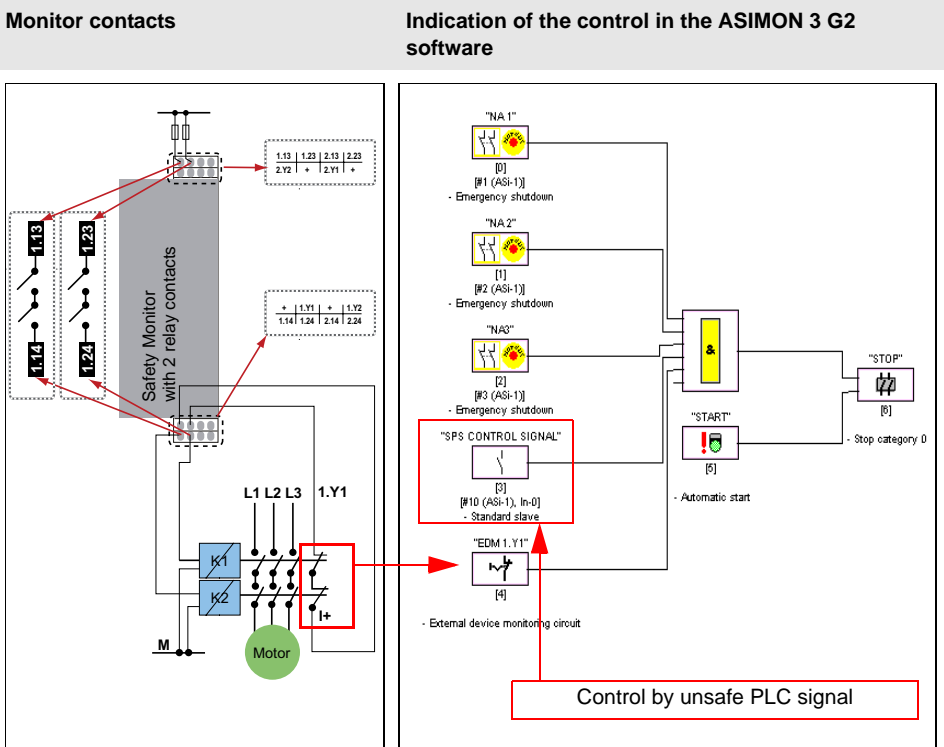
Monitor contacts	Indication of the control in the ASIMON 3 G2 software

Fig.: Safety program for the first release circuit, controlled by standard signal from AS-i slave 10, bit 0.

10.2 Example: Switching using monitor contact (monitor with 2 semiconductor outputs + 2 relay contacts)

Monitor contacts	Indication of the control in the ASIMON 3 G2 software
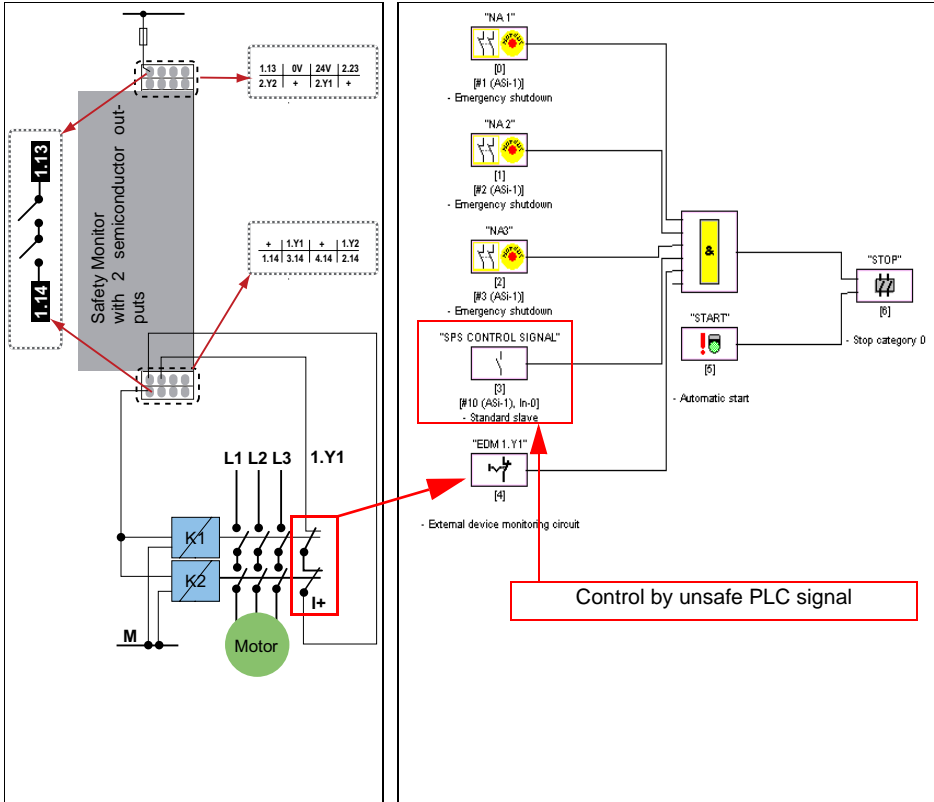
Fig.: Safety program for the first release circuit, controlled by standard signal from AS-i slave 10, bit 0.

10.3 Example: Switching using contacts on safe output

SaW contacts
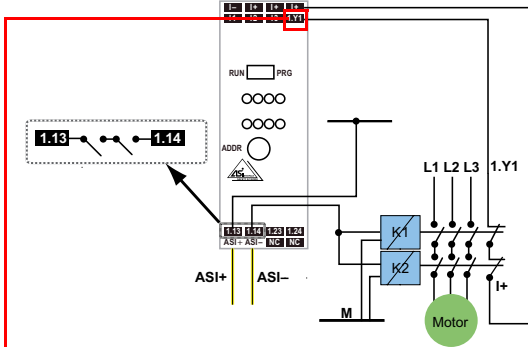
Indication of the control in the ASIMON 3 G2 software
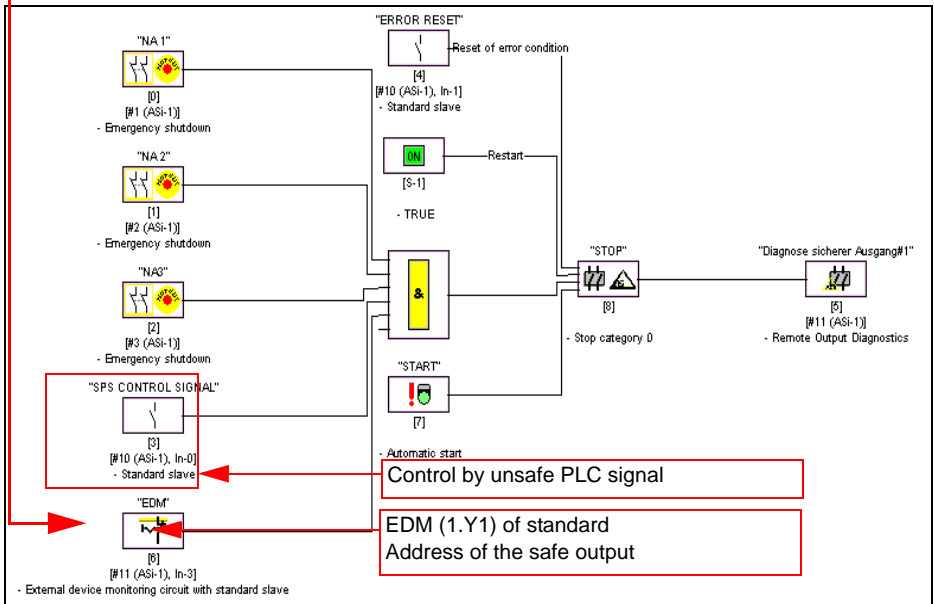
Fig.: Safety program for safety output slave, control by standard signal from AS-i slave 10, bit 0. EDM feedback of the output is performed via its standard address 11, bit 3.

10.4   Using the muting device

Muting lamp

User device

AOPD + muting device
linked via the logic OR function
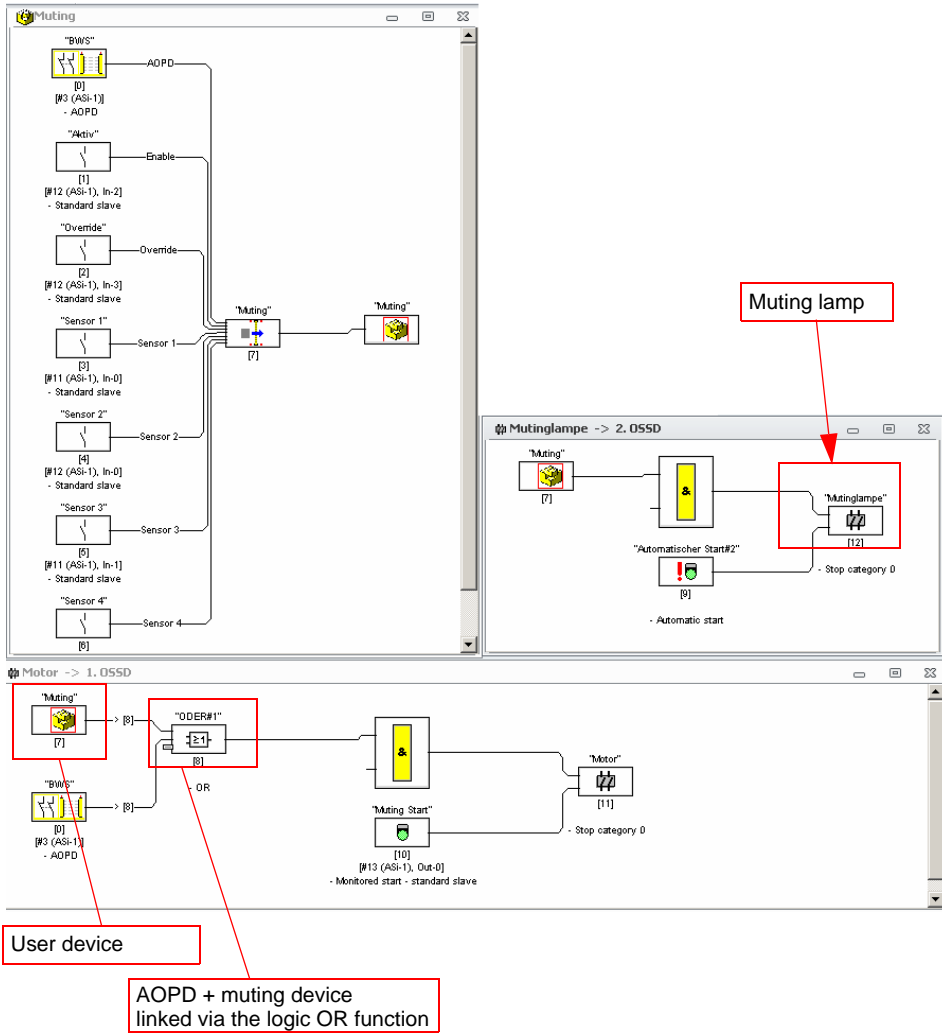
The muting device is only in the switched-off state during the muting action. For this reason, it can be used directly as a muting lamp. The flash device can also be used for a dynamic signal.

For the validation itself, the muting device must be "or" linked with the light barrier. This overwrites the state of the light barrier during the muting action.

10.5 Reaction times

10.5.1 Sensor -> local relay output
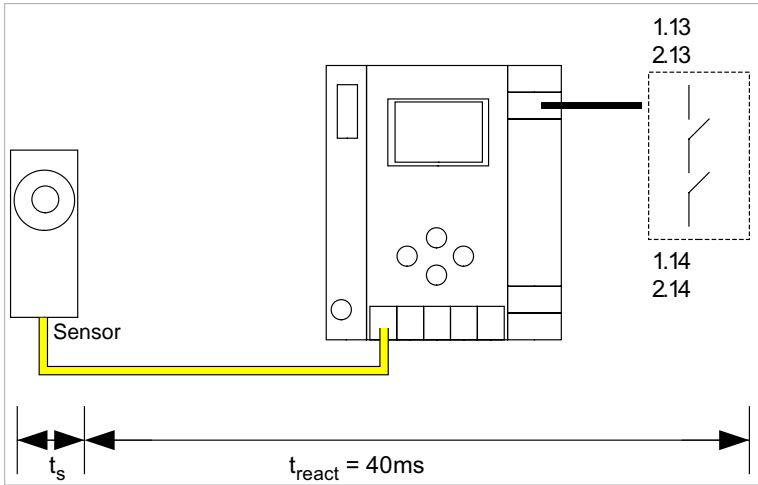
t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system

10.5.2   Sensor -> local electronic output
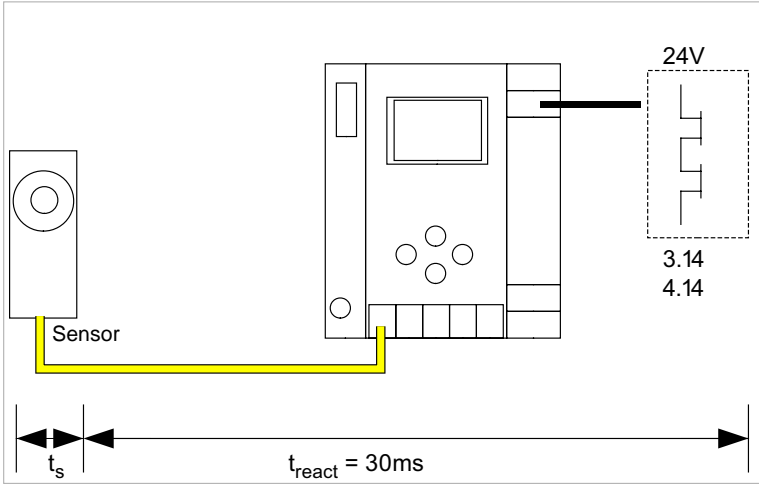
t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system
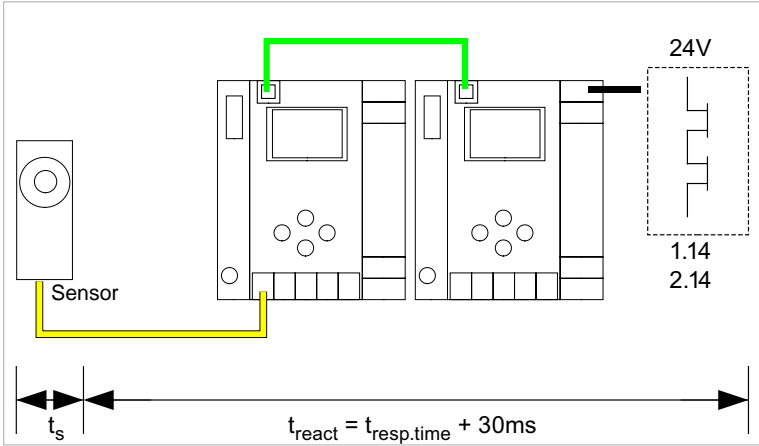
10.5.3   Sensor -> AS-i relay output
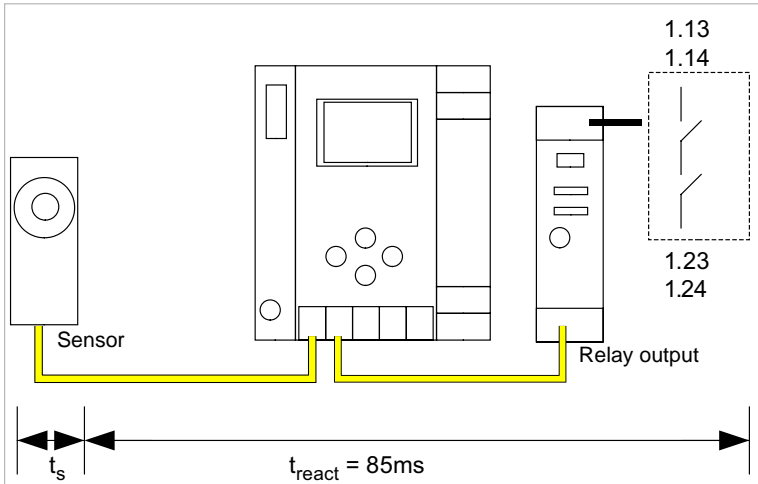
t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system

10.5.4   Sensor -> AS-i electronic output
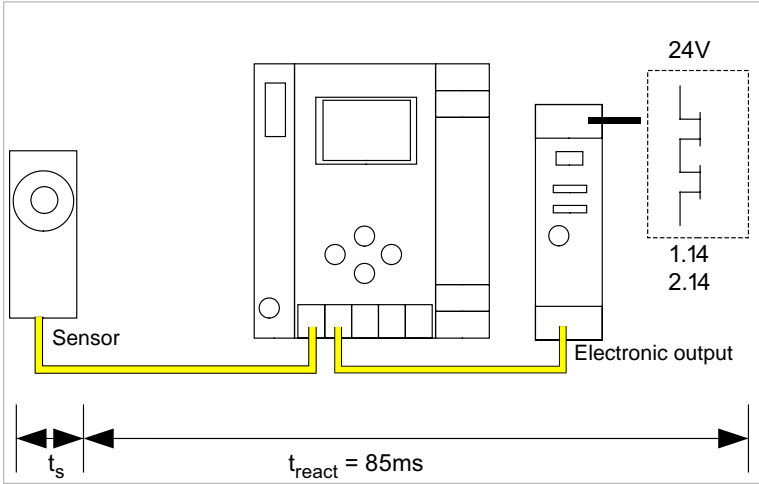
t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system

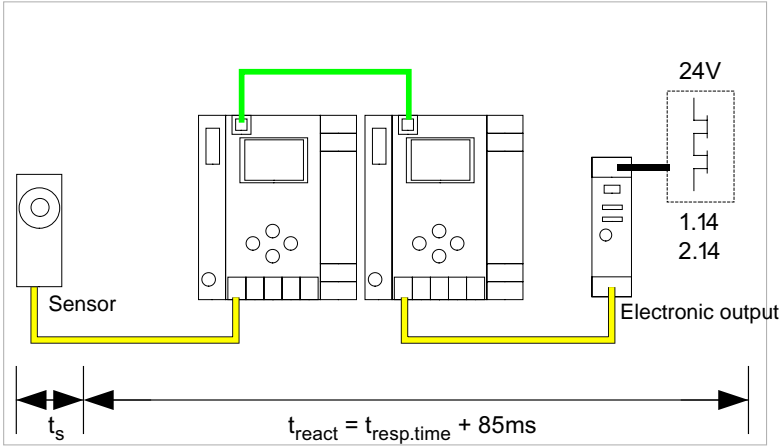## 10.5.5   Ethernet cross-communication -> local relay output
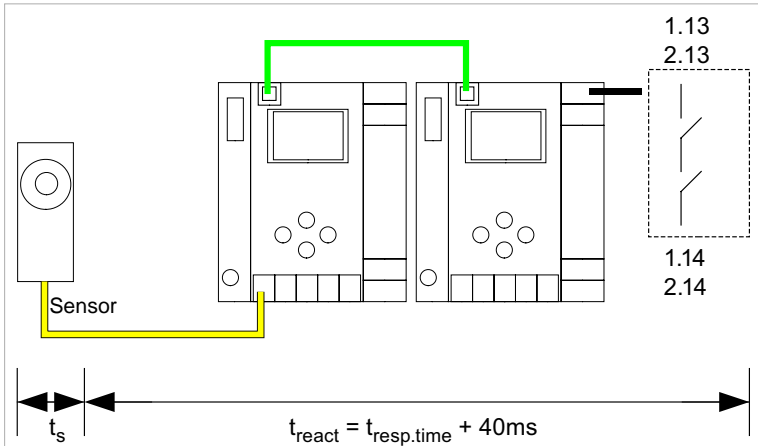
t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system
$t_{resp.time}$ = reaction time from configuration log

10.5.6   Ethernet cross-communication -> local electronic output


t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system
$t_{resp.time}$ = reaction time from configuration log

10.5.7   Ethernet cross-communication -> AS-i relay output
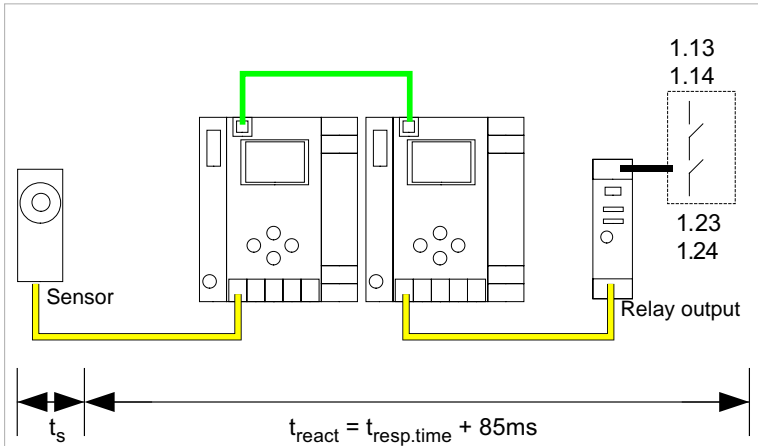
t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system
$t_{resp.time}$ = reaction time from configuration log

10.5.8   Ethernet cross-communication -> electronic output

t_s = maximum reaction time of the sensor (see data sheet)
t_{react} = maximum reaction time of the system
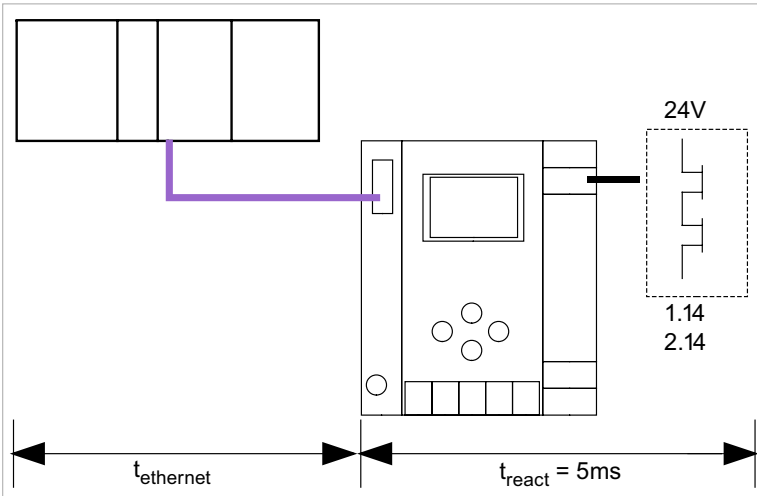$t_{resp.time}$ = typ. value for 5 gateways 199 ms; typ. value for 32 gateways 432 ms

⚠️ **Attention!**
The "$t_{resp.time}$" value should always be taken from the ASIMON configuration log!

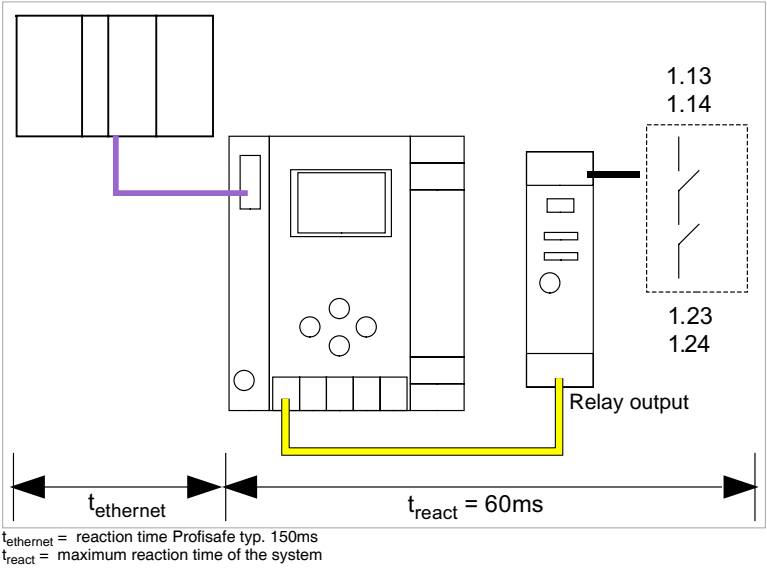## 10.5.9 Ethernet (Profisafe) -> local relay output
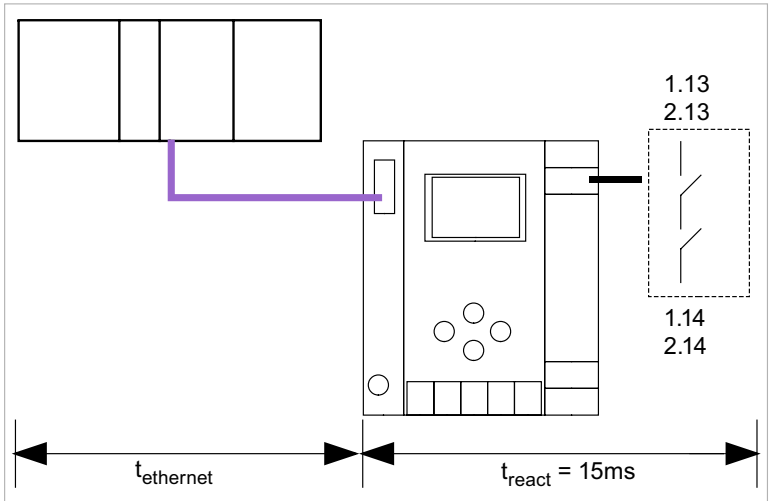
$t_{ethernet}$ = reaction time Profisafe typ. 150ms
t_{react} = maximum reaction time of the system

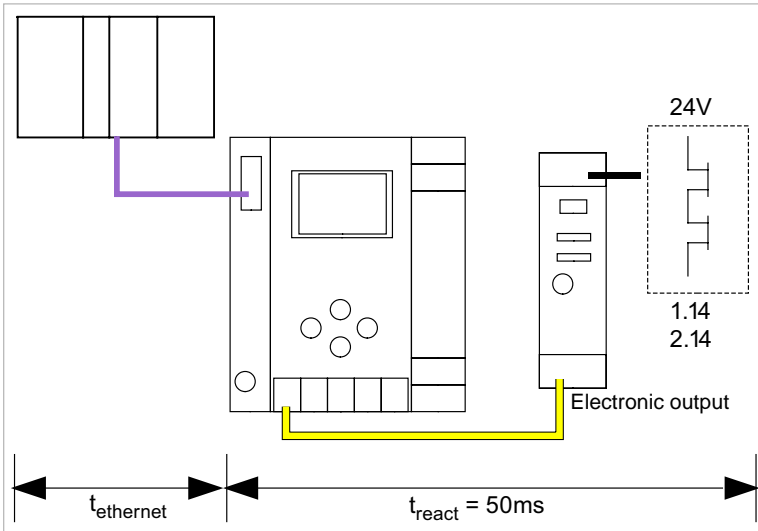## 10.5.10 Ethernet (Profisafe) -> local electronic output

$t_{ethernet}$ = reaction time Profisafe typ. 150ms
t_{react} = maximum reaction time of the system

10.5.11 Ethernet (Profisafe) -> AS-i relay output

$t_{ethernet}$ = reaction time Profisafe typ. 150ms
t_{react} = maximum reaction time of the system

10.5.12 Ethernet (Profisafe) -> AS-i electronic output

$t_{ethernet}$ = reaction time Profisafe typ. 150ms
t_{react} = maximum reaction time of the system