MANUAL

AS-Interface Safety at Work
VAZ-SW-SIMON

safety monitor
configuration software

PEPPERL+FUCHS

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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-interface safety monitor with the use of a PC.

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

The commissioning and documentation of your safe application are also supported by **asimon**.

Notice!
A brief introduction to secure AS-interface transmission can be found in the operating manual of the AS-interface safety monitor.

This version of the **asimon** configuration software has been developed for use under the Microsoft® Windows 95/98/ME/NT/2000/XP® operating systems.

1.2 Version information

The AS-interface safety monitor and the corresponding **asimon** configuration software have been further developed and their functionality expanded since their production start in the year 2001.

This handbook describes software version 2.1. Listed below is an overview of the new features with respect to software version 1.

New features in software version 2

In addition to the old device types, VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) of version 1, the device types of version 2 support VAS-1A-K12-U (type 1), VAS-2A-K12-U (type 2), VAS-1A-K12 (type 3) and VAS-2A-K12 (type 4) of the AS-interface safety monitor:

		Function range	
		"Basic"	"Enhanced"
Number of output circuits	1	VAS-1A-K12-U	VAS-1A-K12
	2	VAS-2A-K12-U	VAS-2A-K12

Table 1.1: Features of device versions

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The **"Basic"** and **"Enhanced"** function ranges differ as follows:

	"Basic"	"Enhanced"
Number of functional devices at logic level	32	48
OR gates (inputs)	2	6
AND gates (inputs)	no	6
Safe time function, switch-on and switch-off delay	no	yes
Function "button"	no	yes
Safety guard/module with debouncing	no	yes
Safety guard with lock	no	yes
Deactivation of functional devices	yes	yes
Reset of error condition	yes	yes
Diagnosis stop	yes	yes
Support of A/B technology for non-safe slaves	yes	yes
New functional devices (flip-flop, pulse on pos. edge, etc.)	no	yes
Dummy device (NOP)	no	yes

Table 1.2: "Basic" and "Enhanced" function ranges

New features in software version 2.1

Version 2.1 of the **asimon** configuration software includes the following new features:

- New monitoring device **zero sequence detection**
- Expansion of the output device **door lock by means of delay time**: now optionally available with stop category 1 for the first OSSD
- Expansion of the output device **door lock by means of zero-speed relay and delay time**: now optionally available with stop category 1 for the first OSSD
- New start device **activation via standard slave** (level-sensitive)
- New start device **activation via monitor input** (level-sensitive)
- New monitoring device **operational switching by means of monitor input**
- Expansion of monitoring device **double channel dependent with debouncing** for local acknowledgement and startup test
- Expansion of monitoring device **double channel independent** for local acknowledgement and startup test
- Incremental teaching of the code sequences
- Device index assignment
- Display of inverted icon when standard slave is inverted
- Number of simulated slaves can be selected
- Signalling of relay outputs and message outputs via the AS-interface

Attention!
The new functions of software version 2.1 can only be used in combination with AS-interface safety monitors of version 2.12 and higher.

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Compatibility

With version 2.1 of the **asimon** configuration software, old configurations from version 1 and version 2 can be opened, edited and saved.

Notice!
asimon *configuration files have the extension* ****.ASI*** *(AS-interface safety monitor, version 1) or* ****.AS2*** *(AS-interface safety monitor, version 2).*

1.3 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.

Notice!
This symbol indicates text which contains important information.

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1.4 Definition of terms

Output switching element (safety output) of the AS-interface 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

The safe AS-interface components and functional devices assigned to an output circuit of the AS-interface safety monitor. They are responsible for releasing the machine element which generates the hazardous 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 behaviour on the AS-interface 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.

Safe input slave

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

Safe slave

Slave for connecting safe sensors, actuators and other devices.

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Safety monitor

Component which monitors the safe 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-safe sensors, actuators and other devices.

Synchronisation 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 safe 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 safe switching outputs.

1.5 Abbreviations

AS-interface	Actuator Sensor Interface
AOPD	Active Optoelectronic Protective Device
EDM	External Device Monitoring
PLC	Programmable Logic Control

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2 Installation of hardware and software

2.1 Hardware

2.1.1 Prerequisites

To configure the AS-interface safety monitor via a PC, you will need:

- an AS-interface safety monitor VAS-1A-K12-U (type 1), VAS-2A-K12-U (type 2), VAS-1A-K12 (type 3) or VAS-2A-K12 (type 4)
- the interface cable for connecting the PC and AS-interface 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 installation
  - a mouse (recommended)
  - a free RS 232 (serial) interface with 9-pin Sub-D connection

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

Notice!
The connection of the AS-interface safety monitor to the PC is described here only briefly. Detailed information can be found in the operating manual for the AS-interface safety monitor.

To configure the AS-interface safety monitor with **asimon**, you must connect your PC and the AS-interface safety monitor using the serial interface cable (available as accessory).

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-interface safety monitor!

To connect, plug the interface cable end with the RJ45 connector into the 'CONFIG' socket on the front of the AS-interface safety monitor and the other end with the 9-pin Sub-D socket connector to a free COM port (serial RS232 interface) on your PC.

The connection can be made directly either to a serial interface or to a USB adapter.

Notice!
If the connection between the AS-interface 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 behaviour of the PC (see user documentation for the PC or that of the operating system manufacturer).*

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2.2 Software

2.2.1 System requirements

The following system requirements are necessary for the AS-interface safety monitor configuration software:

- at least 32 MB free main memory (RAM)
- at least 32 MB free hard disk memory
- Microsoft® Windows 95/98/ME/NT/2000/XP® 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.

With an update installation, the setup program checks whether asimon version 2 is already installed on the PC. If a previous installation is detected, the setup program offers the option of replacing the existing installation with version 2.1 or, as an alternative, creating a second subfolder.

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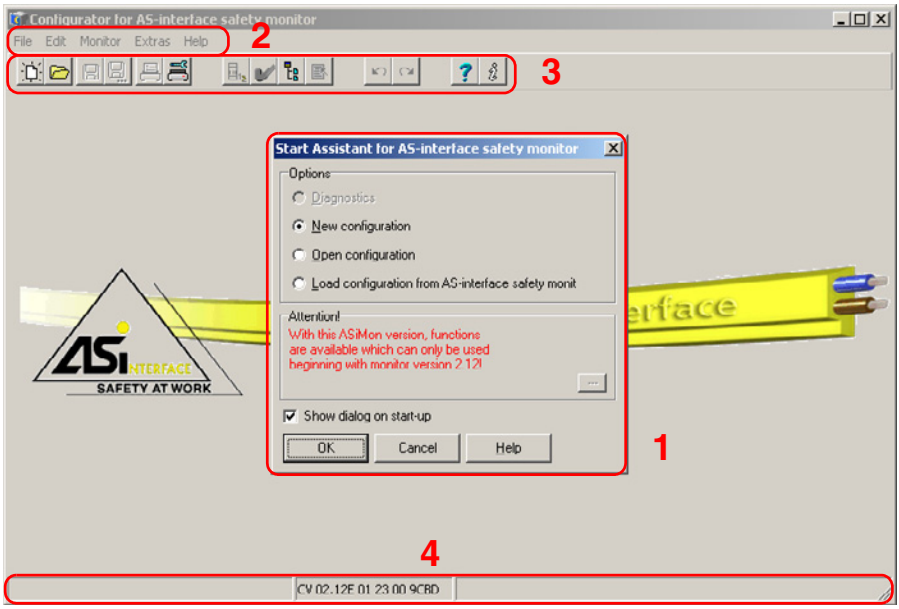
3 First steps

Notice!
Connect the interface cable to the PC and the safety monitor as described in chapter 2.1.2. 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 stored configuration.

3.1 Launching the program

To start the configuration software for the AS-interface 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** 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 Toolbar
4 Status/Info bar

Figure 3.1: User interface of the **asimon** configuration software after starting the software

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Start Assistant

Notice!
In order to query the diagnostic information, the connected AS-interface safety monitor must be in protective operation.

If a connection to the AS-interface safety monitor cannot be established on program startup (no AS-interface safety monitor connected, connected to wrong interface etc.) or if the connected AS-interface 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 stored on a data carrier or to search for errors (see chapter 6.2 "Troubleshooting and error rectification").

Option **Diagnostics**

When you select the **Diagnostics** option, first a window opens with the following query. By clicking **Neutral**, the diagnostic information of the connected AS-interface safety monitor is queried, even if no configuration is loaded in **asimon**.

Notice!
Querying the diagnostic information of an unknown configuration can take several minutes, as the configuration of the connected AS-interface safety monitor must be reconstructed in ***asimon****. In this way you can load an unknown configuration without needing to exit protective operation.*

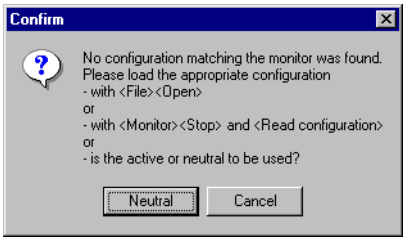

Figure 3.2: Query with the **Diagnostics** option

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

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Option **New configuration**

With the **New configuration** option, you can create a completely new configuration for the AS-interface safety monitor. First, you must enter the base data for the new configuration in the **Information about monitor and bus** window. This window is displayed automatically.

Notice!
The **Information about monitor and bus** *window can be called up at any time. To do this, on the* **Edit** *menu, select the* **Information about monitor and bus…** *menu command or click the*  *button.*

Notice!
If a valid configuration has been loaded to or from an AS-interface safety monitor, the time at which the current configuration in the program was transmitted to the AS-interface safety monitor is shown in the **Download time** *window area.*

On the **Information about monitor** tab, you must enter a title for the configuration, select the operating mode and specify the function range **"Basic"** or **"Enhanced"** of the AS-interface safety monitor.

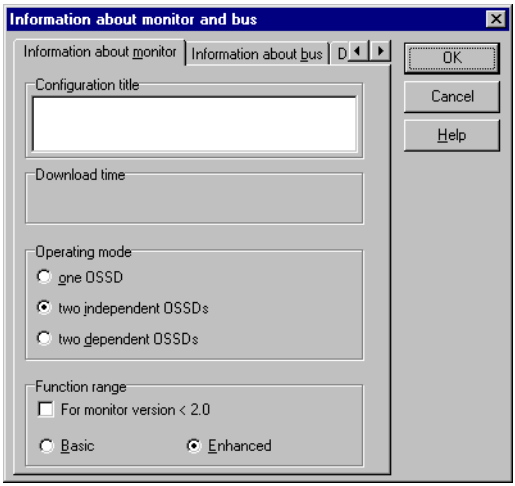

Figure 3.3: **Information about monitor and bus** window, **Information about monitor** tab

Configuration title

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

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Operating mode

You can select from three operating modes:

- one OSSD
  for AS-interface safety monitors VAS-1A-K12-U (type 1) or VAS-1A-K12 (type 3) with 1 OSSD (1 redundant safe relay output)
- two independent OSSDs
  for AS-interface safety monitors VAS-2A-K12-U (type 2) or VAS-2A-K12 (type 4) with 2 independently functioning OSSDs (2 redundant safe relay outputs)
  Select this operating mode when you would like to configure two completely independent shut-down modes.
- two dependent OSSDs
  for AS-interface safety monitors VAS-2A-K12-U (type 2) or VAS-2A-K12 (type 4) with 2 OSSDs (2 redundant safe relay outputs) in which the second OSSD is dependent on the first (see chapter 4.3.5 "Output devices").
  Special switch-off functions are available in this operating mode.

Notice!
Prior to a subsequent change of operating mode, determine whether this operating mode is compatible with the AS-interface safety monitor type which you are using (see table 3.1).

Function range

Here, enter the function range of the AS-interface safety monitor which is to be configured. The following table shows how the four device types of the AS-interface safety monitor differ from one another:

		Function range	
		"Basic"	"Enhanced"
Number of output circuits	1	VAS-1A-K12-U	VAS-1A-K12
	2	VAS-2A-K12-U	VAS-2A-K12

Table 3.1: Features of device versions

When you would like to create or edit a configuration for an AS-interface safety monitor VAS-1A-K12-U or VAS-2A-K12-U, you must click the checkbox **For monitor version < 2.0**.

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On the **Information about bus** tab, you must enter the AS-interface bus addresses of the used standard slave and the safety-oriented AS-interface slaves which are present in this AS-interface network.

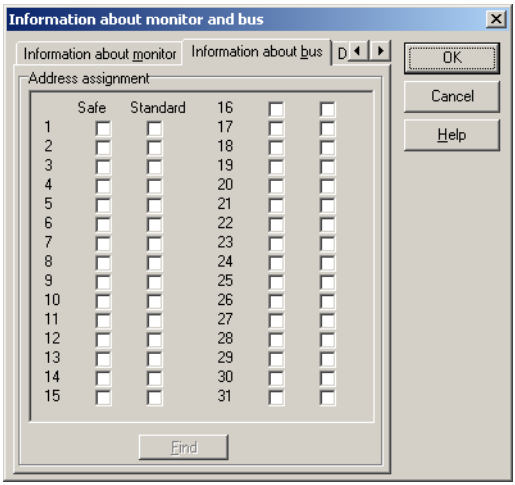

Figure 3.4: **Information about monitor and bus** window, **Information about bus** tab

Attention!
*If you would like to operate two or more AS-interface safety monitors on the same AS-interface bus, you must enter for all AS-interface safety monitors **all** safe slaves on this AS-interface bus in the Information about bus tab even when they are not monitored by the given AS-interface safety monitor.*

With the **Find** button, you can also search the AS-interface bus for slaves when the AS-interface safety monitor is in configuration operation.

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

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

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On the **Diagnosis / Service** tab, you can make global adjustments for Diagnosis stop and for Reset of error condition as well as configure the diagnostics via the AS-interface bus.

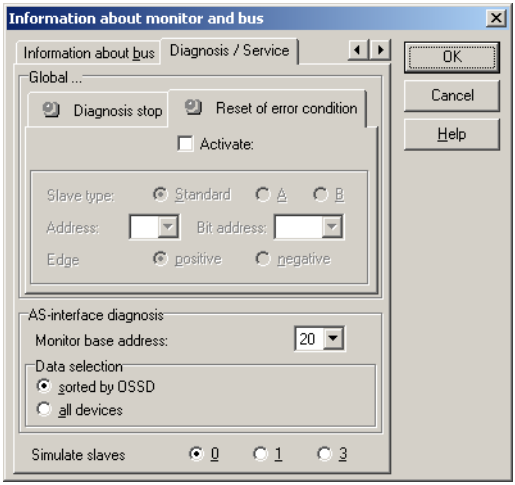

Figure 3.5: **Information about monitor and bus** window, **Diagnosis / Service** tab

Global adjustments, **Diagnosis stop** sub-tab

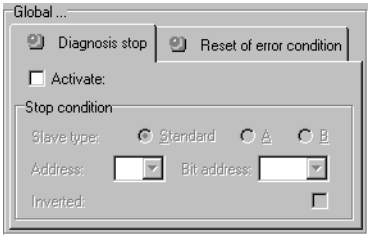

Figure 3.6: **Diagnosis stop** sub-tab of the **Diagnosis / Service** tab

The Diagnosis stop function is activated by clicking the **Activate:** checkbox. This function is used when a stop condition is fulfilled (specified AS-interface standard/A/B slave is in the ON state) to keep the devices in a ready state (diagnostics LED yellow, waiting for confirmation). This does not occur with activated local acknowledgement. The diagnosis stop is level-sensitive and is deactivated if the specified standard/A/B slave has no bus communication.

This function is very useful, for example, for detecting during very brief switch-off actions which device, and, thus, which safe input slave caused the switch-off.

Notice!
For additional information on calling up diagnostic information see chapter 6 "Diagnostics and error handling" and chapter 7 "Diagnostics via AS-interface".

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Global adjustments, **Reset of error condition** sub-tab

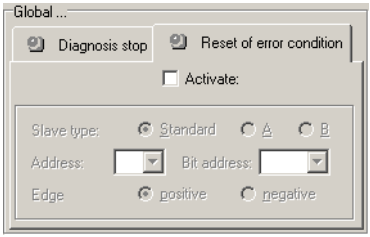

Figure 3.7: **Reset of error condition** sub-tab of the **Diagnosis / Service** tab

By selecting the **Activate:** checkbox, the global reset of error conditions via one of the standard/A/B slaves connected to the AS-interface bus is activated.

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

As of version 2.0 of the AS-interface safety monitor, it is possible to differentiate the reset of error conditions (Reset). Reset of error condition can be activated by an AS-interface standard/A/B 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.

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AS-interface diagnosis

Monitor base address

You can assign an AS-interface bus address for the AS-interface safety monitor. In this case, it is possible to query diagnostic information about the AS-interface bus from your AS-interface master (e.g. the PLC). If you do not assign an AS-interface bus address, the AS-interface 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.

For assigned monitor base addresses, you can set under Data selection whether the diagnostic data are to be output via AS-interface **sorted by OSSD** or are to be left unsorted (**all devices**) (see chapter 7).

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

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Simulate slaves

If less than four safe or unsafe AS-interface slaves are connected to the AS-interface bus, you must set **Simulate slaves** unequal to zero in order for the AS-interface safety monitor to function correctly.

The number of simulated slaves can be **1** (for large AS-interface networks) or **3** (for small AS-interface networks).

Notice!
*If **Simulate slaves** is set unequal to zero, either 1 or 3 additional AS-interface slaves are simulated internally. These slaves are automatically assigned the first or first three bus address(es), respectively, which follow on the AS-interface 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-interface master (PLC) via the AS-interface 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-interface master.

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

According to this, the AS-interface safety monitor occupies a different number of bus addresses in the AS-interface network:

Number of occupied bus addresses	Meaning
0	No bus address was assigned to the AS-interface safety monitor. No communication and, thus, no diagnostics possible via AS-interface with the safety monitor.
1	One bus address was assigned to the AS-interface safety monitor. Diagnostics possible via AS-interface with the safety monitor. Number of simulated slaves equal to **0**.
2	One bus address was assigned to the AS-interface safety monitor. Diagnostics possible via AS-interface with the safety monitor. Number of simulated slaves equal to **1**. State of relay- and message outputs can be accessed via AS-interface at **monitor base address+1** (monitor version 2.12 and higher).
4	One bus address was assigned to the AS-interface safety monitor. Diagnostics possible via AS-interface with the safety monitor. Number of simulated slaves equal to **3**. State of relay- and message outputs can be accessed via AS-interface at **monitor base address+1** (monitor version 2.12 and higher).

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Option **Open configuration**

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

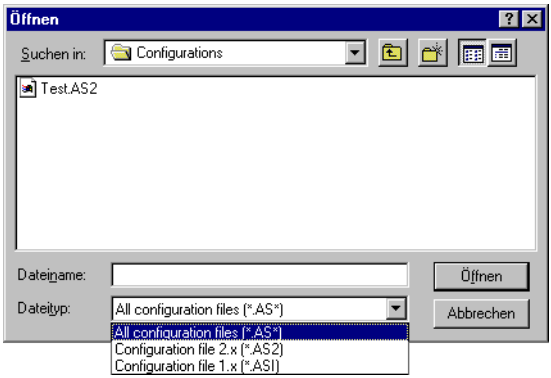

Figure 3.8: Opening a stored configuration file

Notice!
asimon *configuration files have the extension* ****.ASI*** *(AS-interface safety monitor, version 1) or* ****.AS2*** *(AS-interface safety monitor, version 2).*

Option **Load configuration from AS-interface safety monitor**

Notice!
If a connection to the AS-interface safety monitor cannot be established on program startup (no AS-interface safety monitor connected, connected to wrong interface etc.) or if the connected AS-interface safety monitor is in protective operation, the **Load configuration from AS-interface 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 stored on a data carrier or to search for errors (see chapter 6.2 "Troubleshooting and error rectification").

When you select the **Load configuration from AS-interface safety monitor** option, the configuration of the connected AS-interface safety monitor is queried and displayed in the main program window.

Checkbox **Show dialog on start-up**

When this checkbox is activated, the Start Assistant is called up each time the **asimon** program is started. If you do not wish to use this program feature, simply deactivate this checkbox 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.

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3.2 Description of the user interface

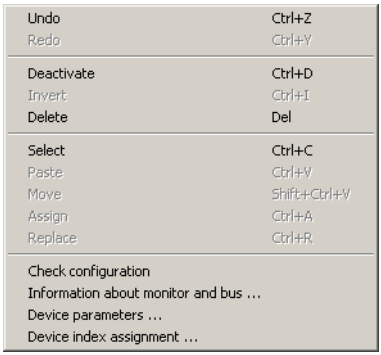
3.2.1 The menu bar

Menu overview

Main menu bar

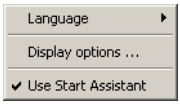
File menu

Edit menu



Monitor menu

Extras menu



Help menu

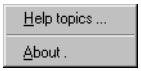


Figure 3.9: Menu overview

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Notice!
Depending on the program state, particularly when no connection to an AS-interface safety monitor exists, not all menu commands are available.

3.2.2 The toolbar

As in other Windows® programs, you can use the buttons located in the toolbar to directly execute important functions without accessing the menu.

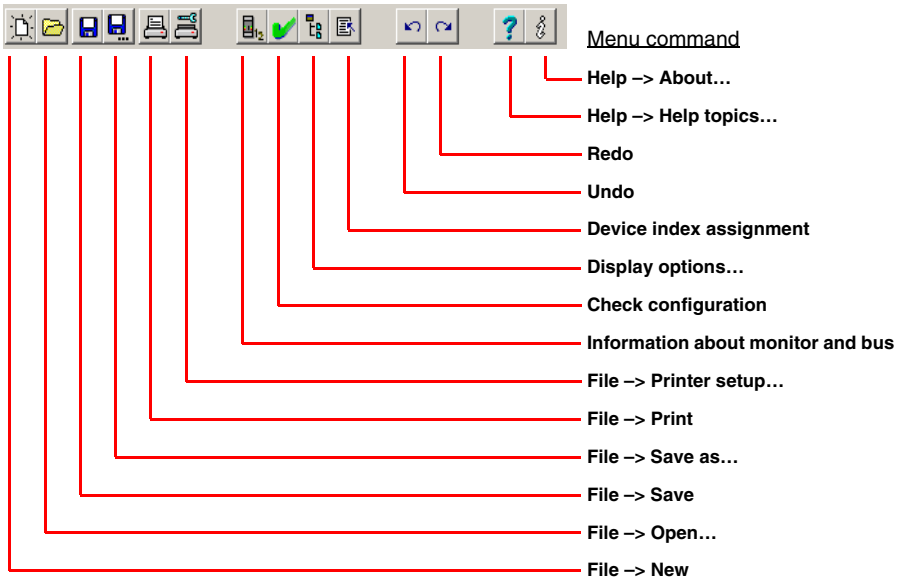

Figure 3.10: Toolbar

3.2.3 The status/info bar

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

Left side:	Centre:	Right side:
Help information	**Monitor version** (in configuration operation)	**Status and error information**

Figure 3.11: Status/info bar

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3.2.4 The window areas

The configuration of an AS-interface safety monitor with the **asimon** software is performed graphically and interactively. Using a library of icons representing devices (left window), you can select the safe AS-interface slaves which are to be monitored as well as other functional devices and assemble a configuration with them.

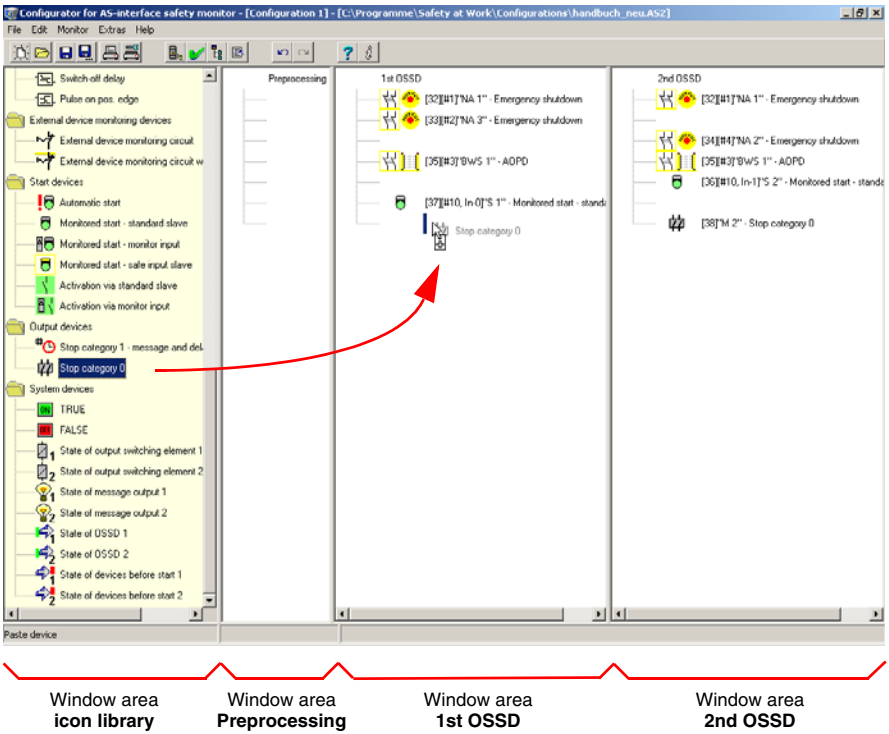

Figure 3.12: Window areas

The widths of the individual window areas can be adjusted to meet your needs as in other Windows® programs.

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Preprocessing window area

The **Preprocessing** window area differs from the OSSDs only in that the individual, functional devices configured here are not linked by a global AND-gate, but rather the output of each logic operation can be processed further separately.

Notice!
Insert the monitoring devices which you would like to link to one another via a logic device in the Preprocessing window area. Then insert the desired logic device in the OSSD. Finally, insert the devices which are to be linked as a copy from Preprocessing into the logic device in the OSSD.

You can link monitoring devices from the other OSSD by inserting them directly into the logic device. The index of this monitoring device must, however, be less than the index of the logic device. Thus, the monitoring device must be processed before the logic operation.

For AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) 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 preprocessing, you can also insert logic devices and there link system devices to one another.

1st OSSD and 2nd OSSD window areas

In the **1st OSSD** and **2nd OSSD** window areas, the monitoring devices (safe AS-interface slaves), start devices, EDM devices and output devices can be grouped to the desired configuration and globally linked to one another by the logic AND function.

In addition, components from Preprocessing and system devices can be linked to one another by logic devices for the creation of more complex functions.

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Operation

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

- With the mouse:
  - by **drag&drop**:
    click device with the left mouse button, keep mouse button pressed, and move the device. Simultaneously press the **<Shift>** or **<Ctrl>** key for additional options:
    - If devices are pulled from the selection list with the mouse into Preprocessing or an OSSD, the device is automatically inserted. If the **<Ctrl>** key is pressed before the mouse button is released, the selected device replaces the device previously present at this position.
    - If devices are moved with the mouse from OSSD 1 to OSSD 2 or vice versa, the devices are, by default, copied. If the **<Shift>** key is also pressed, the device is moved.
    - If devices are moved downward with the mouse within Preprocessing or the OSSDs, the devices are, by default, moved. If the **<Ctrl>** key is also pressed, the device can be assigned to a logic device.
  - 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>** key: change window areas.
  - with the arrow keys: select circuit, device or position.
  - execute actions using the following keyboard commands:

<Ctrl> + <D>	**= Activate/Deactivate**
<Ctrl> + <I>	**= Invert**
<Delete>	**= Delete**
<Ctrl> + <C>	**= Select**
<Ctrl> + <V>	**= Paste**
<Shift> + <Ctrl> + <V>	**= Move**
<Ctrl> + <A>	**= Assign**
<Ctrl> + <R>	**= Replace**

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Display options…

You can set with which informational content the devices are to be displayed in the Preprocessing and the OSSD window areas. To do this, on the **Extras** menu, select the **Display options…** menu command or click the  button.

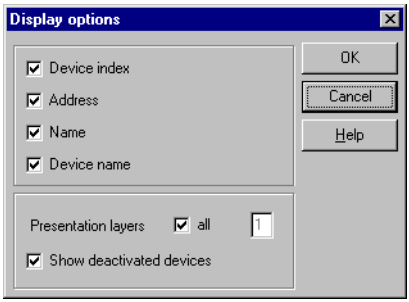

Figure 3.13: Display options

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3.3 Program settings

3.3.1 Setting the program language

The user interface of the **asimon** configuration software supports the following languages:

- German
- English
- French
- Spanish
- Italian
- Japanese

To change the language of the user interface, select on the **Extras** menu under the **Language** menu item the desired language. The program does not need to be restarted after changing the language.

Figure 3.14: Setting the program language

Notice!
The Japanese characters can be displayed only if the operating system supports such characters.

3.3.2 Selecting the serial interface

When starting the program, **asimon** asks if and at which PC serial interface (COM-port) an AS-interface safety monitor is connected. If the connection between the PC and safety monitor is established only after the **asimon** software has been started, you must manually select the correct COM port in the program. Otherwise, no connection can be established to the AS-interface safety monitor.

The transmission parameters for serial communication with the AS-interface safety monitor are automatically set by **asimon**.

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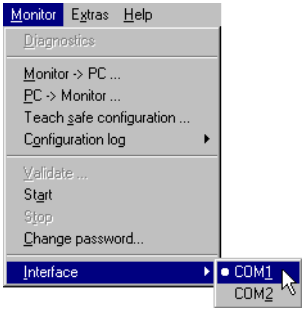

Figure 3.15: Selecting the serial interface

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4 Configuring the AS-Interface safety monitor

The AS-interface 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-interface safety monitor

The functional task of the AS-interface 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 safe switching outputs.

During configuration, the **asimon** software automatically organises the devices into the following order:

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

In protective operation, the devices are likewise cyclically analysed in this order.

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 safe 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 safe switching outputs.

In the first step of the evaluation, the states of all monitoring, logic and EDM devices are linked to one another by means of a logic AND function, i.e. only when all configured monitoring, logic and EDM 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 switch elements are connected in series and validation is possible only when all contacts are closed.

In the second step, the start devices which determine the startup behaviour 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.

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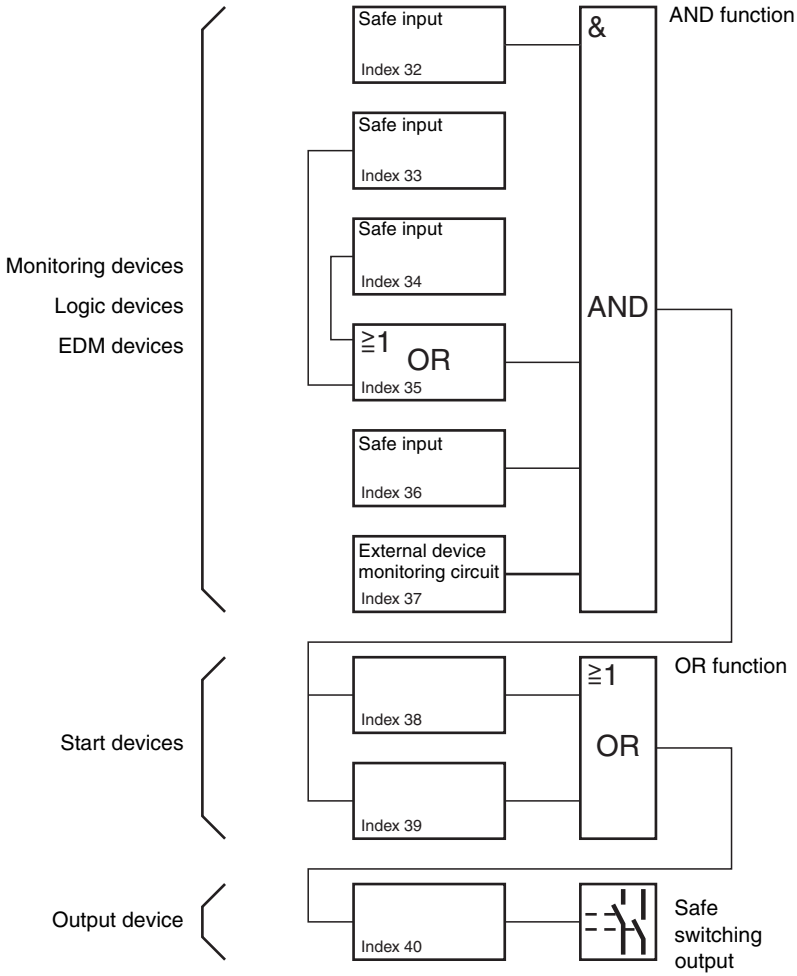

Figure 4.1: Order of events during the evaluation of the configured devices

In the third step, the output device is then analysed. 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 safe switching outputs of the OSSD in accordance with its functional characteristics and time behaviour, i.e. the relays trip and the switching contacts close.

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4.2 General procedure

The procedure is identical for all device variants of the AS-interface safety monitor (1 or 2 OSSDs, "Basic" or "Enhanced" function range).

Step 1 - Information about monitor and bus

In order to create a new configuration, you must first make the required entries in the **Information about monitor and bus** window for the AS-interface safety monitor and the slaves which are to be monitored (see "Start Assistant" on page 13):

- Assign the configuration title
- Specify operating mode of the AS-interface safety monitor
  - One OSSD
  - Two independent OSSDs
  - Two dependent OSSDs
- Specify function range of the AS-interface safety monitor
  - "Basic" or "Enhanced" function range
  - Monitor Version 2.0 or < 2.0
- Enter the AS-interface bus addresses of the safe and unsafe AS-interface slaves which are to be monitored
- If necessary, activate diagnosis stop via Standard slave
- If necessary, activate reset of error condition via Standard slave
- Activate diagnostics via AS-interface
  - Enter the AS-interface bus address of the AS-interface 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

You can now assemble a new configuration with the required devices from the icon library. see "Creating and changing a configuration" on page 33. In addition, in **asimon** version 2.1, you can freely assign the devices diagnosis indices for the AS-interface diagnostics. see "Assignment of the AS-interface diagnosis indices" on page 135.

Step 3 - Commissioning

After you have created a valid configuration, you can commission the AS-interface safety monitor. The commissioning procedure is described in chapter 5.

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4.3 Creating and changing a configuration

A valid configuration for the AS-interface 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 OSSD 1)
- exactly 1 output device (with two dependent output groups, only for OSSD 1)

The maximum number of devices is dependent on the function range of the AS-interface safety monitor type:

- function range **"Basic"**: maximum **32 devices** (device index 32 … 63).
- function range **"Enhanced"**: maximum **48 devices** (device index 32 … 79).

Procedure

Select a device from the icon library in the left window area and insert it into the window area of the desired OSSD (see "Operation" on page 26).

Notice!
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 the desired OSSD, 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"
- AS-interface 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.

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Example:

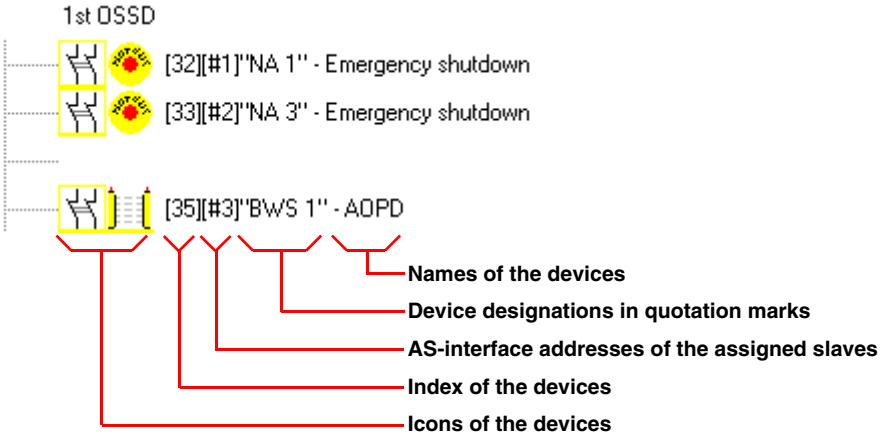

Figure 4.2: Graphic depiction of the devices

In addition to icon, designation and name, the respective device index for each device is specified. The index, which is automatically assigned by **asimon** for each configured device, uniquely identifies each device, regardless of whether it has been configured for the first or second OSSD.

The index begins with 32 and increases incrementally by 1. Within the configuration log, each configured device can be uniquely identified using the index.

Notice!
The display of the devices can be modified.
*To do this, on the **Extras** menu select the* **Display options…** *menu command or click the button (see chapter 3.2.4).*

Notice!
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 added to or deleted from the configuration, all subsequent indices were shifted. As a result, it was necessary for the user to modify the diagnostics program in the PLC.

*In the **Edit** menu of **asimon** version 2.1, you can now use the **Device index assignment** menu item to freely assign diagnosis indices to the devices for AS-interface diagnostics (see see chapter 7). When making the assignments, you can specify whether the diagnosis index range is 0 … 47 or analogous to the device indices 32 … 79.*

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asimon automatically places all of the devices in a configuration into the following order:

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

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

Notice!
A monitoring or logic device configured in the 1st OSSD can also be used in the 2nd OSSD and vice versa.

If a device is only configured in one OSSD, the index position in the other OSSD remains unoccupied.

Example:

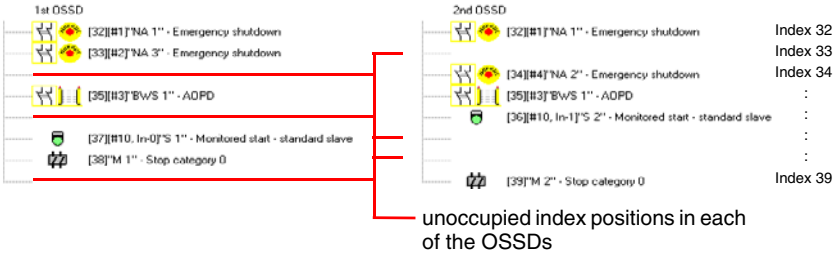

Figure 4.3: Structure of a configuration

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 icon 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.

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4.3.1 Monitoring devices

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

With the monitoring devices, a distinction is made between:

Double channel, forced components

Upon actuation of an emergency-off 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 tolerated transition time has passed.

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

- emergency shutdown switches
- active optoelectronic protective device
- zero-speed relays

Here, both the direct connection of an integrated AS-interface slave as well as the connection of a conventional device via a safe coupling module are possible. Local acknowledgement and/or the startup 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 protective switches. If this safety guard is opened or closed, the protective switches are not actuated simultaneously. In the double channel dependent functional device, a synchronisation time can, therefore, be specified. Both switches must close within this synchronisation time. If the synchronisation 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 protective switches
- two-handed operations

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

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Double channel, dependent components with debouncing

Notice!
These components are only available for the types of the AS-interface safety monitor with enhanced function range (VAS-1A-K12 (type 3) and VAS-2A-K12 (type 4)).

The monitoring to determine whether a safety guard is open or closed is performed by two protective switches. If this safety guard is opened or closed, the protective 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 synchronisation 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 synchronisation time has not yet passed, the validation is performed. The selected synchronisation time must be greater than the bounce time. If the synchronisation 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 switch
- switches with high bounce times

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

Double channel, conditionally dependent components

Notice!
These components are only available for the types of the AS-interface safety monitor with enhanced function range (VAS-1A-K12 (type 3) and VAS-2A-K12 (type 4)).

The monitoring to determine whether a safety guard is open or closed is performed by a protective switch with lock. One contact is switched by the protective 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 protective 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.

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-interface slave as well as the connection of a conventional device via a safe coupling module are possible.

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

Double channel, independent components

The monitoring to determine whether a safety guard is open or closed is performed by a protective switch with lock. One contact is switched by the protective 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

- Protective switch for door monitoring

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

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

Standard slave

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

Attention!
The use of a standard slave device for safe 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-interface safety monitor can also be used to implement strictly operational switching of the safe switching output(s) of the AS-interface safety monitor in an OSSD.

Attention!
The use of a monitor input device for safe switching tasks is not permitted!

Button

The Button device can be integrated within the OSSD or Preprocessing. The Button device makes acknowledgement 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.

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

NOP

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

Zero sequence detection

The zero sequence detection monitoring device can be used to monitor whether both switches of a safe 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 safe switching tasks is not permitted!

Application icons

For all monitoring devices, with the exception of the standard slave, application icons are available in addition to the device icons (double channel forced, double channel dependent, double channel independent) to provide a realistic and clear depiction of the configuration. Each of these application icons represents the same respective monitoring device. The input mask offers all device options, even when e.g. a local acknowledgement for a two-handed operation does not make much sense.

The monitoring devices in an OSSD are always displayed with both icons: the device icon and the application icon.

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Device options

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

Start-up test

The startup 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 startup test requires that the guard be opened and closed again before the machine is started. Only then can the machine be started.

Local acknowledgement

Local acknowledgement is used, for example, when a safety guard is located in an area not visible from the control desk. With local acknowledgement, acknowledgement (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-interface 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 local acknowledgement can either be a standard slave or an A/B slave whose AS-interface bus address and bit address must be specified.

Notice!
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 acknowledgement, at least 50ms must pass.*
2. *An actuation of the local acknowledgement is evaluated as valid if the switching signal is present for a minimum of 50ms and a maximum of 2s.*
3. *After the local acknowledgement is released, the monitoring device is validated following a wait period of 50ms.*

The available monitoring devices are described individually below.

Notice!
The functional devices and their variants, e.g. **double channel forced safety input** *with* **startup test**, *included in the devices described below can be found in this form in the configuration log of the AS-interface safety monitor (see chapter 5.8 and examples of the respective monitoring devices).*

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Double channel forced

Icon

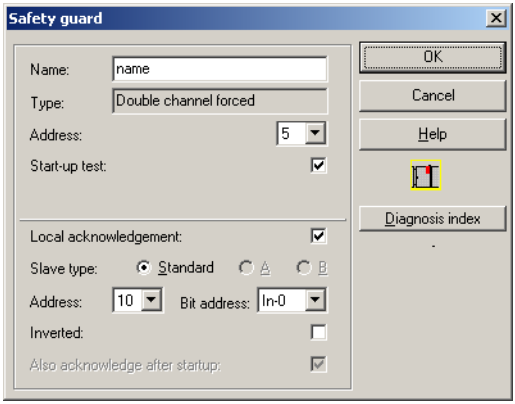
Functional device **Double channel forced safety input**

Type	Designation in the configuration log
20	double channel forced safety input
Variants	
Without startup test	SUBTYPE: no startup test
With startup test	SUBTYPE: startup test
Without local acknowledgement	SUBTYPE: no local acknowledge
With local acknowledgement	SUBTYPE: local acknowledge
With local acknowledgement also after startup	SUBTYPE: local acknowledge always

Parameters

Name:	max. 29 ASCII characters plaintext
Address:	AS-interface bus address (1 … 31)
Start-up test:	with / without
Local acknowledgement:	with / always / without
Slave type:	standard/A/B slave
Address:	AS-interface bus address of the local acknowledgement (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted

Input mask



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Description

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

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

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

Application icons

Emergency shutdown


Safety guard


AOPD - Contactless active protective device


Module - used to connect conventional safe switching elements via a safe AS-interface module.

Configuration log

Example: without startup test + without local acknowledgement

```
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
```

Example with startup test + without local acknowledgement

```
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
```

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Example: without startup test + with local acknowledgement

```
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
```

Example: without startup test + with local acknowledgement also after startup

```
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
```

Example: with startup test + with local acknowledgement

```
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
```

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Double channel dependent

Icon

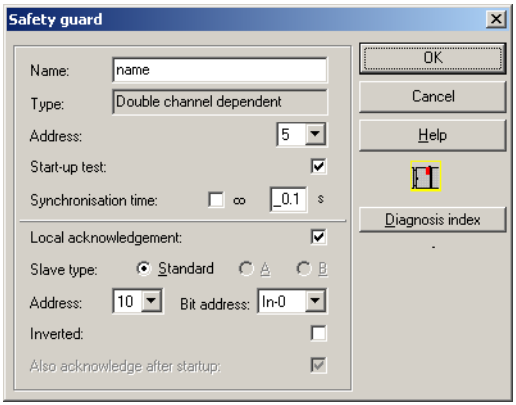
Functional device **Double channel dependent safety input**

Type	Designation in the configuration log
21	`double channel dependent safety input`
Variants	
Without startup test	`SUBTYPE: no startup test`
With startup test	`SUBTYPE: startup test`
Without local acknowledgement	`SUBTYPE: no local acknowledgement`
With local acknowledgement	`SUBTYPE: local acknowledgement`
With local acknowledgement also after startup	`SUBTYPE: local acknowledgement always`

Parameters

Name:max. 29 ASCII characters plaintext
Address: AS-interface bus address (1 … 31)
Start-up test: with / without
Synchronisation time 100ms … 30s in multiples of 100ms or ∞ (infinite)
Local acknowledgement: with / also after startup / without
Slave type: standard/A/B slave
Address: AS-interface bus address of the local acknowledgement (1 … 31)
Bit address: In-0 … In-3 or Out-0 … Out-3, inverted / not inverted

Input mask



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Description

With the **double channel dependent** monitoring device, both switching signals of the respective safe AS-interface slave each act on 2 bits of the transmission sequence. In this case, both of the switching signals must arrive within a synchronisation 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 startup test and/or a local acknowledgement are/is possible. Upon activation of the **Also acknowledge after startup** checkbox, local acknowledgement is always mandatory even after switching on the AS-interface safety monitor or following a communication error (warm start of the AS-interface safety monitor).

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

Application icons


Emergency shutdown


Safety guard


AOPD - Contactless active protective device


Module - used to connect conventional safe switching elements via a safe AS-interface module.


Two-handed operation
(as per EN 574: with startup test, max. synchronisation 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 startup test + without local acknowledgement

```
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
```

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Example with startup test + without local acknowledgement

```
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
```

Example: without startup test + with local acknowledgement

```
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
```

Example: without startup test + with local acknowledgement also after startup

```
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
```

Example: with startup test + with local acknowledgement

```
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
```

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Double channel dependent with debouncing

Icon

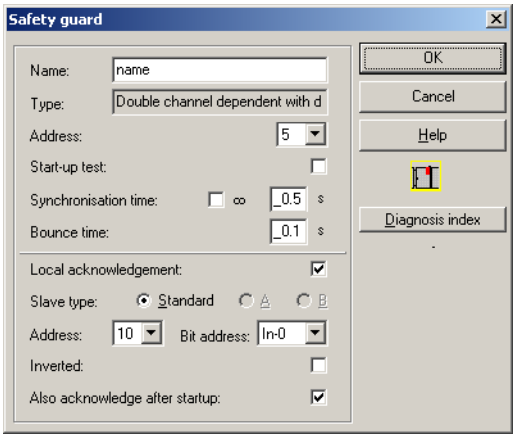
Functional device **Double channel dependent safety input with debouncing**

Type	Designation in the configuration log
24	**double channel dependent slow action safety input**
Variants	
Without startup test	**SUBTYPE: no startup test**
With startup test	**SUBTYPE: startup test**
Without local acknowledgement	**SUBTYPE: no local acknowledge**
With local acknowledgement	**SUBTYPE: local acknowledge**
With local acknowledgement also after startup	**SUBTYPE: local acknowledge always**

Parameters

Name:	max. 29 ASCII characters plaintext
Address:	AS-interface bus address (1 … 31)
Start-up test:	with / without
Synchronisation 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 acknowledgement:	with / also after startup / without
Slave type:	standard/A/B slave
Address:	AS-interface bus address of the local acknowledgement (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted

Input mask



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Description

With the **double channel dependent with debouncing** monitoring device, both switching signals of the respective safe AS-interface slave each act on 2 bits of the transmission sequence. In this case, both of the switching signals must arrive within a synchronisation 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 synchronisation time has not yet passed, the validation is performed. The selected synchronisation time must be greater than the bounce time.

Notice!
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.

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

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

Application icons

 Safety guard

 Module - used to connect conventional safe switching elements via a safe AS-interface module.

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Configuration log

Example: synchronisation time 0.3 s, bounce time 0.2 s

```
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
```

Example: synchronisation time infinite, bounce time 0.1 s

```
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
```

Example: with startup test

```
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
```

Example: with startup test and local acknowledgement

```
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
```

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Double channel conditionally dependent

Icon

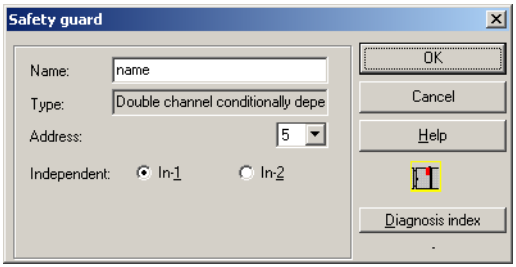
Functional device **Double channel conditionally dependent safety input**

Type	Designation in the configuration log
25	double channel priority safety input
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Address:	AS-interface bus address (1 … 31)
Independent:	Bit address of the independent contact (In-1 or In-2)

Input mask



Description

With the **double channel conditionally dependent** monitoring device, both switching signals of the respective safe AS-interface 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.

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 fulfils the requirements of the desired safety category.

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Application icons

Safety guard with lock

Module - used to connect conventional safe switching elements via a safe AS-interface module.

Configuration log

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

```
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: 0                                              4
```

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

```
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
```

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Double channel independent

Icon

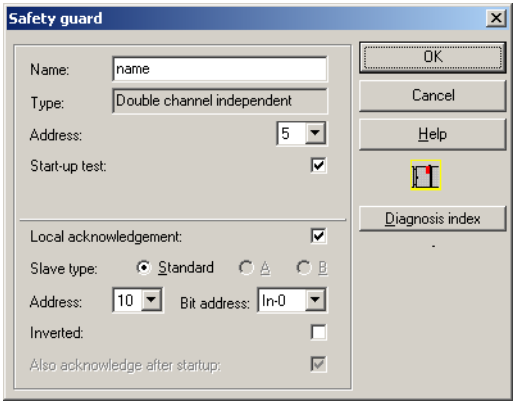
Functional device **Double channel independent safety input**

Type	Designation in the configuration log
22	double channel independent safety input
Variants	
Without startup test	SUBTYPE: no startup test
With startup test	SUBTYPE: startup test
Without local acknowledgement	SUBTYPE: no local acknowledge
With local acknowledgement	SUBTYPE: local acknowledge
With local acknowledge-ment also after startup	SUBTYPE: local acknowledge always

Parameters

Name:	max. 29 ASCII characters plaintext
Address:	AS-interface bus address (1 … 31)
Start-up test:	with / without
Local acknowledgement:	with / also after startup / without
Slave type:	standard/A/B slave
Address:	AS-interface bus address of the local acknowledgement (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted

Input mask



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Description

With the **double channel independent** monitoring device, the two switching signals of the respective safe AS-interface 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 synchronisation time.

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

Notice!
If the startup test option is selected, always both switches must be opened during the test. Moreover, a startup test must be performed following the reset of an error condition.

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 fulfils the requirements of the desired safety category.

Application icons

Emergency shutdown


Safety guard


Module - used to connect conventional safe switching elements via a safe AS-interface module.

Configuration log

Example: with startup test

```
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
```

Example: with local acknowledgement also after startup

```
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
```

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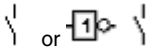
Standard slave

Icon 

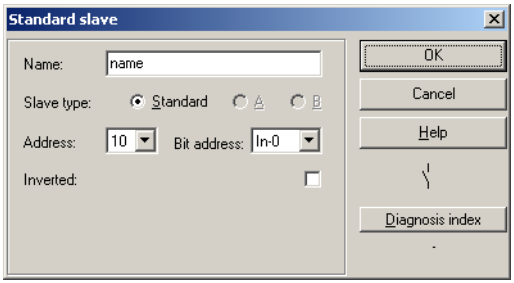
Functional device **Standard slave**

Type	Designation in the configuration log
23	activation switch
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Slave type:	standard/A/B slave
Address:	AS-interface bus address (1 … 31)
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-safe, standard AS-interface switching signal as an additional switching signal **for operational switching** of the AS-interface safety monitor relay(s) in an OSSD.

Notice!
With the input and output bits of a non-safe, standard AS-interface slave, the process image is always analysed, 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 icon precedes the icon for the standard slave device in the configuration.*

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Attention!
The use of a standard slave device for safe switching tasks is not permitted!

Configuration log

Example:

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

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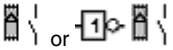
Monitor input

Icon



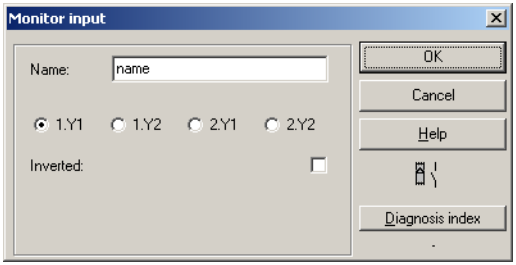
Functional device **Monitor input**

Type	Designation in the configuration log
28	monitor input
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Monitor input:	1.Y1, 1.Y2, 2.Y1 or 2.Y2, inverted / not inverted

Input mask



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-interface safety monitor as an additional switching signal **for operational switching** of the AS-interface 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.

Notice!
A configuration which uses inputs 2.Y1 or 2.Y2 cannot be operated in a single channel AS-interface safety monitor.

*If the **Inverted** parameter is activated, the inverter icon precedes the icon for the monitor input device in the configuration.*

Attention!
The use of a monitor input device for safe switching tasks is not permitted!

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Configuration log

Example:

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

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Button

Icon

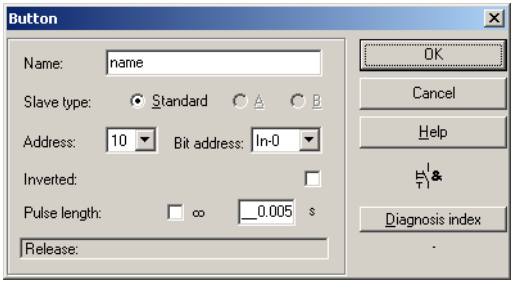
Functional device **Button**

Type	Designation in the configuration log
26	button
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Slave type:	standard/A/B slave
Address:	AS-interface bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted
Pulse length	5ms … 300s in multiples of 5ms or ∞ (infinite)

Input mask



Description

The Button device can be integrated within the OSSD or Preprocessing. The Button device makes acknowledgement 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 released by actuating the button, i.e. acknowledged (device switches to the ON state). If the device is not validated before the acknowledgement arrives, the device switches to the OFF state.

Notice!

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

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Configuration log

Example:

```
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
```

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NOP

Icon

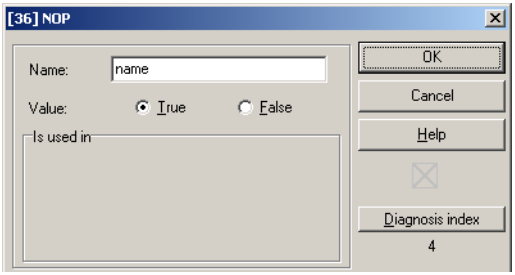
Functional device **Dummy**

Type	Designation in the configuration log
59	no operation
Variants	
none	

Parameters

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** easier to organise or to create a sample configuration to be used as a pattern for different configuration variants. A NOP dummy occupies an index within the configuration. Each functional device can be replaced by a NOP dummy and vice versa.

Notice!
With NOP devices, make certain that the status values are assigned correctly in the configuration. In AND logic operations, NOP devices should be assigned the ON state; in OR logic operations, on the other hand, they should assigned the OFF state.

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Configuration log

Example: NOP device with OFF state

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

Example: NOP device with ON state

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

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Zero sequence detection

Icon

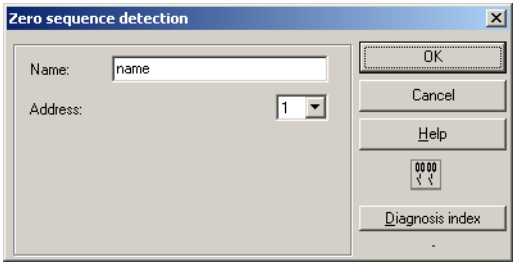
Functional device **Zero sequence detection**

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

Parameters

Name:	max. 29 ASCII characters plaintext
Address:	AS-interface bus address (1 … 31)
State:	ON or OFF

Input mask



Description

The zero sequence detection monitoring device can be used to monitor whether both switches of a safe 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 safe switching tasks!

Configuration log

Example: Zero sequence detection device

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

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4.3.2 Logic devices

In more complex safety tasks, the linking of various input signals and intermediate states is necessary – something not possible with the global AND. This linking is performed in the configuration of the AS-interface safety monitor in such a way that the input signals in the preprocessor or in the other OSSD are first calculated as internal variables and then processed further by the logic devices in the OSSD (see window areas on page 25).

Notice!
Insert the monitoring devices which you would like to link to one another via a logic device in the Preprocessing window area. Then insert the desired logic device in the OSSD. You then assign the devices from the preprocessing area which are to be linked to the logic device in the OSSD, see "Operation" on page 26.

You can link monitoring devices from the other OSSD by inserting them directly into the logic device. The index of this monitoring device must, however, be less than the index of the logic device. Thus, the monitoring device must be processed before the logic device. If the index is larger, you can move the monitoring device in front of the logic device with the mouse.

For AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) 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:

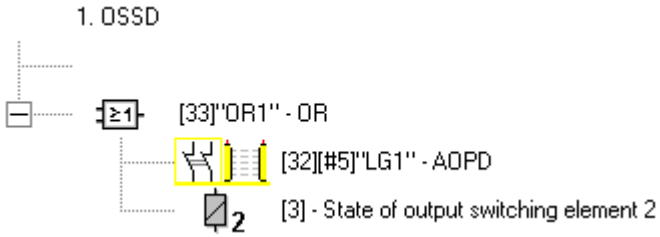

Figure 4.4: Logic device example

In the example shown here, the OR logic device switches to the ON state (switched on) when the active optoelectronic protective device "LG1" is in the ON state (switched on) or the safe switching output of the second OSSD is activated (relay triggered) or both conditions are true.

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Example 2:

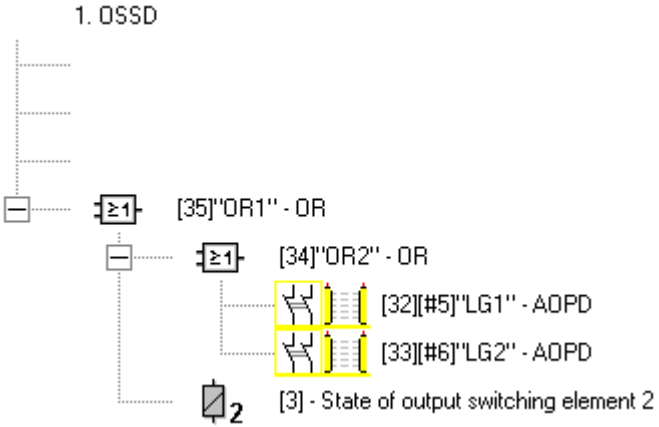

Figure 4.5: Nested logic devices example

As shown in the second example, logic devices can also be nested. To do this in the shown example, the subordinate "OR2" logic operation with index 34 must first be created in Preprocessing. Afterward, the "OR1" logic operation can be assigned.

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OR

Notice!
*For AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) with "Basic" function range, the only possible logic device available for the linking of **two** monitoring or system devices is the logic OR function.*

Icon

Functional device **OR gate**

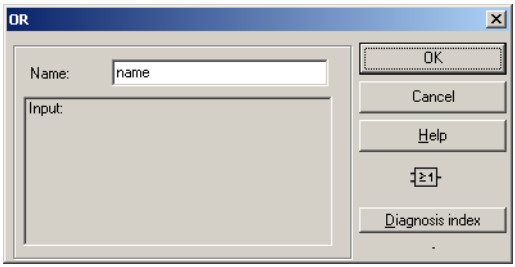
Type	Designation in the configuration log
40	or gate
Variants	
2 inputs [1]	SUBTYPE: number of inputs 2
2 … 6 inputs [2]	SUBTYPE: number of inputs 2 or SUBTYPE: number of inputs 3 or SUBTYPE: number of inputs 4 or SUBTYPE: number of inputs 5 or SUBTYPE: number of inputs 6

1) Only AS-interface safety monitor VAS-1A-K12-U (type 1)/VAS-2A-K12-U (type 2) with "Basic" function range (see chapter 1.2) !

2) Only AS-interface safety monitor VAS-1A-K12 (type 3)/VAS-2A-K12 (type 4) with "Enhanced" function range (see chapter 1.2) !

Parameters Name: max. 29 ASCII characters plaintext

Input mask



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-interface safety monitor, the same functional devices can be used e.g. for a light barrier and an emergency-off switch. When configuring, you must pay attention to which safety functions may and which may not be bridged.

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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

```
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 device 1"                           6
0067 IN DEVICE:  33 = "Name device 2"                           7
0068 IN DEVICE:  34 = "Name device 3"                           8
0069 IN DEVICE:  35 = "Name device 4"                           9
0070 IN DEVICE:  36 = "Name device 5"                           0
0071 IN DEVICE:  37 = "Name device 6"                           1
```

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AND

Notice!
This logic device is not available ***for AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) with "Basic" function range****.*

Icon

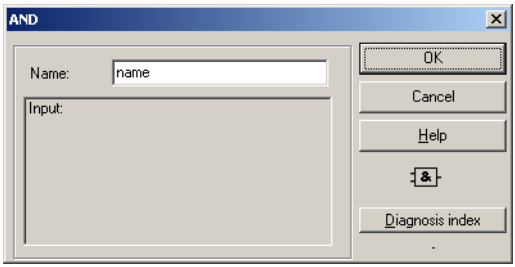
Functional device **AND gate**

Type	Designation in the configuration log
41	**and gate**
Variants	
2 … 6 inputs [1]	**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 AS-interface safety monitor VAS-1A-K12 (type 3)/VAS-2A-K12 (type 4) with "Enhanced" function range (see chapter 1.2) !

Parameters 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.

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Configuration log

Example: AND link

```
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 device 1"                       7
0078 IN DEVICE:  33 = "Name device 2"                       8
0079 IN DEVICE:  34 = "Name device 3"                       9
0080 IN DEVICE:  35 = "Name device 4"                       0
0081 IN DEVICE:  36 = "Name device 5"                       1
0082 IN DEVICE:  37 = "Name device 6"                       2
```

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FlipFlop

Notice!
This logic device is not available for AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) with "Basic" function range.

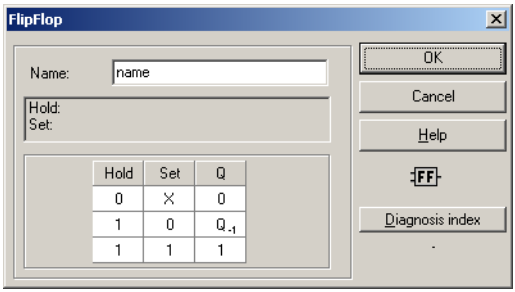
Icon

Functional device **R/S-flipflop**

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

Parameters 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)
switched on (ON)	any	switched on (ON)	switched on (ON)
switched off (OFF)	any	switched off (OFF)	switched off (OFF)
other			switched off (OFF)

Configuration log

Example:

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

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Switch-on delay

Notice!
This logic device is not available for AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) with "Basic" function range.

Icon

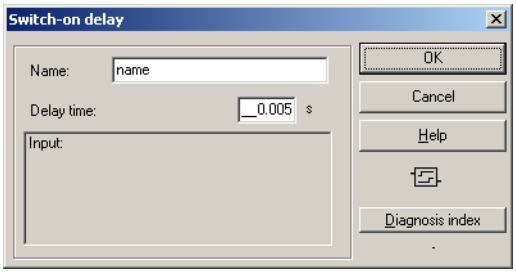
Functional device **Switching delay**

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

Parameters

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

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:

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

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Switch-off delay

Notice!
This logic device is not available for AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) with "Basic" function range.

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

Icon

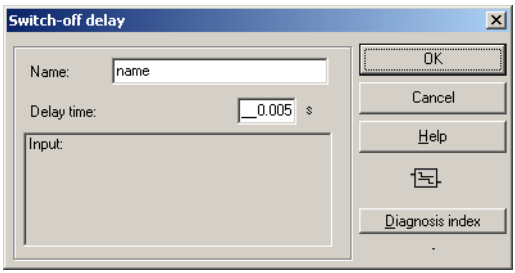
Functional device **Switching delay**

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

Parameters

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)

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Configuration log

Example:

```
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 device"                             1
0102 DELAY TIME:  0.005 Sec                                      2
```

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Pulse on pos. edge

Notice!
This logic device is not available for AS-interface safety monitors VAS-1A-K12-U (type 1) and VAS-2A-K12-U (type 2) with "Basic" function range.

Icon

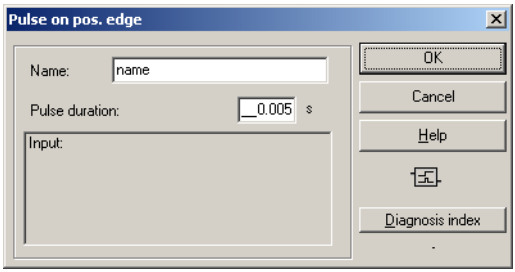
Functional device **Pulse generator on positive edge**

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

Parameters

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

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.

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

Configuration log

Example:

```
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 = "AOPD1"                                   8
0109 PULSE WIDTH:0.005 Sec                                       9
```

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4.3.3 External device monitoring devices

External device monitoring devices (also called EDM devices - External Device Monitor) are used for realising dynamic contactor monitoring for a configuration of the AS-interface safety monitor. If no EDM device is configured, contactor monitoring is deactivated.

Notice!
Multiple EDM 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 safe switching outputs of the AS-interface safety monitor. Via a feedback control loop, the state of the contactors is monitored by the input contactor monitor on the AS-interface safety monitor.

Notice!
Additional information about the electrical design and connection of a contactor monitor can be found in the operating manual of the AS-interface safety monitor.

Reset of error condition

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

With software versions of the AS-interface safety monitor > 2.0, the reset of error conditions (Reset) on the device level is possible separately for each OSSD, i.e. via an AS-interface standard/A/B slave, e.g. a button, the error lock can be released (see chapter 3.1).

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External device monitoring circuit

Icon

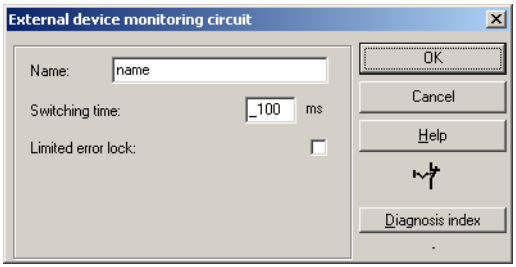
Functional device **External device monitoring circuit**

Type	Designation in the configuration log
60	external device monitor
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameters

text	Name:	max. 29 ASCII characters plain-
	Switching time:	10 … 1000 ms, switching time of the contactor
	Limited error lock	with / without

Input mask



Description

As long as the safe outputs are switched off, the input contactor monitor on the AS-interface safety monitor must be active = ON . After the safe 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 safe 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.

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.

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Error lock

If the input is inactive when the safe outputs are switched off or active when the safe outputs are switched on, the system switches to the error state and locks.

Notice!
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 safe outputs are switched off, the system switches to the error state and locks. If the input remains active after the safe outputs are switched active = ON, e.g. when the contactor no longer engages due to a blown fuse, the contactor monitor switches the safe outputs of the OSSD back off.

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 safe outputs of the AS-interface safety monitor to be continuously switched on and off.

Configuration log

Example: Error lock

```
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
```

Example: Limited error lock

```
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
```

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External device monitoring circuit with standard slave

Icon

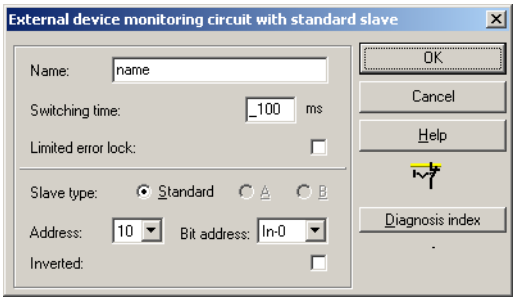
Functional device **External device monitoring circuit with standard slave**

Type	Designation in the configuration log
62	external device monitor standard slave
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameters

text	Name:	max. 29 ASCII characters plain-
	Switching time:	10 … 1000 ms, switching time of the contactor
	Limited error lock	with / without
	Slave type:	standard/A/B slave
	Address:	AS-interface bus address (1 … 31)
	Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted

Input mask



Description

The external device monitoring circuit with standard slave is functionally identical to the normal external device monitoring circuit.

As long as the safety outputs are switched off, the standard/A/B slave must be in the state active = ON. After the safe outputs have been switched on (validation), the state of the standard/A/B slave is not relevant for set switching time. Afterward, the standard/A/B slave must be in the inactive = OFF state again. The state of the contactor monitor is active = ON (switched on).

After the safe outputs have been switched off, the state of the contactor monitor returns to inactive = OFF (switched off) and the state of the standard/A/B slave is not queried for the set switching time. Afterward, the standard/A/B slave must be in the state active = ON again.

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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.

Error lock

If the input is inactive = OFF when the safe outputs are switched off or active = ON when the safe outputs are switched on, the system switches to the error state and locks.

Notice!
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 safe outputs are switched off, the system switches to the error state and locks. If the input remains active after the safe outputs are switched active = ON, e.g. when the contactor no longer engages due to a blown fuse, the contactor monitor switches the safe outputs of the OSSD back off.

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 safe outputs of the AS-interface safety monitor to be continuously switched on and off.

Configuration log

Example: Error lock

```
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
```

Example: Limited error lock

```
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
```

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External device monitoring circuit for dependent, second OSSD

Notice!
This EDM device can only be used in the 1st OSSD of a configuration with two dependent output groups.

Icon

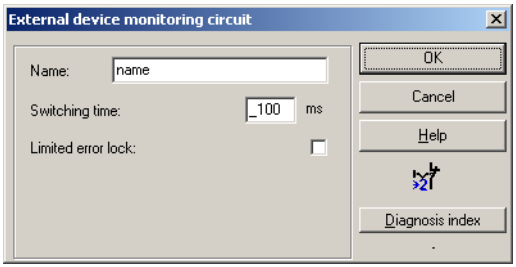
Functional device **External device monitoring circuit for dependent, second OSSD**

Type	Designation in the configuration log
61	external device monitor channel two
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameters

text	Name:	max. 29 ASCII characters plain-
	Switching time:	10 … 1000 ms, switching time of the contactor
	Limited error lock	with / without

Input mask



Description

The external device monitoring circuit for a second, dependent OSSD is functionally identical with a normal external device monitoring circuit. It monitors the downstream contactor on the second channel, but acts on the validation of channel 1.

As long as the safe outputs are switched off, the input contactor monitor on the AS-interface safety monitor must be active = ON . After the safe 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 safe 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.

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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.

Error lock

If the input is inactive when the safe outputs are switched off or active when the safe outputs are switched on, the system switches to the error state and locks.

Notice!
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 safe outputs are switched off, the system switches to the error state and locks. If the input remains active after the safe outputs are switched active = ON, e.g. when the contactor no longer engages due to a blown fuse, the contactor monitor switches the safe outputs of the OSSD back off.

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 safe outputs of the AS-interface safety monitor to be continuously switched on and off.

Configuration log

Example: Error lock

```
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
```

Example: Limited error lock

```
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
```

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External device monitoring circuit with standard slave for dependent, second OSSD

Notice!
This EDM device can only be used in the 1st OSSD of a configuration with two dependent output groups.

Icon

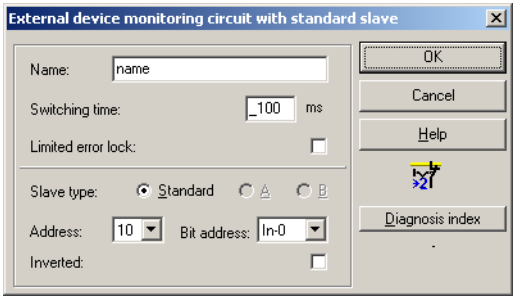
Functional device **External device monitoring circuit with standard slave for dependent, second OSSD**

Type	Designation in the configuration log
63	external device monitor channel two standard slave
Variants	
Error lock	SUBTYPE: none
Limited error lock	SUBTYPE: limited error lock

Parameters

Name:	max. 29 ASCII characters plain-text
Switching time:	10 … 1000 ms, switching time of the contactor
Limited error lock	with / without
Slave type:	standard/A/B slave
Address:	AS-interface bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted

Input mask



Description

The external device monitoring circuit with standard slave for the second, dependent OSSD is functionally identical with a normal external device monitoring circuit for the second, dependent OSSD.

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As long as the safety outputs are switched off, the standard/A/B slave must be in the state active = ON. After the safe outputs have been switched on (validation), the state of the standard/A/B slave is not relevant for set switching time. Afterward, the standard/A/B slave must be in the inactive = OFF state again. The state of the contactor monitor is active = ON (switched on).

After the safe outputs have been switched off, the state of the contactor monitor returns to inactive = OFF (switched off) and the state of the standard/A/B slave is not queried for the set switching time. Afterward, the standard/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.

Configuration log

Example: Error lock

```
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
```

Example: Limited error lock

```
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
```

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4.3.4 Start devices

In the course of the analysis, after all monitoring, logic and EDM 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 analysed 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 fulfils the condition for the validation.

Possible start conditions are:

- Automatic start (no additional start condition)
- Monitored start by means of an AS-interface standard slave
- Monitored start by means of start input on the AS-interface safety monitor
- Monitored start by means of a safe AS-interface slave
- Activation via standard slave
- Activation via monitor input

Notice!
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.

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Automatic start

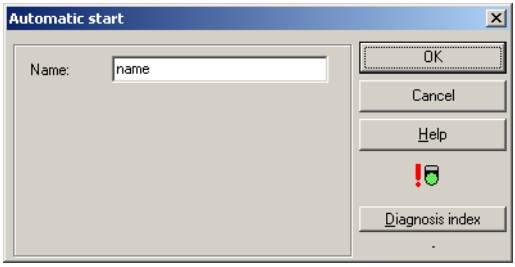
Icon

Functional device **Automatic start**

Type	Designation in the configuration log
80	automatic start
Variants	
none	

Parameters 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 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:

```
0106 INDEX:      45 = "Name"                    6
0107 TYPE:       80 = automatic start           7
0108 ASSIGNED:   channel one                    8
```

Notice!
The combination of the **automatic start** *start device with other start devices is not useful, as a start would occur in every case.*

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Monitored start - standard slave

Icon

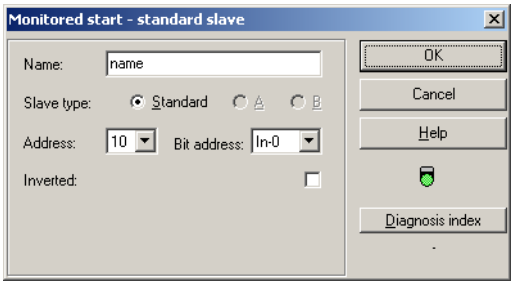
Functional device **Monitored start - standard slave**

Type	Designation in the configuration log
81	manual start standard slave
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Slave type:	standard/A/B slave
Address:	AS-interface bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3

Input mask



Description

The "monitored start - standard slave" start device requires as additional start condition the ON state of a standard/A/B slave on the AS-interface bus (e.g. start button via AS-interface standard slave module). If the AND link of all monitoring, logic and EDM 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.

Notice!
Between the occurrence of the ON state of the AND link of all monitoring, logic and EDM devices of an OSSD and the activation of the standard/A/B slave, at least 50ms must pass. The standard/A/B slave must be activated for ***at least 50ms and at most 2s****. 50ms after activation of the standard/A/B slave has concluded, the validation request is performed.*

Configuration log

Example:

```
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
```

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Monitored start - monitor input

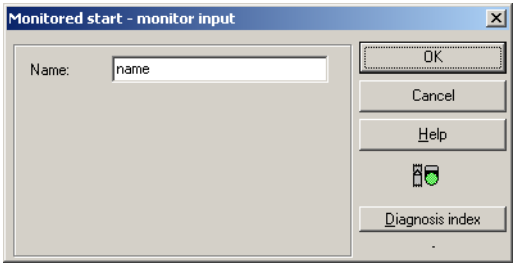
Icon

Functional device **Monitored start - monitor input**

Type	Designation in the configuration log
82	`manual start monitor input`
Variants	
none	

Parameters Name: max. 29 ASCII characters plaintext

Input mask



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 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.

Notice!
Between the occurrence of the ON state of the AND link of all monitoring, logic and EDM 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:

```
0115 INDEX:      47 = "Name"                                    5
0116 TYPE:       82 = manual start monitor input                6
0117 ASSIGNED:   channel one                                    7
```

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Monitored start - safe input slave

Icon

Functional device **Monitored start - safe input slave**

Type	Designation in the configuration log
83	manual start safe input
Variants	
none	

Parameters

Name: max. 29 ASCII characters plaintext
Address: AS-interface 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-interface bus. If the AND link of all monitoring, logic and EDM 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.

Notice!
Between the occurrence of the ON state of the AND link of all monitoring, logic and EDM devices of an OSSD and the activation of the safe input slave, at least 50 ms must pass. The safe input slave must be activated for ***at least 50 ms and at most 2 s****. 50 ms after activation of the safe input slave has concluded, the validation request is performed.*

Configuration log

Example:

```
0119 INDEX:       48 = "Name"                                  9
0120 TYPE:        83 = manual start safe input                 0
0121 ASSIGNED:    channel one                                  1
0122 SAFE SLAVE:  5                                            2
```

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Activation via standard slave

Icon

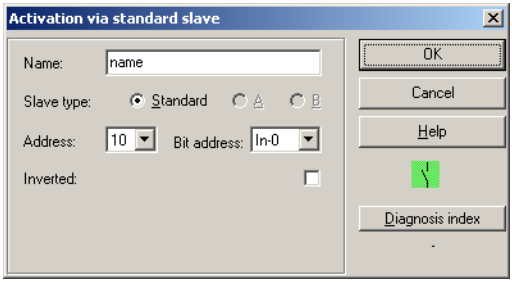
Functional device **Activation via standard slave**

Type	Designation in the configuration log
84	enable start standard slave
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Slave type:	standard/A/B slave
Address:	AS-interface bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3

Input mask



Description

The **activation via standard slave** start device is used to implement a start function via an AS-interface input (Start button) or an AS-interface 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 100ms 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 conditions are fulfilled and the activating level is reached! When the level is frozen while in the activated state, the machine can, thus, start unexpectedly!

Notice!
*A combination with the **automatic start** start device is not permitted.*

Configuration log

Example:

```
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
```

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Activation via monitor input

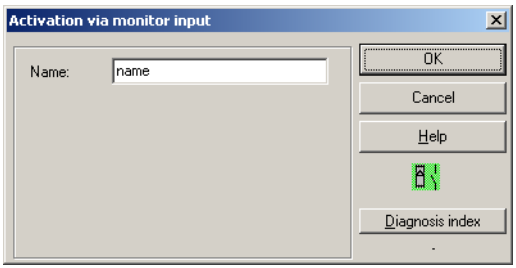
Icon

Functional device **Activation via monitor input**

Type	Designation in the configuration log
85	enable start monitor input
Variants	
none	

Parameters Name: max. 29 ASCII characters plaintext

Input mask



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!

Notice!
*A combination with the **automatic start** start device is not permitted.*

Configuration log

Example:

```
0115 INDEX:      47 = "Name"                          5
0116 TYPE:       85 = enable start monitor input      6
0117 ASSIGNED:   channel two                          7
```

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4.3.5 Output devices

Upon validation of the start devices, the output devices set the output circuits and message outputs to their logical nominal states according to their function.

In the AS-interface safety monitor, a shutdown system consists of a redundantly constructed relay output and a message output. If two shutdown systems are present in one monitor, the second shutdown system can be operated dependently or independently of the first. The output devices differ from one another at this point.

Notice!
For two independent OSSDs, exactly one output device must be present for each OSSD.

For two dependent OSSDs, exactly one output device in the 1st 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-interface 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.

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Stop category 1 - message and delayed relay output

Notice!
This output device is available only for one OSSD or for two independent OSSDs.

Icon

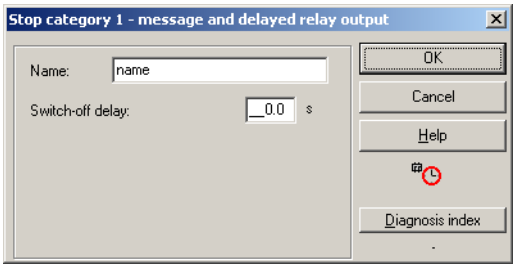
Functional device **Stop category 1 - message and delayed relay output**

Type	Designation in the configuration log
100	stop category 1 with delayed relay
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Switch-off delay	0s … 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.

Attention!
The message output is not safe. A safe maximum switch-off delay only exists for the output circuits.
In the event of an internal error in the AS-interface 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:

```
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
```

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Stop category 0

Notice!
This output device is available only for one OSSD or for two independent OSSDs.

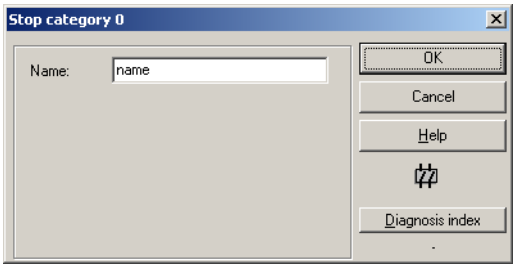
Icon

Functional device **Stop category 0**

Type	Designation in the configuration log
101	stop category 0
Variants	
none	

Parameters 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** output device. If the circuit is switched off, OFF state, the message output and the output circuit are switched off immediately without delay.

Notice!
In the event of an error in the AS-interface safety monitor, the state of the message output is undefined. The output circuit is switched off.

Configuration log

Example:

```
0129 INDEX:      50 = "Name"                    9
0130 TYPE:       101 = stop category 0          0
0131 ASSIGNED:   channel one                    1
```

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Stop category 1 - two relay outputs

Notice!
This output device is available only with two dependent OSSDs.

Icon

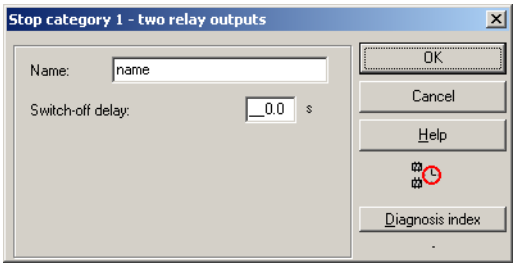
Functional device **Stop category 1 - two relay outputs**

Type	Designation in the configuration log
102	stop category 1 with two relay
Variants	
none	

Parameters

Name:	max. 29 ASCII characters plaintext
Switch-off delay	0s … 300s in multiples of 100ms

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 OSSD 1 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 0s and 300s in increments of 100ms. The circuit can be switched back on only after both output circuits have been switched off.

Notice!
In the event of an internal error in the AS-interface 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:

```
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
```

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Door lock by means of zero-speed relay and delay time

Notice!
This output device is available only with two dependent OSSDs.

Icon

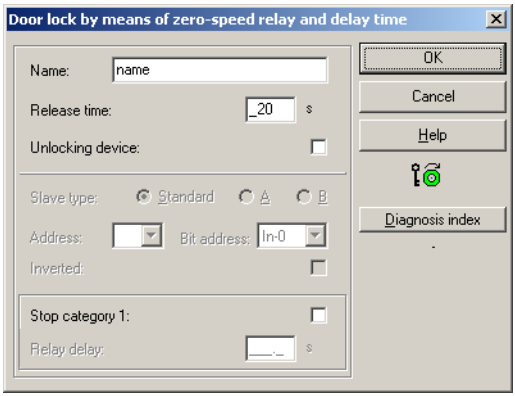
Functional device **Door lock**

Type	Designation in the configuration log
103	door lock
Variants	
Zero-speed relay and delay time	SUBTYPE: input or time

Parameters

Name:	max. 29 ASCII characters plaintext
Release time	1 s … 300 s in multiples of 1 s
Unlocking device	with / without
Slave type:	standard/A/B slave
Address:	AS-interface 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 300 s in increments of 1 s.

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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.

Notice!
After the AS-interface 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.

Unlocking device function

After the first output circuit is switched off (e.g. following an emergency shutdown), the second output circuit is switched on after the set release time has passed (or by the zero-speed relays) so that the doors unlock. This unlocking is not always desired. By enabling **Unlocking device** (checkbox 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 release time has passed. When the machine is switched off, the LOCK signal can thus be used to freely turn door locking on and off.

Configuration log

Example: with unlocking device

```
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
```

Example: without unlocking device

```
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
```

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Door lock by means of zero-speed relay and delay time with stop category 1

Notice!
This output device is available only with two dependent OSSDs.

Icon

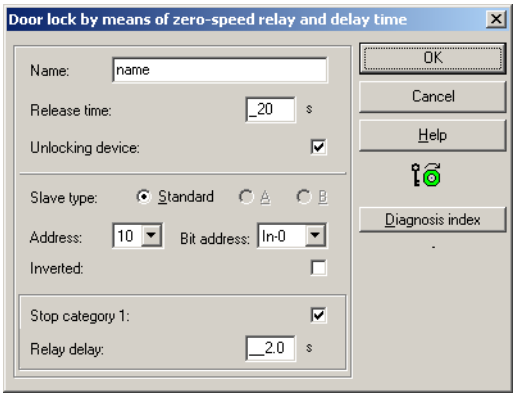
Functional device **Door lock**

Type	Designation in the configuration log
104	door lock and stop 1 with delayed relay
Variants	
Delay time	SUBTYPE: input or time

Parameters

Name:	max. 29 ASCII characters plaintext
Release time	1s … 250s in multiples of 1s
Unlocking device	with / without
Slave type:	standard/A/B slave
Address:	AS-interface bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted
Relay delay	0s … 300s in multiples of 100ms

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.

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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 safe. A safe maximum switch-off delay only exists for the output circuits.
In the event of an internal error in the AS-interface 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.

Notice!
After the AS-interface 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.

Unlocking device function

After the first output circuit is switched off (e.g. following an emergency shutdown), the second output circuit is switched on after the set release time has passed (or by the zero-speed relays) so that the doors unlock. This unlocking is not always desired. By enabling **Unlocking device** (checkbox 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 release time has passed. When the machine is switched off, the LOCK signal can thus be used to freely turn door locking on and off.

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Configuration log

Example: with unlocking device

```
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
```

Example: without unlocking device

```
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
```

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Door lock by means of delay time

Notice!
This output device is available only with two dependent OSSDs.

Icon

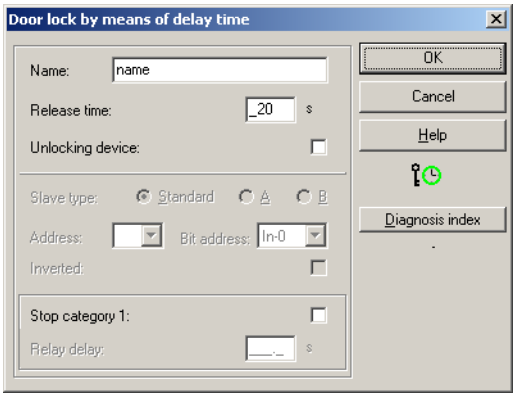
Functional device **Door lock**

Type	Designation in the configuration log
103	door lock
Variants	
Delay time	SUBTYPE: time

Parameters

Name:	max. 29 ASCII characters plaintext
Release time	1 s … 300 s in multiples of 1 s
Unlocking device	with / without
Slave type:	standard/A/B slave
Address:	AS-interface 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. 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.

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Notice!
After the AS-interface safety monitor is switched on, the second output circuit is inactive for at least the duration of the set release time.

Unlocking device function

After the first output circuit is switched off (e.g. following an emergency shutdown), the second output circuit is switched on after the set release time has passed (or by the zero-speed relays) so that the doors unlock. This unlocking is not always desired. By enabling **Unlocking device** (checkbox 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. When the machine is switched off, the LOCK signal can thus be used to freely turn door locking on and off.

Configuration log

Example: with unlocking device

```
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
```

Example: without unlocking device

```
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
```

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Door lock by means of delay time with stop category 1

Notice!
This output device is available only with two dependent OSSDs.

Icon

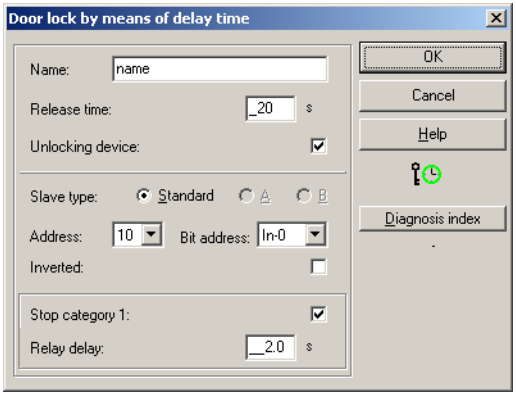
Functional device **Door lock**

Type	Designation in the configuration log
104	door lock and stop 1 with delayed relay
Variants	
Delay time	SUBTYPE: time

Parameters

Name:	max. 29 ASCII characters plaintext
Release time	1s … 250s in multiples of 1s
Unlocking device	with / without
Slave type:	standard/A/B slave
Address:	AS-interface bus address (1 … 31)
Bit address:	In-0 … In-3 or Out-0 … Out-3, inverted / not inverted
Relay delay	0s … 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 1s and 250s in increments of 1s. Before the first output circuit is switched on, the second must be switched off.

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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 safe. A safe maximum switch-off delay only exists for the output circuits.
In the event of an internal error in the AS-interface 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.

Notice!
After the AS-interface safety monitor is switched on, the second output circuit is inactive for at least the duration of the set release time.

Unlocking device function

After the first output circuit is switched off (e.g. following an emergency shutdown), the second output circuit is switched on after the set release time has passed (or by the zero-speed relays) so that the doors unlock. This unlocking is not always desired. By enabling **Unlocking device** (checkbox 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. When the machine is switched off, the LOCK signal can thus be used to freely turn door locking on and off.

Configuration log

Example: with unlocking device

```
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
```

Example: without unlocking device

```
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
```

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4.3.6 System devices

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 processed before the configured device is calculated, i.e. they contain the values from the previous calculation.

Notice!
Within a configuration, system devices can only be used as auxiliary variables for the logical linking of states in the logic devices.

System device	Icon	Index	Description
TRUE		1 = static on	State always ON
FALSE		17 = static off	State always OFF
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		18 = not main output one	Negated state of the 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		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		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		21 = not notify output two	Negated state of the message output of OSSD 2
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 devices of OSSD 1

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System device	Icon	Index	Description
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 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 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 devices of OSSD 2

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4.3.7 Activating and deactivating devices

Changing the state of the devices

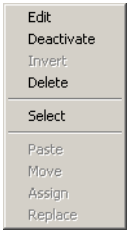
Notice!
This functionality is only available in AS-interface safety monitors starting with version 2.0.

AS-interface 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.

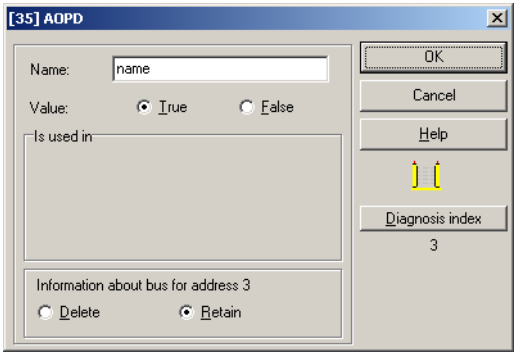
Deactivating devices

Attention!
Observe all safety regulations when you deactivate a device. This must only be performed by an authorised safety technician.

When you select a device with the mouse and click the right mouse button, the following pop-up menu opens:



Select the **Deactivate** command.



In the window which opens, you specify under which conditions the deactivated device is to be replaced in the configuration. To do this within an AND device, select the value **TRUE**. This also applies for the top configuration level. To do this within an OR device, select the value **FALSE**.

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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-interface 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-interface 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-interface 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 reperformed does not appear until teaching the safe configuration.

After deactivating a device, the device is displayed in grey. Within logic devices, deactivated devices are represented with green-grey colour (value **TRUE**) or with red-grey colour (value **FALSE**) depending on their value.

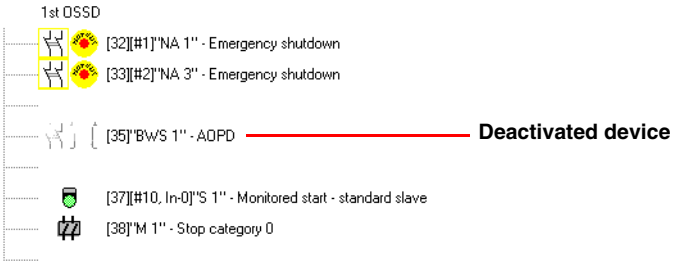


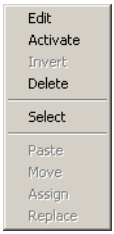
Figure 4.6: Display of a deactivated device

Notice!
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.

1. Such multiple usage is, however, only possible with the "zero sequence detection" device.

Activating devices

In order to reactivate a deactivated device, click the right mouse button on the deactivated device. The following pop-up menu opens.



Select the **Activate** command. The device is again displayed as a full-colour 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 greyed-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 cancelling activation) that the address of the deactivated device is again available.

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4.4 Saving / loading a configuration

With the **Open…** command in the **File** menu, you can load a configuration stored on a data carrier into the **asimon** program. In **asimon** it is only possible to work with 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.

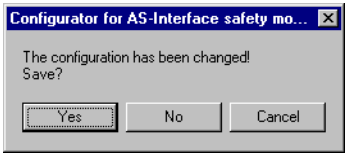

Figure 4.7: Confirmation dialog upon opening a configuration

To save a configuration, select either the **Save** or **Save as…** command from the **File** menu. Configurations are saved in the accustomed Windows® manner.

Notice!
asimon *configuration files have the extension* ****.ASI*** *(AS-interface safety monitor, version 1) or* ****.AS2*** *(AS-interface safety monitor, version 2).*

Saving a configuration on a data carrier does not ensure a useful, correct and functioning configuration. For further information, refer to chapter 5.

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5 Commissioning the AS-interface safety monitor

5.1 Procedure

Attention!
As the commissioning of the AS-interface safety monitor involves safety-relevant worksteps, the commissioning must be performed by the safety officer responsible for the application.

For reasons of safety, the commissioning of the AS-interface safety monitor is performed step by step according to a fixed procedure.

Step 1 - Call up and edit (optional) configuration

If you would like to change the configuration of a previously configured AS-interface safety monitor, you have the option of reading the configuration stored in the AS-interface safety monitor into **asimon**. This is particularly useful when no configuration file has been stored on a data carrier, or when a configuration file has been lost, e.g. due to data loss.

When configuring an AS-interface safety monitor for the first time, or if you would like to completely reconfigure an AS-interface safety monitor, continue with Step 2.

To call up the configuration, proceed as follows:

- If the AS-interface safety monitor is in protective operation, you must first use the **Stop** command (password-protected) in the **Monitor** menu to switch it to configuration operation (see chapter 5.7 "Stopping the AS-interface safety monitor").
- Then transfer the current AS-interface safety monitor configuration to **asimon** using the **Monitor -> PC ...** command in the **Monitor** menu (see chapter 5.2 "Reading in a configuration from the AS-interface safety monitor").
- Change the configuration in **asimon** as described in chapter 4.

Notice!
By querying the diagnostic information of an AS-interface safety monitor used in protective operation, you can reconstruct an unknown configuration, see "Option Diagnostics" on page 13.

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Step 2 - Transfer the configuration to the AS-interface safety monitor

After you have created a valid configuration for the connected AS-interface safety monitor, you must then transfer it to the AS-interface safety monitor.

Attention!
The existing configuration on the AS-interface 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** *and save it to a data carrier before performing a new configuration.*

If you would like to reconfigure the AS-interface 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 5.9 "Entering and changing the password").*

Proceed as follows:

- If the AS-interface safety monitor is in protective operation, you must first use the **Stop** command (password-protected) in the **Monitor** menu to switch it to configuration operation (see chapter 5.7 "Stopping the AS-interface safety monitor").
- Then transfer the current configuration from **asimon** to the AS-interface safety monitor using the **PC -> Monitor ...** command (see chapter 5.3 "Transferring a configuration to the AS-interface safety monitor").
- Following successful transfer to the AS-interface safety monitor, the configuration must be taught in (teaching in the code sequence of the safe AS-interface 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 - Teaching the safe configuration

After you have transferred your configuration to the connected AS-interface 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-interface slaves which are to be monitored.

Proceed as follows:

- Put the AS-interface bus into operation, including all safe AS-interface slaves which are to be monitored.
- Where possible, set all of the safe AS-interface slaves which are to be monitored to the switched-on state (ON).

Notice!
To teach-in the safe configuration, the respective AS-interface bus must be in full operation and the safe AS-interface slaves which are to be monitored should, if possible, be in the switched-on state (ON). Otherwise, the AS-interface safety monitor cannot receive code sequences.

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- 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 "Teach safe configuration").
- The code sequences are now taught in. If, due to the system design, not all of the safe AS-interface 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-interface slaves which are to be monitored to the switched-on state (ON) in sequence.

If the code sequences of all safe AS-interface slaves which are to be monitored could reliably be read in, the provisional configuration log is then immediately transferred to **asimon** 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-interface 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 chapter 5.8. Following this, you must validate the configuration (password-protected).

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 from the **Monitor** *menu the* **Validate…** *command (see chapter 5.5 "Validating the configuration").*

Following validation of the AS-interface safety monitor configuration, the final configuration log must be transferred to **asimon** 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 chapter 5.8.

Step 5 - Start the AS-interface safety monitor

In the final step of the configuration, you must start the AS-interface safety monitor, i.e. switch from configuration operation to protective operation. To do this, select from the **Monitor** menu the **Start** command (password-protected, see chapter 5.6 "Starting the AS-interface safety monitor").

You must now check that your application functions properly (see chapter 6 "Diagnostics and error handling").

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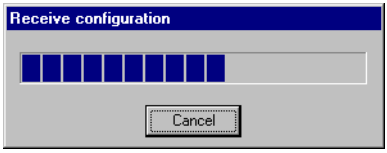
5.2 Reading in a configuration from the AS-interface safety monitor

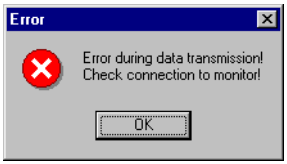
First switch the AS-interface safety monitor from protective operation to configuration operation (see chapter 5.7 "Stopping the AS-interface safety monitor").

To read in the configuration currently stored in the AS-interface safety monitor, select in the **Monitor** menu the **Monitor -> PC …** command. The configuration is then transmitted to **asimon**. The transmission takes several seconds. The progress is displayed in a window.



Upon successful conclusion of the data transmission from the AS-interface safety monitor, the configuration is available in **asimon** for further editing.

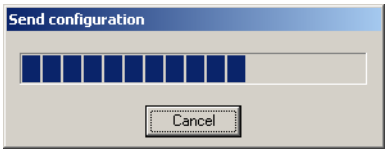
If an error occurs during the data transmission, an error message is output.



5.3 Transferring a configuration to the AS-interface safety monitor

First switch the AS-interface safety monitor from protective operation to configuration operation (see chapter 5.7 "Stopping the AS-interface safety monitor").

To transfer the configuration currently located in **asimon** to the connected AS-interface safety monitor, select on the **Monitor** menu the **PC -> Monitor…** command. The configuration is then transmitted to the AS-interface safety monitor. The transmission takes several seconds. The progress is displayed in a window.



Upon successful conclusion of the data transmission to the AS-interface safety monitor, the configuration is stored in the AS-interface safety monitor.

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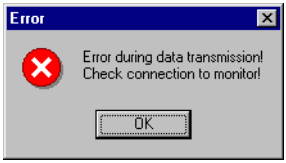
If an error occurs during the data transmission, an error message is output.



5.4 Teach safe configuration

After you have transferred your configuration to the connected AS-interface safety monitor, you must then teach in the safe configuration. For this purpose, the code sequences of the safe AS-interface slaves to be monitored by the AS-interface are read in. The code sequence of each safe AS-interface slave which is to be monitored is stored in the configuration log.

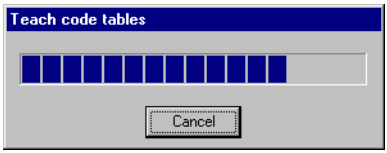
Notice!
Additional information on code sequences and secure AS-interface transmission can be found in the operating manual for the AS-interface safety monitor.

Before teaching-in the safe configuration, you must commission the AS-interface bus including all safe AS-interface slaves which are to be monitored and, where possible, set all safe AS-interface slaves which are to be monitored to the switched-on state (ON).

If, due to the system design, not all of the safe AS-interface 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 safe AS-interface 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-interface slaves which are to be monitored to the switched-on state (ON) in sequence.

To teach-in the code tables, select from the **Monitor** 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-interface safety monitor. The teaching-in process takes several seconds. The progress is displayed in a window.



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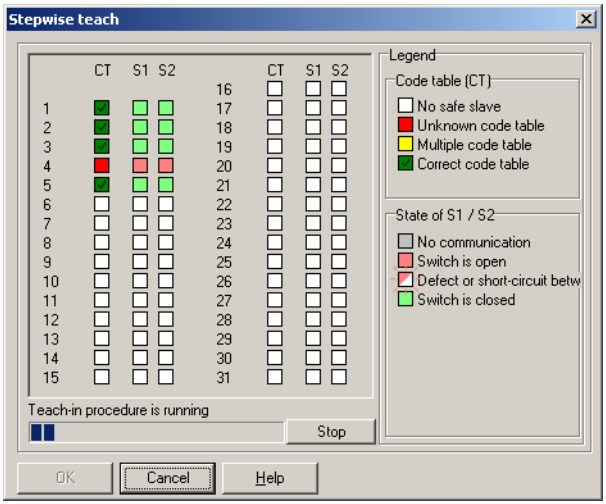
If not all of the safe AS-interface slaves which are to be monitored can be set to the switched-on state (ON) simultaneously, the following window appears in which the progress of the teaching process is graphically depicted.



Now, one after the other, set all safe AS-interface slaves whose code sequences could not previously be read to the switched-on state (ON) for several seconds. The configuration is continuously read by the AS-interface safety monitor. The display of the safe AS-interface slaves which have already been taught and those which still need to be taught is updated constantly.

Upon successful conclusion of the teaching process, click OK. Immediately afterward, the preliminary configuration log is transmitted to **asimon**.

Notice!
In the **Incremental teach** *window, switch states S1 and S2 are displayed for the respective slaves in addition to the teach state. In this way, you can also detect possible device malfunctions or communication faults from a single screen.*

Incremental teaching of the code sequences also functions with older AS-interface safety monitor models, but takes longer as the entire configuration must always be loaded into the safety monitor between two successive teach operations.

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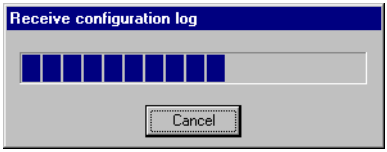
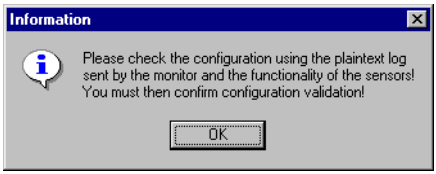
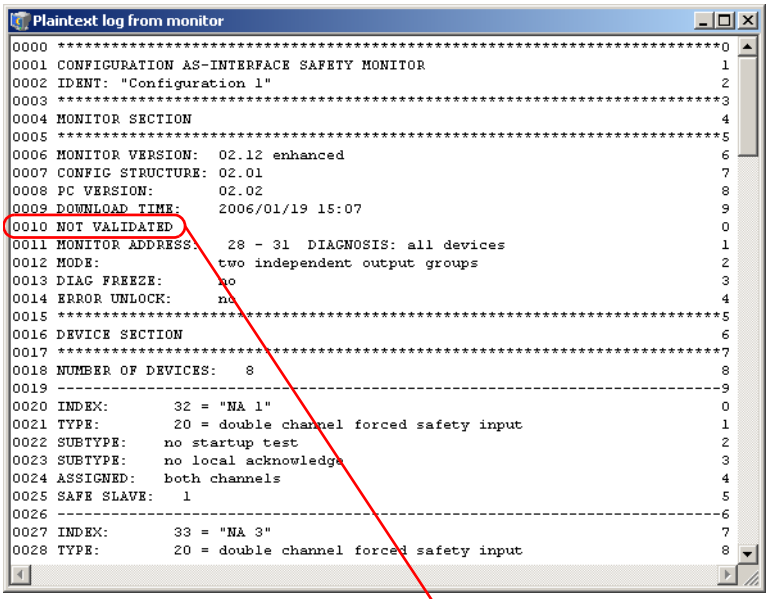
The progress of the transmission of the provisional configuration log is displayed in a window.



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** in a separate window.



"NOT VALIDATED" (line 10):
indicates a provisional configuration log

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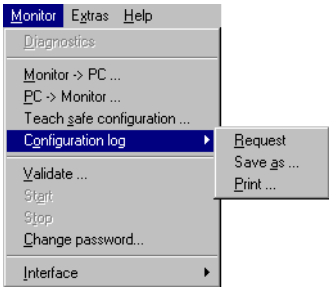
Notice!
The configuration log is always written in English.

You can print out this provisional configuration log and/or store it as a file, as long as the protocol window remains open. To do this, select on the **Monitor** menu in the **Configuration log** submenu the appropriate command.

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.

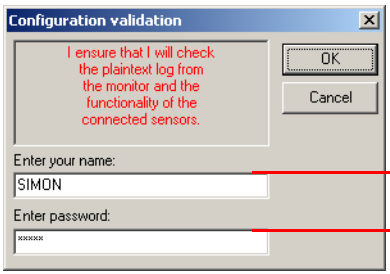


After you have successfully checked the configuration using the provisional configuration log, you can validate the configuration in the AS-interface safety monitor.

5.5 Validating the configuration

Notice!
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 **Monitor** menu the **Validate…** command. A dialog box appears in which you can validate a configuration by entering your name and the password.



2 … 8 alphanumerical characters;
A … Z, a … z, 0 … 9

4 … 8 alphanumerical characters;
A … Z, a … z, 0 … 9, default: "SIMON"

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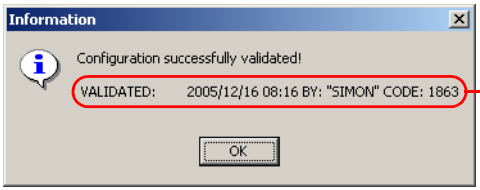
Notice!
Configuration validation is, as are several other safety-relevant commands, password protected. The default password of a brand-new AS-interface safety monitor is "SIMON". You must change this default password to a password known only to the safety officer responsible for the application (see chapter 5.9 "Entering and changing the password").

Confirm your entry with the **OK** button. An info window then confirms successful validation of the configuration.



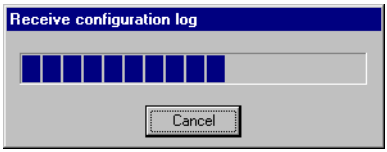
Validation information:
- date and time
- name
- code

Notice!
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 stored in the configuration file and the **asimon** *diagnostics recognise 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-interface 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**. The progress of the transmission of the final configuration log is displayed in a window.



The final configuration log is displayed in **asimon** 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.

Notice!
The configuration log is always written in English.

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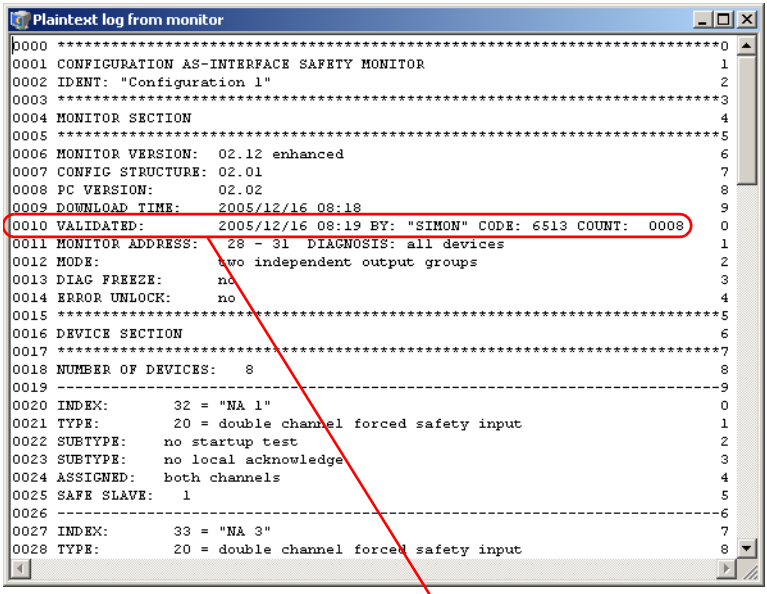
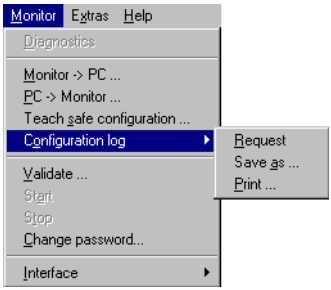


"VALIDATED..." (line 10):
indicates a final configuration log with validatio formation
- date and time
- name
- code
- sequential number of the configuration

You can print out the final configuration log and/or store it as a file. To do this, select on the **Monitor** menu in the **Configuration log** submenu the appropriate command.

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 default printer.



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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 chapter 5.8.

After you have successfully validated the configuration, you can start the AS-interface safety monitor, i.e. put it into protective operation.

5.6 Starting the AS-interface safety monitor

If a valid, validated configuration is present in the AS-interface safety monitor, you can switch the AS-interface safety monitor from configuration operation to protective operation using the **Start** command in the **Monitor** menu.

After starting protective operation, the status bar informs you of the change to the new operating mode.

The change from protective operation to configuration operation is then possible only by means of a Stop command (see chapter 5.7 "Stopping the AS-interface safety monitor").

5.7 Stopping the AS-interface safety monitor

If the AS-interface safety monitor is in protective operation, it can be switched to configuration operation by **asimon** only by means of the **Stop** command in the **Monitor** menu.

A Stop command is accepted by the AS-interface safety monitor when

- the valid password is entered.
- no AS-interface telegrams are present on the bus, even without password.

Notice!
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-interface safety monitor service button. Further information can be found in the operating manual for the AS-interface safety monitor.

A Stop command is treated similarly to the activation (shutting-down) of a monitoring device, i.e. depending on the configured output device, it may take up to one minute before the AS-interface safety monitor switches off the safe switching outputs and switches to configuration operation.

Following execution of the stop command, the status bar provides information about the change to configuration operation.

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5.8 Configuration documentation

Configuration log

The configuration log serves as safety-relevant documentation of the application (see chapter 5.4 and chapter 5.5). It contains all information about the configuration of the AS-interface safety monitor.

The provisional configuration log is to be used by the safety officer for reviewing the configuration of the AS-interface safety monitor and the safety-relevant AS-interface application.

The final configuration log is to be used by the safety officer for documenting the configuration of the AS-interface safety monitor and the safety-relevant AS-interface application. It is an important part of the safety-relevant documentation of your application and must be filed with the safety-relevant documentation.

Notice!
The configuration log is always written in English.

The structure is explained below using an example.

Example of a final configuration log

```
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:  02.12 enhanced                                         6
0007 CONFIG STRUCTURE: 02.01                                                  7
0008 PC VERSION:       02.02                                                  8
0009 DOWNLOAD TIME:    2005/08/05 18:42                                       9
0010 VALIDATED:        2005/08/05 18:43 BY: "SIMON" CODE: C141 COUNT: 0003 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 ************************************************************************5
0016 DEVICE SECTION                                                           6
0017 ************************************************************************7
0018 NUMBER OF DEVICES:   8                                                   8
0019 ------------------------------------------------------------------------9
0020 INDEX:        32 = "NA 1"                                                0
0021 TYPE:         20 = double channel forced 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
```

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Example of a final configuration log

```
0026 ------------------------------------------------------------------------6
0027 INDEX:       33 = "NA 3"                                                 7
0028 TYPE:        20 = double channel forced safety input                     8
0029 SUBTYPE:    no startup test                                              9
0030 SUBTYPE:    no local acknowledge                                         0
0031 ASSIGNED:   channel one                                                  1
0032 SAFE SLAVE:   2                                                          2
0033 ------------------------------------------------------------------------3
0034 INDEX:       34 = "NA 2"                                                 4
0035 TYPE:        20 = double channel forced safety input                     5
0036 SUBTYPE:    no startup test                                              6
0037 SUBTYPE:    no local acknowledge                                         7
0038 ASSIGNED:   channel two                                                  8
0039 SAFE SLAVE:   4                                                          9
0040 ------------------------------------------------------------------------0
0041 INDEX:       35 = "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:   both channels                                                5
0046 SAFE SLAVE:   3                                                          6
0047 ------------------------------------------------------------------------7
0048 INDEX:       36 = "S 2"                                                  8
0049 TYPE:        81 = manual start standard slave                            9
0050 ASSIGNED:   channel two                                                  0
0051 ADDRESS:     10   BIT:  In-1 noninv                                      1
0052 ------------------------------------------------------------------------2
0053 INDEX:       37 = "S 1"                                                  3
0054 TYPE:        81 = manual start standard slave                            4
0055 ASSIGNED:   channel one                                                  5
0056 ADDRESS:     10   BIT:  In-0 noninv                                      6
0057 ------------------------------------------------------------------------7
0058 INDEX:       38 = "M 1"                                                  8
0059 TYPE:       101 = stop category 0                                        9
0060 ASSIGNED:   channel one                                                  0
0061 ------------------------------------------------------------------------1
0062 INDEX:       39 = "M 2"                                                  2
0063 TYPE:       101 = stop category 0                                        3
0064 ASSIGNED:   channel two                                                  4
0065 ************************************************************************5
0066 SUBDEVICE SECTION                                                        6
0067 ************************************************************************7
0068 ADDRESS:      1 used safety input      CODE:       15 64 9E A7          8
0069 ADDRESS:      2 used safety input      CODE:       36 8A BD 57          9
0070 ADDRESS:      3 used safety input      CODE:       39 6B ED 5C          0
0071 ADDRESS:      4 used safety input      CODE:       1B DE CA 76          1
0072 ADDRESS:      5 not used safety input  CODE:       1D AE 74 5B          2
0073 ADDRESS:      6 no entry                                                3
0074 ADDRESS:      7 no entry                                                4
0075 ADDRESS:      8 no entry                                                5
0076 ADDRESS:      9 no entry                                                6
```

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Example of a final configuration log

```
0077 ADDRESS:     10 used standard                                          7
0078 ADDRESS:     11 no entry                                               8
0079 ADDRESS:     12 no entry                                               9
0080 ADDRESS:     13 no entry                                               0
0081 ADDRESS:     14 no entry                                               1
0082 ADDRESS:     15 no entry                                               2
0083 ADDRESS:     16 no entry                                               3
0084 ADDRESS:     17 no entry                                               4
0085 ADDRESS:     18 no entry                                               5
0086 ADDRESS:     19 no entry                                               6
0087 ADDRESS:     20 not used standard                                      7
0088 ADDRESS:     21 no entry                                               8
0089 ADDRESS:     22 no entry                                               9
0090 ADDRESS:     23 no entry                                               0
0091 ADDRESS:     24 no entry                                               1
0092 ADDRESS:     25 no entry                                               2
0093 ADDRESS:     26 no entry                                               3
0094 ADDRESS:     27 no entry                                               4
0095 ADDRESS:     28 not used standard                                      5
0096 ADDRESS:     29 not used standard                                      6
0097 ADDRESS:     30 not used standard                                      7
0098 ADDRESS:     31 not used standard                                      8
0099 ************************************************************************9
0100 INFO SECTION                                                           0
0101 ************************************************************************1
0102 INACTIVE:    none                                                      2
0103 ************************************************************************3
0104 VALIDATED:      2003/12/05 17:36 BY:  "simon" CODE: CE07 COUNT: 0028   4
0105 END OF CONFIGURATION                                                   5
01 ************************************************************************6
```

Line 0000 … 0003: Header information of the configuration log
- **Line 0002**: Configuration title in quotation marks

Line 0004 … 0015: Information about the AS-interface safety monitor
- **Line 0006**: Software version of the AS-interface safety monitor
- **Line 0007**: Version of the configuration structure (firmware)
- **Line 0008**: Version of the **asimon** PC software
- **Line 0009**: Time at which the stored configuration was transmitted
- **Line 0010**: Time at which the stored configuration was validated
- **Line 0011**: AS-interface bus address(es) of the safety monitor / device diagnostics
- **Line 0012**: Operating mode (see "Operating mode" on page 15)
- **Line 0013**: Diagnosis stop yes/no
- **Line 0014**: Reset of error condition yes/no

Line 0016 … 0019: Start of the device descriptions
- **Line 0018**: Number of configured devices

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Line 0020 … 0026: Description of the device with index 32
- **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-interface bus address of the corresponding, safe AS-interface slave

Notice!
The detailed descriptions of the devices as well as an example of their respective entries in the configuration log can be found in chapter 4.3.

Line 0027 … 0033: Description of the device with index 33

Line 0034 … 0040: Description of the device with index 34

: :

Line 0062 … 0065: Description of the device with index 39

Line 0066 … 0099: Information about the AS-interface bus
- **Line 0068 … Line 0098**:Table of the AS-interface bus addresses with designation of their assignment, see following explanation

Line 0100 … 0106: Footer information of the configuration log
- **Line 0102**: Designation of inactive slaves
- **Line 0104**: Repetition of the validation information
- **Line 0105**: Designation of configuration log end

Explanation of the table entries for the AS-interface bus address assignments

`no entry`	No entry present.
`not used standard`	Bus address is occupied by an AS-interface standard slave which is, however, not monitored by the AS-interface safety monitor.
`used standard`	Bus address is occupied by an AS-interface standard slave which is monitored by the AS-interface safety monitor, e.g. local acknowledgement, manual start etc.
`not used safety input`	Bus address is occupied by a safe AS-interface slave which is, however, not monitored by the AS-interface safety monitor. Also listed is the code table for this safe AS-interface slave.
`used safety input`	Bus address is occupied by a safe AS-interface slave which is monitored by the AS-interface safety monitor, e.g. emergency shutdown, contactless active protective device (AOPD), safety guard etc. Also listed is the code table for this safe AS-interface slave.

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Example of a provisional configuration log (excerpt)

```
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:  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 ********************************************************************5
  :
  :
```

A provisional configuration log can be identified by the entry "**NOT VALIDATED**" in line 10

Example configuration log (excerpt) of a faulty configuration

```
  :
  :
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.

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In the above example, line 79 contains the error message indicating that the code table of the safe AS-interface slave is faulty. The code "**00 00 00 00**" indicates that this safe AS-interface slave was not switched on (ON state) during the teaching of the safe configuration. Line 115 at the end of the configuration log also contains the error message indicating that the configuration is faulty.

AS-interface diagnosis indices

Notice!
If the default assignment of the diagnosis indices is changed (see chapter 7.2 "Assignment of the AS-interface diagnosis indices") and this configuration is loaded into the AS-interface safety monitor, the current assignments of the device indices to the AS-i diagnosis indices is included in the configuration log as an assignment list.

Example configuration log with AS-i diagnosis index assignment

```
0101 ********************************************************************************1
0102 INACTIVE:    none                                                               2
0103 --------------------------------------------------------------------------------3
0104 AS-INTERFACE 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
```

Printing the configuration

Use the **Print** command in the **File** menu to print the configuration currently in **asimon**.

Notice!
Printing the configuration using the **Print command** *in the* **File** *menu does not replace the configuration log. It serves only as a good documentation aid in the set program language.*

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Following is an example of such a configuration hardcopy.

AS-interface safety monitor configuration

Date:	16.12.2005 08:24:20
Configuration title:	Configuration 1
Download time:	16.Dezember 2005 . 08:18
Monitor address:	28 / 29 / 30 / 31
AS-interface diagnosis:	all devices
Operating mode:	two independent OSSDs
Diagnosis stop:	-
Reset of error condition:	-

[32] Emergency shutdown

Name:	"NA 1"
Type:	Double channel forced
Start-up test:	No
Local acknowledgement:	No
OSSD:	1 / 2
Address:	1

[33] Emergency shutdown

Name:	"NA 3"
Type:	Double channel forced
Start-up test:	No
Local acknowledgement:	No
OSSD:	1
Address:	2

[34] Emergency shutdown

Name:	"NA 2"
Type:	Double channel forced
Start-up test:	No
Local acknowledgement:	No
OSSD:	2
Address:	4

[35] AOPD

Name:	"BWS 1"
Type:	Double channel forced
Start-up test:	No
Local acknowledgement:	No
OSSD:	1 / 2
Address:	3

[36] Monitored start - standard slave

Name:	"S 2"		
OSSD:	2		
Address:	10	In-1	not inverted

[37] Monitored start - standard slave

Name:	"S 1"		
OSSD:	1		
Address:	10	In-0	not inverted

[38] Stop category 0

Name:	"M 1"
OSSD:	1
Switch-off delay:	0.000 s

[39] Stop category 0

Name:	"M 2"
OSSD:	
Switch-off delay:	0.000 s

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5.9 Entering and changing the password

The following safety-relevant, important commands are protected in **asimon** 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 authorisation 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.

Notice!
When a correct password is entered, **asimon** *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-interface safety monitor is "**SIMON**". If you would like to reconfigure the AS-interface safety monitor, you **must first change this default password to a new one** known only to you as safety officer.

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With the **Change password…** command in the **Monitor** menu, you can change the password of the connected AS-interface safety monitor in configuration operation.

The following dialog box opens:

4 … 8 alphanumerical characters;
A … Z, a … z, 0 … 9

Password is case-sensitive!

Confirm your entry with the **OK** button. The new password is now stored in the AS-interface safety monitor and must be used for all password-protected commands from now on.

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6 Diagnostics and error handling

6.1 Diagnostics

With the **Diagnostics** command in the **Monitor** menu, you can open the diagnostics view of the configuration stored in the AS-interface safety monitor.

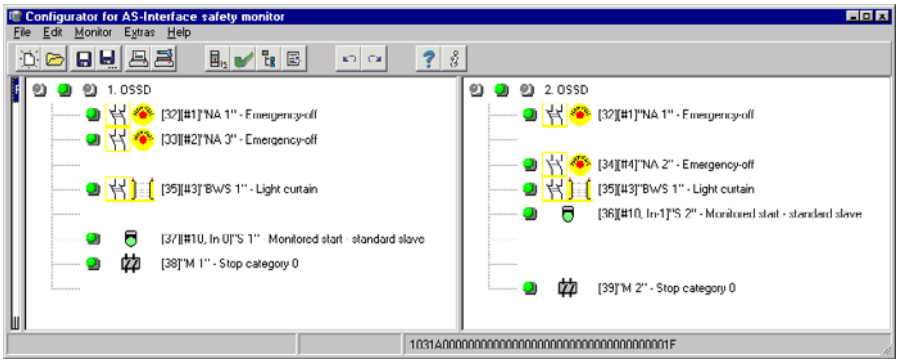
Notice!
The Diagnostics command is available only when the AS-interface safety monitor is in protective operation!

In protective operation, the AS-interface safety monitor continuously transmits diagnostic data to **asimon** via the configuration interface. In the diagnostics view, the data are displayed in the status bar as they pass through.

:10002000000006000000000000000000000000CA

For the diagnostics view, these data are converted for each device in the configuration to virtual LEDs which offer a fast overview of the state(s) of the OSSD(s).

Example 1: Both OSSDs are validated



Each configured device is assigned an LED which indicates its state.

In addition, each OSSD also has three LEDs which correspond to the device LEDs on the AS-interface safety monitor: **1**, **2** and **3** (for a description of the states, refer to the operating manual of the AS-interface safety monitor).

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The device LEDs can have the following states:

Display	Colour	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 acknowledgement, diagnosis 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: • Reset of error condition with the Service button • Actuate slave for reset of error condition • Power OFF/ON • AS-interface bus OFF/ON
	grey, off	No communication with the AS-interface slave

Notice!

Additional diagnostic information can be obtained via the AS-interface bus and the device LEDs on the AS-interface safety monitor and, if applicable, the participating AS-interface slaves. Additional information on diagnostics can be found in chapter 7.

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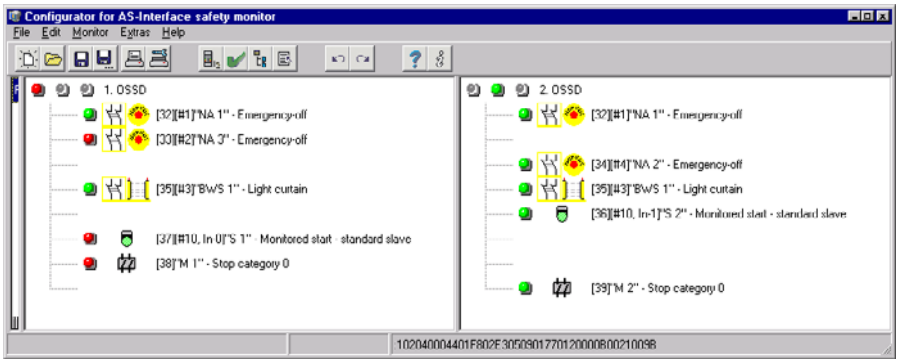
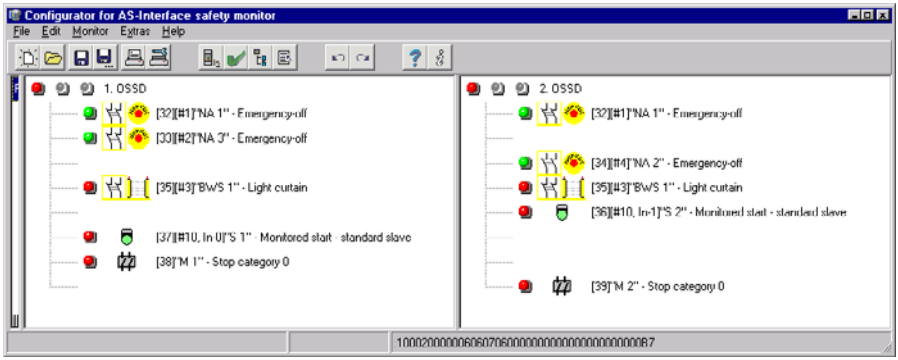
Examples of typical diagnostic states follow.

Example 2:



Example 3:



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6.2 Troubleshooting and error rectification

The **asimon** software provides information for most errors and operating states via

- the status bar
- message and info window
- the diagnostics

Additional information on troubleshooting can be obtained:

- through diagnostics via the AS-interface bus (see chapter 7)
- the device LEDs on the AS-interface safety monitor
  (see operating manual of the AS-interface safety monitor)
- the device LEDs on the participating AS-interface 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.

6.3 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-interface 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 behaviour of the operating system can be changed. For details, refer to the user documentation provided by the manufacturer of your PC or operating system.

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7 Diagnostics via AS-interface

7.1 General procedure

Notice!
*The assignment of an **AS-interface slave address for the AS-interface safety monitor** is a prerequisite for diagnosing the AS-interface safety monitor on the AS-interface master.*

Using the AS-interface bus, diagnosis of the AS-interface safety monitor and configured devices is possible from the AS-interface 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-interface. 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-interface 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 status information sent by the AS-interface 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-interface safety monitor (approx. 30 … 150ms).
- Whether a deactivated relay of an output circuit represents the normal state depends on the operating mode of the AS-interface 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-interface 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 diagnosis. The AS-interface 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 stored in the AS-interface 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.

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If, with the bit D3 set, the answer from the AS-interface safety monitor signals deactivation of an output circuit, detailed diagnostic information can now be queried in the stored state with the specific data calls (2) … (B). Depending on the setting in the configuration of the AS-interface safety monitor, data calls (4) … (B) return device diagnostic information sorted according to output circuit (see section 7.3.2) or unsorted (see section 7.3.3).

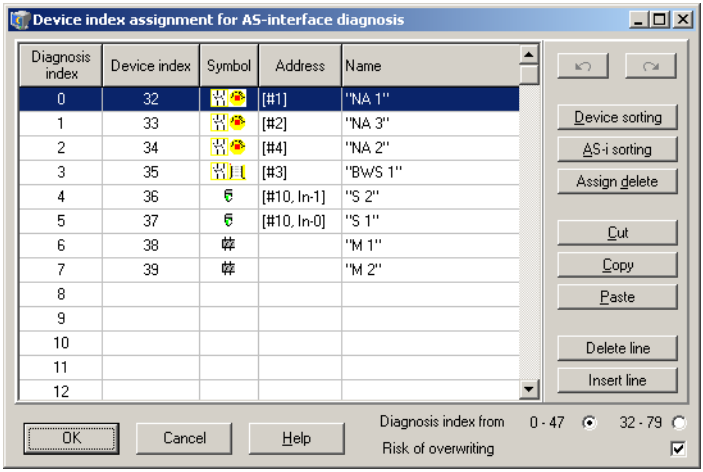
Notice!
If the AS-interface safety monitor is in configuration operation, it is not possible to query the detailed diagnostic information using the data calls (2) … (B).

A fresh data call (0) cancels the stored state again.

7.2 Assignment of the AS-interface diagnosis 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-interface safety monitor, if a device was added to or deleted from the configuration, all subsequent indices were shifted. As a result, it was necessary for the user to modify the diagnostics program in the PLC.

In the **Edit** menu of **asimon** version 2.1, you can now use the **Device index assignment** menu item to freely assign diagnosis indices to the devices for AS-interface diagnostics.



Notice!
*You can also call up the Device index assignment window by clicking the **Diagnosis index** button when creating or editing a device. When editing a device, the current diagnosis index of the device is also displayed below the **Diagnosis index** button.*

In the lower right part of the **Device-index assignment for AS-i diagnostics** window, you can first define whether the diagnosis index is to use the range from 0 … 47 (default setting) or the range from 32 … 79 (analogous to the device index).

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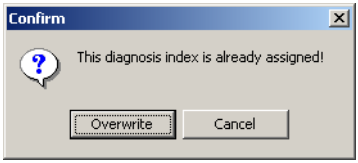
By activating the **Risk of overwriting** checkbox, **asimon** will display the following info window to warn you if you attempt to assign an already assigned diagnosis index to a different device.



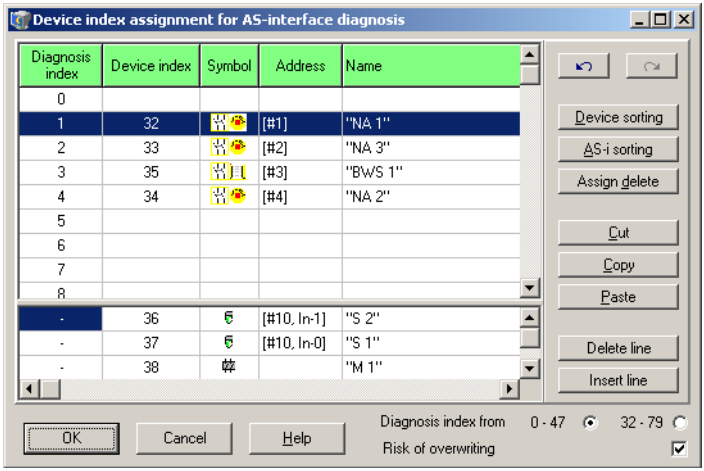
Editing assignments

By default, all configured devices are assigned sequentially increasing diagnosis indices. The device with index 32 is assigned diagnosis index 0, the device with index 33 is assigned diagnosis index 1, etc.

Notice!
*Use the **Device sorting** button to restore this original assignment at any time.*

If the default assignment of the diagnosis indices is changed, the colour of the table headings changes from grey to green.

If a device is not assigned to a diagnosis index, the Device index assignment window is split horizontally and the unassigned devices appear in the lower window area.



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.

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- **Direct editing** of the diagnosis indices in the lower window area in the **Diagnosis 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>+<Z> (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 diagnosis indices is restored.

AS-i sorting

All devices assigned to an AS-interface address are assigned to the diagnosis index which corresponds to the AS-interface address. The remaining devices are listed in the lower window area by increasing device index.

Delete assignment

The assignment of the devices to the diagnosis 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 pasted 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 (diagnosis index minus one).

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Insert line

A blank line is added above the marked line, the lines which follow the added line are shifted down (diagnosis 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.

Notice!

If the default assignment of the diagnosis indices is changed (indicated by a change in the colour of the table headings from grey to green) and this configuration is loaded into the AS-interface safety monitor, the current assignment of the device indices to the AS-i diagnosis indices is included in the configuration log as an assignment list.

Example configuration log with AS-i diagnosis index assignment

```
0101 ************************************************************************1
0102 INACTIVE:    none                                                       2
0103 ------------------------------------------------------------------------3
0104 AS-INTERFACE 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
```

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7.3 Telegrams

7.3.1 Diagnosis of AS-interface safety monitor

State of output circuits, operating mode

Notice!
The alternate sending of data calls (0) and (1) is essential for consistent data transmission. see "Diagnostic procedure" on page 134.

*The **binary values of the data calls relate to the AS-interface 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 (unavailable, 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 Store diagnostic information (state of monitor)	1000	Protective operation, everything OK (unavailable, 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.

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State of device LEDs

Data calls (2) and (3) return a simplified indication of the output circuit LEDs on the AS-interface safety monitor.

If answer to data call (1) = 10XX:

Data call / Value	Answer D3 … D0	Meaning
(2) / 1101 State of LEDs of output circuit 1	0000	Green = contacts of output circuit closed
	0001	Yellow = startup/restart-disable active
	0010	Yellow flashing or red = contacts of output circuit open
	0011	Red flashing = error on level of the monitored AS-interface components
	01XX	Reserved

Data call / Value	Answer D3 … D0	Meaning
(3) / 1100 State of LEDs of output circuit 2	1000	Green = contacts of output circuit closed
	1001	Yellow = startup/restart-disable active
	1010	Yellow flashing or red = contacts of output circuit open
	1011	Red flashing = error on level of the monitored AS-interface components
	11XX	Reserved

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Colour coding

Notice!
*The colour of a device corresponds to the colour of the virtual LEDs in the diagnostic view of the **asimon** configuration software. A device which is not assigned to any output circuit is always shown in green.*

Code CCC (D2 … D0)	Colour	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. local acknowledgement, diagnosis stop or start button
011	yellow, flashing	Time condition exceeded, action must be repeated, e.g. synchronisation 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-interface bus OFF/ON
110	grey, off	No communication with the AS-interface slave

Table 7.1: Colour coding

Notice!
During proper protective operation, there are also devices which are not in the green state. When searching for the cause of a shutdown, 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 shifted if the configuration is changed, we recommend using the diagnosis index assignment.

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7.3.2 Diagnosis of devices, sorted according to OSSD

With the appropriate configuration setting, data calls (4) … (B) return device diagnostic information sorted according to output circuit.

Notice!
*Make sure that the correct diagnosis type is set for the AS-interface safety monitor in the **Information about monitor and bus** window of the **asimon** configuration software.*

The values returned in calls (5) and (6) as well as (9) and (A) refer to the device diagnosis index in the configuration program and not to an AS-interface address.

Always execute data calls (4) … (7) and (8) … (B) together in sequence for each device.

Sorted device diagnosis, 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: XXX = 1 … 6: XXX = 7:	no devices, answers to data calls (5) … (7) not relevant number of devices in output circuit 1 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:	diagnosis index of device in output circuit 1 of configuration (HHHLLL = diagnosis index)

Data call / Value	**Answer D3 … D0**	**Meaning**	
(6) / 1001 Device address LOW, output circuit 1	0LLL	LLL = I2,I1,I0:	diagnosis index of device in output circuit 1 of configuration (HHHLLL = diagnosis index)

Data call / Value	**Answer D3 … D0**	**Meaning**
(7) / 1000 Colour of device, output circuit 1	1CCC	CCC = colour (see table 7.1 on page 141)

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Sorted device diagnosis, 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: XXX = 1 … 6: XXX = 7:	no devices, answers to data calls (5) … (7) not relevant number of devices in output circuit 2 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:	diagnosis index of device in output circuit 2 of configuration (HHHLLL = diagnosis index)

Data call / Value	Answer D3 … D0	Meaning	
(A) / 0101 Device address LOW, output circuit 2	0LLL	LLL = I2,I1,I0:	diagnosis index of device in output circuit 2 of configuration (HHHLLL = diagnosis index)

Data call / Value	Answer D3 … D0	Meaning
(B) / 0100 Colour of device, output circuit 2	1CCC	CCC = colour (see table 7.1 on page 141)

Notice!
Data calls (C) 0011 to (F) 0000 are reserved.

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7.3.3 Diagnosis of devices, unsorted

With the appropriate configuration setting, data calls (4) … (B) return unsorted device diagnostic information for all devices.

Notice!
*Make sure that the correct diagnosis type is set for the AS-interface safety monitor in the **Information about monitor and bus** window of the **asimon** configuration software.*

The values returned in calls (5) and (6) as well as (9) and (A) refer to the device diagnosis index in the configuration program and not to an AS-interface address.

Always execute data calls (4) … (7) and (8) … (B) together in sequence for each device.

Unsorted device diagnosis, 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: XXX = 1 … 6: XXX = 7:	no devices, answers to data calls (5) … (7) not relevant. number of devices not green. number of devices not green is > 6 (for colours, see table 7.1 on page 141).

Data call / Value	**Answer D3 … D0**	**Meaning**	
(5) / 1010 Device address HIGH	1HHH	HHH = I5,I4,I3:	diagnosis index of device of configuration (HHHLLL = diagnosis index).

Data call / Value	**Answer D3 … D0**	**Meaning**	
(6) / 1001 Device address LOW	0LLL	LLL = I2,I1,I0:	diagnosis index of device of configuration (HHHLLL = diagnosis index).

Data call / Value	**Answer D3 … D0**	**Meaning**
(7) / 1000 Colour of device	1CCC	CCC = colour (see table 7.1 on page 141).

Data call / Value	**Answer D3 … D0**	**Meaning**
(8) / 0111	0XXX	not used

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Data call / Value	Answer D3 … D0	Meaning
(9) / 0110 Device address HIGH	1HHH	HHH = I5,I4,I3: diagnosis index of device of configuration (HHHLLL = diagnosis index).

Data call / Value	Answer D3 … D0	Meaning
(A) / 0101 Device address LOW	0LLL	LLL = I2,I1,I0: diagnosis index of device of configuration (HHHLLL = diagnosis index).

Data call / Value	Answer D3 … D0	Meaning
(B) / 0100 Assignment to output circuit	10XX	XX = 00: device from pre-processing XX = 01: device from output circuit 1 XX = 10: device from output circuit 2 XX = 11: device from both output circuits

Notice!
Data calls (C) 0011 to (F) 0000 are reserved.

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7.4 Example: Querying with diagnosis sorted according to OSSD

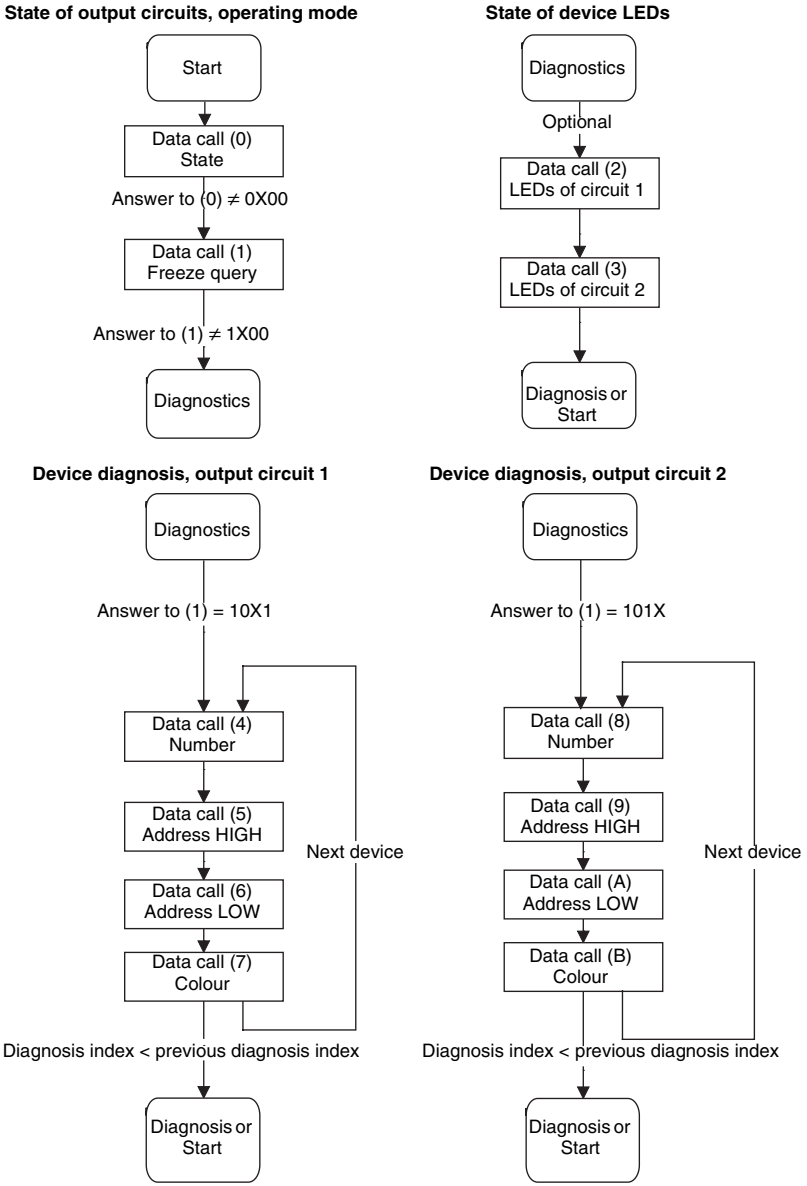

Figure 7.1: Querying with diagnosis sorted according to output circuit

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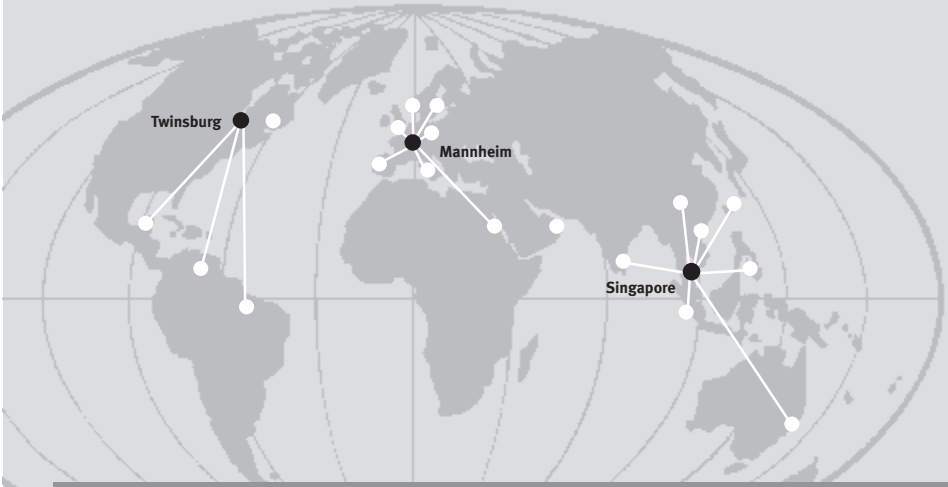

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