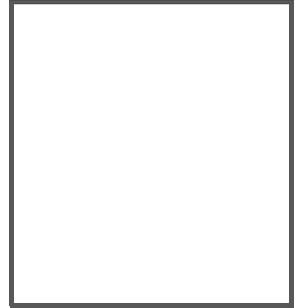


MANUAL

**AS-I 3.0 PROFIBUS  
GATEWAY WITH INTEGR.  
SAFETY MONITOR**



With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship".

# Table of contents

## Table of contents

<b>1</b>	<b>Introduction.....</b>	<b>9</b>
<b>2</b>	<b>Declaration of conformity .....</b>	<b>10</b>
2.1	Declaration of conformity.....	10
<b>3</b>	<b>Safety .....</b>	<b>11</b>
3.1	Symbols relevant to safety.....	11
3.2	General notes on safety .....	11
3.3	Disposal .....	11
<b>4</b>	<b>General .....</b>	<b>12</b>
4.1	Product information.....	12
4.1.1	AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor .....	12
4.1.2	AS-i 3.0 PROFIBUS Gateway, PROFIsafe for 2 AS-i circuits .....	13
4.2	New Generation of AS-i Gateways with ethernet diagnostics interface ...	13
4.3	Brief description.....	14
<b>5</b>	<b>Spezifications - AS-i/PROFIBUS Gateways.....</b>	<b>16</b>
5.1	Technical data .....	16
5.2	Safety-relevant characteristic data.....	17
5.2.1	Overview of parameter for determining the failure rates .....	18
5.3	Reaction times.....	19
5.3.1	Sensor -> local relay output.....	19
5.3.2	Sensor -> local electronic output .....	19
5.3.3	Sensor -> AS-i relay output.....	20
5.3.4	Sensor -> AS-i electronic output.....	20
5.3.5	System reaction times – example calculations .....	21
5.4	Scope of delivery .....	24
<b>6</b>	<b>Spezifications - AS-i/PROFIsafe Gateways .....</b>	<b>25</b>
6.1	Technical data .....	25
6.2	Safety-relevant characteristic data.....	26
6.3	Reaction times.....	27
6.3.1	Ethernet (PROFIsafe) -> local relay output.....	27
6.3.2	Ethernet (PROFIsafe) -> local electronic output .....	27
6.3.3	Ethernet (PROFIsafe) -> AS-i relay output.....	28
6.3.4	Ethernet (PROFIsafe) -> AS-i electronic output.....	28

<b>7</b>	<b>Installation .....</b>	<b>29</b>
7.1	Dimensions .....	29
7.2	Connections .....	30
7.3	Installing in the control cabinet.....	31
7.4	Removing .....	31
7.5	Electrical Connection .....	32
7.6	Commissioning.....	32
7.6.1	Switching to advanced display mode.....	32
7.6.2	Setting the PROFIBUS-DP address 14.....	32
7.6.3	Setting the PROFIsafe address 17 .....	33
7.6.4	Connecting AS-i Slaves .....	34
7.6.5	Quick setup .....	35
7.6.6	Error tracing.....	36
7.6.6.1	Faulty slaves.....	36
7.6.6.2	Error display (last error).....	36
7.7	Addressing .....	37
7.7.1	Assigning address 15 to slave currently at address 2.....	37
7.8	Local parameter setting of safe AS-i/Gateways and Monitors .....	38
7.9	Replacing a defective safety-configured AS-i slave.....	40
7.10	Replacing the chip card .....	40
7.11	Replacing a defective device.....	42
7.11.1	Teaching the group manager after replacing a device .....	44
7.12	Replacing the monitor .....	45
7.13	Safe configuration using ASIMON 3 G2 .....	48
<b>8</b>	<b>Maintenance .....</b>	<b>50</b>
8.1	Checking for safe turn-off.....	50
<b>9</b>	<b>Electrical connection.....</b>	<b>51</b>
9.1	Overview of terminals, indicators and operating elements.....	51
9.1.1	VBG-PB-K30-D-S.....	51
9.1.2	VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PBS-K30-DMD .....	52
9.1.3	VBG-PB-K30-DMD-S16-EV .....	53
9.2	AS-i bus connection .....	54
9.3	Information about the device types .....	54
9.4	AS-i and power supply terminal assignments .....	54
9.4.1	Electrical connection VBG-PB-K30-D-S16, VBG-PB-K30-D-S .....	55
9.4.2	Electrical connection VBG-PB-K30-DMD-S16, VBG-PBS-K30-DMD .....	56
9.4.3	Electrical connection VBG-PB-K30-DMD-S16-EV.....	57
9.5	Diagnostics interface .....	58
9.5.1	VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PB-K30-D-S, VBG-PBS-K30-DMD 58	
9.5.2	VBG-PB-K30-DMD-S16-EV .....	58
9.5.3	SafeLink over ethernet (VBG-PB-K30-DMD-S16-EV).....	59

9.6	Chip card.....	59
9.7	PROFIBUS interface.....	60
9.7.1	Terminating resistors on the PROFIBUS network.....	60
9.8	Release circuits.....	61
9.8.1	Wiring overview of safety unit VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PBS-K30-DMD, VBG-PB-K30- DMD-S16-EV61	
9.8.2	Wiring overview of safety unit VBG-PB-K30-D-S.....	62
9.9	Indicators and operating elements.....	63
9.9.1	LED indicators – master.....	63
9.9.2	LED indicators - safety unit VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PBS-K30-DMD, VBG-PB-K30- DMD-S16-EV64	
9.9.3	LED indicators – safety unit VBG-PB-K30-D-S.....	64
9.9.4	Buttons.....	65
10	Function and startup of the Safety Monitor.....	66
10.1	Powering up the device.....	66
10.2	Configuration of the safety functions.....	66
10.2.1	Description of configuration using ASIMON 3 G2 software.....	67
10.2.2	Description of configuration using chip card with master configuration.....	68
10.2.3	Configuration using a chip card with complete configuration.....	68
10.3	Safety-relevant documentation of the application.....	69
10.4	Diagnostic data.....	69
10.4.1	Diagnostics of release circuits 1-4 via the binary data.....	70
10.4.2	Switch-off history.....	70
10.5	Password protection.....	70
10.5.1	Procedure for configuring and teaching code sequences.....	71
10.5.2	Function of the ESC/Service key.....	72
10.6	Safe coupling slaves on the AS-i circuits.....	72
10.7	Chip card.....	72
10.7.1	Unsafe data.....	72
10.7.1.1	Card unformatted.....	72
10.7.1.2	Data not compatible.....	73
10.7.1.3	Card empty.....	73
10.7.1.4	Data compatible.....	73
10.7.1.5	Data in the device and on the chip card identical.....	73
10.7.1.6	Data in the device and on the chip card not identical.....	74
10.7.2	Safe data.....	74
10.7.2.1	Data incompatible.....	74
10.7.2.2	Data compatible.....	75
10.7.2.3	Complete configuration.....	75
10.7.2.4	Data on the chip card and in the device are identical.....	75
10.7.2.5	Data not identical.....	76
10.7.2.6	Operating the chip card from the menu.....	76
10.7.3	Working with multiple memory banks.....	76

<b>11</b>	<b>Operation in advanced display mode .....</b>	<b>78</b>
<b>12</b>	<b>Advanced Diagnostics for AS-i Masters .....</b>	<b>79</b>
12.1	List of corrupted AS-i Slaves (LCS) .....	79
12.2	Protocol analysis: Counters for corrupted data telegrams .....	79
12.3	Offline Phase for Configuration Errors.....	80
12.4	Functions of the AS-i Fault Detector .....	80
12.4.1	Duplicate address detection.....	80
12.4.2	Earth/Ground Fault Detector .....	81
12.4.3	Noise Detector .....	81
12.4.4	Over-voltage Detector .....	81
12.5	Functions of the new generation of AS-i Gateways .....	82
12.5.1	C-programmable Gateways .....	82
12.5.2	Interchangeable memory card.....	82
12.5.3	Earth fault monitor.....	82
12.5.4	Current can be read directly on the unit.....	83
12.5.5	Self-resetting fuses .....	84
12.5.6	AS-i Power24V capable .....	84
12.5.7	Ethernet diagnostics interface with web server .....	85
12.5.8	Transitionless operating mode changes .....	85
<b>13</b>	<b>PROFIBUS DP .....</b>	<b>86</b>
13.1	DP telegrams .....	86
13.1.1	Diagnostics .....	86
13.1.1.1	Parameters .....	91
13.1.2	Configuration DP/V0 (cyclic data).....	91
13.1.2.1	Options .....	91
13.1.3	I/O Data .....	95
13.1.3.1	Process data.....	95
13.1.3.2	EC-Flags and AS-i detector .....	96
13.1.3.3	Power Control (current limit) .....	97
13.1.3.4	AS-i 16 bit data .....	98
13.1.3.5	Command interface .....	99
13.1.3.6	Safety Control/Status .....	99
13.1.3.7	Fieldbus bit .....	102
13.1.3.8	Diagnostics in the cyclic channel (10 Byte SafeLink.Diag.) .....	103
13.2	DP/V1 .....	104
13.3	PROFIBUS .....	104
<b>14</b>	<b>Configuration with Windows Software ASIMON 3 G2 .....</b>	<b>105</b>
<b>15</b>	<b>SafeLink .....</b>	<b>106</b>
15.1	General introduction .....	106
15.2	Configuration .....	107
15.2.1	Configuration using ASIMON .....	108
15.3	Diagnostics .....	109

<b>16</b>	<b>System startup using AS-i Control Tools.....</b>	<b>111</b>
16.1	Windows software AS-i Control Tools .....	111
16.2	PROFIBUS DP Master Simulator .....	114
<b>17</b>	<b>Status indication, faults and fault elimination .....</b>	<b>115</b>
17.1	Spontaneous display of faults from the safety unit.....	115
17.2	Replacing a defective safety-configured AS-i slave .....	116
17.3	Replacing a defective AS-i Safety Monitor .....	117
17.4	Forget the password? What do I do now? .....	117
<b>18</b>	<b>Glossary .....</b>	<b>119</b>
<b>19</b>	<b>Appendix: Example for startup on a Siemens S7 .....</b>	<b>124</b>
19.1	Hardware configuration .....	124
19.1.1	Electrical connection for AS-i.....	124
19.1.2	Electrical connection for PROFIBUS DP .....	125
19.2	SIMATIC Step 7 Configuration .....	125
19.2.1	Configuration of the Hardware .....	125
19.2.2	Insert AS-i/Gateway with safety monitor .....	128
19.2.3	AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor configure in-/outputs .....	132
19.2.4	AS-i/Gateway with safety monitor parameters .....	135
19.2.4.1	General DP parameters .....	137
19.2.4.2	AS-i-Parameter Slave 1/1A.....	137
19.2.4.3	Hex parameterizing.....	139
19.2.5	SIMATIC Step7 blocks.....	139
19.2.6	Variable table VAT_ASI_IO .....	140
19.2.6.1	AS-i flags byte 0, input bits 7 - 4 .....	142
19.2.6.2	AS-i flags byte 0, output bits 7 - 4 .....	142
19.2.7	System behavior on AS-i Config Error .....	144
19.3	Device-specific parameters.....	147
<b>20</b>	<b>Codes indicated by the display .....</b>	<b>150</b>
<b>21</b>	<b>Appendix: Startup on a Siemens NC control .....</b>	<b>152</b>
21.1	Setting in the S7 configuration .....	152
21.2	Setting in the NC control .....	153
21.3	Setting "PROFISAFE_IN_ADDRESS" .....	153
21.4	Setting "PROFISAFE_OUT_ADDRESS" .....	153
21.5	Setting "PROFISAFE_IN_ASSIGN" .....	153
21.6	Setting "PROFISAFE_OUT_ASSIGN" .....	154
21.7	Setting "PROFISAFE_IN_FILTER" .....	154
21.8	Setting "PROFISAFE_OUT_FILTER" .....	154

<b>22</b>	<b>Reference List .....</b>	<b>155</b>
<b>22.1</b>	<b>Manual: "ASIMON 3 G2 Configuration Software" .....</b>	<b>155</b>
<b>22.2</b>	<b>Sources.....</b>	<b>155</b>

## 1. Introduction

### Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Before installing this equipment and put into operation, read this manual carefully. This manual contains instructions and notes to help you through the installation and commissioning step by step. This makes sure bring such a trouble-free use of this product. This is for your benefit, since this:

- ensures the safe operation of the device
- helps you to exploit the full functionality of the device
- avoids errors and related malfunctions
- avoids costs by disruptions and any repairs
- increases the effectiveness and efficiency of your plant

Keep this manual at hand for subsequent operations on the device.

After opening the packaging please check the integrity of the device and the number of pieces of supplied.

### Symbols used

The following symbols are used in this manual:



#### **Information!**

*This symbol indicates important information.*



#### **Attention!**

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



#### **Warning!**

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

### Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Telephone: +49 621 776-4411  
Fax: +49 621 776-274411  
E-Mail: [fa-info@pepperl-fuchs.com](mailto:fa-info@pepperl-fuchs.com)

## 2. Declaration of conformity

### 2.1 Declaration of conformity

This product was developed and manufactured under observance of the applicable European standards and guidelines.



#### **Information!**

*A Declaration of Conformity can be requested from the manufacturer.*

The product manufacturer, Pepperl+Fuchs GmbH, D-68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.

### 3. Safety

#### 3.1 Symbols relevant to safety



**Information!**

*This symbol indicates important information.*



**Attention!**

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



**Warning!**

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

#### 3.2 General notes on safety

Only instructed specialist staff may operate the device in accordance with the operating manual.

User modification and or repair are dangerous and will void the warranty and exclude the manufacturer from any liability. If serious faults occur, stop using the device. Secure the device against inadvertent operation. In the event of repairs, return the device to your local Pepperl+Fuchs representative or sales office.

The connection of the device and maintenance work when live may only be carried out by a qualified electrical specialist.

The operating company bears responsibility for observing locally applicable safety regulations.

Store the not used device in the original packaging. This offers the device optimal protection against impact and moisture.

Ensure that the ambient conditions comply with regulations.

#### 3.3 Disposal



**Information!**

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

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

## 4. General

### 4.1 Product information

This system manual applies to the following Pepperl+Fuchs GmbH equipment:

#### 4.1.1 AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor

Article no.	Type	Inputs safety, expandable to	Outputs Safety, SIL 3, cat. 4	Safety outputs, independent according to SIL 3, expandable to	Safety communication	Number of AS-i networks, number of AS-i Master	1 power supply, 1 gateway for 2 AS-i networks, inexpensive power supplies	Diagnostic and configuration interface
<b>VBG-PB-K30-DMD-S16-EV</b>	Safety, PROFIBUS	max. 62 x 2 channels, max. 1922 in max. configuration	4 release circuits; 2 x relay, 2 x fast electronic safe outputs	max. 32, max. 992 in max. configuration	Safe-Link <sup>1</sup>	2 AS-i networks, 2 AS-i Masters	yes, max. 4A/AS-i network	Ethernet
<b>VBG-PB-K30-DMD-S16</b>	Safety, PROFIBUS	max. 62 x 2 channels	4 release circuits; 2 x relay, 2 x fast electronic safe outputs	max. 16	–	2 AS-i networks, 2 AS-i Masters	no, max. 8A/AS-i network, redundant supply	RS 232
<b>VBG-PB-K30-D-S16</b>	Safety, PROFIBUS	max. 62 x 2 channels	4 release circuits; 2 x relay, 2 x fast electronic safe outputs	max. 16	–	2 AS-i networks, 1 AS-i Master	no, max. 8A/AS-i network, redundant supply	RS 232
<b>VBG-PB-K30-D-S</b>	Safety, PROFIBUS	max. 62 x 2 channels	2 release circuits; 2 x 2 relay	max. 16	–	2 AS-i networks, 1 AS-i Master	no, max. 8A/AS-i network, redundant supply	RS 232

Tab. 4-1. Function range AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor

1. SafeLink via ethernet. Please refer here to the information in the section <SafeLink>.

The AS-i/Gateway with integrated Safety Monitor combines an AS-i 3.0 PROFIBUS Gateway with a Safety Monitor for 2 AS-i circuits. The product offers the full functionality of an AS-i/PROFIBUS Gateway and an AS-i Safety Monitor for 2 AS-i circuits.

The safety unit provides 4 inputs which can be defined as either EDM or as START inputs.

The AS-i PROFIBUS gateways are designed to connect AS-i systems to an upper-level PROFIBUS network. The gateways act as a master for AS-i and as a slave on PROFIBUS.

All AS-i functions can be used cyclically as well as acyclically via PROFIBUS DP/ V1.

For the cyclical data transfer up to 32 bytes of I/O data can be transferred as binary data for one AS-i network. Additionally, analog signals and all available commands of the new AS-i specification can be transferred via the command channel through PROFIBUS.

On the serial PROFIBUS Master AS-i Control Tools can be used to monitor the AS-i data online via PROFIBUS DP/V1.

#### 4.1.2 AS-i 3.0 PROFIBUS Gateway, PROFIsafe for 2 AS-i circuits

Article no.	Type	Inputs safety, expandable to	Outputs Safety, SIL 3, cat. 4	Safety outputs, independent according to SIL 3, expandable to	Safety communication	Number of AS-i networks, number of AS-i Master	1 power supply, 1 gateway for 2 AS-i networks, inexpensive power supplies	Diagnostic and configuration interface
VBG-PBS-K30-DMD	PROFIsafe, PROFIBUS	max. 62 x 2 channels	4 release circuits; 2 x relay, 2 x fast electronic safe outputs	max. 16	PROFIsafe (F-CPU)	2 AS-i networks, 2 AS-i Masters	no, max. 8A/AS-i network, redundant supply	RS 232

Tab. 4-2. Function range "AS-i 3.0 PROFIBUS Gateway, PROFIsafe for 2 AS-i circuits"

#### 4.2 New Generation of AS-i Gateways with ethernet diagnostics interface

##### The plus points of the new Gateway generation at a glance:

- Gateways now programmable in C
- Ethernet diagnostics interface for remote diagnostics
- Integrated web server: diagnostics for the Gateways and the AS-i circuits over Ethernet possible with no additional software
- Configuration files (e.g.: GSD for PROFIBUS, SDD for sercos III, EDS for EtherNET/IP or GSDML for PROFINET) already stored in the web server
- Earth fault monitor distinguishes between AS-i cable and sensor cable
- Current from both AS-i circuits in the "1 Gateway, 1 power supply for 2 AS-i circuits" version can now be read directly on the unit
- Self-resetting fuses in the "1 Gateway, 1 power supply for 2 AS-i circuits" version
- Device temperature display
- AS-i Power24V capable
- Interfaces for virtually every bus system and Ethernet solution



**Information!**

See also section <Functions of the new generation of AS-i Gateways> for further information.

**4.3 Brief description**

The actuator-sensor interface (AS-i) has established itself as a system for networking primarily binary sensors and actuators at the lowest level of the automation hierarchy. The high number of installed systems, the ease of use and the reliable operating behaviour also make the AS-i interesting in the area of machine safety.

The **safety** AS-i system is intended for safety applications up to Category 4/SIL 3. Mixed operation of standard components and safe components is possible.

**AS-i 3.0 PROFIBUS Gateway, PROFIsafe for 2 AS-i circuits**

The safety unit monitors within an AS-i system the safe slaves which have been assigned according to the configuration specified by the user with the configuration software. This safety information is transmitted to PROFIsafe.

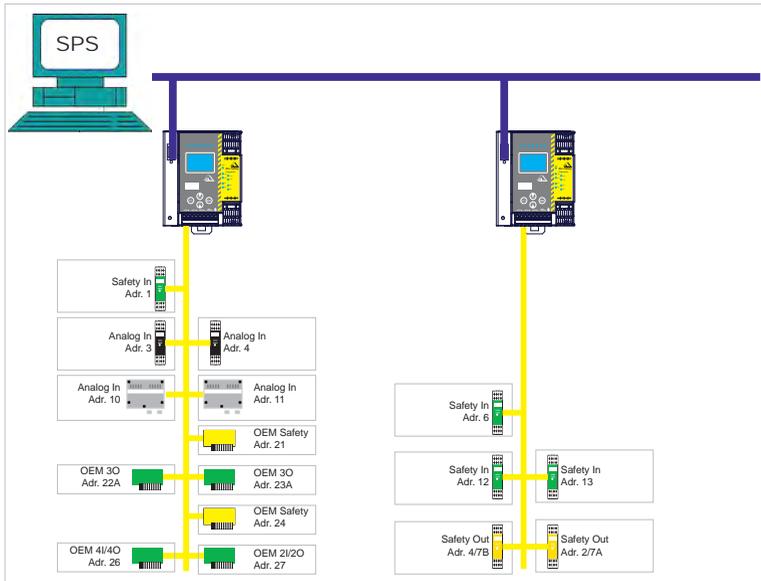


Fig. 4-1. Safe and standard components in an AS-i network

**AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor**

The AS-i/Gateway with safety monitor monitors within an AS-i system the safe slaves which have been assigned according to the configuration specified by the user with the configuration software. In the event of a stop request or a defect, the AS-i/Gateway with safety monitor switches off the system in protective operation mode with a maximum reaction time of 40 ms.

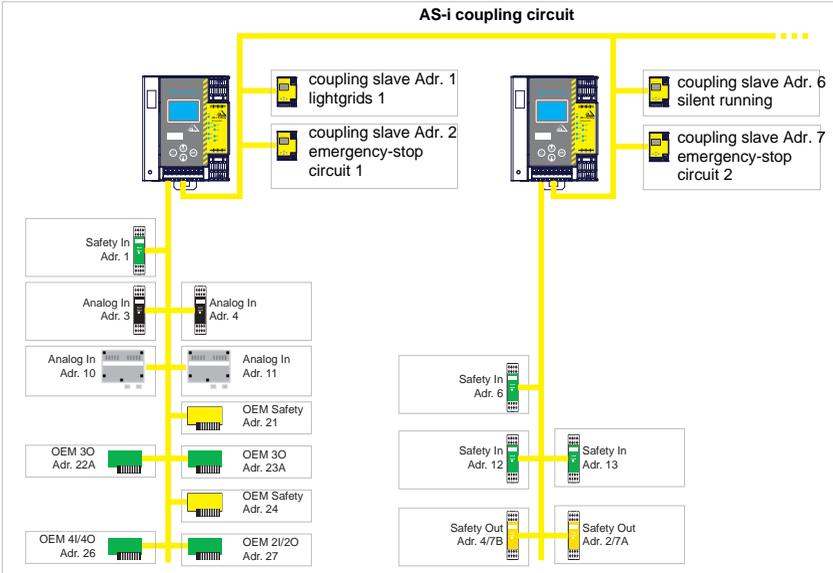


Fig. 4-2. Safe and standard components in an AS-i network

Multiple AS-i Safety Monitors can be used within an AS-i system. In this way, a safe slave can be monitored by multiple AS-i Safety Monitors.

## 5. Spezifikationen - AS-i/PROFIBUS Gateways

### 5.1 Technical data

The technical data are placed in the data sheet. Please view the current version on the web page: <http://www.pepperl-fuchs.com>.



#### **Attention!**

*The AS-I power supply for the AS-I components must have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The power supply for the 24 V supply must also have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The maximum output voltage of the power supply must also be less than 42 V in case of a fault.*

**5.2 Safety-relevant characteristic data**

Characteristic data	Value	Standard
Safety category	4	EN 954-1
Safety category	4	EN ISO 13849-1: 2008
Performance Level (PL)	e	
Safety Integrity Level (SIL)	3	EN 61508: 2001
Lifespan (TM) in years	20	EN ISO 13849-1: 2008
Maximum switch-on time in months	12	EN 61508: 2001
Max. system reaction time in milliseconds	40	EN 61508: 2001

Tab. 5-3.



**Attention!**

*In addition to the system reaction time of max. 40 ms, the reaction times of the safe AS-interface sensor slave, of the sensor being used for monitoring, of the safe AS-interface actuator slave and of the actuator used for this purpose must still be added. Please note that additional reaction times may likewise arise through the configuration of the safety monitor.*



**Notice!**

*Refer to the technical data for the slaves as well as to that for the sensors and actuators for the reaction times to be added.*



**Attention!**

*The system reaction times of the daisy-chained AS-interface components are added up.*

### 5.2.1 Overview of parameter for determining the failure rates

nop/y	switching intervals $t_{\text{cycle}}$ [s]	B10d value	electromechanics		Standard
			MTTF <sub>d</sub> [years]	PFH [1/h]	
105.120	300	2.500.000	237,82	$9,908 \times 10^{-9}$	EN ISO 13849-1
52.560	600		475,65	$4,853 \times 10^{-9}$	
8.760	3600		2853,88	$9,054 \times 10^{-10}$	

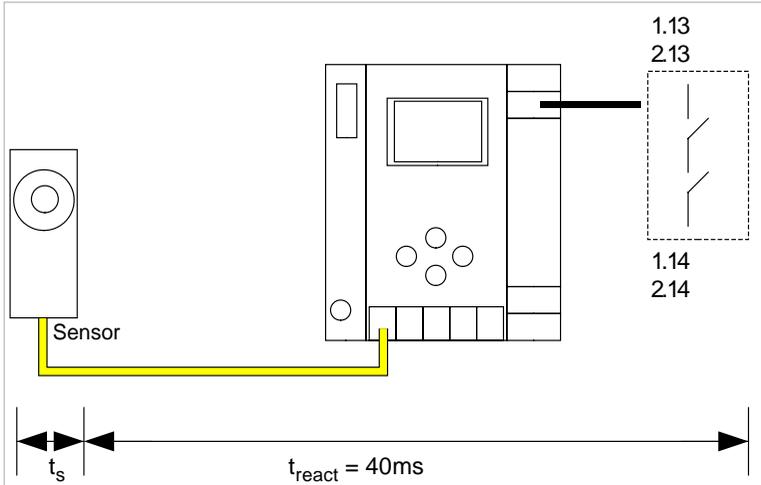
Tab. 5-4.

nop/y	switching intervals $t_{\text{cycle}}$	B10d value	electronics PFH	electromechanics		PFH total	Standard	
				MTTF <sub>d</sub>	PFH			
105.120	300	2.500.000	$4,76 \text{ E}^{-09}$	237,82	$1,12 \times 10^{-8}$	$1,6 \times 10^{-8}$	EN 62061 EN 61508	
52.560	600			475,65	$5,09 \times 10^{-9}$			$9,85 \times 10^{-9}$
8.760	3600			2853,88	$7,82 \times 10^{-10}$			$5,54 \times 10^{-9}$

Tab. 5-5.

### 5.3 Reaction times

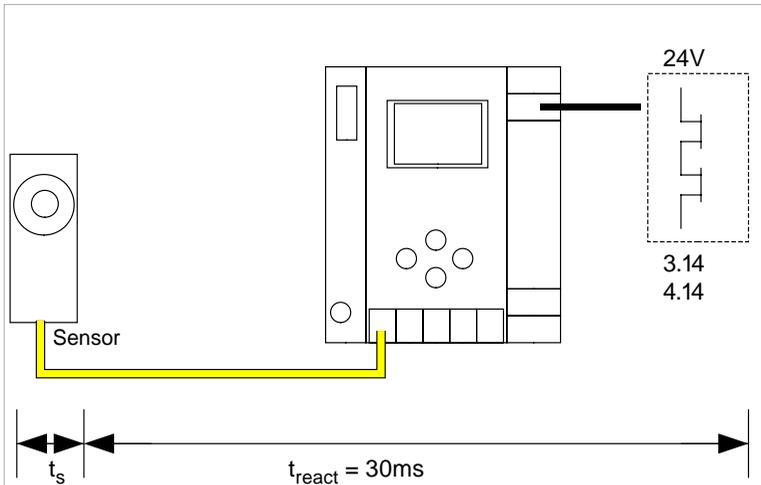
#### 5.3.1 Sensor -> local relay output



$t_s$  = maximal reaction time of the sensor (see data sheet)

$t_{react}$  = maximal system reaction time

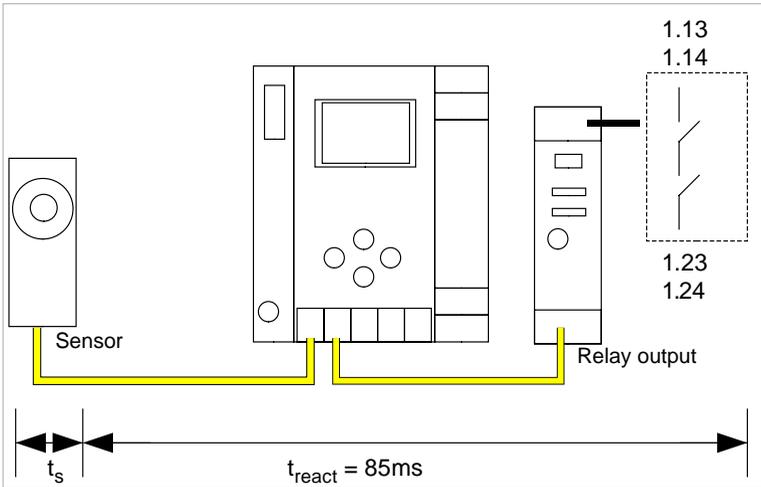
#### 5.3.2 Sensor -> local electronic output



$t_s$  = maximal reaction time of the sensor (see data sheet)

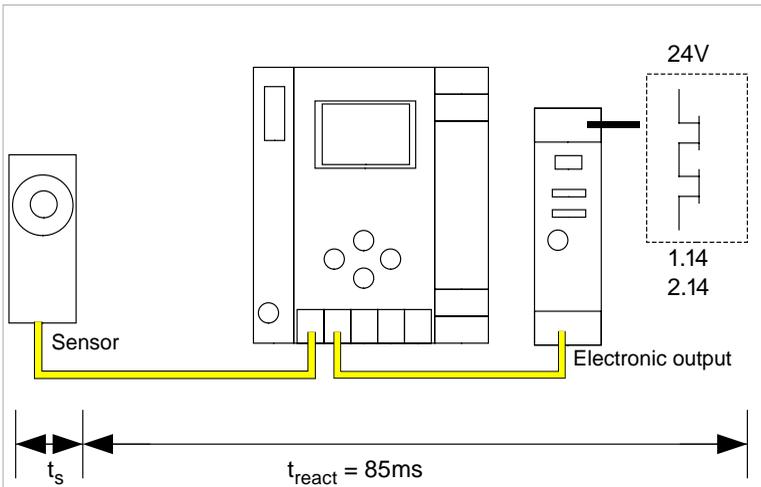
$t_{react}$  = maximal system reaction time

5.3.3 Sensor -> AS-i relay output



$t_s$  = maximal reaction time of the sensor (see data sheet)  
 $t_{react}$  = maximal system reaction time

5.3.4 Sensor -> AS-i electronic output



$t_s$  = maximal reaction time of the sensor (see data sheet)  
 $t_{react}$  = maximal system reaction time

5.3.5 System reaction times – example calculations

System components:		
<b>ASI1</b>	AS-i network 1	
<b>ASI2</b>	AS-i network 2	
<b>S1-1</b>	Safe sensor slave	(EMERGENCY-OFF switch: $t_{R\ S1-1} = 100\text{ ms}$ )
<b>S1-2</b>	Safe sensor slave	(safety light barrier: $t_{R\ S1-2} = 18\text{ ms}$ )
<b>S2-1</b>	Safe sensor slave	(EMERGENCY-OFF switch: $t_{R\ S2-1} = 100\text{ms}$ )
<b>A2-1</b>	Safe actuator slave	(motor starter: $t_{R\ A2-1} = 50\text{ms}$ )
<b>SM1-1</b>	Safety monitor with 16 relais circuits and one safe AS-i output in AS-i network 1	
<b>SM1-2</b>	Safety monitor with 2 relais circuits and one safe AS-i output in AS-i network 1	
<b>SM2-1</b>	Safety monitor with 16 relais circuits and one safe AS-i output in AS-i network 2	

Tab. 5-6.

**System configuration - example 1: Calculation of the system reaction time**

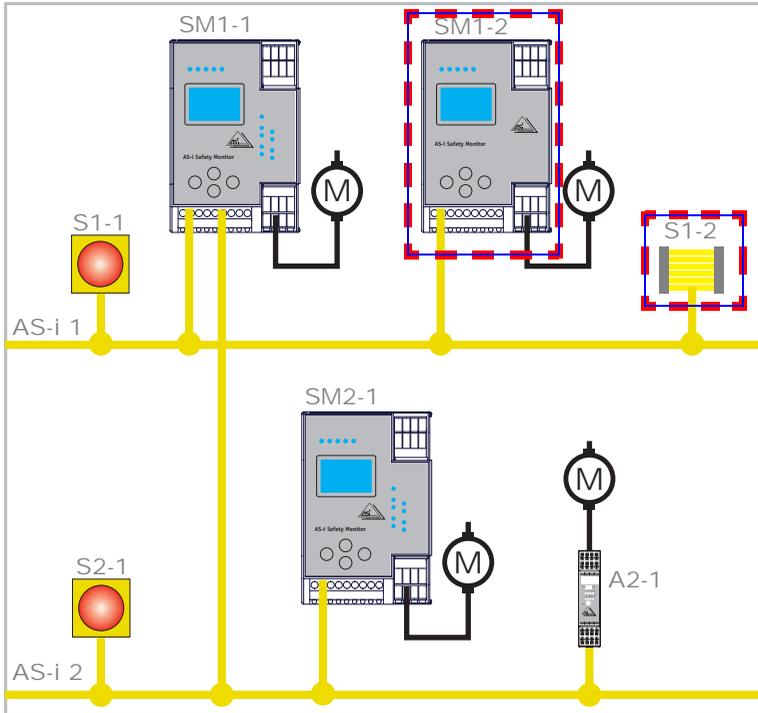


Fig. 5-3.

Upon activation of safety light barrier S1-2, the relay safety output of safety monitor SM1-2 is controlled.

Calculation of the AS-i relevant system reaction time:

$$t_{\text{System total a)}} = t_{\text{R S1-2}} + t_{\text{R System}} = 18\text{ms} + 40\text{ms} = \underline{58\text{ms}}$$

**System configuration - example 2: Calculation of the system reaction time**

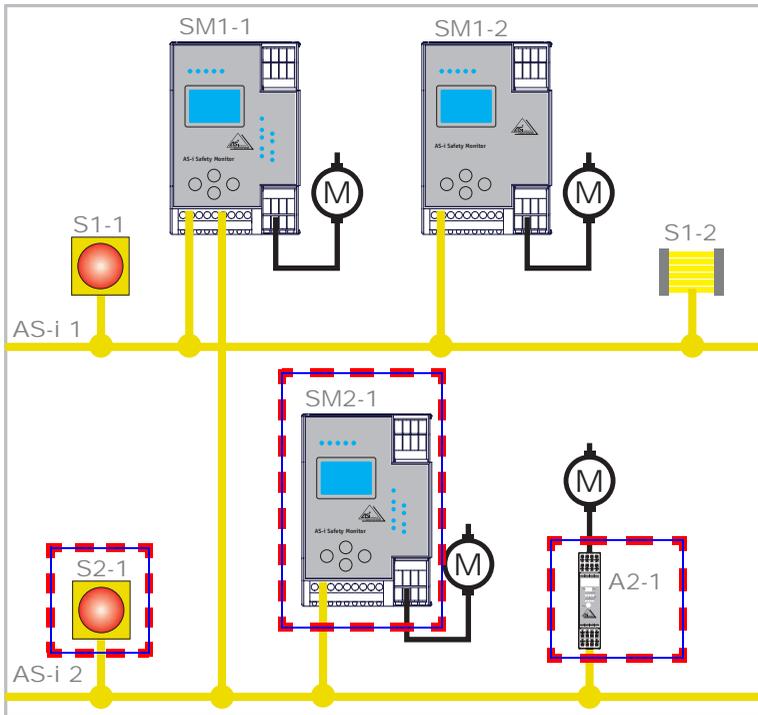


Fig. 5-4.

Upon locking of the EMERGENCY-OFF switch S2-1, the motor starter is controlled via the safe AS-interface output of safety monitor SM2-1.

Calculation of the AS-interface-relevant system reaction time:

$$t_{\text{System total b)}} = t_{\text{R S2-1}} + t_{\text{R System}} + t_{\text{R A2-1}} = 100\text{ms} + 40\text{ms} + 50\text{ms} = \underline{190\text{ms}}$$

**System configuration - example 3: Calculation of the system reaction time**

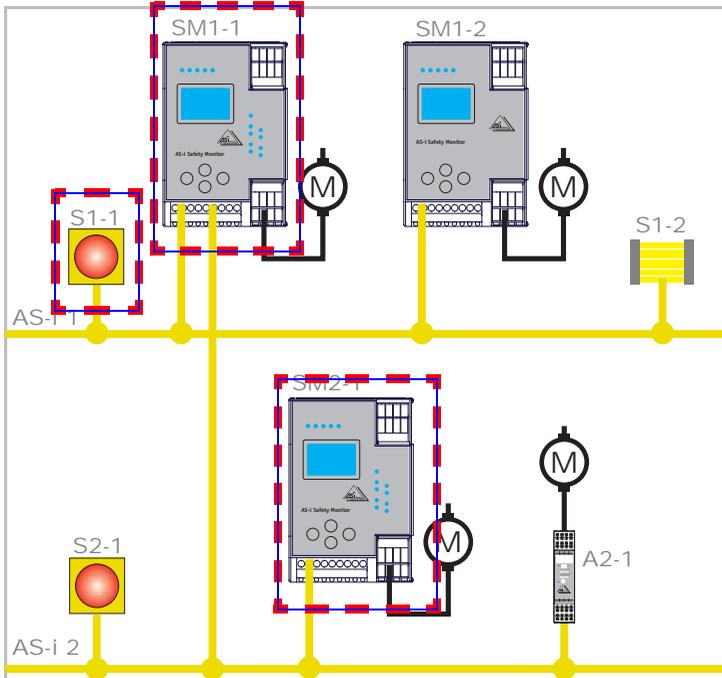


Fig. 5-5.

Upon locking of the EMERGENCY-OFF switch S1-1, the relay output of safety monitor SM2-1 is controlled via the coupling of the safe AS-interface output of safety monitor SM1-1.

Calculation of the AS-i relevant system reaction time:

$$t_{\text{System total c)}} = t_{\text{R S1-1}} + t_{\text{R System ASi1}} + t_{\text{R System ASi2}} = 100\text{ms} + 40\text{ms} + 40\text{ms} = \underline{180\text{ms}}$$

#### 5.4 Scope of delivery

The **basic unit** consists of:

AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor.

The following **accessories** are available:

Software CD with

- **ASIMON 3 G2** communication software for Microsoft® Windows 2000/XP/ Vista/Windows 7/Windows 8®
- System manual in PDF format (Adobe® Reader® Version 5.x or newer is required for viewing the files)

## 6. Spezifikationen - AS-i/PROFIsafe Gateways

### 6.1 Technical data

The technical data are placed in the data sheet. Please view the current version on the web page: <http://www.pepperl-fuchs.com>.



#### **Attention!**

*The AS-I power supply for the AS-I components must have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The power supply for the 24 V supply must also have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The maximum output voltage of the power supply must also be less than 42 V in case of a fault.*

**6.2 Safety-relevant characteristic data**

Characteristic data	Value	Standard
Safety category	4	EN 954-1
		EN ISO 13849-1: 2008
Performance Level (PL)	e	EN ISO 13849-1: 2008
Safety Integrity Level (SIL)	3	IEC 61508: 2001
Lifespan (TM) in years	20	EN ISO 13849-1: 2008
Maximum switch-on time in months	12	IEC 61508: 2001
PFD	$< 9,25 \times 10^{-6}$	IEC 61508: 2001, EN 62061: 2005
PFH <sub>D</sub> (probability of a dangerous failure per hour)	$< 5,36 \times 10^{-9}$	IEC 61508: 2001, EN 62061: 2005
<b>Max. system reaction time in milliseconds</b>		IEC 61508: 2001
PROFIsafe → local relay output	15	
PROFIsafe → local electronic output	5	
PROFIsafe → AS-i relay output	60	
PROFIsafe → AS-i electronic output	50	
AS-i → PROFIsafe	30	
PROFIBUS → local output	40	
PROFIBUS → AS-i		
AS-i → local output		
AS-i → AS-i		
AS-i → PROFIBUS	50	

Tab. 6-7.

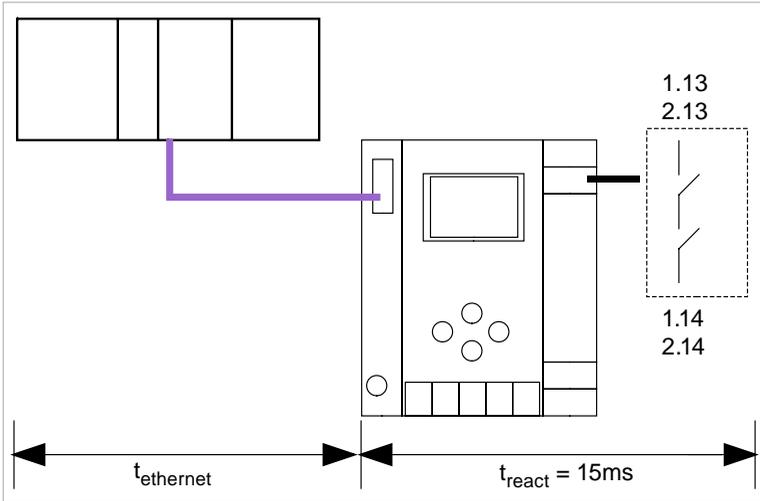


**Attention!**

*In addition to the system reaction time in the gateway, eventually reaction times of other daisy-chained safe AS-i and PROFIsafe components have to be added too. Please note that additional reaction times may likewise arise through the configuration of the safety unit.*

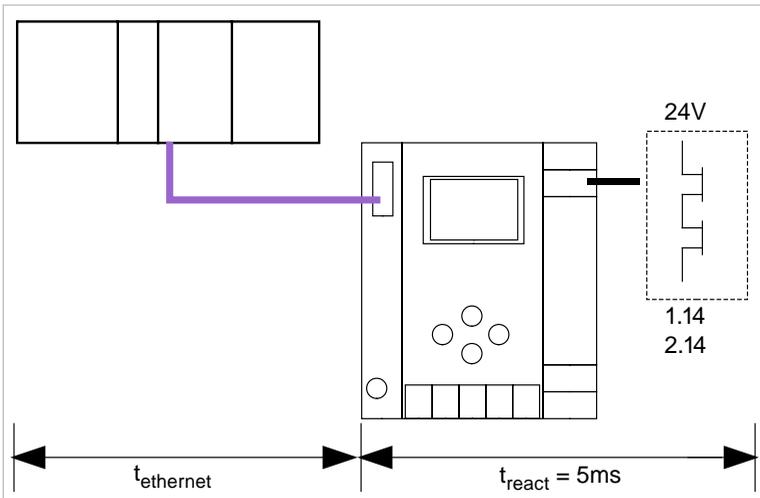
### 6.3 Reaction times

#### 6.3.1 Ethernet (PROFIsafe) -> local relay output



$t_{ethernet}$  = reaction time PROFIsafe type 150ms  
 $t_{react}$  = maximal system reaction time

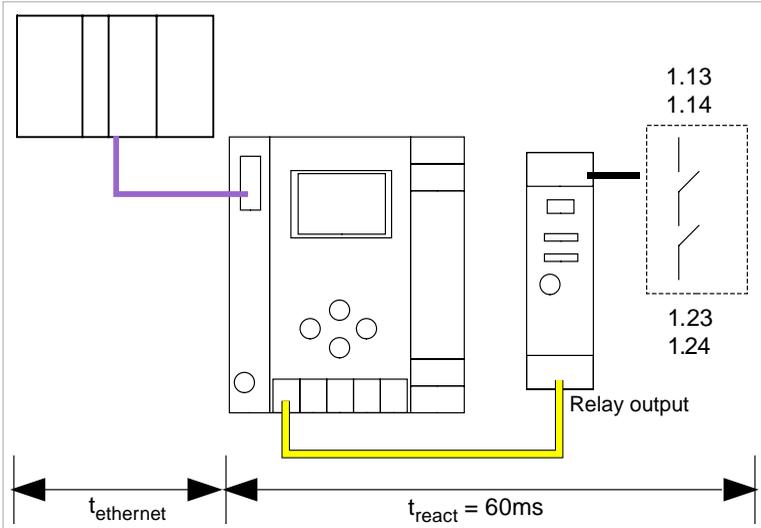
#### 6.3.2 Ethernet (PROFIsafe) -> local electronic output



$t_{ethernet}$  = reaction time PROFIsafe type 150ms  
 $t_{react}$  = maximal system reaction time

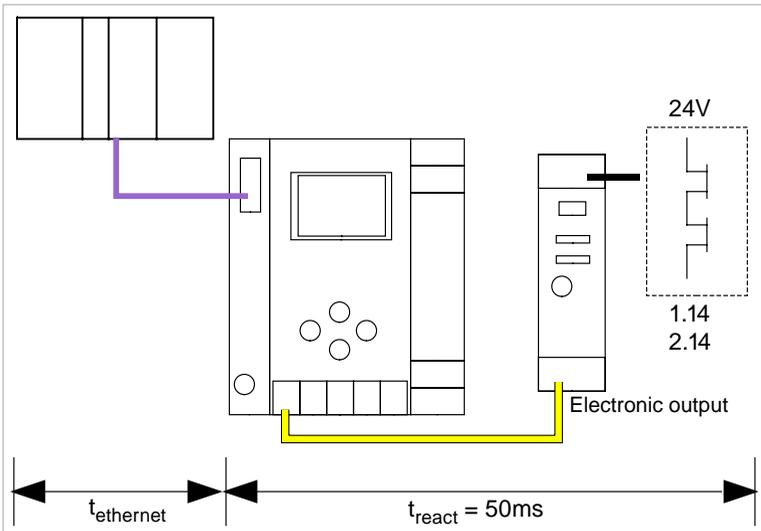
2.5.2013

6.3.3 Ethernet (PROFIsafe) -> AS-i relay output



$t_{\text{ethernet}}$  = reaction time PROFIsafe type 150ms  
 $t_{\text{react}}$  = maximal system reaction time

6.3.4 Ethernet (PROFIsafe) -> AS-i electronic output

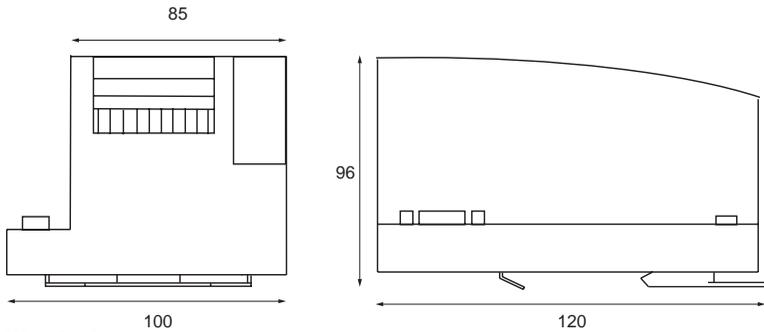


$t_{\text{ethernet}}$  = reaction time PROFIsafe type 150ms  
 $t_{\text{react}}$  = maximal system reaction time

2.5.2013

## 7. Installation

### 7.1 Dimensions



#### **Warning!**

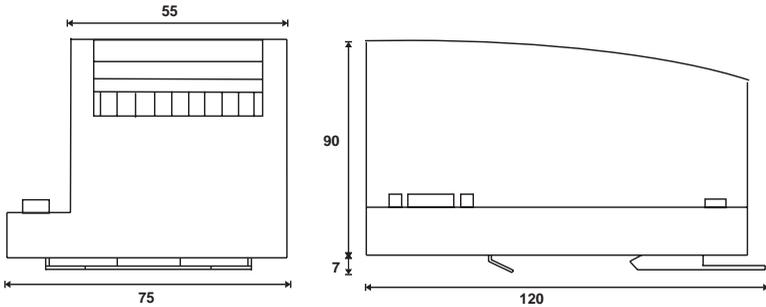
Cover the top of the gateway when doing any drilling work above the unit. No particles, especially metal chips, should be allowed to enter the housing, since this could cause a short circuit.



#### **Information!**

Please refer to installation instruction for this device for detailed mounting information.

#### **Devices without integr. safe outputs**



## 7.2 Connections

 Ø 5 - 6 mm / PZ2	0,8 Nm 7 LB.IN
	2 x (0,5 ... 1,5) mm <sup>2</sup>
	2 x (0,5 ... 1,5) mm <sup>2</sup>
AWG	2 x 24 ...12



### Attention!

The AS-I power supply for the AS-I components must have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The power supply for the 24 V supply must also have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The maximum output voltage of the power supply must also be less than 42 V in case of a fault.

### 7.3 Installing in the control cabinet

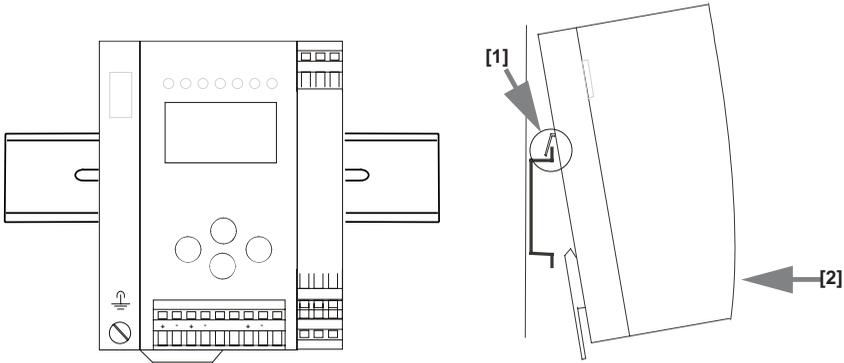
The AS-I/Gateway is installed in the control cabinet on 35mm DIN rails per DIN EN 50 022.



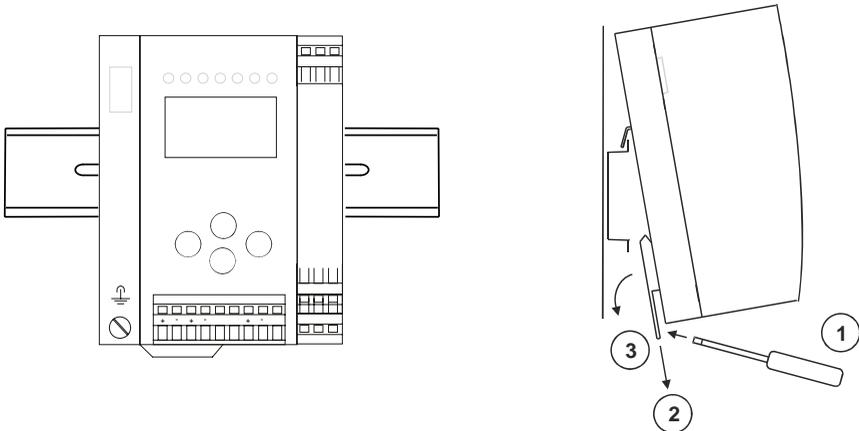
**Information!**

*The enclosure of the AS-I/Gateway is made of stainless steel. The unit is also suitable for exposed wall mounting.*

To install, place the unit on the upper edge of the DIN rail and then snap in the lower edge.



### 7.4 Removing



To remove, press the holding clamps [2] down using a screwdriver [1], press the unit firmly against the upper rail guide and lift out.

## 7.5 Electrical Connection

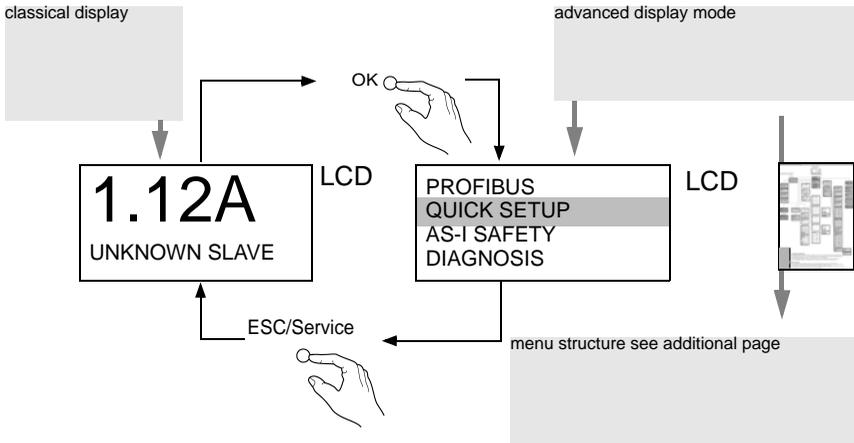


### Information!

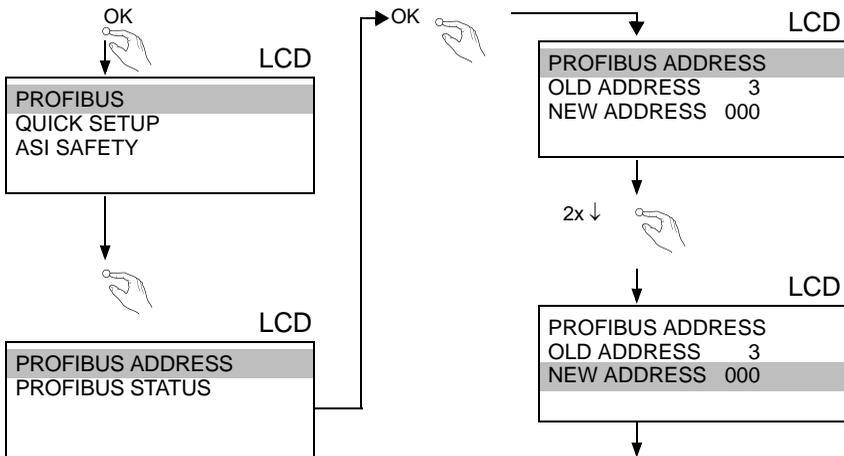
Electrical connections are described in section <Electrical connection>.

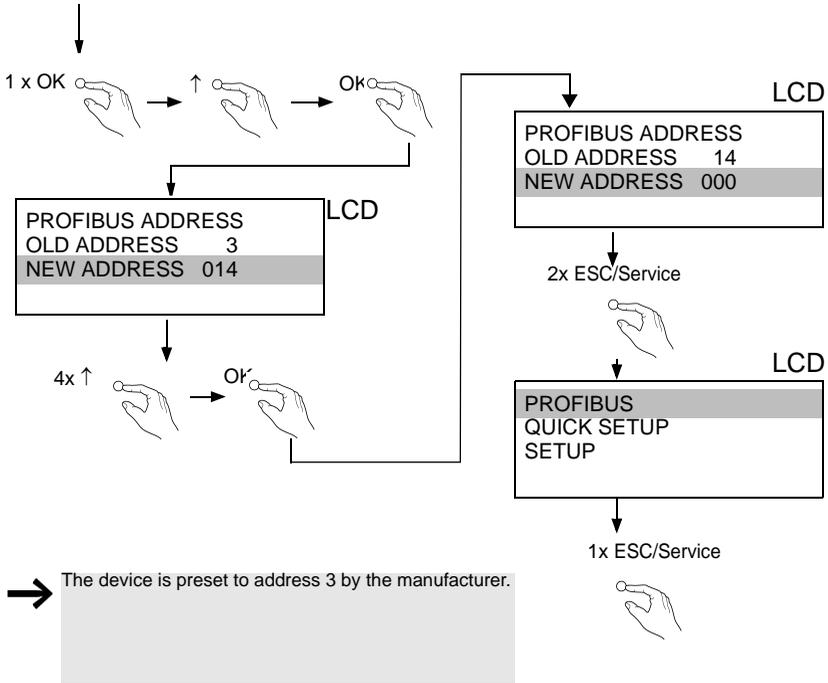
## 7.6 Commissioning

### 7.6.1 Switching to advanced display mode

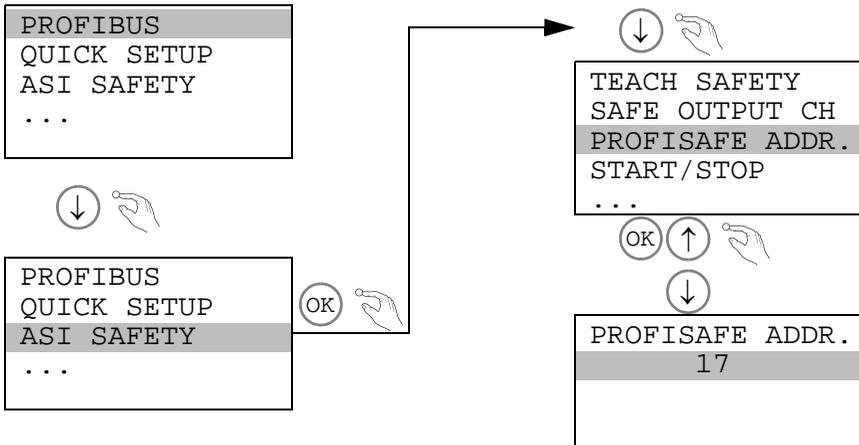


### 7.6.2 Setting the PROFIBUS-DP address 14





### 7.6.3 Setting the PROFIsafe address 17

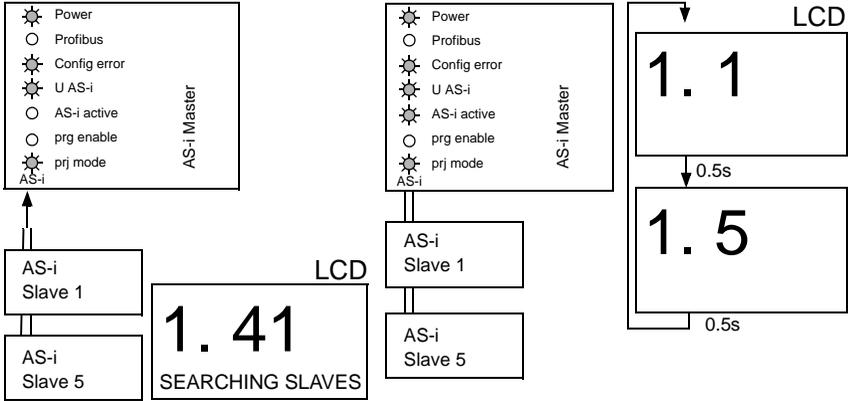




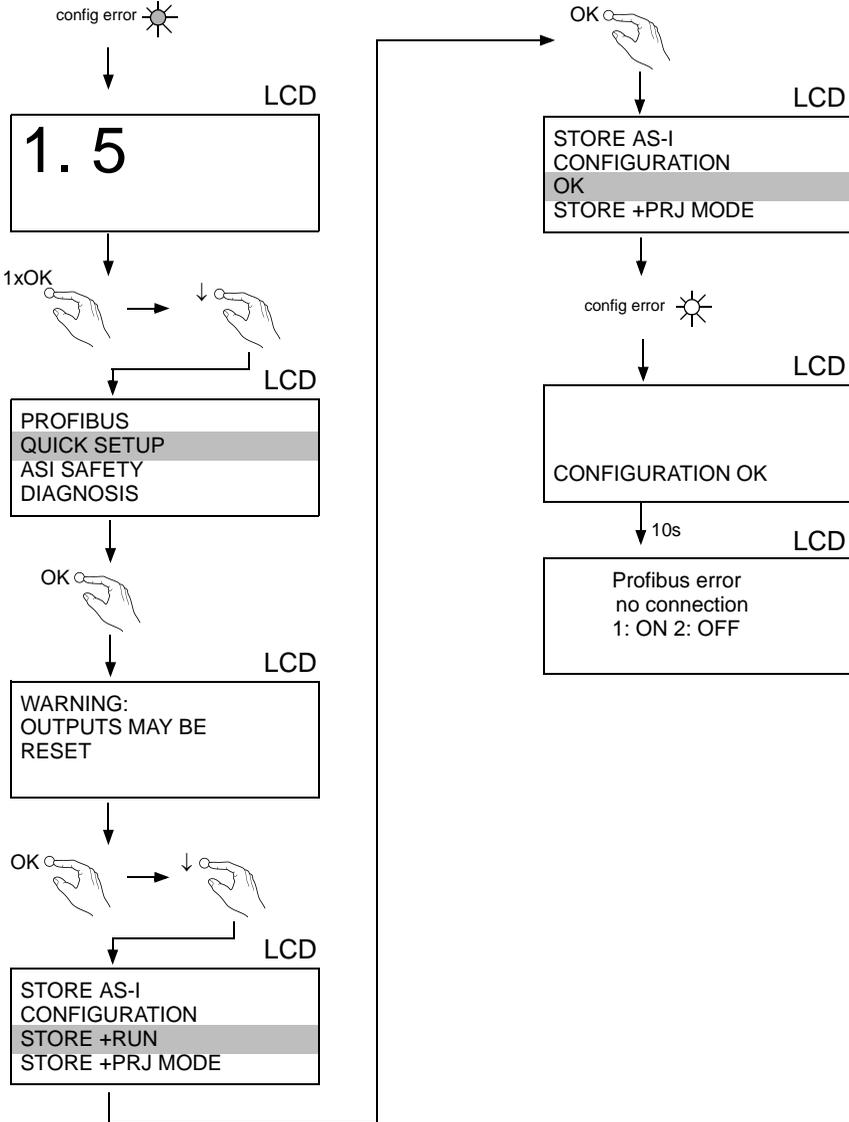
**Information!**

Available only with AS-i/PROFIsafe Gateways.

**7.6.4 Connecting AS-i Slaves**

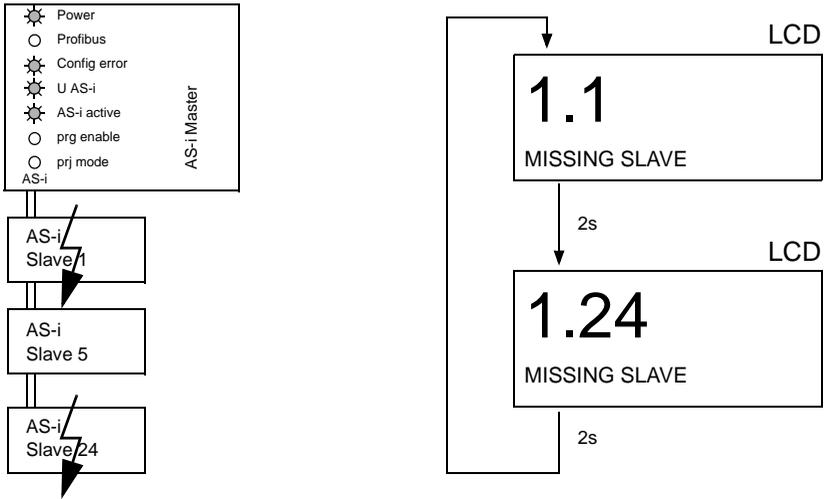


7.6.5 Quick setup

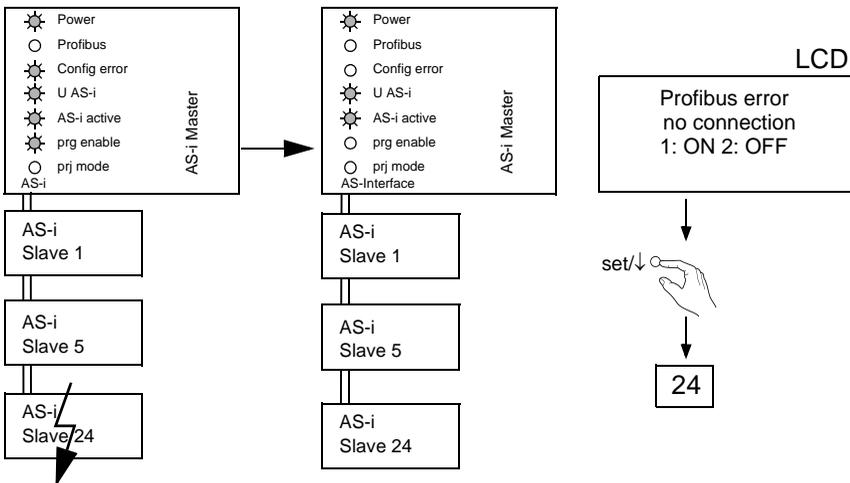


## 7.6.6 Error tracing

### 7.6.6.1 Faulty slaves

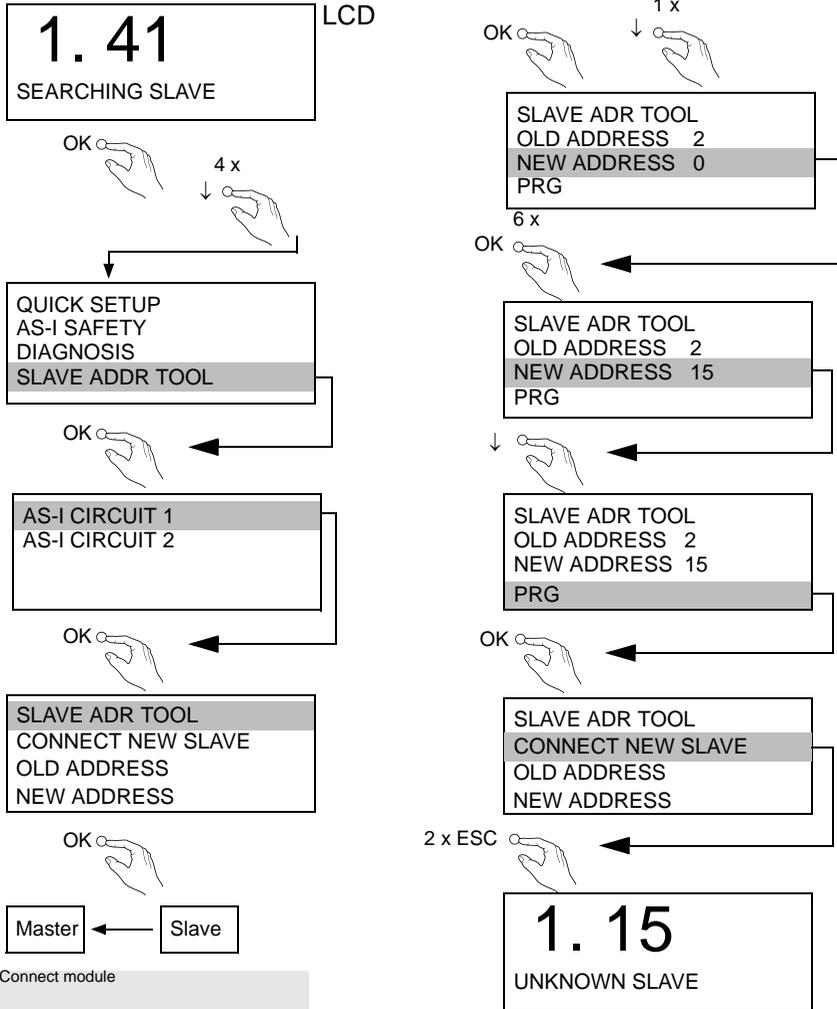


### 7.6.6.2 Error display (last error)



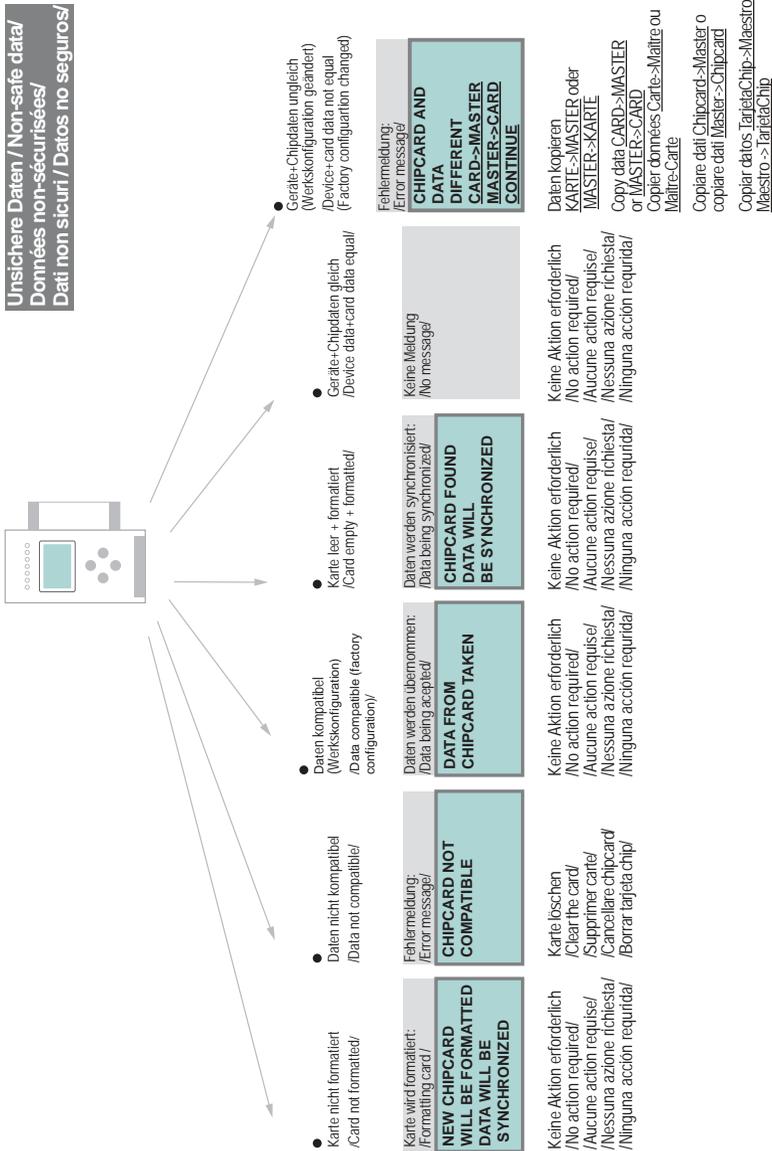
## 7.7 Addressing

### 7.7.1 Assigning address 15 to slave currently at address 2

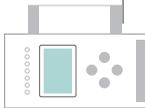


For additional information see manual, section <Operation in advanced display mode>.

## 7.8 Local parameter setting of safe AS-i/Gateways and Monitors



**Sichere Daten / Safe data/  
Données sécurisées/  
Dati sicuri / Datos seguros**



- Gerät enthält **keine** validierte Konfiguration auf der Chipkarte /No validated configuration in the device/
- Stamm-/Vollständige Konfiguration auf der Chipkarte /Master configuration or complete configuration on the card
- Gerät enthält validierte Konfiguration /There is a validated configuration on the card
- Beide Konfigurationen ungleich/Both configurations not equal
- Validierte Konfiguration in Gerät, Chipkarte leer /Validated configuration in the device; chip card empty/
- Keine validierte Konfiguration in Gerät + Chipkarte /No validated configuration in the device + chip card/
- Daten werden synchronisiert/ Data being synchronized/
- CHIPCARD FOUND SAFETY DATA WILL BE SYNCHRONIZED
- Keine Aktion erforderlich /No action required/ /Aucune action requis/ /Nessuna azione richiesta/ /Ninguna acción requirida/
- Karte löschen /Clear the card/ /Supprimer carte/ /Cancellare chipcard/ /Borrar chip/
- Sichere Daten auf der Chipkarte nicht kompatibel zum Gerät /Safe data on the chip card not compatible to the device/
- Fehlermeldung/ Error message/
- CHIPCARD NOT COMPATIBLE
- Daten werden synchronisiert/ Data being synchronized/
- CHIPCARD FOUND SAFETY DATA WILL BE SYNCHRONIZED
- Keine Aktion erforderlich /No action required/ /Aucune action requis/ /Nessuna azione richiesta/ /Ninguna acción requirida/
- Datenfreigabe per Release-Code notwendig/ Data release via release code required/
- COPY BANK A TO MONITOR ... RELEASE CODE: 1BDF TYPE CODE 1BDF OK
- Konfiguration per Release-Code freigeben /Validate the configuration via release code/ /Respecter les indications de sécurité exposées dans le manuel ASIMON /Osservare le istruzioni di sicurezza riportate nel manuale ASIMON /Habilitar la configuración via código de liberación/
- Keine Aktion erforderlich /No action required/ /Aucune action requis/ /Nessuna azione richiesta/ /Ninguna acción requirida/
- Datenfreigabe per Release-Code notwendig/ Data release via release code required/
- COPY BANK A TO MONITOR ... RELEASE CODE: 1BDF TYPE CODE 1BDF OK
- Konfiguration per Release-Code freigeben /Validate the configuration via release code/ /Respecter les indications de sécurité exposées dans le manuel ASIMON /Osservare le istruzioni di sicurezza riportate nel manuale ASIMON /Habilitar la configuración via código de liberación/
- Fehlermeldung/ Error message/
- ERROR. CHIPCARD AND SAFETY DATA DIFFERENT DELETE CHIPCARD OR SAFETY DATA
- Daten löschen /Clear data/ /Supprimer données / Cancellare dati /Borrar datos

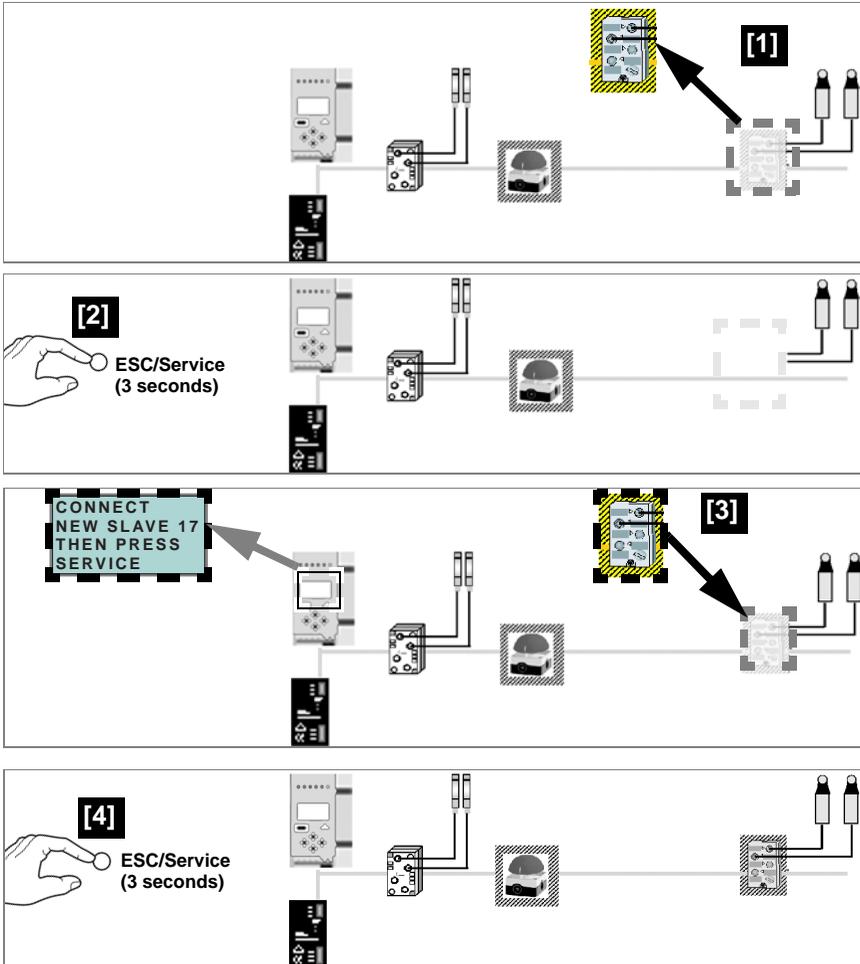


For further information see manual, section <Chip card>

### 7.9 Replacing a defective safety-configured AS-i slave



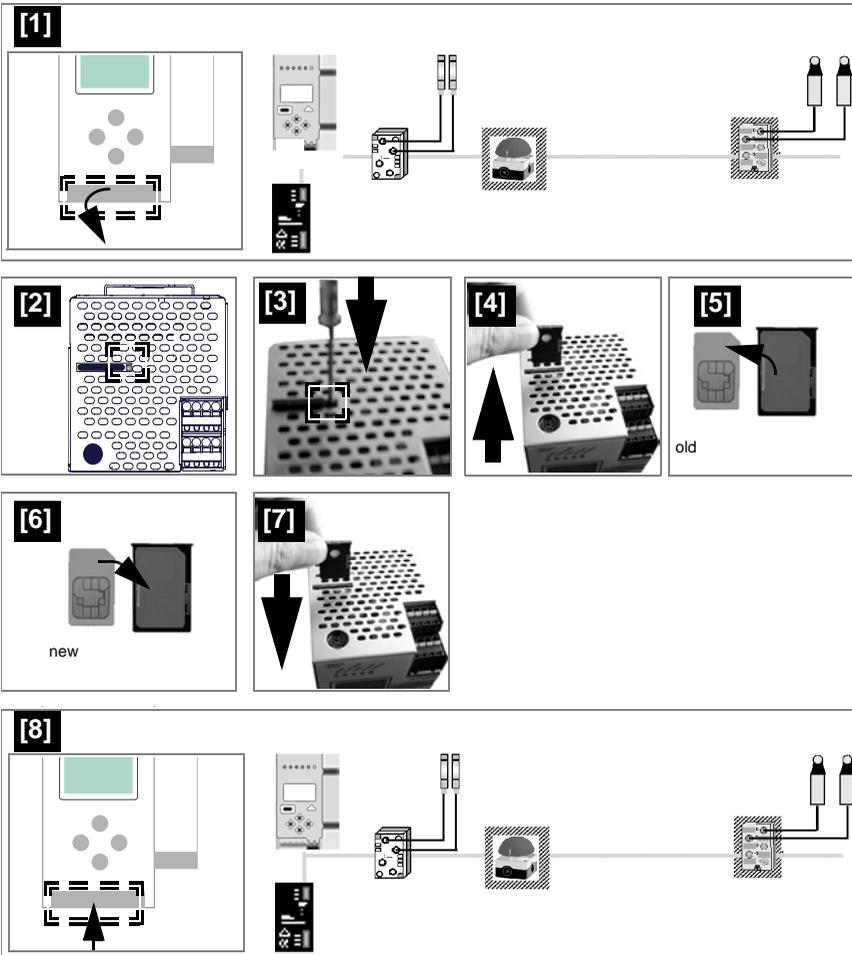
The new slave must be able to send teaching codes and must have the same address as the old one. The addressing of the new slave is carried out automatically by default for all Pepperl+Fuchs AS-i Masters. Only one missing slave is allowed!



### 7.10 Replacing the chip card



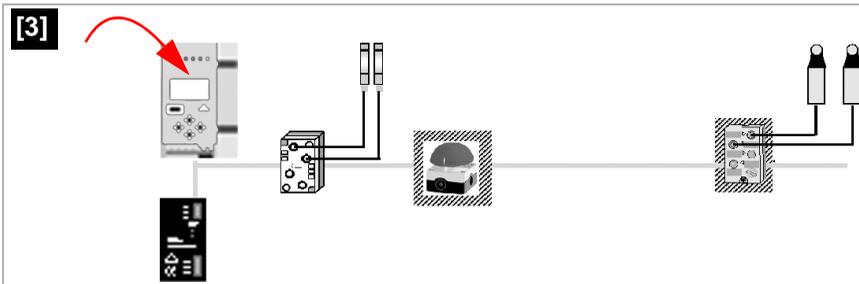
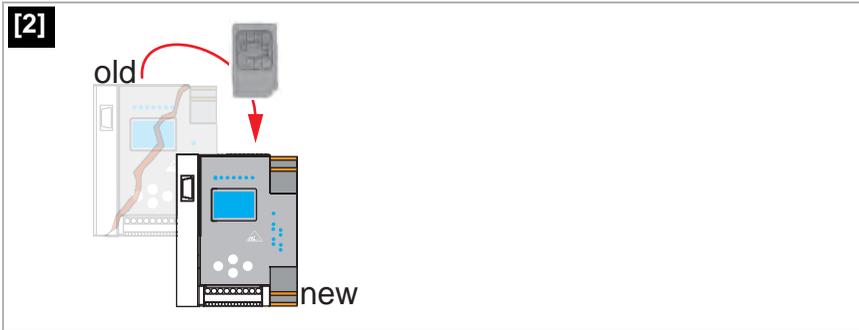
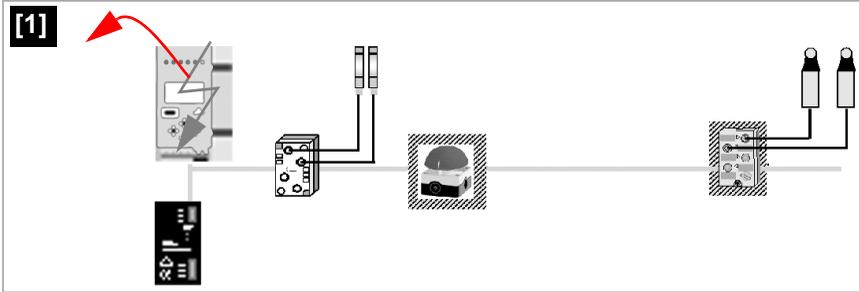
Always turn off power before inserting or removing the card!

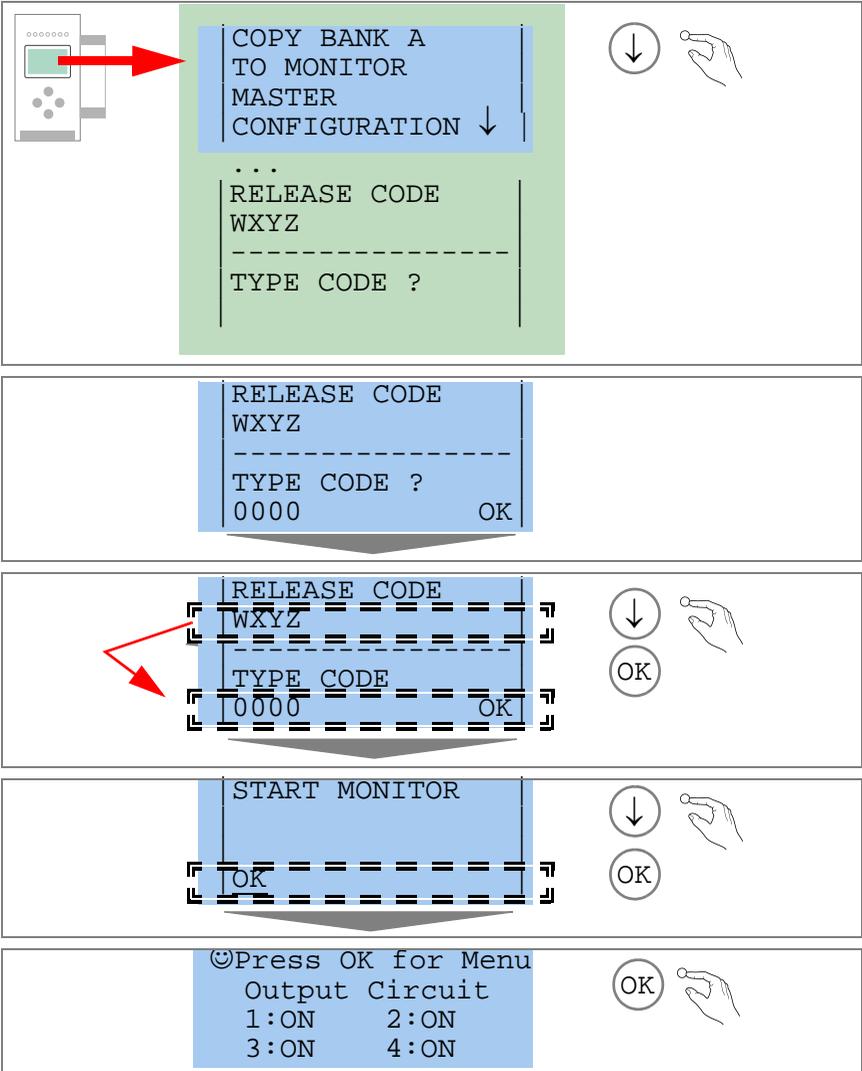


### 7.11 Replacing a defective device

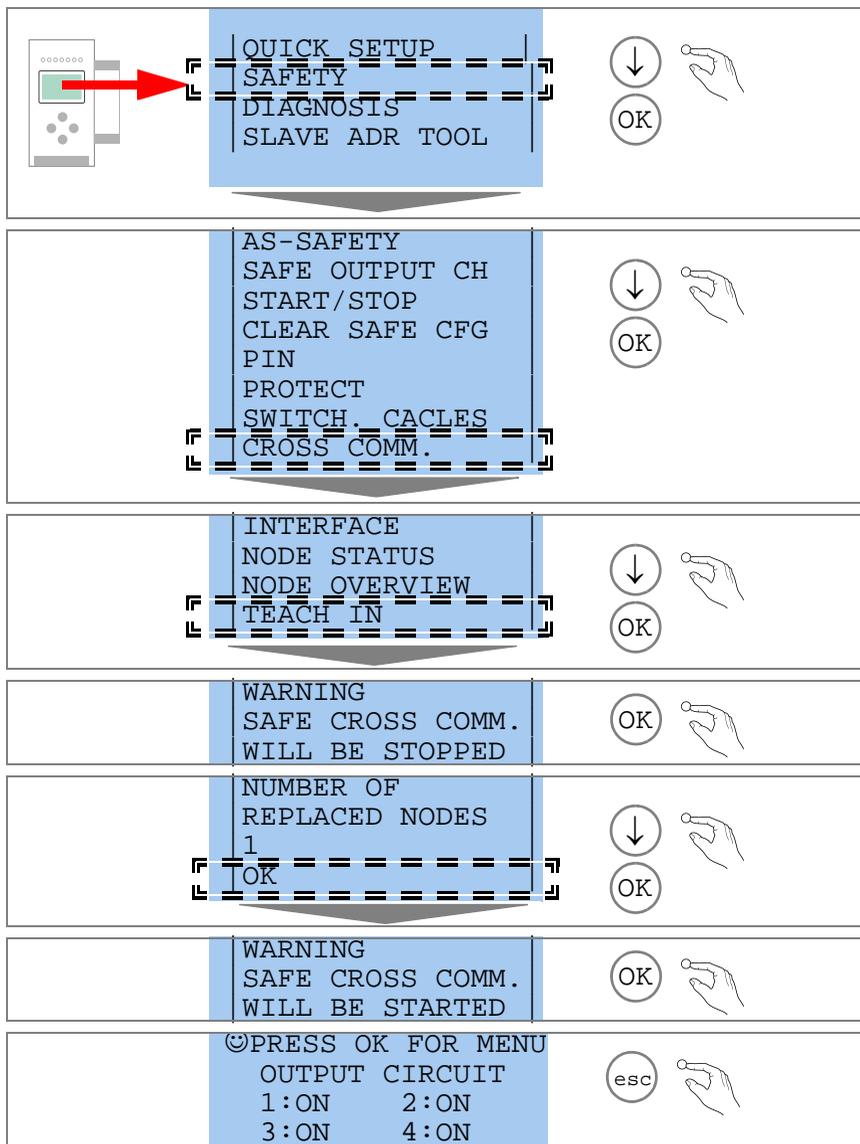


*If SafeLink is used, it is necessary to teach the group manager after replacing a defective device (see next section)!*

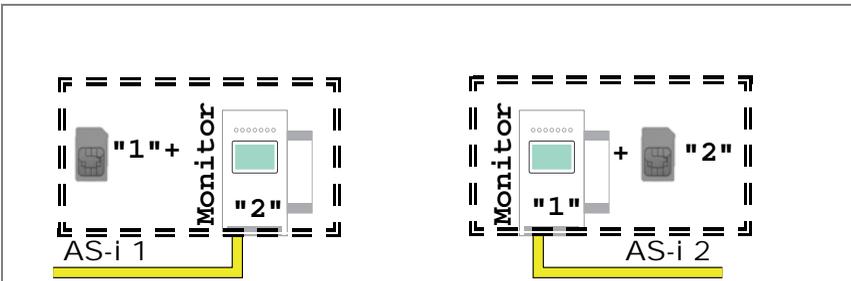
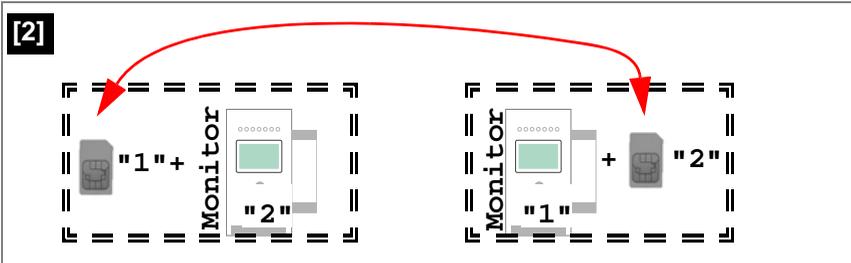
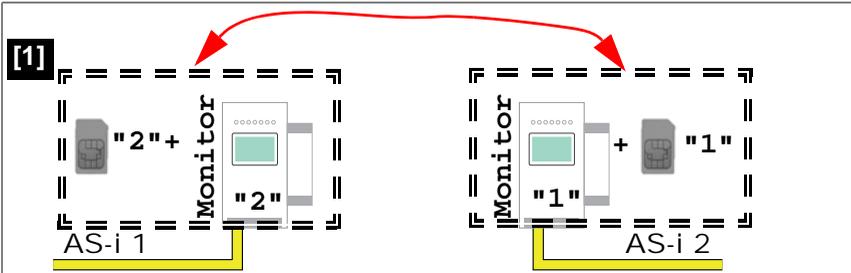
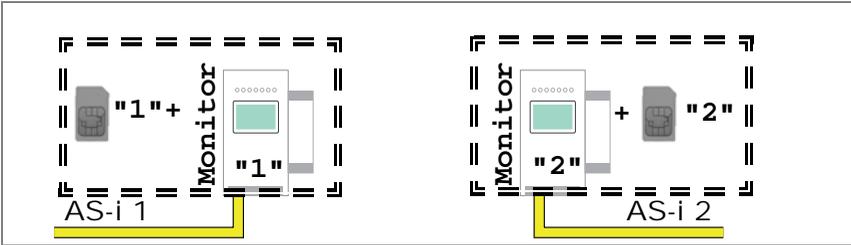


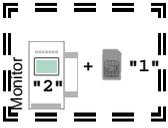


### 7.11.1 Teaching the group manager after replacing a device

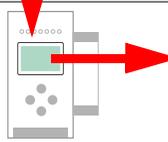


7.12 Replacing the monitor

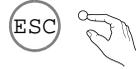




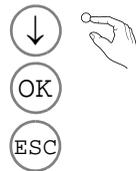
**Safety configuration + AS-i configuration different!**



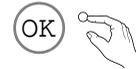
**Error:**  
Chip Card and  
Safety Data  
Different.  
Delete Chip  
Card or Safety  
Data



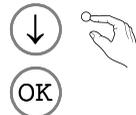
Chipcard and  
AS-i Data  
Different  
Chipcard->Master  
Master->Chipcard  
Continue



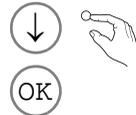
☺Press OK for Menu  
Output Circuit  
1:OFF 2:OFF  
3:OFF 4:OFF

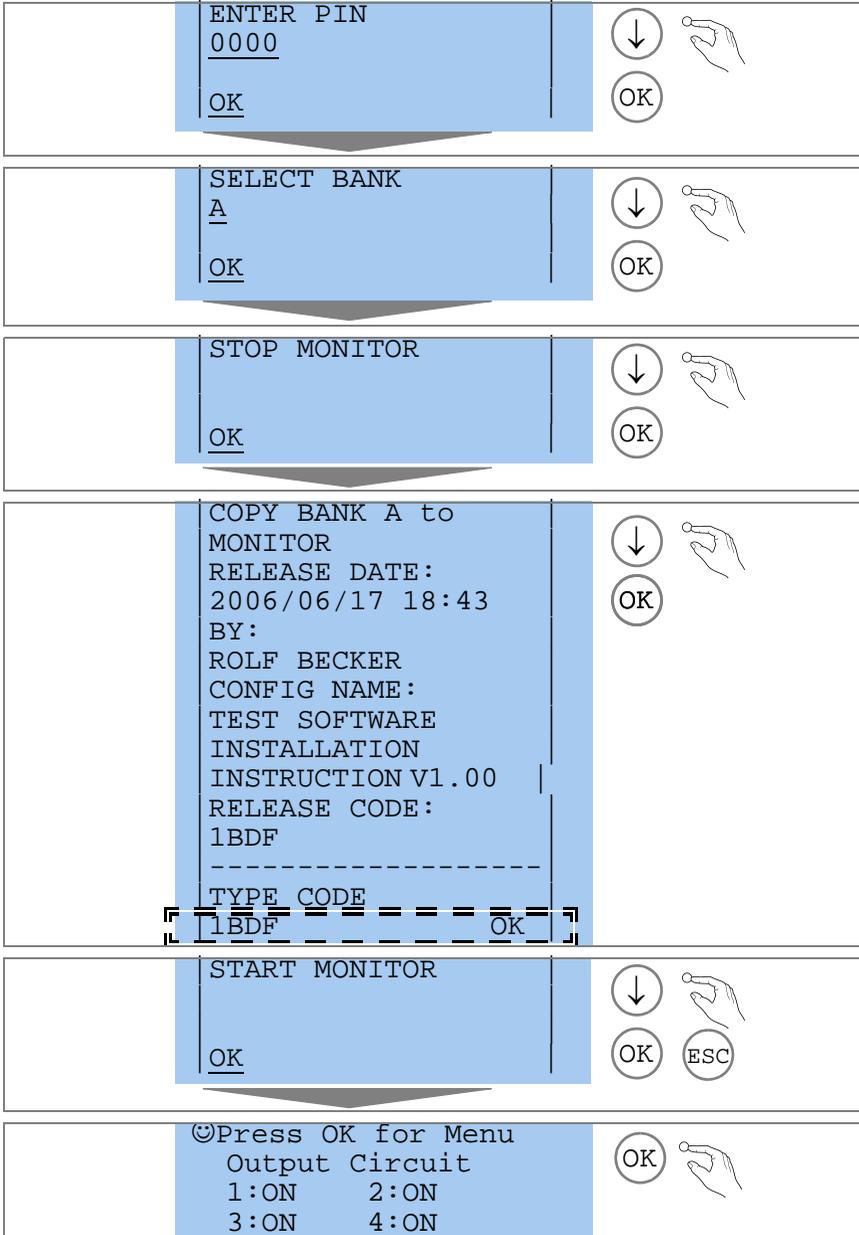


QUICK SETUP  
SAFETY  
DIAGNOSIS  
SLAVE ADR TOOL  
TEST

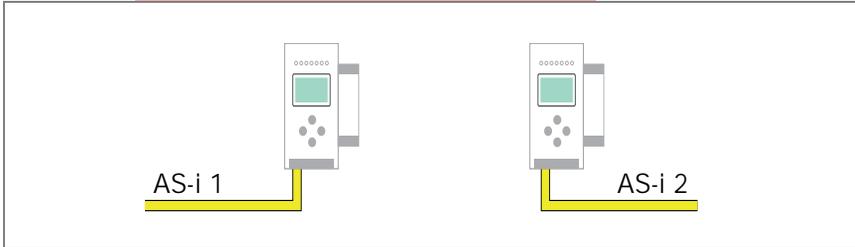


SAFE CHIPCARD  
ACTIVE: BANK A  
VIEW  
CARD -> MONITOR  
MONITOR -> CARD  
CLEAR CODES  
LCD CONTRAST

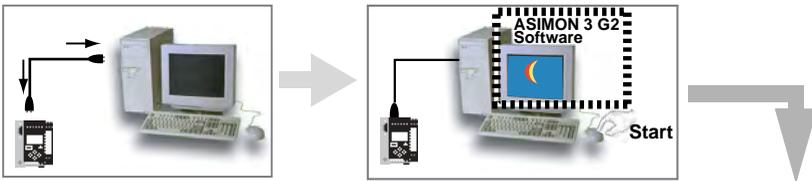




 **Safety configuration + AS-i configuration identic!** 



### 7.13 Safe configuration using ASIMON 3 G2



*Before commissioning the safety unit, put the gateway into operation!*

#### ASIMON 3 G2 Software

Change the preset password during the first use of the device (Monitor/change password!)

#### ASIMON 3 G2 Software

Create the desired configuration.

#### ASIMON 3 G2 Software

Download the configuration with MONITOR / PC-> MONITOR into the device. Enter the password for this purpose.

### ASIMON 3 G2 Software

You can acknowledge the request TEACH CODE SEQUENCES? selecting "Yes", or you can do it later via display selecting "No".



### ASIMON 3 G2 Software

Check the configuration log (respect instructions in <chap. 5.8> of the ASIMON manual!).



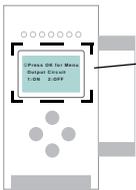
### ASIMON 3 G2 Software

Validate the configuration with MONITOR → VALIDATION.



### ASIMON 3 G2 Software

Start the monitor with MONITOR → START.



The device is in the protected mode now.



*If you have assigned the safety monitor its own address in the software ASIMON 3 G2, adjust the configuration in the AS-i master (Quick Setup)! This is also valid when using simulated slaves.*



*Please consider notes on safety in the software manual ASIMON 3 G2!*

## 8. Maintenance

### 8.1 Checking for safe turn-off

The safety representative is responsible for checking flawless function of the AS-i Safety Monitor within the safety system.

Safe turn-off when an associated safe sensor or switch is triggered must be checked at least once a year.



**Attention!**

*To do this, actuate each safe AS-i slave and observe the switching behavior of the output circuits of the AS-i Safety Monitor.*



**Attention!**

*Note the maximum turn-on duration and the overall turn-on operating duration. These values depend on the PFD value selected (see section <Safety-relevant characteristic data>).*

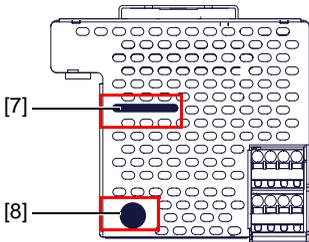
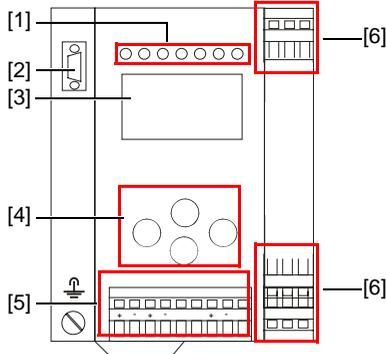
*When the maximum turn-on duration is reached (three, six or twelve months), check the complete safety system and its proper function.*

*When the total operating time (20 years) has been reached, the device must be returned to the manufacturer to check for proper function.*

## 9. Electrical connection

### 9.1 Overview of terminals, indicators and operating elements

#### 9.1.1 VBG-PB-K30-D-S

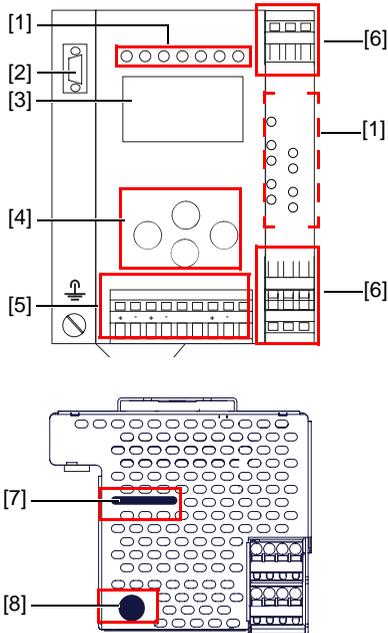


<b>i</b>	
 Ø 5 - 6 mm / PZ2	0,8 Nm 7 LB.IN
	2 x (0,5 ... 1,5) mm <sup>2</sup>
	2 x (0,5 ... 1,5) mm <sup>2</sup>
AWG	2 x 24 ...12

#### Legend:

- [1] LEDs
- [2] D-SUB port (as PROFIBUS interface)
- [3] LC display
- [4] Buttons
- [5] Terminals: Supply voltage and AS-i circuit
- [6] Terminals: Safety unit
- [7] Chip card slot
- [8] RS 232 diagnostics port<sup>1</sup>

9.1.2 VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PBS-K30-DMD



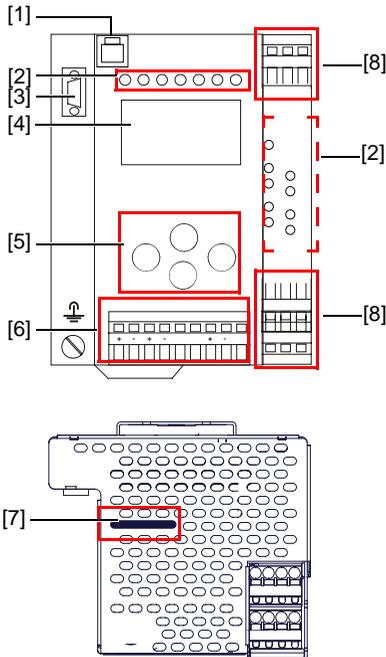
	0,8 Nm 7 LB.IN
	2 x (0,5 ... 1,5) mm <sup>2</sup>
	2 x (0,5 ... 1,5) mm <sup>2</sup>
AWG	2 x 24 ...12

**Legend:**

- [1] LEDs
- [2] D-SUB port (as PROFIBUS interface)
- [3] LC display
- [4] Buttons
- [5] Terminals: Supply voltage and AS-i circuit
- [6] Terminals: Safety unit
- [7] Chip card slot
- [8] RS 232 diagnostics port<sup>2</sup>

2. Only together with ASIMON 3 G2 Software or AS-i Control Tools

9.1.3 VBG-PB-K30-DMD-S16-EV

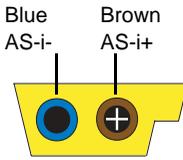


<b>i</b>	
 Ø 5 - 6 mm / PZ2	0,8 Nm 7 LB.IN
 10	2 x (0,5 ... 1,5) mm <sup>2</sup>
 10	2 x (0,5 ... 1,5) mm <sup>2</sup>
AWG	2 x 24 ...12

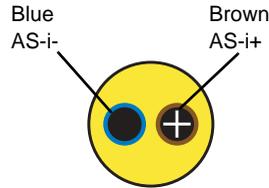
**Legend:**

- [1] Ethernet diagnostic<sup>3</sup> interface
- [2] LEDs
- [3] D-SUB port (as PROFIBUS interface)
- [4] LC display
- [5] Buttons
- [6] Terminals: Supply voltage and AS-i circuit
- [7] Chip card slot
- [8] Terminals: Safety unit

## 9.2 AS-i bus connection



Yellow ASi ribbon cable



2-conductor AS-i round cable  
(Recommended: flexible power cable  
H05VV-F2x1,5 per DIN VDE 0281)



### **Information!**

*Electrical work is to be performed only by electrical technicians.*

## 9.3 Information about the device types



### **Information!**

*A listing of the individual devices and their features can be found in section <Product information>.*

## 9.4 AS-i and power supply terminal assignments



### **Information!**

*The cable indicated by grey must not have slaves or repeaters connected to it.*

*The yellow cable must not have AS-i power suppliers or additional masters connected to it.*



### **Information!**

*The function ground can be connected either to the grounding screw or to the terminal. The function ground should be made with as short a cable as possible to ensure good EMC characteristics.*

*Therefore function grounding using the grounding screw is preferred.*



### **Attention!**

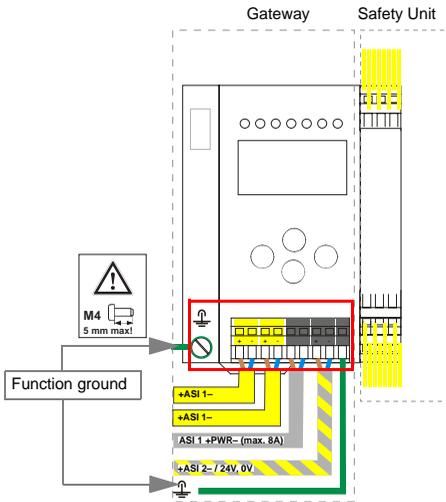
*The AS-I power supply for the AS-I components must have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The power supply for the 24 V supply must also have isolation per IEC 60 742 and be able to handle momentary power interruptions of up to 20 ms. The maximum output voltage of the power supply must also be less than 42 V in case of a fault.*



### **+AS-i 2– (Connection to 2nd AS-i Circuit)**

*More information about the additional slave circuit can be found in section <Safe coupling slaves on the AS-i circuits>.*

9.4.1 Electrical connection VBG-PB-K30-D-S16, VBG-PB-K30-D-S



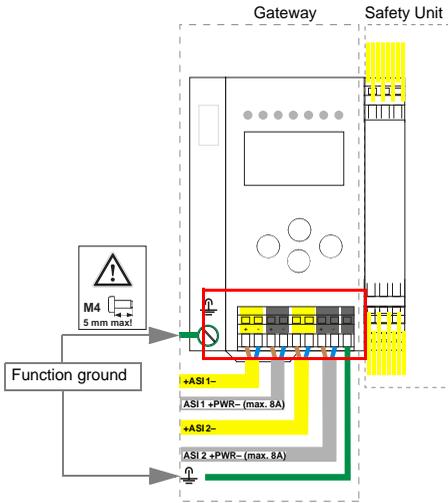
Terminal	Signal / Description
+ASI 1-	Connection to AS-i Circuit 1
ASI 1 +PWR-	Supply voltage for AS-i Circuit 1 (max. 8 A)
+ASI 2 - / 24 V, 0 V	Connection to AS-i Circuit 2; 24 V supply optional
FG	Function ground



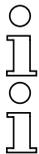
**Information!**

For additional information, please refer to the section <AS-i and power supply terminal assignments>.

9.4.2 Electrical connection VBG-PB-K30-DMD-S16, VBG-PBS-K30-DMD



Terminal	Signal / Description
+ASI 1-	Connection to AS-i Circuit 1
+ASI 2-	Connection to AS-i Circuit 2
ASI 1 +PWR-	Supply voltage for AS-i Circuit 1 (max. 8 A)
ASI 2 +PWR-	Supply voltage for AS-i Circuit 2 (max. 8 A)
FG	Function ground



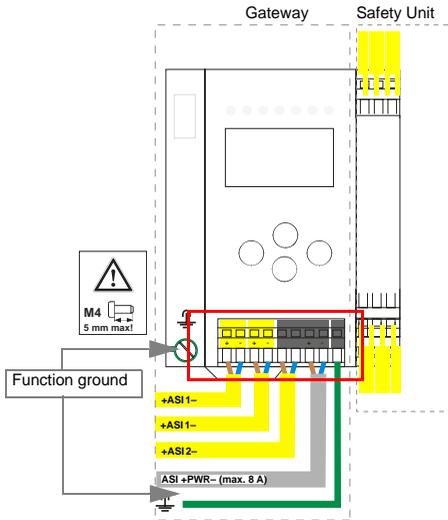
**Information!**

AS-i Circuits 1 and 2 are powered by separate power supplies.

**Information!**

For additional information, please refer to the section <AS-i and power supply terminal assignments>.

9.4.3 Electrical connection VBG-PB-K30-DMD-S16-EV



Terminal	Signal / Description
+ASI 1-	Connection to AS-i Circuit 1
+AS-i 2-	Connection to AS-i Circuit 2
ASI +PWR-	Supply voltage for AS-i Circuits (max. 8 A)
FG	Function ground



**Information!**

AS-i Circuit 1 and 2 are both powered from a Pepperl+Fuchs GmbH power supply!  
No other power supplies are approved!



**Information!**

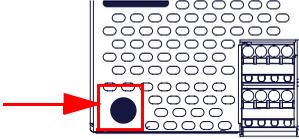
For additional information, please refer to the section <AS-i and power supply terminal assignments>.

## 9.5 Diagnostics interface

The service and diagnostics interface (in conjunction with **AS-i Control Tools** or **ASIMON 3 G2** software) is used for communication between the PC and the unit.

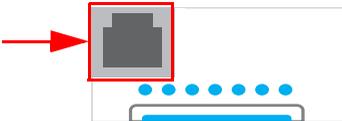
### 9.5.1 VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PB-K30-D-S, VBG-PBS-K30-DMD

The service and diagnostics interface is configured as a mini DIN-6 female and it is placed on the front plate, on the left hand side.



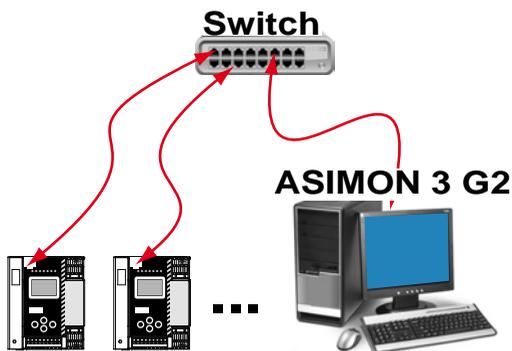
### 9.5.2 VBG-PB-K30-DMD-S16-EV

The service and diagnostics interface in these devices is as RJ45 female configured and it is placed on the front plate, on the left hand side.



### 9.5.3 SafeLink over ethernet (VBG-PB-K30-DMD-S16-EV)

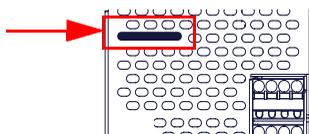
The device supports SafeLink via Ethernet. In order to establish a safe coupling between several devices, they should be connected via the ethernet diagnostics interface to a switch.



#### **Information!**

Please refer here to the information in the section <SafeLink>.

### 9.6 Chip card



The configuration is stored in a fixed installed EEPROM and can be overwritten by the chip card. The chip card does not have to be inserted in operation.

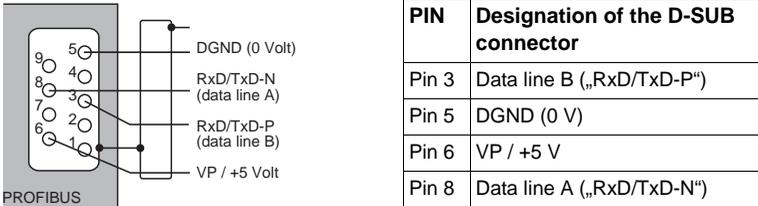


#### **Warning!**

Power must always be turned off when removing or inserting the chip card!

### 9.7 PROFIBUS interface

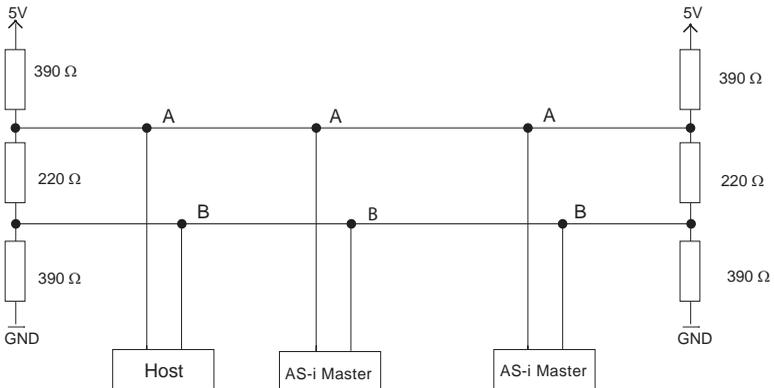
The PROFIBUS interface is designed as a 9-pin D-SUB connector, in accordance with the PROFIBUS standard EN 50 170. It is located at the top left-hand side of the master.



The AS-i/PROFIBUS gateway sends and receives signals on pins 3 and 8 of the D-SUB connector. The PROFIBUS signal “RxD/TxD-N (data line A)”<sup>4</sup> is located on pin 8, the signal “RxD/TxD-P (data line B)”<sup>1</sup> is located on pin 3.

Pin 5 (0 V) and pin 6 (5 V) supply 5 V DC for the bus termination resistor.

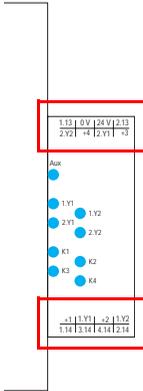
#### 9.7.1 Terminating resistors on the PROFIBUS network



4. If you measure the DC voltage between RxD/TxD-P (data line B) and RxD/TxD-N (data line A), RxD/TxD-P (data line B) is the positive pole when the bus is silent.

**9.8 Release circuits**

**9.8.1 Wiring overview of safety unit  
VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PBS-K30-DMD, VBG-PB-K30-DMD-S16-EV**



**1.Y1 (EDM 1/Start 1), 2.Y1 (EDM 2/Start 2), 1.Y2 (EDM 3/Start 3), 2.Y2 (EDM 4/Start 4)**

The safety unit provides 4 inputs. The EDM & START inputs can be defined freely. The inputs may not be connected to other potentials, but rather only directly or through potential-free switches to + (for EDM/START).  
Switching current static 4 mA at 24 V, dynamic 30 mA at 24 V (T=100 µs).

**3.14, 4.14**

Semiconductor outputs. Max. contact load: 0.5 A DC-13 at 30 V.

**1.13, 1.14; 2.13, 2.14**

Potential-free relay contacts. Safety relay with one contact set for read-back. Max. contact load: 3 A AC-15 at 30 V, 3 A DC-13 at 30 V.

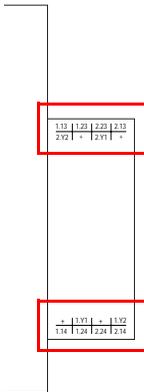
**0 V, 24 V**

Semiconductor outputs are powered by separate 24 V DC.

**+1, +2, +3, +4 (for EDM/Start)**

Output supply, powered by AS-i. May not be connected to other potentials, but rather only directly or through potential-free switches to one of the EDM or START inputs. Voltage 30 ... 15 V<sub>DC</sub>.

### 9.8.2 Wiring overview of safety unit VBG-PB-K30-D-S



#### **1.Y1 (EDM 1), 1.Y2 (Start 1), 2.Y1 (EDM 2), 2.Y2 (Start 2)**

The safety unit provides 4 inputs. The EDM & START inputs can be defined freely. The inputs may not be connected to other potentials, but rather only directly or through potential-free switches to + (for EDM/START).  
Switching current static 4 mA at 24 V, dynamic 30 mA at 24 V (T=100 µs).

#### **1.13, 1.14, 1.23, 1.24; 2.13, 2.14, 2.23, 2.24**

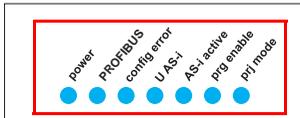
Potential-free relay contacts. Safety relay with one contact set for read-back.  
Max. contact load: 3 A AC-15 bei 30 V, 3 A DC-13 bei 30 V.

#### **+ (for EDM/Start)**

Output supply, powered by AS-i. May not be connected to other potentials, but rather only directly or through potential-free switches to one of the EDM or START inputs. Voltage 30 ... 15 V<sub>DC</sub>.

## 9.9 Indicators and operating elements

### 9.9.1 LED indicators – master



The LED's on the front panel of the device indicate:

#### Power

The master is receiving sufficient power.

#### PROFIBUS

LED an: Gateway is allocated to a PROFIBUS Master.

LED aus: Gateway is not allocated to a PROFIBUS Master.

#### config error

Configuration error.

At least one configured slave is missing, or at least one detected slave is not configured, or for at least one configured and detected slave the actual configuration data does not match the nominal configuration data, or the master is in the startup process.

This LED flashes if a peripheral fault has been detected for at least one AS-i slave on the AS-i network. If there are configuration errors as well as periphery faults, only the configuration error is displayed.

#### U AS-i

The AS-i network is sufficiently powered.

#### AS-i active

Normal operation is active

#### prg enable

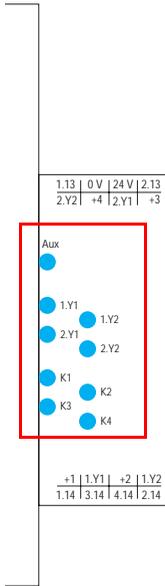
Automatic single node replacement is enabled.

Exactly one slave is missing in the protected operating mode. The slave can be replaced by another slave of the same type with address zero. The master automatically addresses the new slave to the faulty address and thus corrects the configuration error

#### prj mode

The AS-i master is in configuration mode.

**9.9.2 LED indicators - safety unit**  
**VBG-PB-K30-DMD-S16, VBG-PB-K30-D-S16, VBG-PBS-K30-DMD, VBG-PB-K30-DMD-S16-EV**



The LED's on the safety unit indicate:

<b>Aux</b>
24 V supply for the semiconductor outputs is present.
<b>1Y.1, 1Y2, 2Y.1, 2Y.2</b>
Input 1.Y1 (EDM 1/Start 1), 2.Y1 (EDM 2/Start 2), 1.Y2 (EDM 3/Start 3), 2.Y2 (EDM 4/Start 4) is turned on.
<b>K1, K2</b>
Contact sets 1.13, 1.14 (K1) resp. 2.13, 2.14 (K2) closed.
<b>K3, K4</b>
semiconductor output 3.14 (K3) resp.4.14 (K4) is turned on.



**Information!**

If there is no auxiliary voltage connection available, LEDs are turned off, even if the corresponding release circuit is turned on.

**9.9.3 LED indicators – safety unit VBG-PB-K30-D-S**

The safety unit does not have any LEDs.

#### 9.9.4 Buttons

The buttons are used for the following:

##### **Mode/↑**

Switching between configuration mode and protected operating mode, and saving the current AS-i configuration as the nominal configuration.

##### **Set/↓**

Selecting the address of and assigning an address to a slave.

##### **OK**

Change to extended mode.

##### **ESC/Service**

For teaching the code table for a new safe slave, when exactly one safe slave is being replaced, and for unlocking the Safety Monitor. This button is also used to exit extended mode.

For additional information see:

- <Section <Function of the ESC/Service key>
- <Section <Replacing a defective safety-configured AS-i slave>
- <Section <Operation in advanced display mode>.

## 10. Function and startup of the Safety Monitor

Configuration and startup of the AS-i Safety Monitor is accomplished using a PC/ Notebook and the **ASIMON 3 G2** configuration software.

The operating language of the device can be set for the respective country (see section <Operation in advanced display mode>).



### **Information!**

*The description of the **ASIMON 3 G2** software and startup of the AS-i Safety Monitor can be found in the manual "**ASIMON 3 G2 AS-i Safety Monitor Configuration Software for Microsoft®-Windows®**".*

*The software manual is an important component of the operating manual for the AS-i Safety Monitor. It is not possible to configure and start up the AS-i Safety Monitor without the **ASIMON 3 G2** software.*

Configuration may be performed only by a safety authorized person. All safety-related commands are password protected.

### 10.1 Powering up the device

As soon as supply voltage is present on the device an internal system test is started. This operating state is indicated by lighting of the upper LED row.

### 10.2 Configuration of the safety functions

The device can be configured in several ways:

1. Using **ASIMON 3 G2** software  
The **ASIMON 3 G2** software represents the most universal method of configuring the Safety Monitor. Here the behavior of the Safety Monitor can be determined by linking various monitoring modules. After being sent to the Safety Monitor, this configuration is verified and can then be validated. For additional information, refer to the separate manual for the **ASIMON 3 G2** configuration software.
2. Using a chip card with the master configuration  
Configurations stored on the chip card, which are validated but which do not contain any code sequences, can be sent to the device. The code sequences must then be taught to the corresponding safety AS-i slaves. This procedure is useful when you want to use a safety program in several safety monitors without any changes.



### **Information!**

*For additional information refer to section <Description of configuration using chip card with master configuration>.*

- Using a chip card with complete configuration  
In contrast to the master configuration, the complete configuration also contains the code sequences for all included slaves. Sending the complete configuration from the chip card to the Safety Monitor can make replacement of the device enormously simpler and faster.



**Information!**

*For additional information refer to <Configuration using a chip card with complete configuration>.*

### 10.2.1 Description of configuration using ASIMON 3 G2 software

The following description represents a short guide to configuring the AS-i Safety Monitor. For a detailed description of the **ASIMON 3 G2** software, refer to the corresponding manual for the **ASIMON 3 G2** configuration software.

The **ASIMON 3 G2** software is responsible for the following:

- Configuring the AS-i Safety Monitor
- Documenting the device configuration
- Starting up the AS-i Safety Monitor
- Diagnosing the AS-i Safety Monitor



**Information!**

*The description of the **ASIMON 3 G2** program can be found in the separate software manual.*

Proceed as follows:

- Install the program on your PC.
- Apply power to the AS-i Safety Monitor



**Information!**

*To prevent ESD damage, we recommend grounding at an appropriate location before plugging in the interface cable to the Safety Monitor.*

- Connection of monitors with a RS 232 diagnostics interface
  - To connect, plug the diagnostic cable end with the PS2 connector into the socket of the diagnostic interface (RS 232) of the monitor and the other end with the 9-pin Sub-D socket connector to a free COM port (serial RS232 interface) on your PC (see section "Connection between the AS-i Safety Monitor and the PC" in the software manual).
- Configure the AS-i Safety Monitor and start it up as described in the software manual.



**Attention!**

*Before starting up the device you must adapt the device configuration to your application. This means configuring the AS-i Safety Monitor according to the software manual so that the location to be protected is in fact protected by the device.*

## 10.2.2 Description of configuration using chip card with master configuration

Generating a master configuration:

- Generate a configuration using the **ASIMON 3 G2** software
- Load the configuration into the device
- Release (validate) the configuration, but do not teach the code sequences
- The code sequences will be taught on the physical AS-i circuit



### **Attention!**

*Safety advisory:*

*Ensure that the chip card contains the configuration intended for and released for the application!*

*This can be done by comparing the release codes on the display (section <Operation in advanced display mode>):*

- The safety representative who generated and validated the release code stores the release code for the master configuration and approves use of the configuration for specific equipment.
- The person performing the startup reads out the release code on the display before teaching the code and compares it with the release code stored and approved for the equipment.

*After the chip card has been used to load the configuration into the device, the safety functions of the device must be checked in the equipment.*

*Checking of the release code and testing the system must be documented in writing and is part of the system documentation.*

## 10.2.3 Configuration using a chip card with complete configuration

The chip card contains the complete configuration if:

- An empty chip card is plugged into an AS-i Safety Monitor which already contains a complete configuration, or
- The chip card is already inserted while the configuration is being written into the device using **ASIMON 3 G2** software and before validating the code sequences.

If the AS-i Safety Monitor needs to be replaced, the stored configuration can be transferred by simply plugging the chip card from the old device into the new one.



**Attention!**

*Safety advisory:*

*Power must always be turned off when removing or inserting the chip card!*

*Ensure that the chip card contains the configuration intended for and released for the application!*

*This can be done by comparing the release codes on the display (section <Operation in advanced display mode>):*

- The safety representative who generated and validated the release code stores the release code for the master configuration and approves use of the configuration for specific equipment.
- The person performing the startup reads out the release code on the display before starting the equipment and compares it with the release code stored and approved for the equipment.

*After the chip card has been used to load the configuration into the device, the safety functions of the device must be checked in the equipment.*

*Checking of the release code and testing the system must be documented in writing and is part of the system documentation.*

### 10.3 Safety-relevant documentation of the application



**Information!**

*The detailed description of the safety-relevant documentation of the configuration for your application can be found in the separate software manual.*

Proceed as follows:

- Create the configuration of the AS-i Safety Monitor for your application.
- Validate the configuration (done by the safety supervisor).
- Print out the final configuration protocol and optionally the configuration overview (see Section "Configuration documentation" in the software manual).
- Sign the final configuration protocol (done by the safety supervisor).
- Take the protocol for the safety-relevant documentation for your application (machine documentation) and keep it in a safe place.

### 10.4 Diagnostic data



**Information!**

*A detailed description of the setting for diagnostics mode is described in the section "Setting diagnostics type" in the separate manual "AS-i 3.0 Command Interface".*

Diagnostics data can be obtained in any of 4 ways:

- Display
- PROFIBUS
- **ASIMON 3 G2** software over diagnostic port

- AS-i Control Tools over diagnostic port or PROFIBUS

#### 10.4.1 Diagnostics of release circuits 1-4 via the binary data

If monitor slaves with base address +1 and +2 exist, the state of several OSSDs is transmitted there.

Monitor base address+1 assignment	
Data bit	Content
D0	State of output circuit 1
D1	State of message output 1
D2	State of output circuit 2
D3	State of message output 2

Monitor base address+2 assignment	
Data bit	Content
D0	State of output circuit 3
D1	State of message output 3
D2	State of output circuit 4
D3	State of message output 4

#### 10.4.2 Switch-off history

The switch-off history, accessible from the menu DIAGNOSTICS->INT MONITOR->LAST DIAGNOSTIC, is intended to make reconstruction of the reason for switch-off easier for the user. The states of all safety-relevant AS-i slaves and all devices at the time the state change on the output device (change from green to another color) are stored.



#### **Information!**

Available only with AS-i/PROFIBUS-Gateways.

#### 10.5 Password protection

All safety-related commands are password protected. These include:

- Loading configurations into the Monitor
- Stopping
- Learning code sequences
- Releasing
- Changing the password



#### **Information!**

No new release is necessary if when using safety-configured AS-i slaves code sequences have been newly learned using the ESC/Service key.

### 10.5.1 Procedure for configuring and teaching code sequences

The configuration is created using **ASIMON 3 G2** software, loaded into the safety unit and released. The name of the person releasing and the date are stored at this moment. If code sequences controlled through the display are newly taught, this is secured by a PIN to prevent unintended/unauthorized changing of the code sequences.



**Information!**

For additional information see section <Replacing a defective safety-configured AS-i slave>.

- A PIN is a 4-digit number and can only be changed from the display, not via the **ASIMON 3 G2** software.
- After entering the PIN, the display can be used to start a teaching procedure for the code sequences. The monitor stops immediately after entering the PIN. After teaching, the monitor starts after a prompt and acknowledgement on the display.

Action	ASIMON Software	On AS-i Safety Monitor
Configure and load into Safety Monitor	•	• (only from chip card)
Stopping	•	•
Releasing	•	–
Starting	•	•
Teaching code sequences	•	•
Changing the password	•	• (only from chip card)
Changing the PIN	–	•

Legend:

"•" = possible;

"–" = not possible

Tab. 10-8.

Code sequences for releasing a configuration do not necessarily have to have been successfully learned. It is also possible to release without code sequences, which must then be learned at a later time.

Teaching the code sequences is simple to perform:

- Using the ESC/Service key (See section <Replacing a defective safety-configured AS-i slave>)

or

- Using the display (See section <Operation in advanced display mode>).

### 10.5.2 Function of the ESC/Service key

In traditional (classical) display mode, the ESC/Service key takes on two kinds of functions:

- Briefly pressing the ESC/Service key unlocks the Safety Monitor when red is flashing
- A longer press (3s) starts the teach procedure for a slave.



#### **Information!**

For additional information see section <Replacing a defective safety-configured AS-i slave>.

### 10.6 Safe coupling slaves on the AS-i circuits

The two AS-i circuits are capable of emulating a total of up to sixteen safe coupling slaves.

The assignment of the coupling slaves addresses to the release circuits is made using the ASIMON software.

### 10.7 Chip card

The chip card is divided into two areas. One area is reserved for unsafe data and administration, the other for safe data.



#### **Warning!**

Always turn off power before inserting or removing the card.

#### 10.7.1 Unsafe data

This section describes the system behavior of the unsafe system section when using the chip card.

##### 10.7.1.1 Card unformatted

If an unformatted card is found when the device is started, the following is displayed:

```
NEW CHIPCARD  
WILL BE FORMATED  
AS-I DATA WILL  
BE SYNCHRONIZED
```

The chip card is formatted and then the data copied to the chip card.

#### 10.7.1.2 Data not compatible

If a card is found whose data are incompatible with the device, the following error message is displayed:

```
CHIPCARD NOT  
COMPATIBLE
```

#### 10.7.1.3 Card empty

The following message is displayed for an empty card:

```
CHIPCARD FOUND  
AS-I DATA WILL  
BE SYNCHRONIZED
```

From this time on all changes are made both in the device and on the chip card.

#### 10.7.1.4 Data compatible

When starting with an empty device (e.g. after a factory reset) a non-empty card is found whose data are compatible with the device, the following message is displayed:

```
AS-I DATA FROM  
CHIPCARD TAKEN
```

The card configuration is written to the device. From this time on all changes are made both in the device and on the chip card.

#### 10.7.1.5 Data in the device and on the chip card identical

If the card and device are not empty at start and the data are identical, no message is displayed.

### 10.7.1.6 Data in the device and on the chip card not identical

If the card and device are not empty at start and the data are not identical, an error message is displayed and the card is not synchronized with the device. The following menu is then automatically opened:

```
CHIPCARD AND  
AS-I DATA  
DIFFERENT  
CARD->MASTER  
MASTER->CARD  
CONTINUE
```

#### Description

CHIP CARD>MASTER: Chip card data are copied to the master

MASTER->CHIPCARD: Master data are copied to the chip card

NEXT: No change to the data

The menu can be exited by pressing the ESC/Service key without changing the data.

### 10.7.2 Safe data

This section describes the system behavior of the safe unit when using the chip card.

In general the safe part of the chip card has 4 memory banks (A...D). A bank is referred to as an active bank. Unless otherwise stated, the operations described in the following are always performed on the active bank.

#### 10.7.2.1 Data incompatible

If a card with incompatible data is found, the following error message is output:

```
CHIPCARD NOT  
COMPATIBLE
```

### 10.7.2.2 Data compatible

If a card with an empty active memory bank is found, the safety configuration including code sequences is written to the card and in future all changes are made in the card and in the device at the same time. The following message is displayed on the device:

```
CHIPCARD FOUND.  
SAFETY DATA WILL  
BE SYNCHRONIZED
```

### 10.7.2.3 Complete configuration

If when starting with an empty device a card with a released safety configuration including code sequences is found (Complete safety configuration) in the active memory bank, this configuration is written to the device, then the menu for releasing using Release Code is opened:

```
COPY BANK A  
TO MONITOR  
RELEASE DATE:  
2006/06/17 18:43  
BY: ROLF BECKER  
CONFIG NAME:  
L3040 MIT LADEVO  
RRICHTUNG LINKU  
ND PALETTENWECHS  
LER V1.23  
RELEASE CODE: 1BDF  
- - - - -  
- - - - -  
TYPE CODE  
0000  
OK
```

If the active bank contains a Complete Configuration and if the data in the active bank on the memory card and the data in the device are identical (e.g. both empty), in future all changes are made in the card and in the device at the same time.

### 10.7.2.4 Data on the chip card and in the device are identical

If the card and device are not empty at start and the data are identical, no message is displayed.

### 10.7.2.5 Data not identical

If the active bank on the memory card and in the device are not empty at start and the data are not identical, the following message is displayed:

```
ERROR .  
CHIPCARD AND  
SAFETY DATA  
DIFFERENT .  
DELETE CHIPCARD  
OR SAFETY DATA
```

The safety unit will not operate in this case. You must either clear the device or the active bank via menu.

### 10.7.2.6 Operating the chip card from the menu

The data on the chip card can, as described in section <SAFE CHIPCARD>, be exchanged between the Monitor and the chip card. Note however the following:

In order to store a configuration on the chip card as a master configuration (i.e. without code sequences), proceed as follows:

- Write the released configuration into the Monitor without code sequences.
- Copy the configuration into a memory bank using the menu.

For additional information, see section <CARD →MONITOR (copy card data to the Monitor)>.

To convert a master configuration on the memory card to a Complete Configuration, this configuration must be overwritten by a Complete Configuration.

This is done as follows:

- Copy the card data to the Monitor.
- Teach the code sequences
- Write the data from the Monitor to the card.

### 10.7.3 Working with multiple memory banks

The chip card has four memory banks, each of which may contain a configuration (Complete or Master configuration). One of the banks is the active bank.

The AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor always independently utilizes the active bank. Menu commands can however be used to copy the other memory banks to the AS-i Safety Monitor.

The corresponding memory bank thereby becomes the active bank.

If configurations from another memory bank are copied, a few safety rules need to be followed:



**Attention!**

*Safety advisory:*

*Ensure that the configuration intended for and released for the application is used!*

*This can be done by comparing the release codes on the display (See section <MONITOR CONFIG>):*

- The safety representative who generated and validated the configuration stores the release code for the configuration (Complete or Master) stores the release code for the configuration and approves use of the configuration for specific equipment.
- The person performing the startup reads out the release code on the display before starting the equipment or before teaching the code sequences in the case of master configurations and compares it with the release code released for the equipment.

*After the chip card has been used to load the configuration into the device, the safety functions of the device must be checked in the equipment.*

*Checking of the release code and testing the system must be documented in writing and is part of the system documentation.*

## 11. Operation in advanced display mode



**Information!**

*You will find a description of the display menu in the separate document "Display\_Menu".*

## 12. Advanced Diagnostics for AS-i Masters

The advanced AS-i diagnostics is intended to localize occasionally occurring configuration errors and to determine the quality of data transmission on AS-i without using additional diagnostics tools.

AS-i Control Tools, a MS-Windows software designed to simplify AS-i installation and used to program AS-i Control, enables operation of the advanced diagnostics functions (LCS, error counters, and LOS).

### 12.1 List of corrupted AS-i Slaves (LCS)

The LCS contains the information from the Delta list. In addition to the list of configured slaves (LPS), the list of detected slaves (LDS), and the list of activated slaves (LAS), the AS-i master creates a fourth list, the list of corrupted slaves (LCS) containing advanced diagnostics data used to diagnose the causes for intermittently occurring configuration errors on AS-i. This list contains entries for all AS-i slaves that were responsible for at least one intermittent configuration error since the list was last read or since the AS-i master was turned on. Furthermore, intermittent AS-i power failures are listed in the LCS at the position of AS-i slave with address 0.



#### **Information!**

*Whenever the LCS is read it is deleted from memory.*



#### **Information!**

*The last intermittent configuration error can also be displayed on the AS-i master:*

*Pressing the "Set" button on the AS-i master initiates the display of the AS-i slave responsible for the last intermittent configuration error. If a intermittent AS-i power failure occurred, the display shows 39 after pressing the "Set" button.*

*This function is only available if the device is in normal operating mode of the protected mode (display empty) or in the off-line phase (Display: "40").*

### 12.2 Protocol analysis: Counters for corrupted data telegrams

The AS-i master with advanced diagnostics provides a counter for telegram repetitions for each AS-i slave. The counter counts up every time a corrupted data telegram has been found, making it possible to determine the quality of the transmission if only a few telegrams are corrupt and the AS-i slave never caused a configuration error.



#### **Information!**

*The counter values are read via the host interface and will be deleted after they were read.*

*The highest possible counter value is 254. 255 indicates a counter overflow.*

Displaying the protocol analysis is possible through the AS-i Control Tools software by using the command "Master | AS-i Diagnostics".

## 12.3 Offline Phase for Configuration Errors

The AS-i masters with advanced diagnostics offer the possibility to set themselves into the offline phase when a configuration error occurs and thus are able to transition the AS-i network into a safe operational state. This ensures a quick reaction to a configuration error and the host can be relieved from this task. If any problems occur on the AS-i network, the AS-i masters can independently switch the AS-interface into a safe state.

There are two different ways to parameterize the AS-i master for this feature:

- Any configuration error occurring on AS-i switches the master from regular operation in protected mode into the offline phase.
- o . A list with the addresses of slaves that can potential initiate the off-line phase is defined (list of offline slaves LOS).

The user can decide how the system should react to a configuration error on AS-i. Thus, the AS-i master can be set to the offline phase for critical AS-i slaves, whereas for less critical slaves only the error message is sent to the host, but AS-i is still running.

Like the advanced diagnostics, the parameterization "offline phase on configuration error" is also supported by "AS-i-Control-Tools" (Command | Characteristics | Offline because of configuration error).

There are two options to reset the error message "OFFLINE BY LOS":

1. Deleting the complete LOS list on the affected AS-i network ("CLEAR ALL").
2. Power reset on the affected AS-i network.



### **Attention!**

*If a power reset occurs on the AS-i network 1 the complete double gateway will be shut down.*

## 12.4 Functions of the AS-i Fault Detector

### 12.4.1 Duplicate address detection

If two slaves on an AS-i network have the same address, a duplicate address exists. Since the master cannot communicate individually with these slaves any longer, this is considered an error. Because the two slave replies interfere, it is impossible for the master to recognize the slave responses. This results in extremely unstable network behavior.

The duplicate address detection function is used to safely recognize a duplicate address and to display it on the screen and in AS-i Control Tools.

A duplicate address causes a configuration error and is displayed on the screen.



### **Information!**

*Duplicate addresses can be recognized only on an AS-i segment directly connected to the master.*

#### 12.4.2 Earth/Ground Fault Detector

An Earth/Ground Fault exists when the voltage  $U_{\text{GND}}$  (Nominal value of  $U_{\text{GND}}=0,5 U_{\text{AS-i}}$ ) is outside of the following range:

$$10\% U_{\text{AS-i}} \leq U_{\text{GND}} \leq 90\% U_{\text{AS-i}}$$

This error substantially limits the noise immunity of the AS-i communication.

Ground faults are indicated on the master's display as well as in AS-i Control Tools.



##### **Information!**

*To recognize ground faults the master must be grounded with its machine ground connection.*



##### **Information!**

*A ground fault in one of the two networks of a double master in a version 1 power supply for two AS-i networks causes a ground fault in the other network as well because of the the existing galvanic connection.*

#### 12.4.3 Noise Detector

The noise detector detects AC voltages on AS-i, that are not initiated by an AS-i master or AS-i slaves. These interference voltages can cause telegram disturbances.

A frequent cause are insufficiently shielded frequency inverters or improperly routed cables.

Noises is indicated on the master's display as well as in AS-i Control Tools.

#### 12.4.4 Over-voltage Detector

Over-voltages are present if the conductors of an AS-i network that normally are routed electrically symmetrical with respect to machine ground, are strongly electrically raised. A cause can for example be startup procedures of large consumers.

However, over-voltages do generally not interfere with the AS-i communication, but can under certain circumstances cause incorrect sensor signals.

Over-voltages are indicated on the master's display as well as in the AS-i Control Tools.

## 12.5 Functions of the new generation of AS-i Gateways

The new generation scores with further optimized diagnostics, several additional functions and even greater operating convenience.



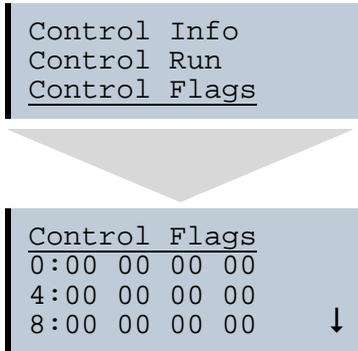
### Information!

A listing of the individual devices and their features can be found in section <New Generation of AS-i Gateways with ethernet diagnostics interface>.

### 12.5.1 C-programmable Gateways

Main menu || SETUP || AS-I CONTROL || CONTROL FLAGS ||

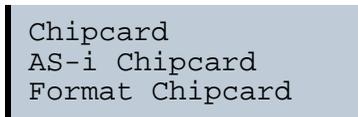
The devices programmed in C are able themselves to take over a great number of control tasks. In smaller systems the user will even be able to do without a PLC altogether: if desired the C program can function as a full mini-PLC. In more complex applications the C-programmable Gateways make the work of the PLC easier - for example by pre-processing special functions.



### 12.5.2 Interchangeable memory card

Main menu || SETUP || CHIPCARD || AS-I CHIPCARD ||

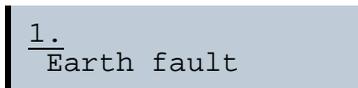
Interchangeable memory card: redundant memory for C program and device configuration.



### 12.5.3 Earth fault monitor

Main menu || DIAGNOSE || ASI WATCHDOG ||

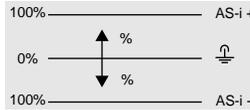
The new earth fault monitor allows the service technician to detect whether an earth fault has occurred directly on AS-i



or on a sensor line.

```
1.
Earth fault sen.
```

The menu **EFLT Ratio** shows the asymmetry of the AS-i network, referenced to ground (see sketch).



```
EFLT Ratio: ↑
AS-i+ 2%
AS-i DC Voltage: 1
31,3V
$
```

```
EFLT Ratio: ↑
AS-i+ 100%
AS-i DC Voltage: 2
31,5V
```

#### 12.5.4 Current can be read directly on the unit

Now the devices display both the maximum current and the current actually present in the respective AS-i circuit. Heavy consumers or a strong overload in an AS-i circuit are then easy to detect. Plus you can set the maximum current in the AS-i circuit on these devices. This ensures line protection even when using large 24V power supplies.

```
AS-i power
Reset
Maximal: 2
1,3A ↓
```

```
Maximal:      ↑
  1,3A
current:     2
  0,3A      ↓
```

```
Current:      ↑
  0,3A
Current limiting 2
  3,2A      ↓
```

### 12.5.5 Self-resetting fuses

Main menu || SETUP || CURRENT LIMIT ||

Thanks to self-resetting fuses in the "1 Gateway, 1 power supply for 2 AS-i circuits" Gateway version, when there is a short circuit in one of the two AS-i circuits the other circuit and the Gateway remain operational - the host controller keeps receiving diagnostic information from AS-i, which also provides meaningful assistance towards rapid troubleshooting.

The fuse resets itself periodically to check if the error is solved. The measured current value is available as diagnostic information at the field on the display and at the control level.

```
Current limiting
  3,2A
  2
```

### 12.5.6 AS-i Power24V capable

Main menu || SETUP || ASI POWER ||

Gateways for AS-i Power24V have been developed especially for use in small systems. They don't need any special AS-i power supply. With a standard 24V power supply a 50 m line length and with an AS-i power supply min. 100 m line length can be realised.

```
AS-i Power
24V geerdet
change
```

```
AS-i Power  
AS-i PWR Supply  
change
```

**12.5.7 Ethernet diagnostics interface with web server**

These devices allow diagnostics for both the Gateway and the AS-i networks (including Safety technology) over Ethernet without additional software. AS-i network can be thus a part of a remote maintenance concept. Moreover the configuration file are stored on the web server and so they are always within reach.

**12.5.8 Transitionless operating mode changes**

Main menu || SETUP || **MODE CHANGE** ||

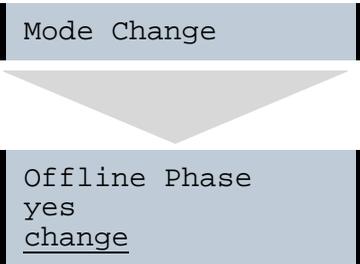
These devices are able to change the operating mode from projecting mode to the protected operating mode without having to first go to the "offline phase".

This means the Slave outputs are not cleared and the safe Slaves not turned off.

Activation and deactivation is set using the PROFIBUS start parameterization.

This function must be explicitly activated; the default setting is "Deactivated."

The setting for activated and deactivated is saved, which means that it remains set after a "power cycle".



### 13. PROFIBUS DP

This chapter contains all necessary information to operate the AS-i/PROFIBUS gateways as part of a PROFIBUS DP network.

#### 13.1 DP telegrams

##### 13.1.1 Diagnostics

###### DP diagnostics

Byte	description
1	station state 1
2	station state 2
3	station state 3
4	Master address
5	ident high
6	ident low

Tab. 13-9.

The following blocks may be optionally appended to the DP diagnostics. Bytes 1 ... 4 are sent in each block according to the PROFIBUS standard.

Only when double masters are used is the entry „circuit 2“ available in the AS-i flags, delta list and LPF.

###### AS-i flags

Byte	description
1	0x06 header
2	0xA0 (circuit 1)/0xA1 (circuit 2) type
3	0x00 slot
4	0x00 spec
5	EC flags (high)
6	EC flags (low)

Tab. 13-10.

###### Delta list

Byte	description
1	0x0C header
2	0xA2 (circuit 1)/0xA3 (circuit 2) type

Tab. 13-11.

2.5.2013

**Delta list**

Byte	description
3	0x00 slot
4	0x00 spec
5	delta (0 ... 7)
6	delta (8 ... 15)
...	...
12	delta (56 ... 63)

Tab. 13-11.

**LPF**

Byte	description
1	0x0C header
2	0xA4 (circuit 1)/0xA5 (circuit 2) type
3	0x00 slot
4	0x00 spec
5	LPF (0 ... 7)
6	LPF (8 ... 15)
...	...
12	LPF (56 ... 63)

Tab. 13-12.

**Safety Single Slaves/Safety Slaves A**

Byte	description
1	0x0C header
2	0xA8 (circuit 1)/0xA9 (circuit 2) type
3	0x00 slot
4	0x00 spec
5	yellow flashing (0 ... 7)
6	yellow flashing (8 ... 15)
7	yellow flashing (16 ... 23)
8	yellow flashing (24 ... 31)
9	red flashing (0 ... 7)

Tab. 13-13.

**Safety Single Slaves/Safety Slaves A**

Byte	description
10	red flashing (8 ... 15)
11	red flashing (16 ... 23)
12	red flashing (24 ... 31)

Tab. 13-13.

**Safety Slaves B**

Byte	description
1	0x0C header
2	0xAA (circuit 1)/0xAB (circuit 2) type
3	0x00 slot
4	0x00 spec
5	yellow flashing (0 ... 7)
6	yellow flashing (8 ... 15)
7	yellow flashing (16 ... 23)
8	yellow flashing (24 ... 31)
9	red flashing (0 ... 7)
10	red flashing (8 ... 15)
11	red flashing (16 ... 23)
12	red flashing (24 ... 31)

Tab. 13-14.

**Description of the safety slave list:**

- yellow flashing: safety slaves whose device is in state "yellow flashing".
- red flashing: safety slaves whose device is in state "red flashing".
- im byte 5 bit 0: 1=safety monitor has stopped, device color is not valid.
- im byte 9 bit 0: 1=no connection to safety monitor, device color is not valid.

**PROFIsafe diagnostics**

Byte	Description
1	0x06 Header
2	0xAC
3	0x00 Slot
4	0x00 Spec
5	<b>Diagnostic value</b>
	0x00 No error
	0x40 Conflict at the destination address. The PROFIsafe destination address in the parameters does not match to the destination address configured in the device.
	0x41 Invalid destination address (0 or 65535)
	0x42 Invalid source address (0 or 65535)
	0x43 Invalid watchdog time
	0x44 SIL value too high. The SIL value in the PROFIsafe parameters beyond the capabilities of the device.
	0x45 Invalid length of the CRC2 (based on the PROFIsafe version)
	0x46 Invalid PROFIsafe version. The PROFIsafe version in the PROFIsafe parameters is not supported by the device.
	0x47 CRC1 error. The CRC over the PROFIsafe parameters does not match.
	0x48 Invalid PROFIsafe parameter
	0x49-0x4A Reserved
	0x4B The IPAR CRC does not match to the release-code of the monitor configuration.

Tab. 13-15.



**Information!**

Available only with AS-i/PROFIsafe Gateways.

**EC-flags (high) and AS-i watchdog:**

- bit 0: periphery fault
- bit 1: ...
- bit 2: failure redundant 24 V AUX (option safety monitor)
- bit 3: failure redundant 24 V AUX (option single master)
- bit 4: earth fault
- bit 5: over voltage
- bit 6: noise
- bit 7: duplicate address

**EC-flags (low):**

- bit 0: configuration error
- bit 1: slave with address '0' detected
- bit 2: auto\_address\_assignment *not* possible
- bit 3: auto\_address\_assignment available
- bit 4: configuration mode active
- bit 5: *not* in normal operation
- bit 6: AS-i power fail
- bit 7: AS-i master offline

**Delta list:** List of AS-i slaves with configuration error

- 1: ConfigError
- 0: no ConfigError

**LPF:** List of AS-i slaves with periphery fault

- 1: periphery fault
- 0: no periphery fault

Each element of the user diagnostics (ec-flags and slave lists) can be switched off by setting the appropriate bit in the parameter telegram.

ExtDiag will be set if at least one of the following conditions is fulfilled:

- ConfigError  $\equiv$  1
- APF  $\equiv$  1
- PeripheryFault  $\equiv$  1

The conditions when to set the ExtDiag bit can be chosen using the user parameters or the commands of the command interface.

The GSD file includes the following presettings:

- The diagnosis transmits ec-flags, delta list and LPF.
- ExtDiag will be set if ConfigError = 1 and APF = 1. ExtDiag will not be set if there is a periphery fault.

### 13.1.1.1 Parameters

By selecting the appropriate parameters in the GSD file, the user can choose if and which slave list is transmitted as part of the diagnostics. Furthermore, it can be selected for which event ExtDiag is to be set in the diagnostics telegram.

### 13.1.2 Configuration DP/V0 (cyclic data)

The configuration of the AS-i/PROFIBUS gateways is set up by using the GSD file. Therefore it is necessary to import the provided GSD file into the PROFIBUS configuration tool.

#### 13.1.2.1 Options

The input and output data field can be used with different "Special IDs".

The advantages of special input and output IDs are that they can include up to 64 elements (bytes or words), and that the length of input and output data is variable. Additionally, "manufacturer specific" data bytes can be set that define the ID type.

The GSD file offers several combinations (several lengths) for transmitting I / O data, the command interface, as well as AS-i 16 bit data. This allows them to be transmitted directly as part of the process data channel and they do not have to be requested through slower DP/V1 commands.

Up to 30 modules can be configured

Possible options:

Length <sup>1</sup>	description
4 byte I	digital input (slave 0 - 7)
8 byte I	digital input (slave 0 - 15)
12 byte I	digital input (slave 0 - 23)
16 byte I	digital input (slave 0 - 31)
20 byte I	digital input (slave 0 - 7b)
24 byte I	digital input (slave 0 - 15B)
28 byte I	digital input (slave 0 - 23B)
32 byte I	digital input (slave 0 - 31B)

Tab. 13-16.

1.Possible for 2 circuits

Length <sup>1</sup>	description
4 byte O	digital output (slave 0 - 7)
8 byte O	digital output (slave 0 - 15)

Tab. 13-17.

Length <sup>1</sup>	description
12 byte O	digital output (slave 0 - 23)
16 byte O	digital output (slave 0 - 31)
20 byte O	digital output (slave 0 - 7B)
24 byte O	digital output (slave 0 - 15B)
28 byte O	digital output (slave 0 - 23B)
32 byte O	digital output (slave 0 - 31B)

Tab. 13-17.

1.Possible for 2 circuits

Length <sup>1</sup>	description
16 byte I/O	digital in/out (slave 0 - 31)
16 byte I/O	digital in/out (slave 0b - 31b)
32 byte I/O	digital in/out (slave 0 - 31b)

Tab. 13-18.

1.Possible for 2 circuits



**Information!**

*Up to eight command interfaces can be integrated.*

Length <sup>1</sup>	description
2 byte I/O	command interface
4 byte I/O	command interface
8 byte I/O	command interface
11 byte I/O	command interface
12 byte I/O	command interface
34 byte I/O	command interface
36 byte I/O	command interface

Tab. 13-19.

1.Possible for 2 circuits

Length <sup>1</sup>	description
24 byte I	analog input (slave 29 - 31)
56 byte I	analog input (slave 25 - 31)

Tab. 13-20.

2.5.2013

Length <sup>1</sup>	description
88 byte I	analog input (slave 21 - 31)
120 byte I	analog input (slave 17 - 31)
128 byte I	analog input (slave 16 - 31)
16 byte I	analog input (slave 14 - 15)

Tab. 13-20.

1.Possible for 2 circuits

Length <sup>1</sup>	description
24 byte O	analog output (slave 29 - 31)
56 byte O	analog output (slave 25 - 31)
88 byte O	analog output (slave 21 - 31)
120 byte O	analog output (slave 17 - 31)
128 byte O	analog output (slave 16 - 31)
16 byte O	analog output (slave 14 - 15)

Tab. 13-21.

1.Possible for 2 circuits

Length <sup>1</sup>	description
2 byte ... 128 byte I	analog input data, dynamic <sup>2</sup>
2 byte ... 128 byte I	analog output data, dynamic

Tab. 13-22.

1.Possible for 2 circuits

2.Modul parameter erquired

Length <sup>1</sup>	description
2 byte I	flags and AS-i detector

Tab. 13-23.

1.Possible for 2 circuits

Length	description
2 byte I / 1 byte O	safety control / status

Tab. 13-24.

**Specific PROFIsafe "special-IDs"**

**PROFIsafe V1/V2**

**Allocation PROFIsafe in input and output area of control**

<b>Byte n+0</b>	0-7	0-6	0-5	0-4	0-3	0-2	0-1	0-0 (reserviert)
<b>Byte n+1</b>	1-7	1-6	1-5	1-4	1-3	1-2	1-1	1-0
<b>Byte n+2</b>	2-7	2-6	2-5	2-4	2-3	2-2	2-1	2-0
<b>Byte n+3</b>	3-7	3-6	3-5	3-4	3-3	3-2	3-1	3-0
<b>Byte n+4</b>	4-7	4-6	4-5	4-4	4-3	4-2	4-1	4-0
<b>Byte n+5</b>	5-7	5-6	5-5	5-4	5-3	5-2	5-1	5-0
<b>Byte n+6</b>	6-7	6-6	6-5	6-4	6-3	6-2	6-1	6-0
<b>Byte n+7</b>	7-7	7-6	7-5	7-4	7-3	7-2	7-1	7-0
<b>Byte n+8</b>	PROFIsafe internal (control byte)							
<b>Byte n+9</b>	PROFIsafe internal (sequential number [V1], CRC2 [V2])							
<b>Byte n+10</b>	PROFIsafe internal (CRC2)							
<b>Byte n+11</b>	PROFIsafe internal (CRC2)							

Tab. 13-25.



**Information!**

Allocation of input and output signals depends on the configuration in the ASIMON software.



**Information!**

Available only with AS-i/PROFIsafe Gateways.

**13.1.3 I/O Data**

**13.1.3.1 Process data**

Process data is arranged the same as for the Siemens and AS-i/InterBus masters. Therefore, data for slaves with a higher address are transmitted in a least significant nibble. Additionally, the EC-flags or hi-flags, respectively, are placed at the data location of AS-i slave 0.

A rising edge of F2 and F3 switches the master to the desired mode.

A falling edge initiates deleting all bits in the LOS.

**Input and Output Data Image**

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
	F3	F2	F1	F0				
0	flags				slave 1/1A			
1	slave 2/2A				slave 3/3A			
2	slave 4/4A				slave 5/5A			
3	slave 6/6A				slave 7/7A			
4	slave 8/8A				slave 9/9A			
5	slave 10/10A				slave 11/11A			
6	slave 12/12A				slave 13/13A			
7	slave 14/14A				slave 15/15A			
8	slave 16/16A				slave 17/17A			
9	slave 18/18A				slave 19/19A			
10	slave 20/20A				slave 21/21A			
11	slave 22/22A				slave 23/23A			
12	slave 24/24A				slave 25/25A			
13	slave 26/26A				slave 27/27A			
14	slave 28/28A				slave 29/29A			
15	slave 30/30A				slave 31/31A			
16	reserved				slave 1B			
17	slave 2B				slave 3B			
18	slave 4B				slave 5B			
19	slave 6B				slave 7B			
20	slave 8B				slave 9B			
21	slave 10B				slave 11B			
22	slave 12B				slave 13B			
23	slave 14B				slave 15B			
24	slave 16B				slave 17B			
25	slave 18B				slave 19B			
26	slave 20B				slave 21B			
27	slave 22B				slave 23B			
28	slave 24B				slave 25B			

Tab. 13-26.

**Input and Output Data Image**

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
29	slave 26B				slave 27B			
30	slave 28B				slave 29B			
31	slave 30B				slave 31B			

Tab. 13-26.

**Flags**

	Input data	Output data
F0	ConfigError	Off-line
F1	APF	LOS-master-bit
F2	PeripheryFault	→ ConfigurationMode
F3	ConfigurationActive	→ ProtectedMode

Tab. 13-27.

ConfigError:	0=ConfigOK	1=ConfigError
APF:	0=AS-i-Power OK	1=AS-i-Power Fail
PeripheryFault:	0=PeripheryOK	1=PeripheryFault
ConfigurationActive:	0=ProtectedOperationMode	1=ProjectingMode
Off-Line:	0=On-Line	1=Off-Line
LOS-master-bit	0=Off-Line by ConfigError deactivated	1=Off-Line by ConfigError activated.

**13.1.3.2 EC-Flags and AS-i detector**

In addition to EC-flags, the AS-i detector flags are transferred with the AS-i diagnostic data.

Diagnostics data is designed as follows:

**EC-flags (high) and AS-i watchdog:**

- bit 0: periphery fault
- bit 1: ...
- bit 2: failure redundant 24 V AUX (option safety monitor)
- bit 3: failure redundant 24 V AUX (option single master)
- bit 4: earth fault
- bit 5: over voltage
- bit 6: noise
- bit 7: duplicate address

**EC-flags (low):**

- bit 0: configuration error
- bit 1: slave with address '0' detected
- bit 2: auto\_address\_assignment *not* possible
- bit 3: auto\_address\_assignment available

2.5.2013

**EC-flags (low):**

- bit 4: configuration mode active
- bit 5: *not* in normal operation
- bit 6: AS-i power fail
- bit 7: AS-i master offline

**13.1.3.3 Power Control (current limit)**



**Information!**

*This function is only available for devices with self-resetting, adjustable fuses!  
Additional information find you in chapters <General> and <Functions of the new generation of AS-i Gateways>.*

**Parameter (AS-i current limit)**

The current limit setting is executed in 0,1 A steps:

input: 0 ... 40  $\cong$  0 A ... 4,0 A

**Input data (high):**

- bit 0: periphery fault
- bit 1: overcurrent
- bit 2: ...
- bit 3: failure redundant 24 V AUX (option single master)
- bit 4: earth fault
- bit 5: over voltage
- bit 6: noise
- bit 7: duplicate address

**Input data (low):**

- bit 0: configuration error
- bit 1: slave with address '0' detected
- bit 2: auto\_address\_assignment *not* possible
- bit 3: auto\_address\_assignment available
- bit 4: configuration mode active
- bit 5: *not* in normal operation
- bit 6: AS-i power fail
- bit 7: AS-i master offline

13.1.3.4 AS-i 16 bit data



**Information!**

*A-Slaves map the data on channels 1 and 2.*

*B-Slaves map the data on channels 3 and 4.*

In addition to the access via the command interfaces, the 16-bit data to or from the slaves, respectively, (profile 7.3., S-7.4, S-6.0, S- 7.5, S-7.A.8, S-7.A.9, S-7.A.A) can be transmitted cyclically with 16 bit values. Competing writing access attempts on analog output data are not interlocking each other. If analog data for a particular slave are transmitted both cyclically and acyclically via the command interface or DP/V1 connections, the acyclically transmitted values are overwritten by the cyclically transmitted values.

AS-i 16-bit data can be transmitted in a reserved data area. Therefore accessing analog and digital data is very easy.

**AS-i 16 bit data**

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	Slave 31-n/8, channel 1, high byte							
2	Slave 31-n/8, channel 1, low byte							
3	Slave 31-n/8, channel 2, high byte							
4	Slave 31-n/8, channel 2, low byte							
...	...							
n-3	Slave 31, channel 3/Slave 31B, channel 1, high byte							
n-2	Slave 31, channel 3/Slave 31B, channel 1, low byte							
n-1	Slave 31, channel 4/Slave 31B, channel 2, high byte							
n	Slave 31, channel 4/Slave 31B, channel 2, low byte							

Tab. 13-28.

### 13.1.3.5 Command interface



**Information!**

The description of the ASIMON program can be found in the separate software manual „AS-i 3.0 Command interface“.

### 13.1.3.6 Safety Control/Status

In the fieldbus configuration the designator **Safety Control/Status** can be added as cyclical data. This is possible both for the integrated Safety Monitor and for 2nd generation Monitors.



**Information!**

Generation III external Monitors allow a maximum of eight OSSDs to be sent.

The state of the outputs and the message outputs is then inserted as a cyclical input datum.

**Inputs**

byte	description
1	Status OSSD 1, color-coded as defined in the table <Coding of status bytes>).
2	Status OSSD 2, color-coded as defined in the table <Coding of status bytes>).
...	...
n	Status OSSD n, color-coded as defined in the table <Coding of status bytes>).

Tab. 13-29.

**Coding of status bytes**

Bit [0 ... 3]	state or. color	description
00 <sub>16</sub>	green permanent lighting	output on
01 <sub>16</sub>	green flashing	delay time is running at stop category 1
02 <sub>16</sub>	yellow permanent lighting	start-up/restart-disable active
03 <sub>16</sub>	yellow flashing	external test necessary / acknowledgement / start delay active
04 <sub>16</sub>	red permanent lighting	output off
05 <sub>16</sub>	red flashing	error
06 <sub>16</sub>	grey or off	output not projected
07 <sub>16</sub>	reserved	
<b>Bit [6]</b>	<b>status or color</b>	

Tab. 13-30.

**Coding of status bytes**

0	no device flashing yellow	
1	at least one device flashing yellow	
<b>Bit [7]</b>	<b>status or color</b>	
0	no device flashing red	
1	at least one device flashing red	

Tab. 13-30.

The cyclical output identifier contains the 4 Safety Monitor bits 1.Y1, 1.Y2, 2.Y1 and 2.Y2. The monitoring element "Monitor input" and the start elements "Monitor Start-Monitor Input" and "Activation using Monitor Input" access these data. In contrast, the "Feedback circuit" element always accesses the EDM input.

**Outputs**

byte	description	
1	byte from the fieldbus	
	bit 0:	1.Y1
	bit 1:	1.Y2
	bit 2:	2.Y1
	bit 3:	2.Y2
	bit 4 ... 7:	reserved
2	reserved	

Tab. 13-31.

The bits of the output bytes are ORed with the real and the homonymous hardware inputs of the device.

**Safety Control Status**

Length	description
2 byte I 1 byte O	Safety Ctrl/Status (2 OSSD)
4 byte I 1 byte O	Safety Ctrl/Status (4 OSSD)
6 byte I 2 byte O	Safety Ctrl/Status (6 OSSD)
8 byte I 2 byte O	Safety Ctrl/Status (8 OSSD)
10 byte I 3 byte O	Safety Ctrl/Status (10 OSSD)

Tab. 13-32.

2.5.2013

**Safety Control Status**

Length	description
12 byte I 3 byte O	Safety Ctrl/Status (12 OSSD)
14 byte I 4 byte O	Safety Ctrl/Status (14 OSSD)
16 byte I 4 byte O	Safety Ctrl/Status (16 OSSD)

Tab. 13-32.

**Safety Control-Status (only with PROFIsafe)**

Length	description
32 byte I 8 byte O	Safety Ctrl/Status (32 OSSD)
64 byte I 16 byte O	Safety Ctrl/Status (64 OSSD)

Tab. 13-33.



**Information!**

Available only with AS-i/PROFIsafe Gateways.

13.1.3.7 Fieldbus bit



**Information!**

*This function is only available with Safety Version 'SV4.3'!*

*Additional information can be found in chapters <General> and <Functions of the new generation of AS-i Gateways>.*

**Output data (device fieldbus bit in ASIMON)**

2 <sup>15</sup>	2 <sup>14</sup>	2 <sup>13</sup>	2 <sup>12</sup>	2 <sup>11</sup>	2 <sup>10</sup>	2 <sup>9</sup>	2 <sup>8</sup>	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
FB <sub>15</sub>	FB <sub>14</sub>	FB <sub>13</sub>	FB <sub>12</sub>	FB <sub>11</sub>	FB <sub>10</sub>	FB <sub>09</sub>	FB <sub>08</sub>	FB <sub>07</sub>	FB <sub>06</sub>	FB <sub>05</sub>	FB <sub>04</sub>	2.Y2	2.Y1	1.Y2	1.Y1

Tab. 13-34.

**Input data (output assignment fieldbus bit in ASIMON)**

2 <sup>15</sup>	2 <sup>14</sup>	2 <sup>13</sup>	2 <sup>12</sup>	2 <sup>11</sup>	2 <sup>10</sup>	2 <sup>9</sup>	2 <sup>8</sup>	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
FB <sub>15</sub>	FB <sub>14</sub>	FB <sub>13</sub>	FB <sub>12</sub>	FB <sub>11</sub>	FB <sub>10</sub>	FB <sub>09</sub>	FB <sub>08</sub>	FB <sub>07</sub>	FB <sub>06</sub>	FB <sub>05</sub>	FB <sub>04</sub>	FB <sub>03</sub>	FB <sub>02</sub>	FB <sub>01</sub>	FB <sub>00</sub>

Tab. 13-35.

FB: Fieldbus-bit

2.Y2, 2.Y1, 1.Y2, 1.Y1: Monitor inputs



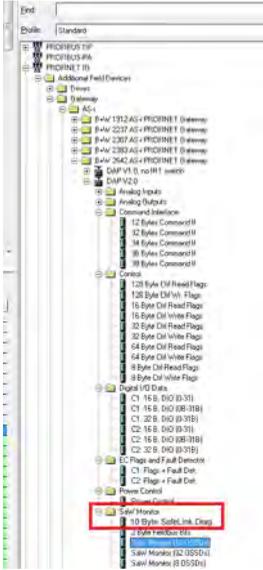
**Information!**

*More detailed information can be found in the manual "ASIMON 3 G2 configuration software", chapters:*

- *"Monitoring devices -> fieldbus-bit"*
- *and*
- *"Output assignment"*.

### 13.1.3.8 Diagnostics in the cyclic channel (10 Byte SafeLink.Diag.)

With this very simple diagnostics, the basic status of SafeLink can be captured. In a configuration file also bytes shorter than 10 can be selected.



Bit	7	6	5	4	3	2	1	0
1	st. adr 4		st. adr 3		st. adr 2		st. adr 1	
2	st. adr 8		st. adr 7		st. adr 6		st. adr 5	
3	st. adr 12		st. adr 11		st. adr 10		st. adr 9	
4	st. adr 16		st. adr 15		st. adr 14		st. adr 13	
5	st. adr 20		st. adr 19		st. adr 18		st. adr 17	
6	st. adr 24		st. adr 23		st. adr 22		st. adr 21	
7	st. adr 28		st. adr 27		st. adr 26		st. adr 25	
8	reserved		st. adr 31		st. adr 30		st. adr 29	
9	node status			node address				
10	domain no.			manager adr				

Tab. 13-36.

**St. adr:** status of an address from the list 'node overview':

bit-combination	meaning
11	active
01	not active
10	nicht taught (only the manager, with the highest priority message)
00	not used

**13.2 DP/V1**

The AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor uses only one data segment (slot 1, index 16). This data segment contains a command interface similar to the one in the DP data telegram.

The DP/V1-command interfaces are processed every time they are sent. Therefore it is possible to execute the same command several times without changing "command" or "network" and setting a toggle bit.

**13.3 PROFIBUS**

The AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor uses a new GSD file with a new PNO-ID. All the setting options for the previous AS-i Masters are available. Cyclical data, Command interface and (optional) diagnostics are compatible with the previous Master.



**Information!**

*GSD files for the previous AS-i Masters cannot be used, since the PROFIBUS parameters have a different structure.*

## 14. Configuration with Windows Software ASIMON 3 G2



### **Information!**

*Please note further information in the configuration software **ASIMON 3 G2** for Windows.*

## 15. SafeLink

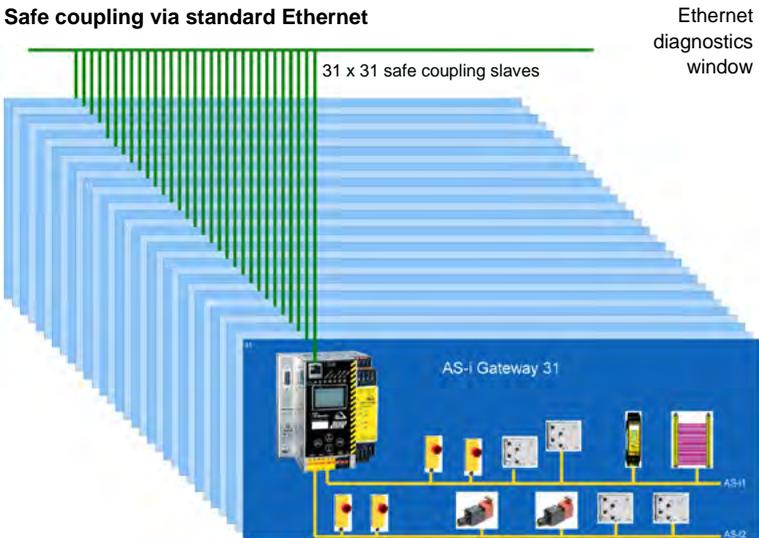
### 15.1 General introduction

Safe Link represents the most efficient and cost-effective way to link safe signals from multiple AS-i networks.

As for an AS-i linking network, safe linking using potential-free contacts or safe electronic in- and outputs eliminates expensive and cumbersome wiring. Safe Link also offers the same system range as a PROFINET controller based on the PROFIsafe standard without being restricted to a particular system controller.

Safe Link allows up to 1922 safe inputs to be processed in a full configuration of 31 gateways with 62 safe slaves. 31 safe bits per Gateway are provided for coupling, resulting in a total of 961 signals that can be safely coupled.

#### Safe coupling via standard Ethernet



For Safe Link the Gateways are connected over the Ethernet diagnostics interface (10 Mbit/s, half-duplex) and a switch. In the case of PROFINET and EtherNET/IP+Modbus TCP, instead the fieldbus interface can be used for Safe Link.

If the Ethernet interface is used for coupling, devices having different controller systems (such as PROFIBUS, PROFINET, EtherNet/IP, Modbus, sercos, etc.) can exchange signals with each other without any additional effort using the switch.

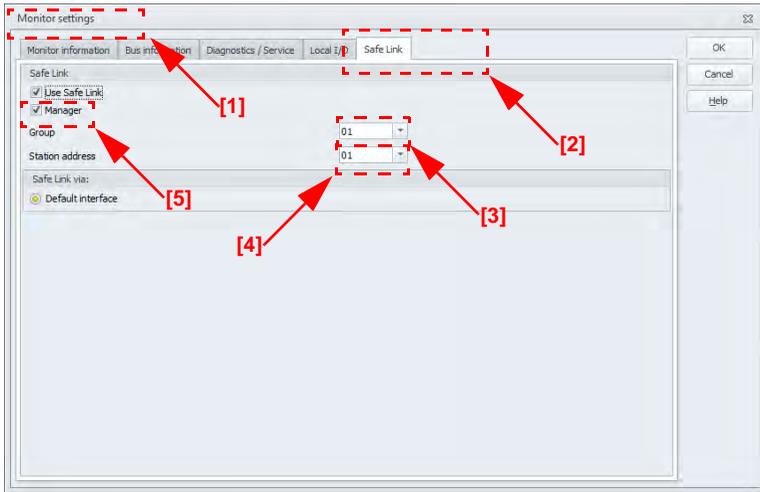
Since data transmission is based on the sending of multicasts, it must be ensured that the switch used can process and pass along the corresponding broadcasts.

## 15.2 Configuration

<b>SafeLink</b>	
Ethernet diagnostics interface	10Mbits, half-duplex
Ports	Depends on the Multicast group Port 1024 to 1038
Protocol	UDP
Data packets	72 bytes per packet Average 286 packets per second
<b>Group organization</b>	
Number	max. 15 groups (Group addresses 1 to 15)
No. of devices	max. 31 devices per group
<b>System size</b>	
max. system size	31 Gateways x 62 safe input slaves = 1922 safe inputs in full configuration
<b>Kopplung</b>	
max. no. of coupled signals	31 GW x 31 signal bits = 961 safe coupled signals in full configuration
<b>Switch</b>	
Requirements	<ul style="list-style-type: none"> <li>• Multicast-capable</li> <li>• If not all connected devices receive all signals, an IGMP-capable lean managed switch is required</li> </ul>

### 15.2.1 Configuration using ASIMON

Complete configuration of SafeLink is done using the ASIMON software, in the "Monitor/Bus information" section [1] on the "Safe Link" tab [2].



Here the group and device addresses are assigned and the safe programs for the individual Gateways managed. Information about the IP addresses of the participating devices are also stored in the project structure.

In organizational terms all Gateways that need to communicate with each other are combined in one group (Group addresses 1 to 15) [3].

Each device in a group is given a unique device address (Device addresses 1 to 31) [4].

One of the devices is assigned as the manager of the group [5], which means it monitors whether all the participating devices are present in the network.

31 bits are available in each Gateway which can be used by the other group members as safe signals.

In a full configuration with 31 Gateways this means a total of 961 safe coupled signals are available.



**Information!**

*Before setting up Safe Link, be sure you have read the information on configuring Safe Link in the ASIMON documentation in the section <Safe Link Tab>*

### 15.3 Diagnostics

#### *Directly on the device*

If a group member does not receive the expected messages from another member, it displays the device address of the missing Gateway together with the message "not active".

e.g. missing data telegrams from Devicer 4:

```
X.4 not active
```

#### *About ASIMON*

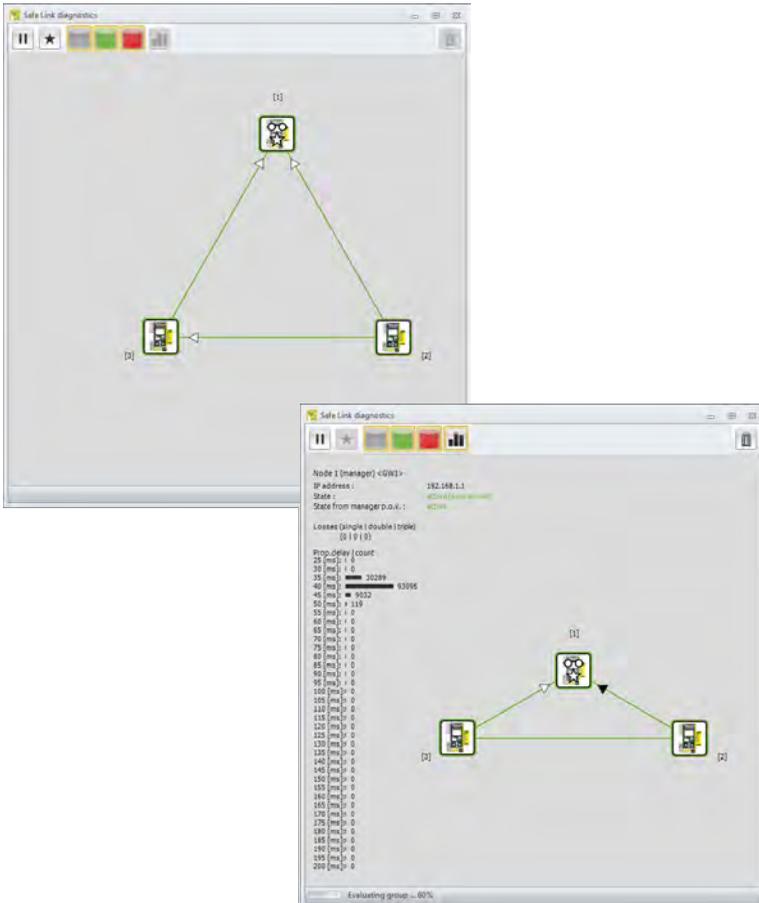
The ASIMON software can be used at any time to perform diagnostics for the SafeLink by invoking "SafeLink diagnostics" from the "Start diagnostics" menu in the "Applications" section. This opens a window with a graphical detailed view of the state of communication for all group members.

If an error occurs in SafeLink, the corresponding signals are shown in gray in the ASIMON configuration, and at the same time a popup window opens automatically with a reference to missing devices.



Clicking on the "Safe Link diagnostics" button [1] on the bottom edge of the popup window also opens the diagnostics window for SafeLink.

Here you are shown the status and direction of communication between the individual group members in graphical format. Based on the arrow colors you can see which sections of communication may be associated with telegram errors.



**Information!**

Please refer here to the information in the ASIMON documentation in the <Safe Link diagnostics> section.

## 16. System startup using AS-i Control Tools

The Windows based software "AS-i Control Tools" with a serial interface for stainless steel AS-i masters is designed to make the startup of the AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor as comfortable as possible.

Additionally, the software communicates with the AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor by using a PROFIBUS DP Master Simulator DP/V1 or the serial PROFIBUS master.

### 16.1 Windows software AS-i Control Tools



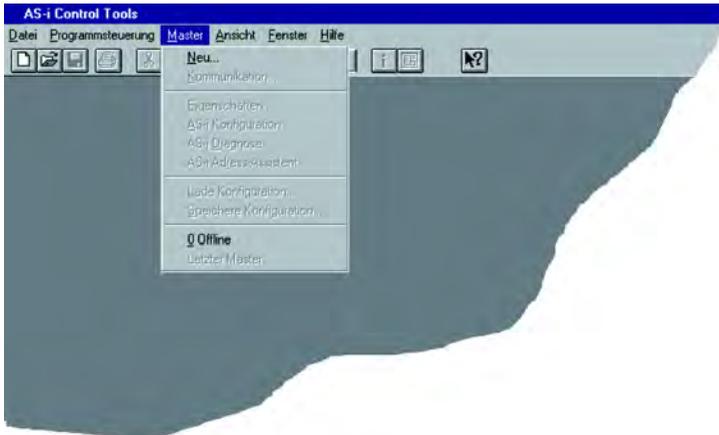
#### **Information!**

*AS-i Control Tools must be installed first!*

This way, the device driver is copied into the previous designed folder in AS-i Control Tools and should be recognized automatically.

The Windows software "AS-i Control Tools" enables the user to easily configure the AS-i network.

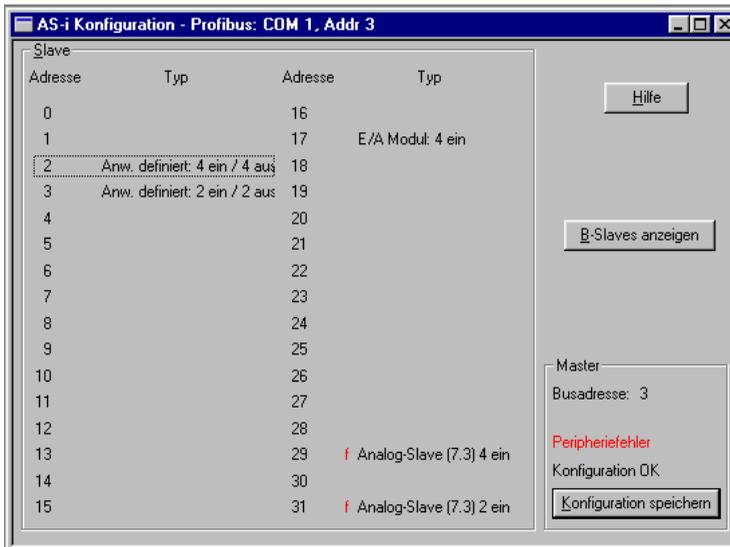
1. Plug the PROFIBUS Master Simulator or a serial PROFIBUS Master, respectively, into the D-SUB connector of the AS-i/PROFIBUS Gateway and connect the device to the PC via its serial interface.
2. Start AS-i Control Tools.
3. Select Master | New.



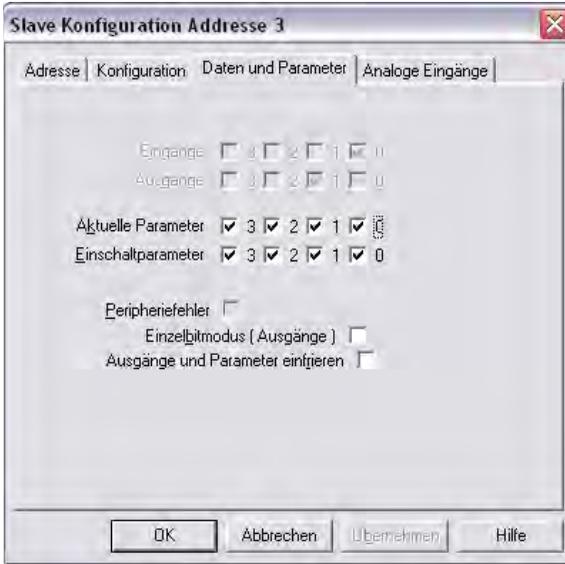
4. Choose PROFIBUS as the protocol.
5. Select the appropriate settings (for example serial interface COM 2, station address <auto>).



6. Select Master | AS-i configuration. The AS-i configuration editor will be started. All detected and configured AS-i slaves are displayed in this window.

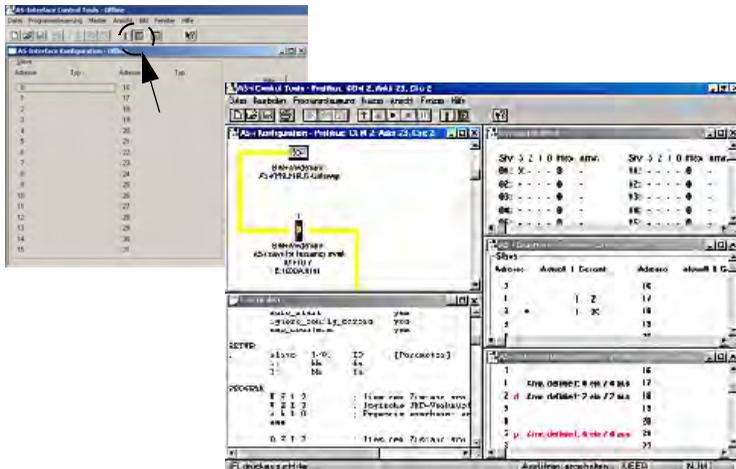


7. Click on a slave to open the dialog window 'slave configuration'.



This window enables the user to edit a slave address and to set AS-i parameters or AS-i configuration data. Additionally, inputs and outputs can be tested.

- Click the second button on the right side of the tool bar to get a graphical display of "AS-i Control Tools".



Configuring the AS-i network is easily accomplished by first connecting each AS-i slave separately to the AS-i line and setting its address, followed by pressing the button "Store configuration" to store the existing AS-i network in the AS-i master as configuration data.

Furthermore, an **AS-i Address Assistant** is available, allowing to perform an address change of a new AS-i slave to the desired address as soon as it is connected to the AS-i network. The desired AS-i configuration can be created offline ahead of time and can be stored to a file. When setting up the system the AS-i slaves are then simply connected, one at a time, to the AS-i network. Further descriptions to all additional features of this software can be obtained from the integrated help file.

## 16.2 PROFIBUS DP Master Simulator

The PROFIBUS DP Master Simulator is an easy to use universal tool for data exchange with PROFIBUS slaves from almost any manufacturer using PROFIBUS DP. The PROFIBUS DP master simulator can exchange data with many PROFIBUS slaves even without GSD file, type-file, or PROFIBUS master. Furthermore, the PROFIBUS DP Master Simulator also processes GSD-files as well as the input of special configurations to start the data exchange with the PROFIBUS slaves.. Addressing of PROFIBUS slaves - especially IP67 modules without addressing switch - is also possible.

The PROFIBUS DP Master Simulator also offers the possibility to scan a complete PROFIBUS network for connected users and to display them graphically. In this case, the **PROFIBUS UART** has to be connected directly to a PROFIBUS slave. I/O data, especially diagnostics data, can now be displayed in binary, hexadecimal, and ASCII format. The output data can be transmitted consistently. It is possible to hold an output as long as the mouse button is pressed in "click and hold" mode.

The new version of the PROFIBUS DP Master Simulator also supports PROFIBUS DP/V1, and therefore enables PROFIBUS slaves to be operated in the acyclic mode. This is especially helpful for the configuration and the startup of complex field devices like drives, modular I/O systems, etc.

The PROFIBUS Master Simulator is delivered with the **PROFIBUS UART**, the ideal interface converter between the RS 232 interface of a PC and PROFIBUS. The compact UART does not need an additional external power supply.

Therefore it is also suitable for mobile use with a laptop or a notebook. The **PROFIBUS UART** is simply inserted between the PROFIBUS and the RS 232 connector cable.

Additionally to the monitor and startup software DLL drivers for Windows NT, 2000, XP, Vista as well as simple examples written in C are supplied with the PROFIBUS UART. This offers the possibility to use the PROFIBUS UART in combination with other software applications. However, the PROFIBUS UART is a monitoring and startup tool for PROFIBUS slaves and is not designed to control automation processes.

## 17. Status indication, faults and fault elimination

### 17.1 Spontaneous display of faults from the safety unit

Spontaneous messages are displayed on Pepperl+Fuchs GmbH AS-i monitors as follows:

- When both networks are operating without error, a smiley is displayed.
- When field bus communication fails, this is indicated by a text message.
- When there is a fault on an AS-i slave, this is displayed until the fault is no longer present.
- When there are no faults present, the states of the safety unit are displayed in text beneath the smiley.
- When four local release circuits are present, a line is displayed with their status.

```

    ☺Press OK for Menu
      Output Circuit
      1:ON      2:ON
      3:ON      4:ON
    
```

#### Coding:

Display in protecting mode:

1, 2, 3 and 4 for the release circuits

display	status of the safety unit	meaning
ON	green	relais circuit turned on
OFF	red	relais circuit turned off
WAIT	flashing green	wait time Stop 1 running
START	yellow	waiting for Start signal

Display in error status:

SAFETY FAULT: flashing red

TEST: flashing yellow

*Red* and *flashing yellow* are fault messages and are treated separately.

If the safety unit is in configuration mode, this is indicated by the CONFIG-OPERATION display.

*Yellow flashing* and *red flashing* means the AS-i slave address of the faulted device is displayed. If there are other faults present at the same time, all faults are displayed alternately.

If the safety unit is in the *red flashing* state and no menu is open, the safety unit can be unlocked by pressing the ESC/Service key (Section <Function of the ESC/Service key>).

- If the message "Fatal Error" is reported from the safety unit, only this error message will be displayed in normal mode (not the menu). The non-safe unit continues to operate normally in this case and the menus can also be opened.

```
FATAL ERROR
000 255 222 111
```

- All other messages are not shown spontaneously.

If the safety unit is in the *yellow flashing* state, depending on the status of the configuration an external test may be required, an acknowledgement of the status may need to be made, or the turn-on delay active.

## 17.2 Replacing a defective safety-configured AS-i slave

If a safety-configured AS-i slave is defective, it can be replaced even without a PC or reconfiguration of the AS-i Safety Monitor by pressing the ESC/Service key on the AS-i Safety Monitor.



### **Information!**

*Pressing the ESC/Service key changes the safety monitor from protecting mode to configuration mode. The output circuits are therefore not turned off.*

*Code tables for replaced AS-i slaves can be taught without the PIN.*

Proceed as follows:

1. Disconnect the AS-i slave from the AS-i cable.
2. Press the ESC/Service key on the AS-i Safety Monitor and on all other safety monitors for approx. 3 seconds.

```
CONNECT NEW
SLAVE 17
THEN PRESS
SERVICE
```

3. Connect the new safety-configured AS-i slave, which has already been programmed to the corresponding address, to the AS-i cable.
4. Press the ESC/Service key again on the AS-i Safety Monitor and on all other Safety Monitors which use the replacement safe AS-i slave for approx. 3 seconds. The code table for the new slave is taught and checked for correctness.  
If this is OK, the AS-i Safety Monitor changes to protecting mode. Otherwise you are prompted again to teach.



### **Information!**

*Inputs on the new slave must be turned on.*



**Attention!**

*After replacing a defective safe AS-i slave, always check the correct function of the new slave.*

### 17.3 Replacing a defective AS-i Safety Monitor

If an AS-i Safety Monitor is defective and needs to be replaced, the replacement unit does not necessarily have to be newly configured using the **ASIMON 3 G2** software, rather it is possible to copy the configuration of the defective device using a chip card.

Requirement:

The replacement unit has an empty configuration in its configuration memory.



**Information!**

*After replacing a defective safe AS-i Safety Monitor, always check the correct function of the new AS-i Safety Monitor.*

### 17.4 Forget the password? What do I do now?



**Attention!**

*Only the responsible safety representative is permitted to retrieve a lost password as follows!*

If the password is lost for your configuration, proceed as follows:

1. Find the valid configuration protocol for the AS-i Safety Monitor whose password you have lost (printout or file). In the configuration protocol in line 10 (Monitor Section, Validated) you will find a 4-digit code.
  - If you do not have the configuration protocol and do not want to place the AS-i safety monitor in configuration mode, connect the AS-i safety monitor whose password you have lost to the PC and start the **ASIMON 3 G2** software.
  - Select a neutral configuration and start the diagnostics function in **ASIMON 3 G2** using MONITOR -> DIAGNOSTICS. Wait until the current configuration appears on the screen. This may take up to 1 minute.
  - Open the window MONITOR/BUS INFORMATION (EDIT MENU -> MONITOR/BUS INFORMATION...). On the Title tab you will also find the 4-digit code in the Download time window area.
2. Contact technical support at your supplier and enter the 4-digit code.
3. From this code a master password can be generated which can be used to access the stored configuration.
4. Use this master password to stop the AS-i Safety Monitor and enter a new user password. In the Monitor menu of the **ASIMON 3 G2** configuration software select the menu item Password changing.



**Attention!**

*Please note that accessing the configuration stored in the AS-i Safety Monitor can affect the safe function of the system. Changes to released configurations are to be made only by authorized personnel. Any change must be made according to the instructions in the User's Manual for the **ASIMON 3 G2** configuration software.*



**Information!**

*The default password (factory setting) of the AS-i safety monitor is "SIMON". If you would like to reconfigure the AS-i safety monitor, you must first change this default password to a new one known only to you as safety officer.*

## 18. Glossary

### A/B slave

An AS-i slave with extended addressing. The address range of an A/B slave extends from 1A to 31A and 1B to 31B.

### AS-i Power Fail

Voltage drop on the AS-i line; If the voltage drops below a specific value, the master changes to the ⇒ Offline phase.

### I/O code

The first digit of the slave profile, which indicates how many in- and outputs the slave has. A 4I/4O slave has for example a "7", and a slave with 4 digital inputs a "0".

### EDM (External Device Monitoring, feedback circuit)

Used for monitoring the switching function of the contactors connected to the Safety Monitor, whereby the normally closed contacts (forced-opening when possible) are fed back to the start circuit of the Safety Monitor. A restart is then only possible if the normally closed contacts are closed (in the quiescent state).

### Detection phase

In the detection phase, after the startup the master is scanning for AS-i slaves. The master remains in this phase until at least one slave was detected. If the master remains in the detection phase no slave was found. Most of the time, the reason for this is a wrong power supply or a wiring error.

The detection phase is indicated by code "41".

### Protected mode

In protected operating mode only those slaves that are registered in the ⇒ LPS and whose current configuration matches the target configuration are activated.

Also see ⇒ configuration mode. This mode is intended for normal operation, since all AS-i protective measures are activated.

### ID code

The ID code is set by the slave manufacturer and cannot be changed. The AS-i Association determines the ID codes which are assigned for a particular class of slaves. For example, all ⇒ A/B slaves have ID code "A".

### ID1 Code, extended ID1 code

The ID1 code is set by the slave manufacturer. In contrast to the other codes, which determine the profile, it can be changed from the master or using an addressing device. The user should however only use this feature in exceptional circumstances, since otherwise *configuration errors* may occur.

In the case of A/B slaves, the MSB of the ID1 code is used for distinguishing between the A and the B address. Therefore, only the lowest 3 bits are relevant for these slaves.

Since this code was not introduced until AS-i Specification 2.1, it is also referred to as extended ID1 code.

**ID2 Code, extended ID2 code**

The ID2 code is set by the slave manufacturer and cannot be changed. The AS-i Association determines the ID2 codes, which are assigned for a particular class of slaves. For example, all 2-channel 16 bit input slaves having an S-7-3 bit code use ID2 code "D". Since this code was not introduced until AS-i Specification 2.1, it is also referred to as extended ID2 code.

**Current configuration**

The configuration data of all slaves detected by the master. The configuration data of a slave, the ⇒ slave profile, consists of:

⇒ IO code, ⇒ ID code, ⇒ extended ID1code , ⇒ extended ID2 code.

**Current parameter**

The AS-i parameter that have most recently been sent to the AS-i slave, as opposed to ⇒ permanent parameters.

**Configuration Error/Config Error**

An configuration error is displayed if the target and the current configuration of the connected slaves do not match. A configuration error could be due to the following:

Missing slave:A slave entered in the ⇒ LPS is not available

Wrong type of slave:The ⇒ slave profile of the connected slave does not comply with the configuration.

Unknown slave: A connected slave is not entered in the ⇒ LPS.

**LAS - List of Activated Slaves**

The master exchanges I/O data with the slaves entered in the LAS. In protected mode only the detected slaves (⇒ LDS) that are expected by the master and are entered in the ⇒ LPS are activated. In configuration mode all slaves entered in the ⇒ LDS are activated.

**LDS - List of Detected Slaves**

If the master was able to read the ⇒ slave profile, the slave is entered in the LDS.

**LPF - List of Peripheral Faults**

The list of peripheral faults was introduced with specification 2.1. This list includes an entry for each slave that signals a ⇒ peripheral fault.

### **LPS - List of Projected Slaves**

The list of projected slaves includes all slaves expected by the master. When saving the current configuration all entries in the  $\Rightarrow$  LDS are stored in the LPS (except for a slave with address 0).

### **Offline phase**

In the offline phase all input and output data is reset. This phase is entered after the startup of the master, after a  $\Rightarrow$  AS-i power fail, and during the transition from the  $\Rightarrow$  configuration mode to the  $\Rightarrow$  protected mode.

Furthermore, the master can actively be transferred into the offline phase by setting the offline flag.

During the offline phase, masters with a LED display show code "40".

No communication will take place during the offline phase.

### **OSSD = Output Signal Switching Device, release circuit**

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

### **Password**

Security code for a (security) configuration, is required for releasing a configuration or activating a changed configuration. The password is a string of 4 ... 8 alphanumeric characters. It is stored in the configuration.

### **Peripheral fault**

A peripheral fault is indicated by a red flashing LED on the master and on the slave.

Depending on the slave type this indicates an overflow, an overload of the sensor's power supply, or another fault regarding the periphery of the slave.

### **PIN**

A security code is required for teaching code sequences. The PIN is a 4-digit decimal number.

The PIN does not authorize for activating a safety configuration.

The PIN is stored in the EEPROM of the unprotected device section as well as in the unprotected area of the chip card, and is therefore sent to a new device when the chip card is replaced. When resetting to factory defaults, the PIN is set to 0000.

### **Permanent configuration**

The configuration data of all expected slaves stored in the master ( $\Rightarrow$  slave profile). If the  $\Rightarrow$  permanent configuration differs from the  $\Rightarrow$  actual configuration, a configuration error exists.

**Permanent parameter**

The parameters saved in the master and sent to the slave after startup of the master during the  $\Rightarrow$  activation phase.

**Configuration mode**

During the configuration mode the master exchanges data with all connected slaves, no matter which of the slaves were configured. Thus, in this mode it is possible to operate a system without the necessity to configure it before.

See also  $\Rightarrow$  protected mode.

**Release Code**

Security code for a safety configuration on the chip card. A 4-character hexadecimal number generated by the **ASIMON 3 G 2** software. The release code is displayed before copying a configuration from the memory card to the Monitor and must be repeated by the operator.

This provides a technical safeguard against errors in the unprotected display and keyboard software.

**Single Slave**

A single slave can in contrast to a  $\Rightarrow$  *A/B slave* only be addressed from range 1 to 31; the fourth output data bit can be used. All slaves as defined by the older AS-i Specification 2.0 are single slaves.

There are however also single slaves as defined by Specification 2.1, for example the new 16 bit slaves.

**Slave profile**

Configuration data for a slave, consisting of:

$\Rightarrow$  *I/O configuration* and  $\Rightarrow$  *ID-Code*, as well as  $\Rightarrow$  *extended ID1-Code* and  $\Rightarrow$  *extended ID2-Code*.

The slave profile is used to distinguish between various slave classes. It is specified by the AS-i Association and set by the slave manufacturer.

AS-i 2.0 slaves do not have extended ID1 and ID2 codes. A 2.1 or 3.0 AS-interface master enters in this case an "F" for each of the extended ID1 and ID2 codes.

**Master configuration**

Released configuration, without code sequences. The safety unit cannot turn on the outputs, but as soon as the code sequences are learned, the device is usable.

Such a master configuration can for example be used in serial production machine building for loading the safety program, whereby the configuration is created in the design and the code sequences taught on the physical machine.

**Complete configuration**

Counterpart to ⇒ *master configuration*. Release configuration including code sequences. The device is always usable.

## 19. Appendix: Example for startup on a Siemens S7

This example shows the start up of the AS-i/Gateway with safety monitor on a Siemens S7-300 programmable logic controller. The start up is the same with new range of devices.

<b>Hardware used:</b>	
SIMATIC S7 power supply	PS 307 5A
SIMATIC S7-CPU mit PROFIBUS DP	CPU 315-2DP Best. Nr.: 6ES7 315-2AF03-0AB0 Firmware Version 1.2
AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor	
AS-i-Power-Extender	
AS-i-4E-Modul	
AS-i-4E/4A-Modul	
power supply	Powers the AS-i components through the AS-i Power Extender
<b>Software used:</b>	
GSD-File für AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor	
SIMATIC Step7 Version 5.4 SP4 Service Pack 1	Ausgabestand: K5.4.4.0
<b>Associated documentation:</b>	
AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor <sup>®</sup> system manual	
SIEMENS S7-300 documentation	

### 19.1 Hardware configuration

#### 19.1.1 Electrical connection for AS-i

To supply the AS-i circuit, connect the output on the AS-i Power Extender or an AS-i power supply to the AS-i/Gateway with safety monitor. Observe correct polarity of the terminals AS-i(+) and AS-i(-).

In the following the desired AS-i slaves are connected to the AS-i circuit. The AS-i slaves have their device address set to 0 by default. This must be changed to the desired AS-i slave address.

You can set the AS-i slave address using the function "AS-i SLAVE ADDR" function from the submenu "SETUP" on the AS-i/Gateway with safety monitor. For more detailed information, refer to chapter "Operating in advanced Display Mode".

Once the AS-i circuit has been configured and parameterized as desired, apply this configuration to the AS-i/Gateway with safety monitor using the function "QUICK SETUP".

The AS-i/Gateway with safety monitor is now ready to run.

### 19.1.2 Electrical connection for PROFIBUS DP

To connect the AS-i/Gateway with safety monitor to the CPU 315-2DP, a standard PROFIBUS cable with 9-pin SUB-D plug is used.

If the AS-i/Gateway with safety monitor is connected on the PROFIBUS as the last station, the termination resistor on the PROFIBUS plug must be enabled.

## 19.2 SIMATIC Step 7 Configuration

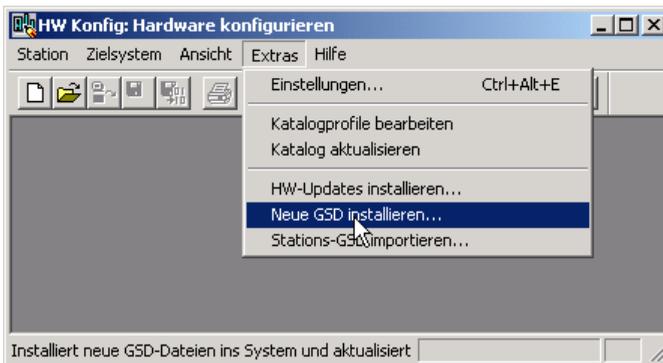
The remainder of this description presumes that a SIMATIC Step7 project has been created and added to an S7-300.

Now the hardware configuration must be opened for this SIMATIC-300 station.

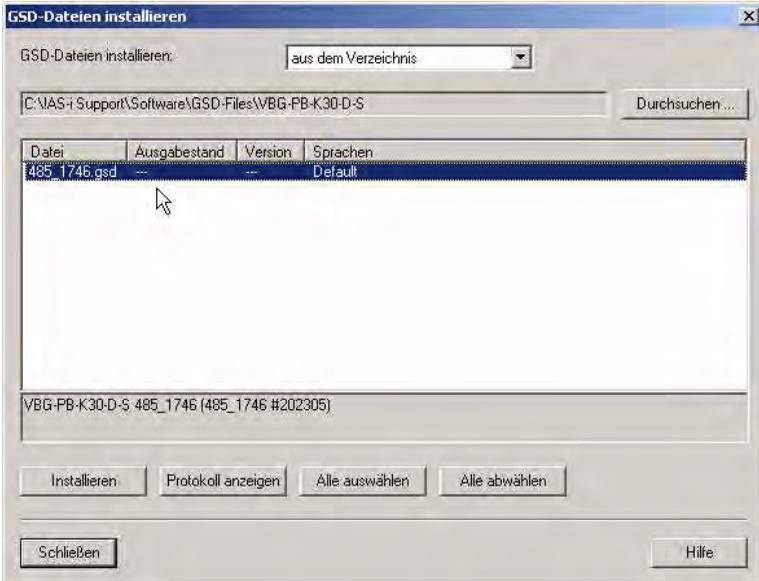
### 19.2.1 Configuration of the Hardware

Before configuring the hardware, the GSD file supplied with the AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor must be added to the hardware catalog.

Add the GSD file using the menu function "Install new GSD".



The PROFIBUS properties of the AS-i/Gateway with safety monitor are described in the GSD file.



Clicking on the "Open" field adds the GSD file to the hardware catalog.

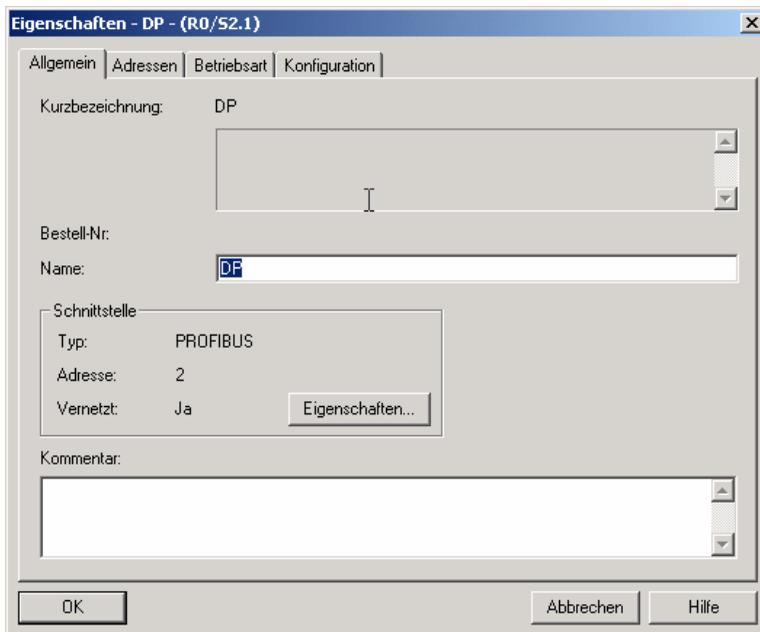
After successful installation of the GSD file you may now open the hardware catalog. The modules contained under SIMATIC 300.

1. profile rail
2. power supply e.g. PS 307 5A
3. CPU e.g. CPU 315-2 DP

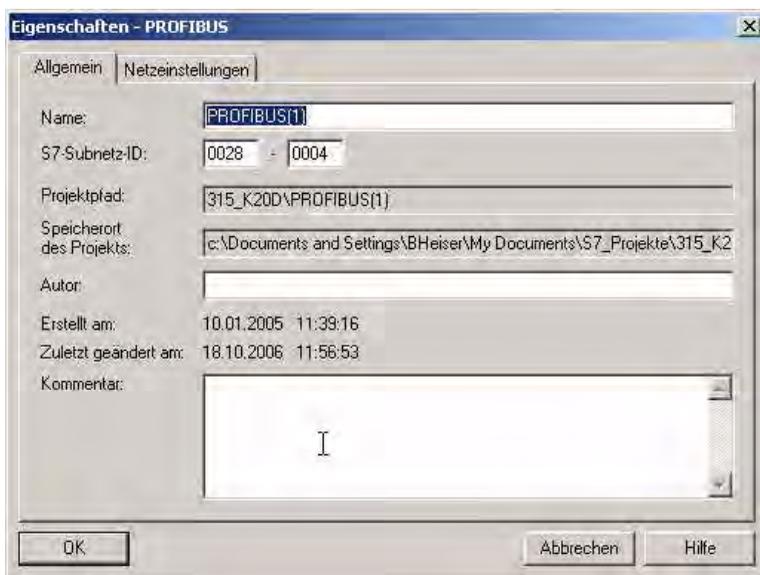
are added to the project. When selecting the CPU module, note the correct hardware version (identifiable by the imprint of the part number at lower left) and the firmware version (identifiable at left beneath the cover).

Steckplatz	Baugruppe	Bestellnummer	Firmware	MPI-Adresse	E-Adresse	A-Adresse
1	PS 307 5A	6ES7 307-1EA00-0AA0				
2	CPU 315-2 DP	6ES7 315-2AF03-0AB0	V1.2	2		
3	DP				1023*	

When adding the CPU module you are prompted for the desired PROFIBUS connection. The standard proposed is for the CPU as PROFIBUS DP Master. This can be directly applied. The CPU mode must be set on the DP Master.



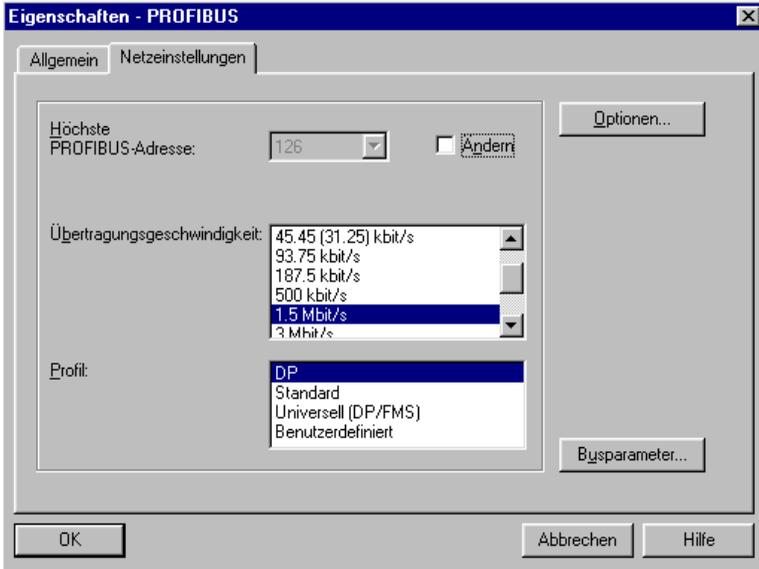
The CPU PROFIBUS DP Properties can be used to display the properties for the PROFIBUS. Clicking on the "Settings" button displays the PROFIBUS settings.



Profile "DP" is generally used as the PROFIBUS profile.

The bit rate for the PROFIBUS can be set in the window "Properties PROFIBUS" → "Network settings" → "Transmission rate".

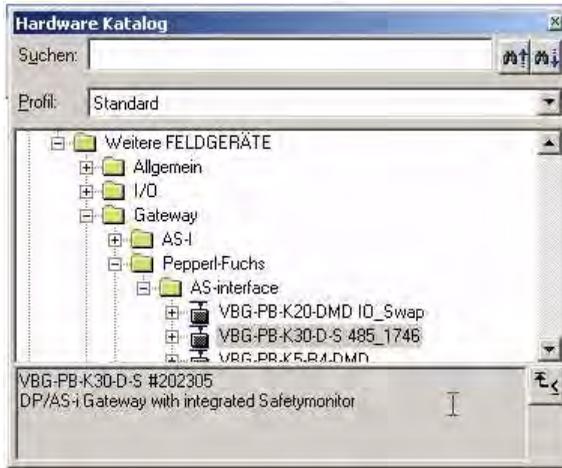
If special adjustments are needed, you can adjust the PROFIBUS parameters using the profile "Properties PROFIBUS" → "Network settings" → "Profile" → "User defined".



### 19.2.2 Insert AS-i/Gateway with safety monitor

Once the SIMATIC hardware has been added to the hardware configuration and the PROFIBUS configured, you can add the AS-i/Gateway with safety monitor to the project.

After successfully installing the GSD file you will find the AS-i/Gateway with safety monitor in the hardware catalog under **PROFIBUS / other FIELD DEVICES / Gateway / PEPPERL+FUCHS / AS-i**.



The AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor can now be added to the PROFIBUS branch using drag and drop.

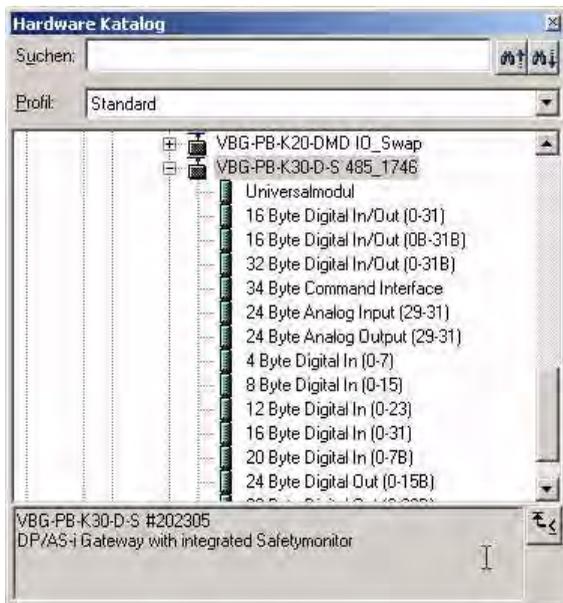
Opening the device by clicking on the plug sign in the hardware catalog causes a list to appear of the possible PROFIBUS communication modules.

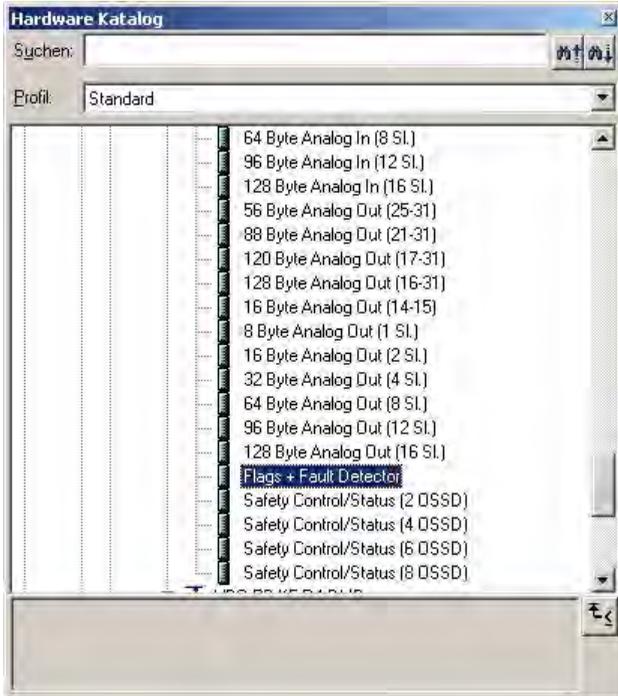
Which module you select for the desired PROFIBUS communication depends on which version of the AS-i circuit you have and on the desired communication possibilities.

For simple transmission of the data bits in an AS-i circuit with AS-i standard sensors in the I/O area of the SIMATIC CPU, use the module "16 Byte Digital In/Out (0-31)". With this module the input and output data for the possible 31 slaves in an AS-i circuit are send directly to the I/O section of the CPU.

When using A/B slaves, use the module "32 Byte Digital In/Out (0-31B)". The B-addressed slaves are mapped in the additional 15 bytes of data.

The other modules called "Digital" can be used instead of the above mentioned module to adapt to the actual AS-i circuit. This makes flexible adaptation to the structure of the AS-i circuit possible.



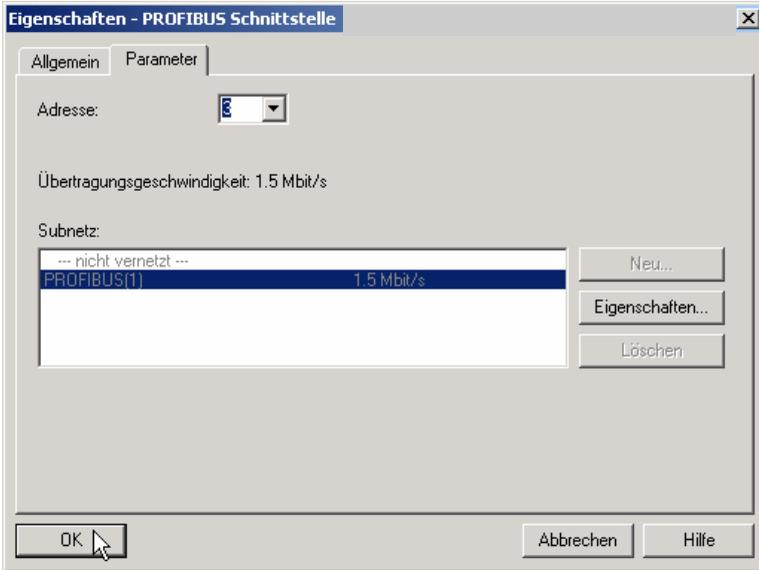


In addition to sending the AS-i slave digital data, a communication interface module can be added. The communication interface is used for sending specific commands to the AS-i/Gateway with safety monitor.

In order to send the analog values for AS-i slaves directly, the modules can be used with the keyword "Analog". The value in parentheses indicates which address range is to be used for the AS-i Analog slaves.

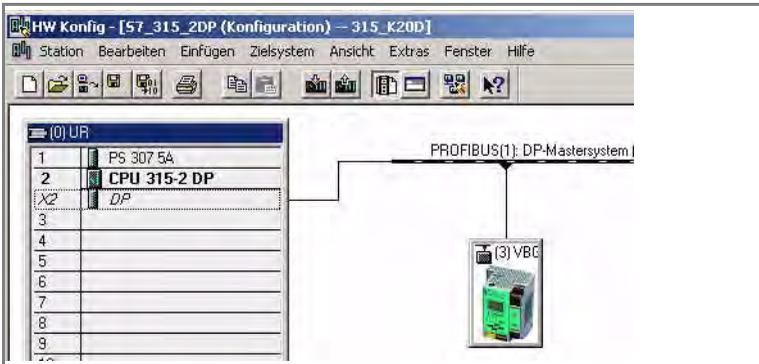
For modules "nn Byte Analog In (n SI.)" and "nn Byte Analog Out (n SI.)" the AS-i address of the analog slave can be freely selected.

When adding the AS-i/Gateway with safety monitor using drag and drop the dialog for assigning the PROFIBUS slave address is shown. The factory default setting for the AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor is Address 3.



**19.2.3 AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor  
 configure in-/outputs**

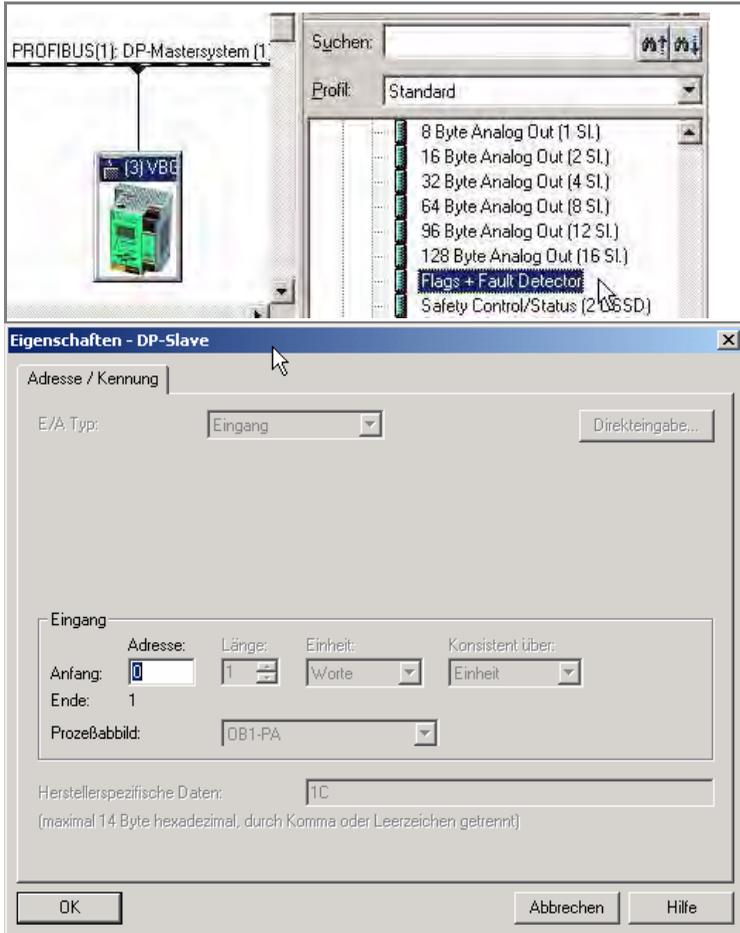
If the AS-i/Gateway with safety monitor is added to the PROFIBUS using drag and drop, the Step7 hardware configuration shows the following graphic.



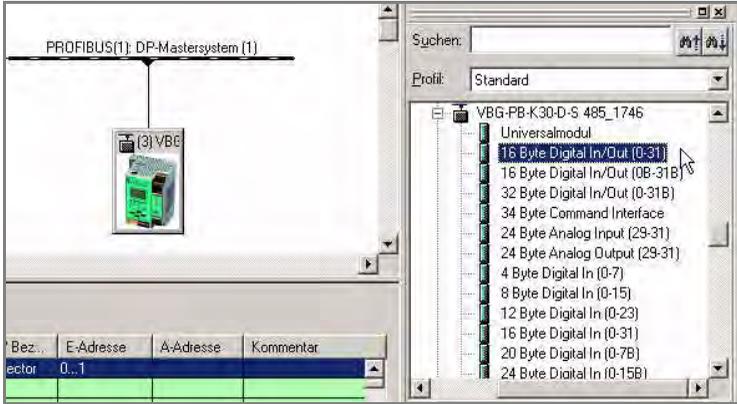
At this point the desired PROFIBUS communication module should be parameterised. This is done in the following steps:

1. Select the AS-i/Gateway with safety monitor by clicking on the Slave icon. In the lower edge of the screen a table is shown which contains lines beginning with Slot 0.

2. Select the desired communication module "Flags + Fault Detector" from the hardware catalog. These flags use the individual bits to signal the operating status of the AS-i/Gateway with safety monitor and should be processed in the application program.
3. Drag the selected communication module to the table line for Slot 0.



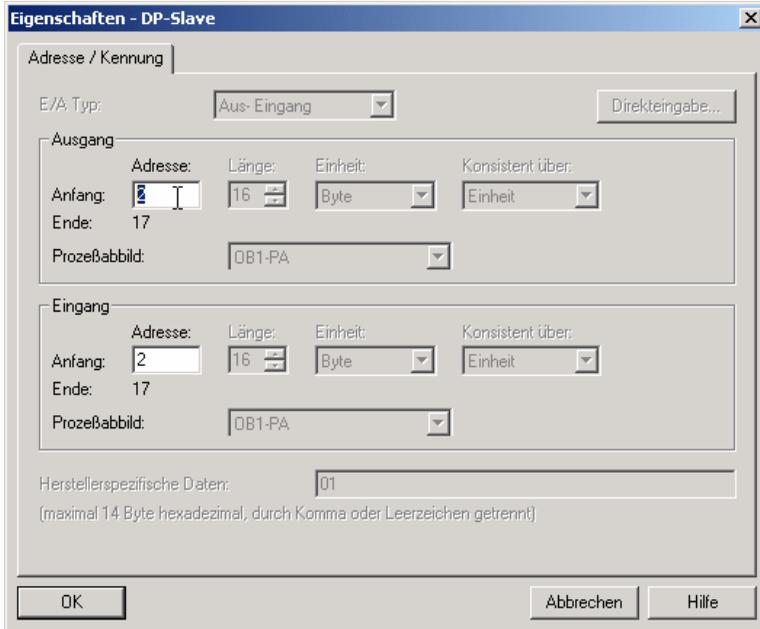
1. Select the desired communication module from the hardware catalog. Here "16 Byte Digital In/Out (0-31)"
2. Drag the selected communication module to the table line for slot 1.



3. If desired, you can now place additional modules for the command interface and analog value transmission in the following slots:



4. Double-clicking on the desired slot line opens a dialog window in which you can assign the PROFIBUS communication module to the address range of the CPU.



In this example the data transfer of the 16 byte in-/output data of the AS-i/Gateway with safety monitor takes place in (out) the CPU address range Input (output) data image byte 2 to 17.

#### 19.2.4 AS-i/Gateway with safety monitor parameters

The AS-i/Gateway with safety monitor is symbolically represented as a rectangular window connected with the PROFIBUS branch. Double-clicking in the upper line of this window opens the dialog window for the properties of this PROFIBUS slave.



The diagnostics address entered in this window is used for parameterizing the function module SFC13 (diagnostic request). At this address you can use the standard function SFC13 to read out the PROFIBUS diagnostic data of this DP slave while running.

When invoking SFC13, note that the diagnostic address must be parameterized as a hexadecimal value.

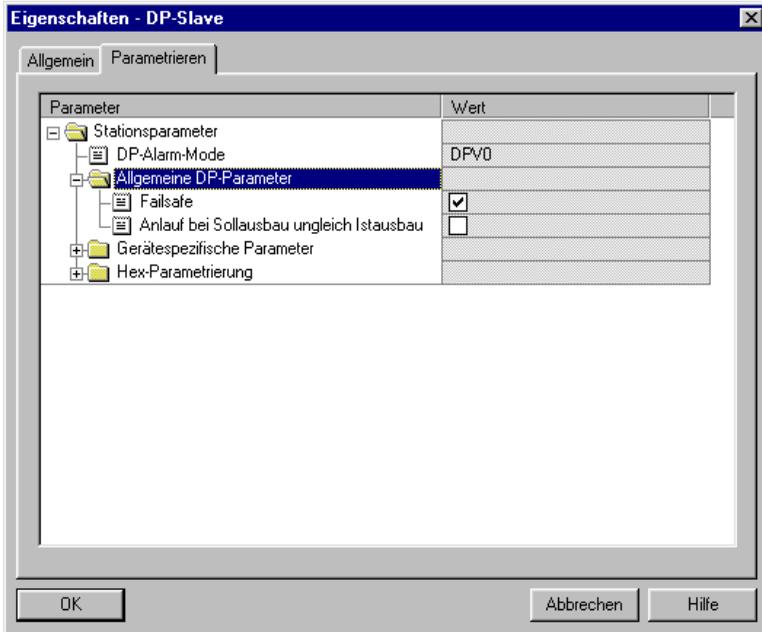
For example: Diagnostic address 1022 → W#16#3FE

Clicking on the "Parameterize" tab displays the possible settings for the PROFIBUS start parameters.

### 19.2.4.1 General DP parameters

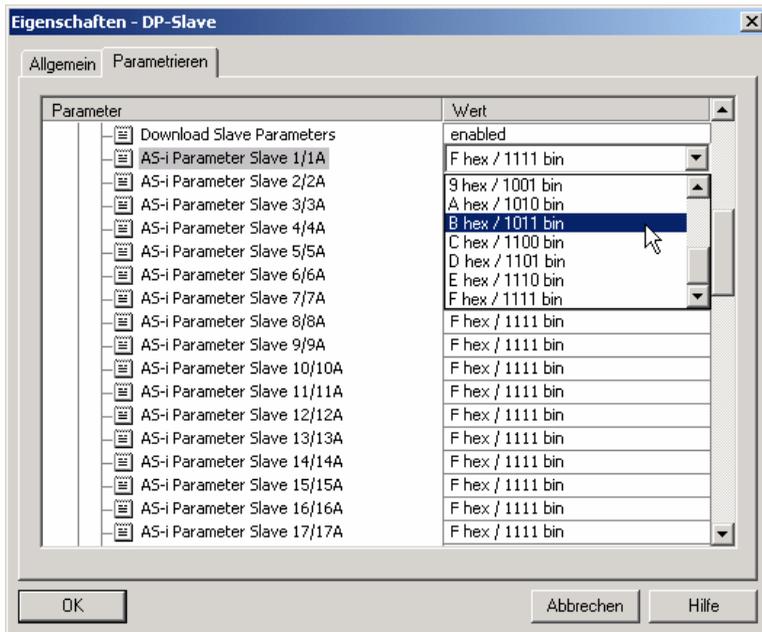
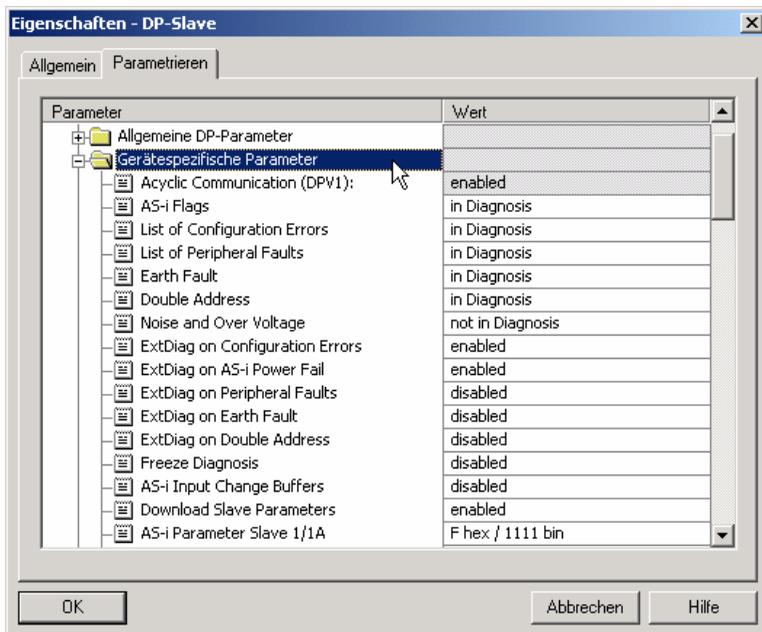
Startup when nominal configuration is not the same as actual configuration:

Use this parameter to specify whether the AS-i circuit should be started up even if the AS-i circuit has a different configuration than the stored AS-i configuration.



### 19.2.4.2 AS-i-Parameter Slave 1/1A...

The parameter bits send to this AS-i slave can be selected in the drop down window. The settings which are made with the parameters bits can be found in the data sheet for the corresponding slave.



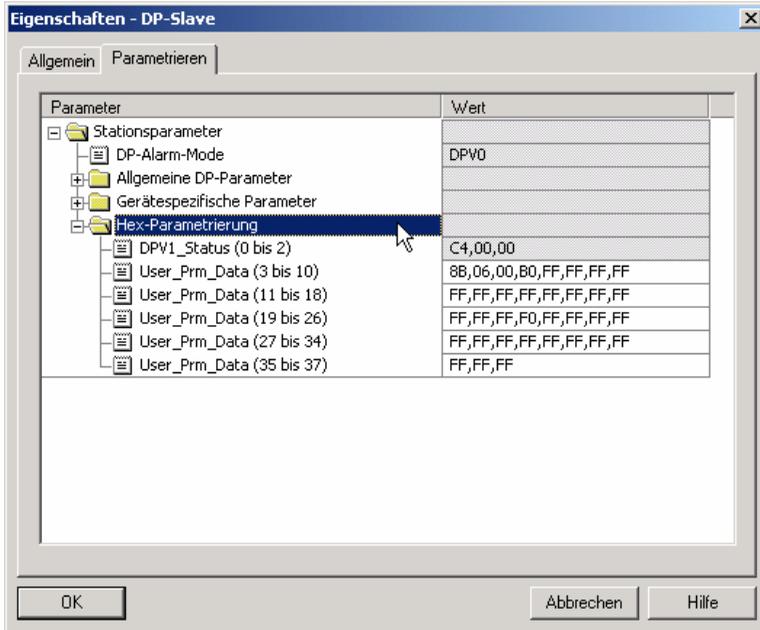
### 19.2.4.3 Hex parameterizing

#### DPV1\_Status

Hexadecimal representation of the data resulting from the settings for parameter bytes 0 to 2.

#### User\_Prm\_Data

Hexadecimal representation of the data resulting from the settings for parameter bytes 3 to 37.



### 19.2.5 SIMATIC Step7 blocks

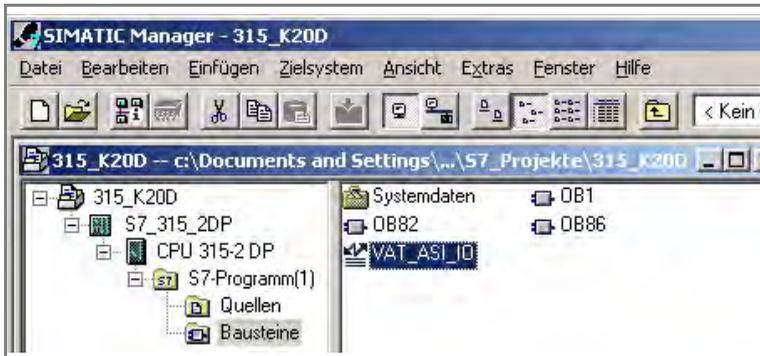
After the hardware has been configured, these can be sent to the CPU. Since data transmission of the AS-i data is done in this example directly to the process image, no additional Step7 program is needed for data refreshing. Therefore there is no program code in OB1.

- OB1 Cyclical program block. Access to the AS-i data is via the parameterized address space in the in-/outputs process image.
- OB82: PROFIBUS diagnostic alarm. This OB is invoked as soon as a PROFIBUS slave has set the ExtDiag flag in the telegram reply. This ExtDiag flag allows a PROFIBUS slave to report an error condition to a PROFIBUS master. If OB82 is not present, the CPU is stopped when a PROFIBUS slave sets the ExtDiag flag.

OB86: PROFIBUS peripheral error. This OB is invoked when the PROFIBUS master detects a PROFIBUS slave failure.

OB100: Startup OB. This OB is run once when the CPU starts up.

VAT\_ASI\_IO: Variable table, AS-i startup example.



### 19.2.6 Variable table VAT\_ASI\_IO

In the hardware configuration the 16 bytes of I/O data for the AS-i/DP Gateway are coupled to the input/output byte Address 2 to 17 of the process image. The directly send AS-i diagnostic information for error processing are evident from the input bits of the EWO.

Flags + Fault Detector

- Bit 0 = Configuration error
- Bit 1 = Slave with address ZERO detected
- Bit 2 = Automatic addressing not possible
- Bit 3 = Automatic addressing available
- Bit 4 = Projecting mode active
- Bit 5 = Not in normal mode
- Bit 6 = AS-i Power Fail
- Bit 7 = AS-i Master is offline
- Bit 8 = Peripheral error
- Bit 9 = reserved
- Bit 10 = reserved
- Bit 11 = reserved
- Bit 12 = Earth fault<sup>1</sup>
- Bit 13 = Overvoltage

1. This bit is set if a release circuit or device, which is assigned to a safety related slave has following colors: 'flashing green', 'yellow', 'yellow' or 'flashing red'.

Bit 14 = Noise

Bit 15 = Double address

This allows the AS-i circuit data to appear directly in the process image inputs/ outputs.

VAT ASI_IO -- @BW ASI3\SIMATIC 300(1)\CPU 315-2 DP\S7-Programm(1) ONLINE					
	Operand	Symbol	Symbolkommentar	Anzahl	Statuswert
1	EB 2	"IN_Flags_Slave1"	Bit7-4=Flags Bit3-0=Slave1	BIN	2#0000_1000
2	EB 3	"IN_Slave2_Slave3"	Bit7-4=Slave2 Bit3-0=Slave3	BIN	2#0100_0000
3	EB 4	"IN_Slave4_Slave5"	Bit7-4=Slave4 Bit3-0=Slave5	BIN	2#0000_0000
4	EB 5	"IN_Slave6_Slave7"	Bit7-4=Slave6 Bit3-0=Slave7	BIN	2#0000_0000
5	EB 6	"IN_Slave8_Slave9"	Bit7-4=Slave8 Bit3-0=Slave9	BIN	2#0000_0000
6	E 2.4	"IN_ASI_Config_Error"	0=ConfigOK 1=ConfigError	BOOL	false
7	E 2.5	"IN_ASI_Power_Fail"	0=AS-iPowerOK 1=AS-iPowerError	BOOL	false
8	E 2.6	"IN_Periphery_Fault"	0=PeripheryOK 1=PeripherieError	BOOL	false
9	E 2.7	"IN_Configuration_Active"	0=ConfigActive 1=ConfigInactiv	BOOL	false
10					
11	AB 2	"OUT_Flags_Slave1"	Bit7-4=Flags Bit3-0=Slave1	BIN	2#0000_0000
12	AB 3	"OUT_Slave2_Slave3"	Bit7-4=Slave2 Bit3-0=Slave3	BIN	2#0000_0100
13	AB 4	"OUT_Slave4_Slave5"	Bit7-4=Slave4 Bit3-0=Slave5	BIN	2#0000_0000
14	AB 5	"OUT_Slave6_Slave7"	Bit7-4=Slave6 Bit3-0=Slave7	BIN	2#0000_0000
15	AB 6	"OUT_Slave8_Slave9"	Bit7-4=Slave8 Bit3-0=Slave9	BIN	2#0000_0000
16	A 2.4	"OUT_ASI_Off_Line"	0=OnLine 1=OffLine	BOOL	false
17	A 2.5	"OUT_LOS_Masterbit"	0=OffLine when ConfigError 1=active when ConfigError	BOOL	false
18	A 2.6	"OUT_Configuration_Mode"	-> Set Configuration Mode	BOOL	false
19	A 2.7	"OUT_Protected_Mode"	-> Set Protected Mode	BOOL	false
20					
21	EW 0	"FLags + Fault Detector"	AS-i Diagnose Information	BIN	2#0000_0000_0000_0000
22					

In the structure of the 16 byte I/O data field each AS-i slave has a 4-bit data field. This is determined by the address of the AS-i slave within the AS-i circuit.

Assignment of the I/O address and AS-i slave address		
Address byte	Bits 7 - 4	Bits 3 - 0
I/O byte 2	flags	slave 1
I/O byte 3	slave 2	slave 3
I/O byte 4	slave 4	slave 5
I/O byte 5	slave 6	slave 7
I/O byte 6	slave 8	slave 9
I/O byte 7	slave 10	slave 11
I/O byte 8	slave 12	slave 13
I/O byte 9	slave 14	slave 15
I/O byte 10	slave 16	slave 17
I/O byte 11	slave 18	slave 19
I/O byte 12	slave 20	slave 21
I/O byte 13	slave 22	slave 23
I/O byte 14	slave 24	slave 25
I/O byte 15	slave 26	slave 27
I/O byte 16	slave 28	slave 29
I/O byte 17	slave 30	slave 31

The data for the slaves present and projected in the AS-i circuit are refreshed based on their position in the I/O data field.

The data fields for non-present slaves are filled with zero.

This means for example the AS-i data for the AS-i slave having Address 12 occupy bits 7 - 4 in I/O byte 8 of the controller.

#### 19.2.6.1 AS-i flags byte 0, input bits 7 - 4

In order to check the current operating status of the AS-i circuit, the AS-i flags refreshed with each PROFIBUS cycle can be used. These for flags occupy bits 7 - 4 in input byte 0.

##### **AS-i Config Error:**

Bit 4: 0 = AS-i configuration OK, 1 = AS-i configuration faulty

If during running the gateway AS-i master detects a discrepancy between the nominal configuration and the actual configuration, this bit is set. This allows the control program to react to a faulty AS-i slave.

##### **AS-i Power Fail**

Bit 5: 0 = AS-i power OK, 1 = AS-i power fail

When there is a failure of the AS-i supply voltage, this is indicated by the AS-i power fail bit.

##### **AS-i Peripheral Error**

Bit 6: 0 = AS-i peripheral OK, 1 = AS-i peripheral error

This bit indicates that there is a peripheral error on an AS-i slave. This may result for example from incorrect parameterizing of the AS-i slave.

##### **AS-i Configuration Active**

Bit 7: 0 = AS-i configuration is active, 1 = AS-i configuration is inactive.

This bit indicates whether the AS-i gateway is in protected mode (Bit 7 = 0) or in projecting mode.



##### ***Information!***

*It is recommended that the AS-i flags be checked in the control program and to respond according to the reported states.*

#### 19.2.6.2 AS-i flags byte 0, output bits 7 - 4

Output bits 7 - 4 in byte 0 can be used to affect the status of the AS-i circuit by the controller.

##### **AS-i Off Line**

Bit 4: 0 = Online, 1 = Offline

Use this bit to enable/disable the data cycle of the AS-i circuit. If the AS-i Master is in offline mode, no AS-i communication with the AS-i slaves will take place.

##### **AS-i LOS Master Bit**

Bit 5: 0 = Offline when AS-i configuration error disabled, 1 = enabled

If this bit is set, the AS-i Master immediately switches to the offline phase and stops AS-i communication when an AS-i configuration error is detected. This results in the connected AS-i output modules immediately switching to safe mode (outputs turned off).

### AS-i Configuration Mode

Bit 6: 0 = no action, 1 = turn on configuration mode of AS-i Master

Setting Bit 6 switches the AS-i Master to configuration mode. Then for example the command interface can be used to save an existing AS-i configuration using the controller.

The rising edge is used for switching. After Bit 7 = 1 in the input flags has indicated that the AS-i Master is in configuration mode, output bit 6 must be reset again by the controller.

### AS-i Protected Mode

Bit 6: 0 = no action, 1= turn on protected mode of AS-i Master

After successful configuration of the AS-i Master through the command interface, the AS-i Master can be switched back to protected mode.

The rising edge is used for switching. After Bit 7 = 0 in the input flags has indicated that the AS-i Master is in configuration mode, output bit 7 must be reset again by the controller.

The table shows an AS-i circuit which is in operation. Since there is no AS-i error, bits 4 - 7 in the input byte are ZERO.

In the case of AS-i Slave address 1, this is a 4 I/O module. In this module Output 3 is set and Input 1 allocated.

AS-i Slave address 2 is a 4 Input module. Input 2 is set.

VAT ASI IO -- @BW ASI3\SIMATIC 300(1)\CPU 315-2 DP\S7-Programm(1) ONLINE						
	Operand	Symbol	Anzei	Statuswert	Steuerwert	
1	EB 2	"IN_Flags_Slave1"	BIN	2#0000_1000		
2	EB 3	"IN_Slave2_Slave3"	BIN	2#0100_0000		
3	EB 4	"IN_Slave4_Slave5"	BIN	2#0000_0000		
4	EB 5	"IN_Slave6_Slave7"	BIN	2#0000_0000		
5	EB 6	"IN_Slave8_Slave9"	BIN	2#0000_0000		
6	E 2.4	"IN_ASI_Config_Error"	BOOL	false		
7	E 2.5	"IN_ASI_Power_Fail"	BOOL	false		
8	E 2.6	"IN_Periphery_Fault"	BOOL	false		
9	E 2.7	"IN_Configuration_Active"	BOOL	false		
10						
11	AB 2	"OUT_Flags_Slave1"	BIN	2#0000_0000		
12	AB 3	"OUT_Slave2_Slave3"	BIN	2#0000_0100	2#0000_0100	
13	AB 4	"OUT_Slave4_Slave5"	BIN	2#0000_0000		
14	AB 5	"OUT_Slave6_Slave7"	BIN	2#0000_0000		
15	AB 6	"OUT_Slave8_Slave9"	BIN	2#0000_0000		
16	A 2.4	"OUT_ASI_Off_Line"	BOOL	false		
17	A 2.5	"OUT_LOS_Masterbit"	BOOL	false		
18	A 2.6	"OUT_Configuration_Mode"	BOOL	false	false	
19	A 2.7	"OUT_Protected_Mode"	BOOL	false	false	
20						
21	EW 0	"FLags + Fault Detector"	BIN	2#0000_0000_0000_0000		

### 19.2.7 System behavior on AS-i Config Error

If while running in protected mode a configured AS-i slave fails, an AS-i configuration error is generated.

1. The missing slave is shown on the display of the AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor.
2. The input flag AS-i Config Error bit 4 in byte 2 is set.
3. If the standard parameters for the PROFIBUS hardware configuration were applied unchanged for the AS-i/Gateway with safety monitor, the Gateway sets the ExtDiag flag in the PROFIBUS data reply. This results in the controller signaling a PROFIBUS slave error and invoking OB82. At the same time the event is written to the diagnostic buffer of the CPU.

If the message for the ExDiagFlag is turned off in the PROFIBUS parameters, no PROFIBUS message is generated and OB82 is not activated. This is always recommended for applications which do not have to respond immediately to an error using OB82. In such cases the status can be processed using the message bit of the AS-i Flags or the Flags + Fault Detector bits for the normal PLC cycle. Error management can be structured on the basis of these messages.

VAT ASI IO -- @BW ASI3\SIMATIC 300(1)\CPU 315-2 DP\S7-Programm(1) ONLINE					
	Operand	Symbol	Anzei	Statuswert	Steuwert
1	EB 2	"IN_Flags_Slave1"	BIN	2#0001_1000	
2	EB 3	"IN_Slave2_Slave3"	BIN	2#0100_0000	
3	EB 4	"IN_Slave4_Slave5"	BIN	2#0000_0000	
4	EB 5	"IN_Slave6_Slave7"	BIN	2#0000_0000	
5	EB 6	"IN_Slave8_Slave9"	BIN	2#0000_0000	
6	E 2.4	"IN_ASI_Config_Error"	BOOL	true	
7	E 2.5	"IN_ASI_Power_Fail"	BOOL	false	
8	E 2.6	"IN_Periphery_Fault"	BOOL	false	
9	E 2.7	"IN_Configuration_Active"	BOOL	false	
10					
11	AB 2	"OUT_Flags_Slave1"	BIN	2#0000_0000	
12	AB 3	"OUT_Slave2_Slave3"	BIN	2#0000_0100	2#0000_0100
13	AB 4	"OUT_Slave4_Slave5"	BIN	2#0000_0000	
14	AB 5	"OUT_Slave6_Slave7"	BIN	2#0000_0000	
15	AB 6	"OUT_Slave8_Slave9"	BIN	2#0000_0000	
16	A 2.4	"OUT_ASI_Off_Line"	BOOL	false	
17	A 2.5	"OUT_LOS_Masterbit"	BOOL	false	
18	A 2.6	"OUT_Configuration_Mode"	BOOL	false	false
19	A 2.7	"OUT_Protected_Mode"	BOOL	false	false
20					
21	Ew 0	"FLags + Fault Detector"	BIN	2#0001_0000_0000_0001	

In the diagnostic buffer of the CPU the configuration error which occurred is entered with "Module error".

The affected AS-i/Gateway with safety monitor can be ascertained from the diagnostic address of the slave which reports the error. This diagnostic address is evident as a parameter of the OB82 when it is invoked. The event is declared as an incoming event.

The diagnostic address, here 1022, refers to the specification in the hardware specification of the S7 with respect to the AS-i/Gateway with safety monitor.

The screenshot shows the 'Baugruppenzustand - CPU 315-2 DP' window. The title bar indicates the path 'Bw\_ASi3SIMATIC 300(1)\CPU 315-2 DP' and the CPU status is 'RUN' with 'Kein Forceauftrag'. The status is 'Fehler' (Error). The interface includes tabs for 'Allgemein', 'Diagnosepuffer', 'Speicher', 'Zykluszeit', 'Zeitsystem', 'Leistungsdaten', 'Kommunikation', and 'Stacks'. The 'Ereignisse' section shows a list of 8 events, all labeled 'Baugruppe gestört' (Module failed), occurring on 29.02.04. The details for event 1 (ID: 16# 3942) are shown below, including 'Anwenderinformation vorhanden', 'Diagnosealarm von Stellvertreter', 'Fehler baugruppenextern', 'Angeforderter OB: Diagnosealarm-OB (OB 82)', and 'Prioritätsklasse: 26'. The details for event 10 (ID: 16# 3942) are also shown, including 'Anwenderinformation vorhanden', 'Diagnosealarm von Stellvertreter', 'Fehler baugruppenextern', 'Angeforderter OB: Diagnosealarm-OB (OB 82)', and 'Prioritätsklasse: 26'.

Nr.	Uhrzeit	Datum	Ereignis
1	13:49:02:944	29.02.04	Baugruppe gestört
2	13:49:02:941	29.02.04	Baugruppe gestört
3	13:49:02:938	29.02.04	Baugruppe gestört
4	13:49:02:934	29.02.04	Baugruppe gestört
5	13:49:02:924	29.02.04	Baugruppe gestört
6	13:49:02:875	29.02.04	Baugruppe gestört
7	13:49:01:752	29.02.04	Baugruppe gestört
8	13:49:01:747	29.02.04	Baugruppe gestört

Details zum Ereignis: 1 von 10 Ereignis-ID: 16# 3942

- Baugruppe gestört
- Baugruppentyp: DP-Normslave
- Eingangsadresse: 1022
- Anwenderinformation vorhanden
- Diagnosealarm von Stellvertreter
- Fehler baugruppenextern

Speichern unter... Einstellungen... Baustein öffnen Hilfe zum Ereignis

Schließen Aktualisieren Drucken... Hilfe

Details zum Ereignis: 1 von 10 Ereignis-ID: 16# 3942

- Anwenderinformation vorhanden
- Diagnosealarm von Stellvertreter
- Fehler baugruppenextern
- Angeforderter OB: Diagnosealarm-OB (OB 82)
- Prioritätsklasse: 26
- externer Fehler, kommendes Ereignis

Speichern unter... Einstellungen... Baustein öffnen Hilfe zum Ereignis

Schließen Aktualisieren Drucken... Hilfe

As soon as the AS-i configuration error is cleared, the OB82 is invoked again. In turn the diagnostic address of the AS-i/Gateway with safety monitor, here 1022, is entered as a parameter and the event is declared as an outgoing event.

The screenshot shows the 'Baugruppenzustand - CPU 315-2 DP' diagnostic buffer window. The path is 'BW\_ASIS\SIMATIC 300(1)\CPU 315-2 DP' and the CPU status is 'RUN'. The status is 'OK' with 'Kein Forceauftrag'. The window has tabs for 'Allgemein', 'Diagnosepuffer', 'Speicher', 'Zykluszeit', 'Zeitsystem', 'Leistungsdaten', 'Kommunikation', and 'Stacks'. The 'Diagnosepuffer' tab is active, showing a list of events with columns for 'Nr.', 'Uhrzeit', 'Datum', and 'Ereignis'. The events are as follows:

Nr.	Uhrzeit	Datum	Ereignis
1	13:51:58:614	29.02.04	Baugruppe ok
2	13:51:58:608	29.02.04	Baugruppe gestört
3	13:51:58:605	29.02.04	Baugruppe gestört
4	13:51:58:602	29.02.04	Baugruppe gestört
5	13:51:58:599	29.02.04	Baugruppe gestört
6	13:51:58:595	29.02.04	Baugruppe gestört
7	13:51:58:587	29.02.04	Baugruppe gestört
8	13:51:58:584	29.02.04	Baugruppe gestört

Below the list, the details for event 1 are shown: 'Ereignis-ID: 16# 3842'. The details include: 'Baugruppe ok', 'Baugruppentyp: DP-Normslave', 'Eingangsadresse: 1022', 'Anwenderinformation vorhanden', 'Diagnosealarm von Stellvertreter', and 'Angeforderter OB: Diagnosealarm-OB IOB 821'. Buttons for 'Speichern unter...', 'Einstellungen...', 'Baustein öffnen', and 'Hilfe zum Ereignis' are visible. The bottom of the window has 'Schließen', 'Aktualisieren', 'Drucken...', and 'Hilfe' buttons.

The second screenshot shows the details for event 1 (ID: 16# 3842) with the following information: 'Eingangsadresse: 1022', 'Anwenderinformation vorhanden', 'Diagnosealarm von Stellvertreter', 'OB-Nummer: 82', 'Prioritätsklasse: 26', and 'externer Fehler, gehendes Ereignis'. The same set of buttons is present at the bottom.

Entry of the error messages in the diagnostic buffer of the CPU and invoking of the OB82 is a consequence of the set ExtDiag flag for an error in the AS-i 3.0 PROFIBUS Gateway with integr. Safety Monitor.

This can be prevented by turning off the ExtDiag flag in the PROFIBUS parameters of the AS-i/Gateway with safety monitor.

The errors can be responded to by the controller by querying the AS-i flag in the input data. This means a configuration error is reported twice in a standard case: Once via the AS-i flag Config Error and once via the ExtDiag flag in the PROFIBUS telegram.

If for timing reasons an AS-i error must be responded to in a non-interrupt controlled way, the message can be turned off using the ExtDiag flag. In this case it is sufficient to check the AS-i flag Config Error in the program sequence.

The same applies to the other messages.

If the message for various error states of the AS-i/Gateway with safety monitor is activated via the PROFIBUS and if the data for the PROFIBUS diagnostic data are enabled, the SIEMENS function module SFC13 can be used to retrieve the PROFIBUS diagnostic data of the AS-i Gateway and save them to a data module. Use of SFC13 is described in detail in the SIEMENS documentation for PROFIBUS.

### 19.3 Device-specific parameters

#### Acyclic Communication

Ein-/Ausschalten der azyklischen #variable<Feldbus>#-Kommunikation nach dem DPV1-Standard (nicht änderbar).

Default: Kommunikation nach DPV1 eingeschaltet.

#### AS-i Flags

Specifies whether the AS-i flags are sent in the #variable<Feldbus># diagnostic.

Default: Transmission in the #variable<Feldbus># diagnostic data.

#### Download Slave Parameters

Based on this entry the parameter bits can be downloaded for each AS-i slave. These are then sent to the connected AS-i slave when the AS-i cycle is started. Sending of the set parameters bits can be disabled with this value.

Default: Sending of the AS-i parameter bits enabled.

#### Double Address

The AS-i/Gateway with safety monitor detects when there is double addressing. This list can be sent with the diagnostic data.

Default: Transmission in the #variable<Feldbus># diagnostic data.

#### Earth Fault

The AS-i/Gateway with safety monitor can detect an earth (ground) fault. The information as to whether there is or is not an earth fault is sent in the diagnostic data.

Default: Transmission in the #variable<Feldbus># diagnostic data.

#### ExtDiag on Configuration Errors

When an AS-i configuration error occurs, the AS-i/Gateway with safety monitor sets the ExtDiag flag in its #variable<Feldbus># data reply. By setting this flag the Profibus DP slave tells the #variable<Feldbus># master that there is an error condition and that the diagnostic data are being updated.

In the case of the S7 controller invoking of the OB82 is triggered when an ExtDiag flag is set. If the latter is not present, the controller is stopped.

Setting this ExtDiag flag can be suppressed using this parameter. Consequently no interrupt controlled OB82 invoking is triggered in the controller, and the controller must then respond to a possible AS-i configuration error by checking the AS-i flag in the input data.

Default: Setting of the ExtDiag flag for AS-i configuration error is enabled.

#### **ExtDiag on AS-i Power Fail**

Activates and deactivates setting of the ExtDiag flag on AS-i power fail.

Default: Setting of the ExtDiag flag on AS-i power fail is enabled.

#### **ExtDiag on Peripheral Faults**

Activates and deactivates setting of the ExtDiag flag on peripheral faults.

Default: Setting of the ExtDiag flag on peripheral faults disabled.

#### **ExtDiag on Earth Fault**

Activates and deactivates setting of the ExtDiag flag on earth (ground) fault.

Default: Setting of the ExtDiag flag on earth fault is disabled.

#### **ExtDiag on Double Address**

Activates and deactivates setting of the ExtDiag flag on double address.

Default: Setting of the ExtDiag flag on double address is disabled.

#### **ExtDiag on Safety Status**

Set the ExtDiagFlag when there is a safety slave with red or yellow flashing device.

Default: Set ExtDiagFlag for safety slaves with red or yellow flashing device.

#### **Failsafe Behaviour**

Setting the master response when an AS-i slave fails.

Clear all bits: Input data are set to  $0_{hex}$  (standard)

Set all bits: Input data are set to  $F_{hex}$ .

Retain old value: Input data are left at the last valid value.

Default: Input data are set to  $0_{hex}$

#### **Freeze Diagnosis**

The diagnostic data are continuously updated during runtime. If this is not desired, this parameter can be used to disable continuous updating. Updating then takes place only when this is required by the #variable<Feldbus># standard.

#### **Input Data Filter**

Filtering of the input data by the specified number of AS-i cycles.

Default: No filtering of the input data.

#### **Language**

Selection of the displayed language.

Default: no change of the displayed language.

#### **List of Configuration Errors**

The AS-i/Gateway with safety monitor saves a list of all AS-i slaves which have triggered a present configuration error. This list can be sent with the #variable<Feldbus># diagnostic data.

Default: Transmission in the #variable<Feldbus># diagnostic data.

#### **List of Peripheral Faults**

The AS-i/Gateway with safety monitor saves a list of all AS-i slaves which have triggered a peripheral errors. This list can be sent with the PROFIBUS diagnostic data.

Default: Transmission in the #variable<Feldbus># diagnostic data.

#### **Noise and Over voltage**

The AS-i/Gateway with safety monitor analyzes the quality of the AS-i voltage during running. This assessment can be sent with the diagnostic data.

Default: Not transmitted in the #variable<Feldbus># diagnostic data.

#### **Safety Status**

Safety slaves whose device is in the red or yellow flashing state can be shown in the diagnostics.

Default: Display of device status enabled in diagnostics.

## 20. Codes indicated by the display

In the basic state of the configuration mode, the addresses of all detected slaves are displayed in two-second intervals. A blank display indicates that the LDS (List of Detected Slaves) is empty, no slaves were detected.

In the basic state of the protected operating mode, the display is either blank or displays the address of a faulty assignment.

During manual address programming, the slave address display has a different meaning (see also chapter "Operating in advanced display mode").

All displayed numbers bigger than 31 which can not be interpreted as a slave address are status or error messages of the master. They have the following meanings:

39	Advanced AS-i diagnostics: After pressing the 'set'-button a short-time AS-i power failure occurred.
40	The AS-i master is in offline phase.
41	The AS-i master is in detection phase.
42	The AS-i master is in activation phase.
43	The AS-i master starts the normal operating mode.
68	Hardware error: disturbed internal communication.
69	Hardware error: disturbed internal communication.
70	Hardware error: The AS-i master's EEPROM cannot be written.
71	Wrong PIC-type.
72	Hardware error: wrong PIC-processor.
73	Hardware error: wrong PIC-processor.
74	Checksum error in the EEPROM.
75	Error in the internal RAM.
76	Error in the external RAM.
77	AS-i control software error: Stack overflow (AS-i control II)
78	AS-i control software error: checksum error in the control program. <u>"control checksum"</u> : checksum in Control III C program (bin.file) not correct. The file is possibly damaged. <u>"control exec err"</u> : error in Control III C program. <u>"control watchdog"</u> : watchdog predetermined in Control III C program has expired . <u>"control incomp"</u> : Control III C program from another gateway type loaded (e.g. Ethernet IP in Profibus gateway).

79	Checksum error in the data menu. <u>"breakpoint"</u> : Control III C program in break point.
80	Error while attempting to exit the configuration mode: A slave with address zero exists.
81	General error while changing a slave address
82	The front panel operation is blocked. Until repowering-up the device can only be accessed from the host via the interface.
83	Program reset of the AS-i Control program: The AS-i Control program is being read from the EEPROM and copied into the RAM.
88	Display test while starting up the AS-i master
90	Error while changing a slave address in protected operating mode: No slave with address 0 existing.
91	Error while changing slave address: Target address is already used.
92	Error while changing slave address: New address could not be set.
93	Error while changing slave address: New address could only be stored volatile in the slave.
94	Error while changing the slave address in protected operating mode: Slave has wrong configuration data.
95	The error 95 is caused by a superfluous slave and not by a missing slave. That is why the slave address is occupied by this superfluous slave. (In the protected mode the slave addresses which caused any configuration error can be displayed by pressing the SET button. AS-i master without graphical display are not able to differentiate between a missing slave, an incorrect slave or a redundant slave. All incorrect addresses are displayed. By pressing the SET button 5 sec. the displayed address starts to flash. Pressing the SET button again the master attempts to program the slave at the address 0 to the incorrect address.)

## 21. Appendix: Startup on a Siemens NC control

The following example describes the settings needed for starting up a PROFIsafe Gateway on a Siemens NC control (here an 840dSL).

To place the PROFIsafe Gateway in operation on a Siemens control, a few settings are needed for the Gateway to function.

The individual items here are excerpted as examples from the corresponding Siemens manuals.

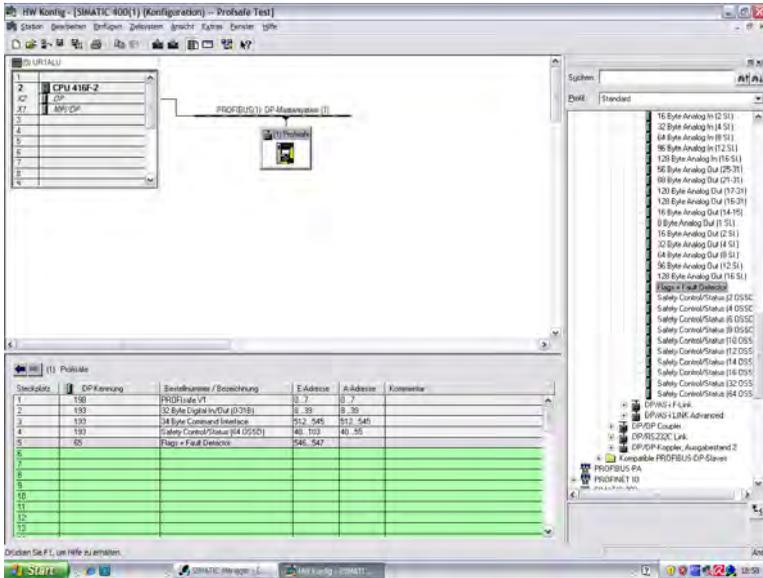
### 21.1 Setting in the S7 configuration

- Install the corresponding GSD file in the S7 hardware configuration.
- Insert the Gateway into the PROFIBUS circuit (this can be found under Profibus-DP, Additional field devices, Gateways, AS-i).
- Set the corresponding PROFIsafe protocol (the NC control only supports V1 at the present time).



**Note!**

The Profisafe data field must be inserted in "Slot 1" (see illustration).



The "F\_Dest\_Add" is set in the PROFIsafe data field, and must then also be set in the NC control under "PROFISAFE\_IN\_ADDRESS" and PROFISAFE\_OUT\_ADDRESS".

## 21.2 Setting in the NC control

The "PROFISAFE\_MASTER\_ADDRESS" is taken from the hardware configuration (F\_Source\_Address) and entered in number 10385.

**Example:**

10385 7D2 (corresponds to 2002 decimal)

## 21.3 Setting "PROFISAFE\_IN\_ADDRESS"

The "PROFISAFE\_IN\_ADDRESS" must be set in two 32-bit fields so that the 64-bit Gateway input data can be addressed.

**Example:**

10386[0] 050000CA (corresponds to 202 decimal, from the hardware configuration, F-destination address, the 5 at the beginning stands for Profibus, addresses the first 32 bits of the input data).

10386[1] 050100CA (corresponds to 202 decimal, from the hardware configuration, F-destination address, the 5 at the beginning stands for Profibus, addresses bits 33-64 of the input data).

## 21.4 Setting "PROFISAFE\_OUT\_ADDRESS"

The "PROFISAFE\_OUT\_ADDRESS" must be set analogous to the "PROFISAFE\_IN\_ADDRESS" so that all 64 bits can also be addressed here.

**Example:**

10387[0] 050000CA (corresponds to 202 decimal, from the hardware configuration, F-destination address, the 5 at the beginning stands for Profibus, addresses the first 32 bits of the output data)

10387[1] 050100CA (corresponds to 202 decimal, from the hardware configuration, F-destination address, the 5 at the beginning stands for Profibus, addresses bits 33-64 of the output data).

## 21.5 Setting "PROFISAFE\_IN\_ASSIGN"

Here you enter in which data range the safe input bits are entered in the INSE.

**Example:**

10388[0] 001032 (The first 32 bits are mapped from 1 to 32).

10388[1] 033064 (The next 32 bits are mapped from 33 to 64).

## 21.6 Setting "PROFISAFE\_OUT\_ASSIGN"

Here you enter from which data range the safe output bits are taken from the OUTSE.

### Example:

10389[0] 001032 (The first 32 bits are mapped from 1 to 32).

10389[1] 033064 (The next 32 bits are mapped from 33 to 64).

## 21.7 Setting "PROFISAFE\_IN\_FILTER"

Here the filter is defined which is used to write the data from the "PROFISAFE\_IN\_ADDRESS" to the "PROFISAFE\_IN\_ASSIGN". In this example there is no filter, rather all data are passed directly.

### Example:

13300[0] FFFFFFFF

13300[1] FFFFFFFF



### Information!

*The first byte **INSE 1** is reserved in the upper example! Slave 1 is mapped to the **INSE 2**. If it is not intended, we recommend you the following setting:*

13300[0] FFFFFFFE

13300[1] FFFFFFFF

Slave 1 is mapped to the **INSE 1** in this example.

## 21.8 Setting "PROFISAFE\_OUT\_FILTER"

Here the filter is defined for writing the data from the "PROFISAFE\_OUT\_ASSIGN" to the "PROFISAFE\_OUT\_ADDRESS". In this example there is no filter, rather all data are passed directly.

### Example:

13300[0] FFFFFFFF

13300[1] FFFFFFFF

## 22. Reference List

### 22.1 Manual: "ASIMON 3 G2 Configuration Software"

This Manual contains a detailed description of the configuration software for the AS-i Safety Monitor. The manual is an important component of the documentation for the AS-i Safety Monitor. It is not possible to configure and start up the AS-i Safety Monitor without the **ASIMON 3 G2** software.

### 22.2 Sources

1. Kriesel, Werner R.; Madelung, Otto W. (editors): AS-interface. Das Aktuator-Sensor-Interface für die Automation. Auflage, Carl Hanser Verlag; München, Wien, 1999, ISBN 3-446-21064-4
2. Spezifikation des AS-interface, ComSpec V3.0 AS-international Association (available from AS-international Association, <http://www.as-interface.net>).
3. Vorschlag eines Grundsatzes für die Prüfung und Zertifizierung von „Bussystemen für die Übertragung sicherheitsrelevanter Nachrichten“, Stand 29.2.2000.
4. AS-interface - Die Lösung in der Automation, Ein Kompendium über Technik, Funktion, Applikation (erhältlich, auch in englischer Sprache, bei AS-international Association, <http://www.as-interface.net>).

# FACTORY AUTOMATION – SENSING YOUR NEEDS



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