MANUAL

VAS-2A1L-K31
VAS-4A16L-K31
AS-Interface Safety Monitor

CE

PEPPERL+FUCHS

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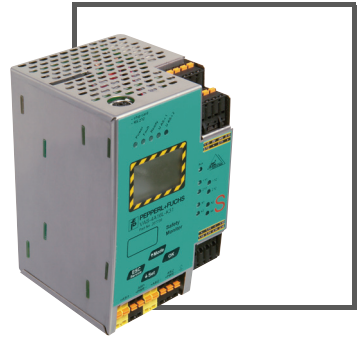
With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI)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

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Issue date: 21.10.2011

Conformity Statement

The AS-i Safety Monitor for 2 AS-i circuits has been developed and produced in accordance with the applicable european standards and directives. The conformity statement according to the EC EMC-, low voltage, and - maschinery directive can be sent to by request.

Additional information can be found in the Pepperl+Fuchs GmbH basic catalogue or in the online catalogue in internet.

Subject to technical modifications.

1. Symbol catalog

Information!

This symbol indicates important information.

Attention!

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

Warning!

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

1.1 Abbreviations

AS-i	AS-interface (actuator sensor interface)
AOPD	Active opto-electronic protective device
CRC	Cyclic redundancy check
I/O	Input/output
EDM	External device monitoring
EMC	Electromagnetic compliance
ESD	Electrostatic discharge
PELV	Protective extra-low voltage
PFD	Probability of failure on demand
PLC	Programmable logic control
SaW	Safety at Work, safety technic

Information!

Additional information can be found in section <Glossary>.

2. General

2.1 Product information

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

2.1.1 AS-i Safety Monitor for 2 AS-i circuits

Article no.	field bus interface	number of AS-i Masters	number of AS-i circuits	power supply decoupling unit integrated	RS 232 diagnostic interface	Ethernet diagnostic interface	number of release circuits	electronic safe outputs integrated	safety relays integrated	SaW outputs	non-safety related inputs
VAS-4A16L-K31	–	–	2	–	●	–	16	2	2	●	4
VAS-2A1L-K31	–	–	2	–	●	–	16	–	2	●	4
BW2205	–	–	2	–	–	●	16	–	2	●	4

Tab. 2-1. Function range "AS-i Safety Monitor for 2 AS-i circuits"

The AS-i Safety Monitor in a stainless steel enclosure is an E-STOP switching device which monitors safety configured slaves and correct function of the network.

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

The unit features two hierarchically equal AS-i circuits and four output switching elements (two safety relays and two semiconductor outputs).

Features:

- Greater computing power to allow more function modules
- Graphical display for better diagnostics
- Optional storing of configuration data on an interchangeable memory card.
- EDM & START inputs can be defined freely

2.2 Brief description

The Actuator-Sensor-Interface (AS-i) has been established as a system for networking primarily binary sensors and actuators on the lowest level of the automation hierarchy. The large number of installed systems, ease of use and reliable operating behavior make AS-i also ideal for machine safety applications.

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

The AS-i Safety Monitor performs monitoring within an AS-i system of the user-assigned safety slaves based on the configuration the user has set using configuration software. In case of a Stop request or a fault condition, the AS-i Safety Monitor safety shuts off the system with a response time of maximum 40 ms.
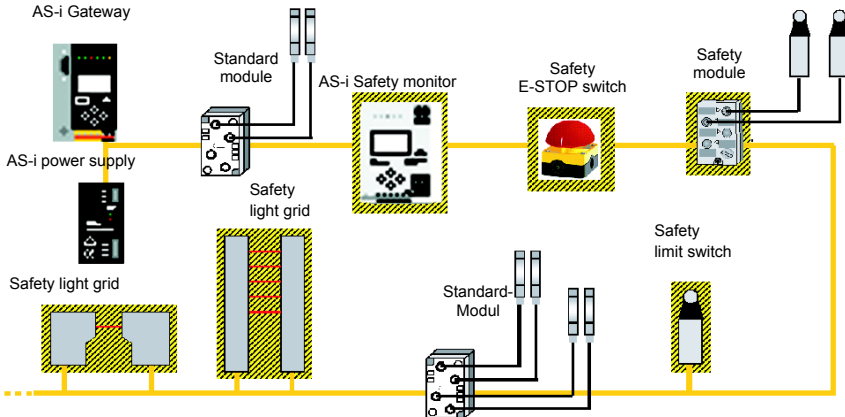
Abb. 2-1.   Safety configured and standard components in an AS-i network

Multiple Safety Monitors can be used within one AS-i system. A safe slave can be monitored by more than one AS-i Safety Monitor.

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3. Safety

3.1 Safety standard

The AS-I Safety Monitor has been developed, manufactured, tested and submitted for type testing in accordance with the safety standards prevailing at the time of testing. The safety requirements per Category 4 in accordance with EN 954-1, SIL3 in accordance with EN 61 508 and Performance Level "e" in accordance with EN ISO 13 849-1 are met by all devices.

Information!

A detailed listing of the values for probability of failure (PFD values) can be found in section Safety-relevant characteristic data.

Following a risk analysis you can sue the AS-I Safety Monitor in accordance with its safety category as a shut-down protection device for protecting hazardous areas.

3.2 Intended use

3.2.1 Conditions of use

The AS-I Safety Monitor has been developed as a **shut-down protection device** for protecting hazardous areas on powered equipment.

Attention!

Protection of operating personnel and equipment is not provided is the device is not used in accordance with its intended use.

Attention!

Manipulation of and changes to the devices other than expressly described in this Manual are not permitted.

3.2.2 Residual risks (EN 292-1)

The circuits suggested in this Manual have been tested and verified with the greatest care. The prevailing standards and regulations are met when using the components and wiring shown. Residual risks remain if:

- There are any deviations from the suggested wiring concept which may result in the connected safety-relevant assemblies or protective devices not being incorporated or only insufficiently incorporated into the safety circuit.
- The operator does not follow the prevailing safety regulations for operation, setting and maintenance of the machine. Machine inspection and maintenance intervals must be strictly observed.

3.3 Areas of application

The AS-I Safety Monitor, when properly used, enables the operation of sensor-controlled personal protection equipment and additional safety components.

The device also assumes the mandatory E-STOP function (Stop Category 0 or 1) for all non-manually operated machines, dynamic monitoring of the restart function and the protection monitoring function.

Examples for use of the AS-I Safety Monitor:

The device is used economically in machines and equipment in which the standard AS-I bus is the local bus. Using the Safety Monitor as a bus component allows already existing AS-I bus configurations to be easily expanded, and safety components having the corresponding AS-i Safety at Work interface can be inserted without difficulty. If there is no AS-I Safety at Work interface on the safety component, so-called coupling modules can be used to establish the connection. Existing AS-I masters and AS-I power supplies can be used as well.

There are no industry-specific restrictions. Some of the key applications are listed below:

•   Machine tools

•   Expanded machining centers with multiple control elements and safety sensors for wood and metal processing

•   Printing and paper processing machines, trimming machines

•   Packaging machinery, both stand-alone and as systems

•   Food and beverage machinery

•   Workpiece and bulk material conveying systems

•   Rubber and plastics industry processing machinery

•   Automatic assembly and handling equipment.

3.4   Organizational requirements

3.4.1   Documentation

All the specifications in this System Manual, in particular the sections "Safety Instructions" and "Commissioning", must be strictly observed.

All the safety instructions in the manual "**ASIMON 3 G2** Configuration Software" must be strictly observed.

Please note the safety rules when configuring the safety functions, see section Configuration of the safety functions. Checking of the release code and testing the system must be documented in writing and is part of the system documentation.

Keep this System Manual in a safe location where it can be readily accessed. It should always be available.

3.4.2   Traceability of the devices

The ordering party is responsible for ensuring traceability of the devices by serial number!

3.4.3   Safety regulations

Observe the locally prevailing legal regulations and requirements of the trade associations.

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3.4.4 Qualified personnel

Installation, commissioning and maintenance of the devices are to be performed only by qualified specialists.

Electrical work is to be performed only by electrical technicians.

Setting and changing the device configuration via PC and **ASIMON 3 G2** configuration software are to be performed only by an authorized safety representative.

The **password** for changing a device configuration must be kept under lock and key by the safety representative.

3.4.5 Repair

Repairs, in particular opening of the housing, are to be performed only by the manufacturer or by an authorized representative of the manufacturer.

3.4.6 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. Spezifications

4.1 Technical data

⚠️ ***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.

4.2 Technical data

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

4.3 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
Lifespan (TM) in years	20	EN ISO 13849-1: 2008
Maximum switch-on time in months	12	EN 61508
Max. system reaction time in milliseconds	40	EN 61508

Tab. 4-2.

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.

4.3.1 Overview of parameter for determining the failure rates

nop/y	switching intervals t_{cycle} [s]	B10d value	electromechanics		Standard
			MTTF$_d$ [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. 4-3.

nop/y	switching intervals t_{cycle}	B10d value	electronics PFH	electromechanics		PFH total	Standard
				MTTF$_d$	PFH		
105.120	300	2.500.000	4,76 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. 4-4.

4.4 System reaction times – example calculations

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

Tab. 4-5.

System configuration - example 1: Calculation of the system reaction time
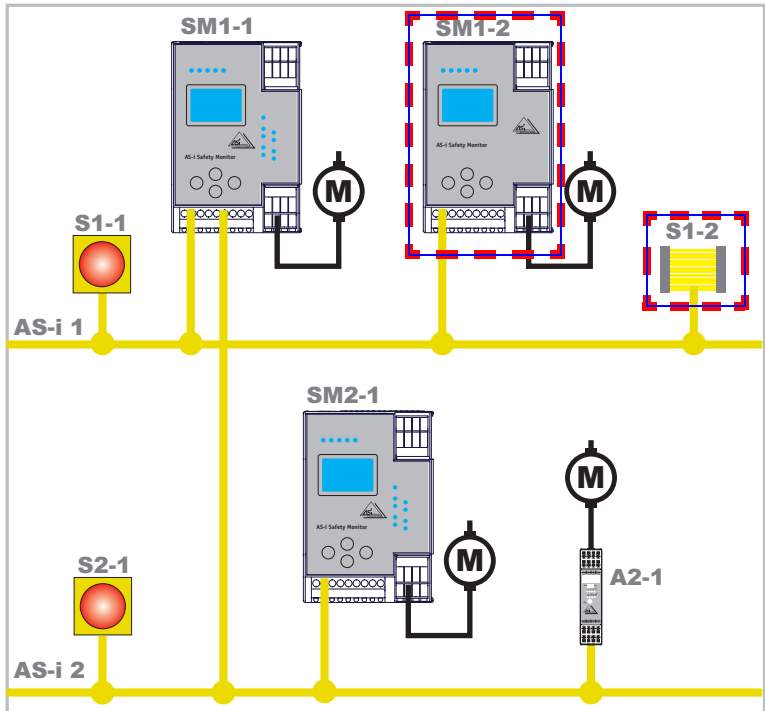
Abb. 4-2.

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
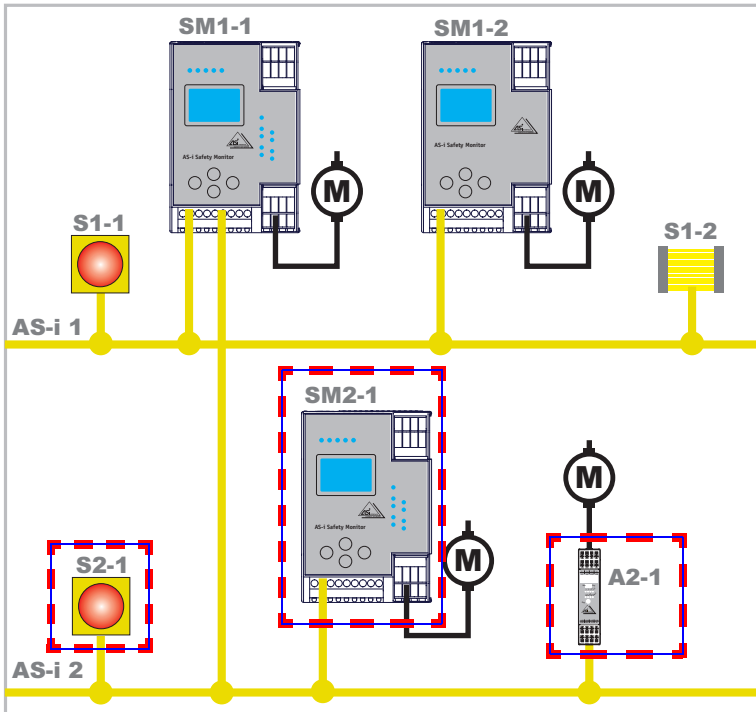
Abb. 4-3.

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:

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

System configuration - example 3: Calculation of the system reaction time
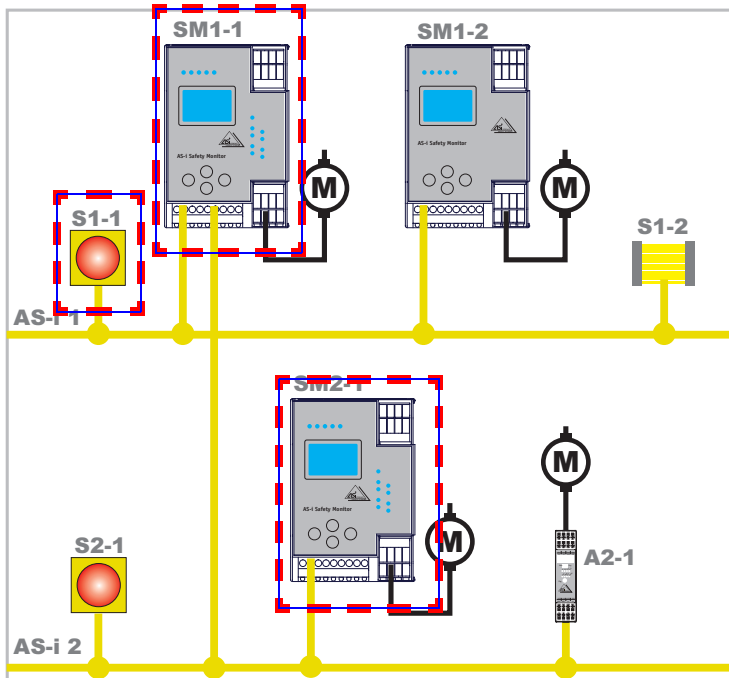
Abb. 4-4.

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:

$$t_{System\ total\ c)} = t_{R\ S1-1} + t_{R\ System\ ASI1} + t_{R\ System\ ASI2} = 100ms + 40ms + 40ms = \underline{180ms}$$

4.5 Scope of delivery

The **basic unit** consists of:

AS-i Safety Monitor for 2 AS-i circuits.

The following **accessories** are available:

Software CD with

- **ASIMON 3 G2** communication software for Microsoft® Windows 2000/XP/ Vista/Windows 7 ®

- System manual in PDF format (Adobe® Reader® Version 5.x or newer is required for viewing the files)

5. Installation

5.1 Dimensions

STOP
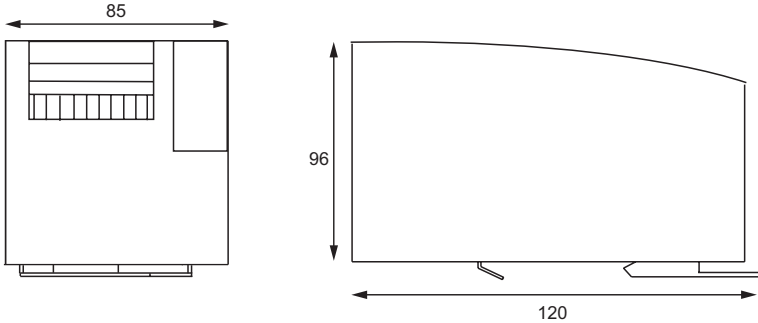
Warning!
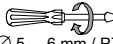
Cover the top of the AS-I Safety Monitor when doing any drilling work above the unit. No particles, especially metal chips, should be allowed to enter the housing, since this could cause a short circuit.

Information!

For additional information, please refer to <Section 15 "Appendix: Installation Notes">.

5.2 Connections

⌀ 5 ... 6 mm / PZ2	0,8 Nm 7 LB.IN
10	$2 \times (0,5 ... 1,5)\ mm^2$
10	$2 \times (0,5 ... 1,5)\ mm^2$
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.

5.3 Installing in the control cabinet

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

◯
🛈 *Information!*

The enclosure of the AS-i Safety Monitor 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.
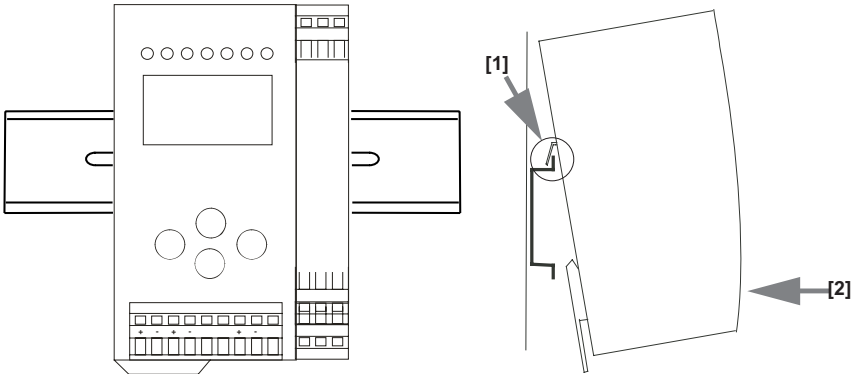
5.4 Removing
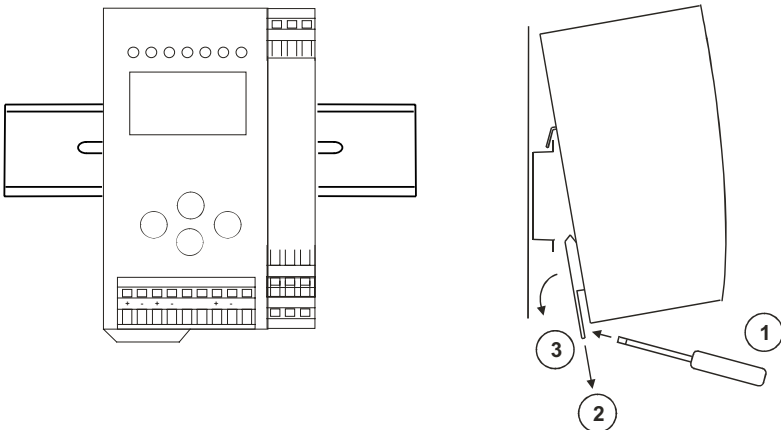
To remove, press the holding clamps [2] down using a screwdriver [1], press the unit firmly against the upper rail guide and lift out.

5.5 Electrical Connection

Information!

Electrical connections are described in section Electrical connection

5.6 Commissioning

5.6.1 Supply voltage for AS-I Safety Monitor

Supply by AS-i	Redundant: supply out of AS-i...	
	...or out of 24 V aux. power	... or out of AS-i 2
AS-i	AS-i 24 V, 0 V	AS-i 1 AS-i 2

5.6.2 Duplicate address recognition

5.6.2.1 AS-i Master without duplicate address recognition
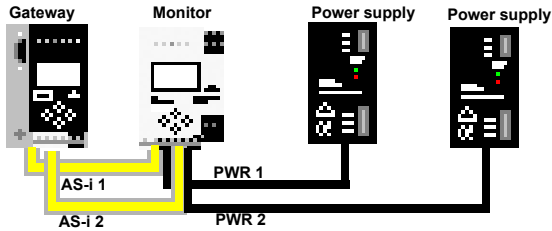
Duplicate address recognition in the AS-i Safety Monitor active

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5.6.2.2   AS-i Master with duplicate address recognition
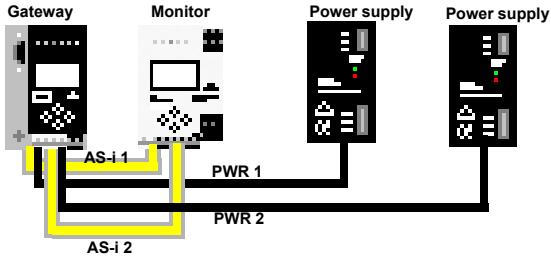
Duplicate address recognition in the AS-i Master active

5.7 Replacing the chip card

STOP *Always turn off power before inserting or removing the card!*

[1]

[2] **[3]** **[4]** **[5]**

old

[6] **[7]**

new

[8]

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

Unsichere Daten / Non-safe data/
Données non-sécurisées/
Dati non sicuri / Datos no seguros/

Geräte+Chipdaten ungleich
(Werkskonfiguration geändert)
/Device+card data not equal
(Factory configuration changed)/

Fehlermeldung:
/Error message/
CHIPCARD AND DATA DIFFERENT
CARD->MASTER
MASTER->CARD
CONTINUE

Daten kopieren
KARTE->MASTER oder
MASTER->KARTE
Copy data CARD->MASTER
or MASTER->CARD
Copier données Carte->Maître ou
Maître->Carte
Copiare dati Chipcard->Master o
copiare dati Master->Chipcard
Copiar dates Chip->Maestro o
Maestro->Chip

Geräte+Chipdaten gleich
/Device data+card data equal/

Keine Meldung
/No message/

Keine Aktion erforderlich
/No action required/
/Aucune action requise/
/Nessuna azione richiesta/
/Ninguna deción requrida/

Karte leer + formatiert
/Card empty + formatted/

Daten werden synchronisiert:
/Data being synchronized/
CHIPCARD FOUND
DATA WILL
BE SYNCHRONIZED

Keine Aktion erforderlich
/No action required/
/Aucune action requise/
/Nessuna azione richiesta/
/Ninguna deción requrida/

Daten kompatibel
(Werkskonfiguration)
/Data compatible (factory
configuration)/

Daten werden übemommen:
/Data being acepted/
DATA FROM
CHIPCARD TAKEN

Keine Aktion erforderlich
/No action required/
/Aucune action requise/
/Nessuna azione richiesta/
/Ninguna deción requrida/

Daten nicht kompatibel
/Data not compatible/

Fehlermeldung:
/Error message/
CHIPCARD NOT
COMPATIBLE

Karte löschen
/Clear the card/
/Supprimer carte/
/Cancellare chipcard/
/Borrar chip/

Karte nicht formatiert
/Card not formatted/

Karte wird formatiert
/Fomatting card/
NEW CHIPCARD
WILL BE FORMATTED
DATA WILL BE
SYNCHRONIZED

Keine Aktion erforderlich
/No action required/
/Aucune action requise/
/Nessuna azione richiesta/
/Ninguna deción requrida/

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

Stamm-/Vollständige Konfiguartion auf der Chipkarte enthalten /Master configuration or complete configuration on the card

Gerät enthält validierte Konfiguration, Daten *ungleich* /There is a validated configuration on the card, data *not equal*

Beide Konfigurationen *ungleich*/ Both configurations *not equal*

Fehlemeldung: /Error message/
ERROR. CHIPCARD AND SAFETY DATA DIFFERENT. DELETE CHIPCARD OR SAFETY DATA

Daten löschen /Clear data/ /Supprimer données / /Cancellare dati /Borrar datos

---

Stamm-/Vollständige Konfiguartion 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 gleich/ Both configurations identical

Keine Meldung/ /No message/

Keine Aktion erforderlich /No action required/ /Aucune action requise/ /Nessuna azione richiesta/ /Ninguna deción requrida/

Gerät enthält *keine* validierte Konfiguration /No validated configuration in the device/

Stamm-/Vollständige Konfiguartion auf der Chipkarte /Master configuration or complete configuration on the card

Datenfreigabe per Release-Code notwendig/ /Data release via release code required/

COPY BANK A TO MONITOR
...
RELEASE CODE:
1BDF

TYPE CODE   OK
1BDF

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 configuratión con el código de liberatión/

Validierte Konfiguration im Gerät, Chipkarte leer /Validated configuration in the device, chip card empty/

Daten werden synchronisiert: /Data being synchronized/
CHIPCARD FOUND SAFETY DATA WILL BE SYNCHRONIZED

Keine Aktion erforderlich /No action required/ /Aucune action requise/ /Nessuna azione richiesta/ /Ninguna deción requrida/

Keine validierte Konfiguration im 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 requise/ /Nessuna azione richiesta/ /Ninguna deción requrida/

Sichere Daten auf der Chipkarte nicht kompatibel zum Gerät /Safe data on the chip card not compatible to the device/

Fehlemeldung: /Error message/
CHIPCARD NOT COMPATIBLE

Karte löschen /Clear the card/ /Supprimer carte/ /Cancellare chipcard/ /Borrar chip/

For further information see manual, section <Chip card>

5.8 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. Only one missing slave is allowed!

[1]

[2] ESC/Service
(3 seconds)

CONNECT
NEW SLAVE 17
THEN PRESS
SERVICE

[3]

[4] ESC/Service
(3 seconds)

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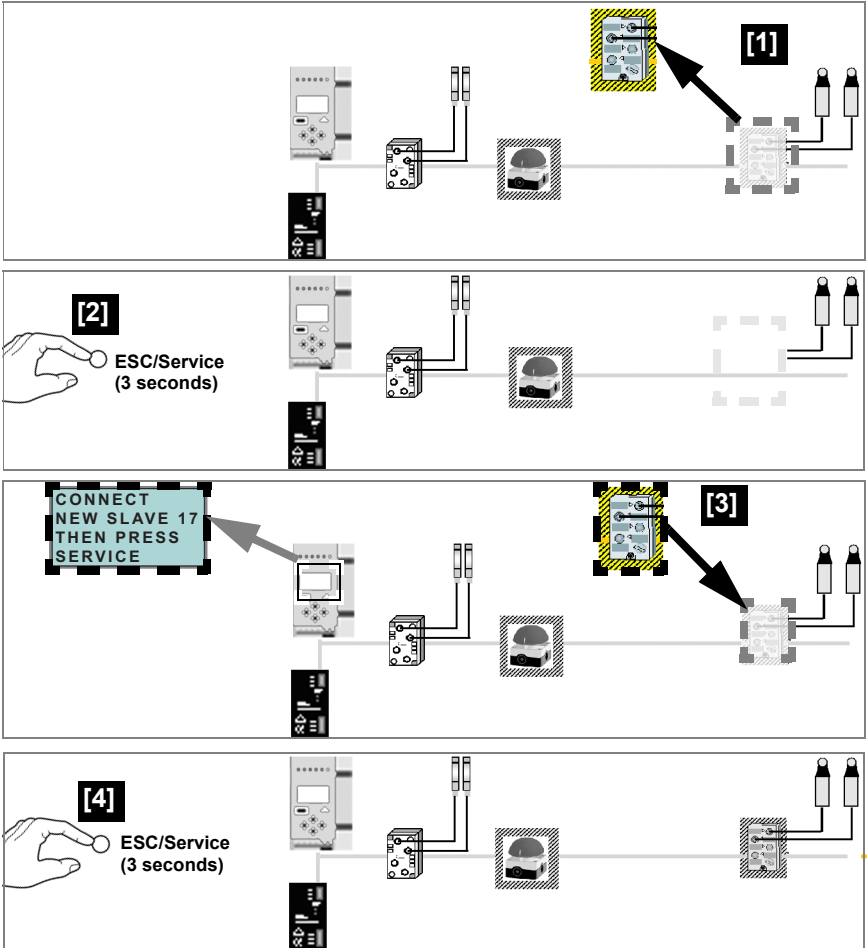
5.9 Safe configuration using ASIMON 3 G2
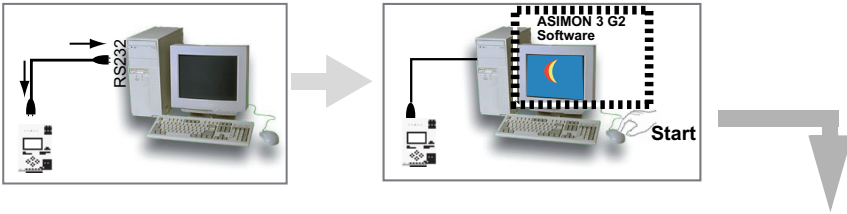
ASIMON 3 G2 Software

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.

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

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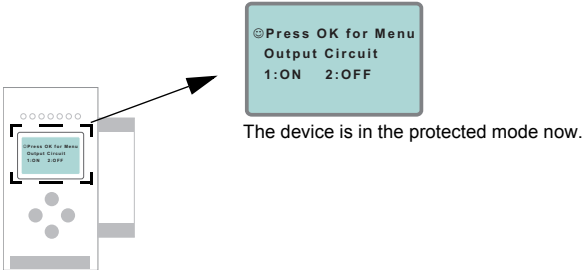
If you have assigned the safety monitor its own address in the software ASIMON 3 G2, adjust the configuration in the AS-i master (Quick Setup)! This is also valid when using simulated slaves.

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

6. Maintenance

6.1 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.
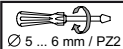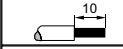
When the total operating time (20 years) has been reached, the device must be returned to the manufacturer to check for proper function.

7. Electrical connection

7.1 Overview of terminals, indicators and operating elements

7.1.1 VAS-2A1L-K31
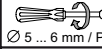
⊘ 5 ... 6 mm / PZ2	0,8 Nm 7 LB.IN	
10	2 x (0,5 ... 1,5) mm²	
10	2 x (0,5 ... 1,5) mm²	
AWG	2 x 24 ...12	

Legend:

[1]   Chip card slot
[2]   RS 232 diagnostics port[1]
[3]   LEDs
[4]   LC display
[5]   Buttons
[6]   Terminals: Supply voltage and AS-i circuit
[7]   Terminals: Safety Monitor

---

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

7.1.2   VAS-4A16L-K31

⌀ 5 ... 6 mm / PZ2		0,8 Nm 7 LB.IN
10		2 x (0,5 ... 1,5) mm²
10		2 x (0,5 ... 1,5) mm²
AWG		2 x 24 ...12

Legend:

[1]	Chip card slot
[2]	RS 232 diagnostics port[1]
[3]	LEDs
[4]	LC display
[5]	Buttons
[6]	Terminals: Supply voltage and AS-i circuit
[7]	Terminals: Safety Monitor

---

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

7.2 AS-i bus connection

Blue
AS-i-

Brown
AS-i+

Blau
AS-i-

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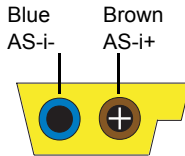
Yellow ASi ribbon cable
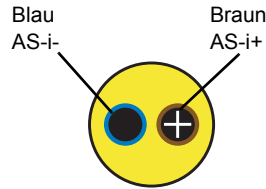
2-conductor AS-i round cable
(Recommended: flexible power cable
H05VV-F2x1,5 per DIN VDE 0281)

Information!

Electrical work is to be performed only by electrical technicians.

7.3 Information about the device types

Information!

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

7.4 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 should be made with as short a cable as possible to ensure good EMC characteristics.

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.

7.4.1   Electrical connection VAS-2A1L-K31
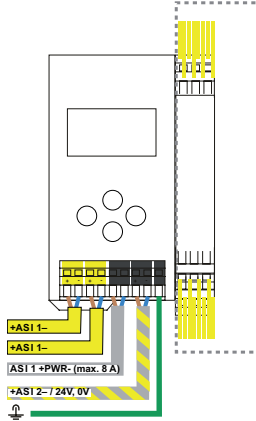
Terminal	Signal / Description
+ASI 1–	Connection to AS-i Circuit 1
ASI 1 +PWR–	Supply voltage for AS-i Circuit 1 (max. 8 A)
+ASI 2 – / 24 V, 0 V	Connection to AS-i Circuit 2; 24V supply Safety Monitor optional
FG	Function ground

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.

7.4.2 Electrical connection VAS-4A16L-K31
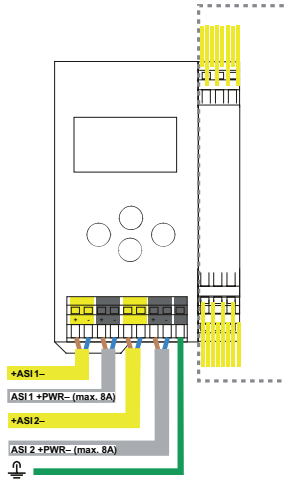
Terminal	Signal / Description
+ASI 1–	Connection to AS-i Circuit 1
+ASI 2–	Connection to AS-i Circuit 2
ASI 1 +PWR–	Supply voltage for AS-i Circuit 1 (max. 8 A)
ASI 2 +PWR–	Supply voltage for AS-i Circuit 2 (max. 8 A)
FG	Function ground

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.

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7.5 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.

7.5.1 VAS-4A16L-K31, VAS-2A1L-K31

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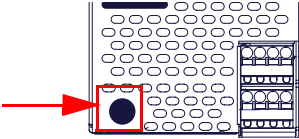
7.6 Chip card
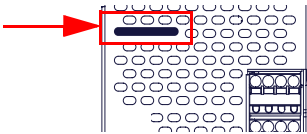
The configuration is stored in a fixed installed EEPROM and can be overwritten by the chip card. The chip card does not have to be inserted in operation.

Warning!

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

7.7 Release circuits

7.7.1 Wiring overview – Safety Monitor VAS-4A16L-K31
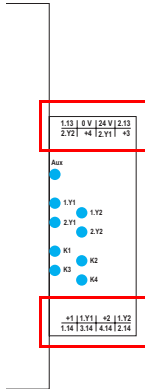
1.Y1 (EDM 1/Start 1), 2.Y1 (EDM 2/Start 2), 1.Y2 (EDM 3/Start 3), 2.Y2 (EDM 4/Start 4)

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_{DC}.

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7.7.2 Wiring overview – Safety Monitor VAS-2A1L-K31
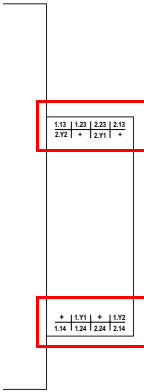
1.Y1 (EDM 1), 1.Y2 (Start 1), 2.Y1 (EDM 2), 2.Y2 (Start 2)

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_{DC}.

7.8 Indicators and operating elements

7.8.1 LED indicators – Monitor VAS-4A16L-K31

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

power
The monitor is receiving sufficient power.

fault	
LED *on:*	Communications fault on the AS-i cable
LED *flashing:*	At least 1 OSSD flashing red

ready	
LED *on:*	Startup/restart block active /
LED *flashing:*	External test required

U AS-i 1 / U AS-i 2
AS-i 1 / AS-i 2 receiving sufficient power

7.8.2 LED indicators – Safety Monitor VAS-2A1L-K31

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

power

The monitor is receiving sufficient power.

U AS-i / fault

Communications fault on the AS-i cable /
Error lock, release circuit active
flashes red if one AS-i safety slave is faulty
illuminates red if communication on the AS-i bus is faulty
illuminates green if AS-i voltage is sufficient

ready

LED *on:*   startup/restart-disable active /
LED *flashing:*   external test necessary

channel 1 / channel 2

State of safety output contact (OSSD):
LED off: open
LED on: closed
LED flashing: delay time runs in event of Stop Category 1

7.8.3 LED indicators – safety unit in VAS-4A16L-K31
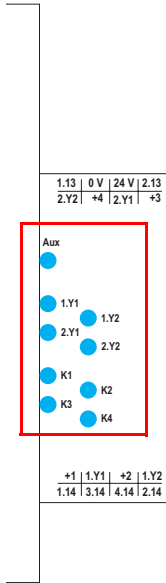
The LED's on the safety unit indicate:

Aux
24 V supply for the semiconductor outputs is present.

1Y.1, 1Y2, 2Y.1, 2Y.2
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.

K1, K2
Contact sets 1.13, 1.14 (K1) resp. 2.13, 2.14 (K2) closed.

K3, K4
Auxiliary voltage is present on the semiconductor output 3.14 (K3) resp.4.14 (K4).

7.8.4 LED indicators – safety unit in VAS-2A1L-K31

LEDs are not used in the safety unit in these devices.

7.8.5   Buttons

The buttons are used for the following:

⇑ / ⇓
Navigation in extended mode
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

8. 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 Language (menu language)).

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.

8.1 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.

8.2 Functions of the AS-i Fault Detector

8.2.1 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 monitor.

8.2.2 Earth/Ground Fault Detector

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

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

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 monitor 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.

8.2.3 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.

8.2.4 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.

8.3 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.

3. 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.

8.3.1 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

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> • 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.

8.3.2 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 MONITOR CONFIG (configuration of the int. monitor)):

- 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.

8.3.3 Configuration using a chip card with complete configuration

The chip card contains the complete configuration if:

- An empty chip cared 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 (sectionMONI-TOR CONFIG):

• 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.

8.4 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.

8.5 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
- Diagnostics through AS-i (see section Diagnostics for AS-i Monitor and networking using AS-i Master).
- ASIMON software over diagnostic port
- AS-i Control Tools over diagnostic port

The following diagnostics can be displayed (see section DIAGNOSTICS):

- Display of the switching state of the outputs
- State ("color") of the devices; distinction when turning off only one channel ("Category 2")
- Error history for finding the cause of sporadic errors

8.5.1 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.

8.5.2 Profile and diagnostics using AS-i

Diagnostics is handled using an AS-i slave based on profile S-7.5.5. For additional information see section Diagnostics using Profile S-7.5.5.

8.6 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.

8.6.1 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 sectionReplacing 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

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 TEACH CODES).

8.6.2   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

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•   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.

8.7 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.

8.8 Chip card

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

STOP
Warning!

Always turn off power before inserting or removing the card.

8.8.1 Unsafe data

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

8.8.1.1 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.

8.8.1.2 Data not compatible

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

```
CHIPCARD NOT
COMPATIBLE
```

8.8.1.3 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.

8.8.1.4 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.

8.8.1.5 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.

8.8.1.6 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->MONITOR
MONITOR->CARD
CONTINUE
```

Command	Description
CHIP CARD>MONITOR	Chip card data are copied to the Monitor

MONITOR->CHIPCARD	Monitor 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.

8.8.2 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.

8.8.2.1 Data incompatible

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

```
CHIPCARD NOT
COMPATIBLE
```

8.8.2.2 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
```

8.8.2.3 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.

8.8.2.4 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.

8.8.2.5 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.

8.8.2.6   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.

8.8.3   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 Safety Monitor for 2 AS-i circuits 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.

9. Operation in advanced display mode

Information!

From SETUP/LANGUAGE you can set the desired menu language (German, English, French, Italian or Spanish), see Language (menu language).

9.1 Overview

Commissioning

classic mode

1.12A

underlined data can be edited   advanced display mode   items in italic are not always available

Basic Operation

The device starts in the traditional mode. You can switch between the two modes with ESC or OK. In the advanced mode the cursor is moved by both arrow buttons. Pushing OK puts you to the superior menue (in the drawing one step to the right side). ESC puts you back to the previous menue. To edit data you first mark them with the cursor and then select them with OK, change them with the arrow buttons and finally apply them with OK. Pushing ESC cancels the editing.

Issue date: 21.10.2011

Commissioning

classic mode

1.12A

underlined data can be edited

advanced display mode

AS-I SAFETY
DIAGNOSIS
SETUP
DISP CONTRAST

DIAGNOSIS

AS-I CIRCUIT 1
AS-I CIRCUIT 2

SAFETY SLAVES
MONITOR
ERROR COUNTERS
LPF
FAULT DETECTOR
AS-I MONITOR

SAFETY ORIENTED
SLAVES
          | 1-XX
2-RX | 3-RR
4- | 5-
...
HELP:
X   CHANNEL OK
R   CH. RELEASED
ON   OUTPUT ON
OFF OPUT OFF
?   OUTPUT STATE
     UNKNOWN

AS-I CIRCUIT 1
AS-I CIRCUIT 2

SAFETY MON
DIAGNOSIS
LAST DIAGNOSIS
VIEW CONFIG

SAFETY MON
COMPLETE
DIAG INDEX

DIAGNOSIS
CH.   1
OK

SAFETY MON
DIAGNOSIS
STATUS: CFG
...
AS-I 1
SLAVE S
          | 1-XX
...
AS-I 2
...
A   COLOR
...
HELP:
X CHANNEL OK
R CH. RELEASED
ON OUTPUT ON
OFF OUTPUT OFF
? OUTPUTSTATE
  UNKNOWN
A DEVICE ADR.

FAULT DETECTOR
RESET
HISTORIC:
EFLT OVRV NOIS
ACTUAL:
EFLT OVRV NOIS
DUP ASI ADR:
0 |31B
HELP:
EFLT EARTH FAULT
OVRV OVERVOLTAGE
NOIS NOISE
DUP ASI ADR
DUPLICATE ASI
SLAVE ADDRESS

LAST DIAGNOSIS
CH COMPLETE
DIAG INDEX

SAFETY MO N
LAST DIAG CH
STATUS: CFG
A COLOR
32 RED
33 GREY
34 F YELLOW
...
HELP:
A DEVICE ADR.
+ CHANGED

ERRORCOUNTERS
FOR SLV. DETAILS
PRESS OK ON ADDR
RESET
1A-   0
...
31A-   66535
1B-   34
...
30B-   0

MONITOR CONFIG
COMPLETE
CONFIGURATION
FGDG
MON.VER.: 3.0
RELEASED
          BY SA
      ON 2007/11/15
      AT: 14:30
RELEASED CODE:
81FE

LPF LIST OF
PERIPH. FAULTS
          | 1A-X
2A- | 3A-X
4A-X | 5A-X
....
30A-X | 31A-
          | 1B-X

SWID:
12345
SAFE CPU A:
12345
SAFE CPU B:
12345
UART CPU 1:
12345
UART CPU 2:
12345

DISP CONTRAST

DISPLAY CONTRAST
DEFAULT

SETUP

CHIPCARD
LANGUAGE
FACTORY RESET

CHIPCARD
CARD->MONITOR
MONITOR->CARD
CLEAR CHIPCARD

LANGUAGE
ENGLISH   X
DEUTSCH
FRANCAIS
ITALIANO
ESPANOL

FACTORY RESET
DO RESET

Basic Operation

The device starts in the traditional mode. You can switch between the two modes with ESC or OK. In the advanced mode the cursor is moved by both arrow buttons. Pushing OK puts you to the superior menue (in the drawing one step to the right side). ESC puts you back to the previous menue. To edit data you first mark them with the cursor and then select them with OK, change them with the arrow buttons and finally apply them with OK. Pushing ESC cancels the editing.

9.2 Navigation in advanced mode

The device starts up in traditional (classical) mode. Switch to advanced mode by pressing the OK key. From advanced mode you can return to traditional mode by repeatedly pressing the ESC/Service key.

In advanced mode you can use the two arrow keys to move a selection bar up or down. The OK key changes to the selection function or to the displayed menu. The ESC/Service key returns the user to the previous menu.

If the values need to be edited, they must first be highlighted in the selection bar, then selected using OK, changed using the arrow keys and then applied by pressing OK. The ESC/Service key cancels the editing.

When slave addresses are displayed, all possible slaves are shown in order. From 1A – 31A and from 1B – 31B. Data for single slaves are set for addresses 1A – 31A.

9.3 AS-I SAFETY

Main Menu || AS-I SAFETY || **TEACH SAFETY** ||

```
TEACH SAFETY
SAFE OUTPUT CH
SAFE COUPLING
START/STOP
CLEAR SAFE CFG
PIN
SAFE CHIPCARD
PROTECT
```

This menu enables the following functions:

TEACH SAFETY:	Teaching code sequences using the display
SAFE OUTPUT CH:	Display function for the status of the individual channels
SAFE COUPLING:	Generating safe coupling slaves on the second AS-i circuit (Optional Menu)[1]
START/STOP	Changing mode Safe operating mode / configuration mode
CLEAR SAFE CFG:	Deleting the safe configuration
PIN:	Changing the PIN number
SAFE CHIPCARD:	Chip card configuration
PROTECT:	Protecting the configuration on the chip card

1. This function is only displayed if no coupling slaves were entered in the configuration.

9.3.1 TEACH CODES

The TEACH CODES menu enables teaching of code sequences using the display.

9.3.1.1 TEACH CODES – COMPLETE

Main Menu || AS-I SAFETY || TEACH CODES || **TEACH CODES COMPLETE** ||

In the sub-menu TEACH CODES COMPLETE you teach the code tables for all included safety AS-i slaves.

First enter the PIN and confirm with OK.

```
TEACH CODES
COMPLETE
SINGLE SLAVE
COUPLING SLAVE
SNGL SLAVE CODE
```

```
TEACH CODES
ENTER PIN
0000
OK
```

If the PIN was correctly entered, the Monitor is stopped and the following informa-
tion appears:

```
TEACHING CODES
CLOSE CONTACTS

AS-I  1:
      |1-OK
2-RX  | 3-RR
....  |
30-DC |31-DC

AS-I  2:
      | 1-OK
2-RX  | 3-RR
....  |
30-DC |31-DC
....
HELP
   NO SAFETY SL
MS MISSING SLAVE
X  CH OK
R  CH RELEASED
OK CODE LEARNED
ER CODE ERROR
DC DUPL.CODE
```

Information!

*If all safety AS-i slaves have been successfully taught, the first line in the display chan-
ges from TEACHING CODES to CODES LEARNED.*

All safety contacts (also in sequence) must be closed for the safety unit to learn
the code sequences. Incomplete code tables are not learned.

Press on ESC/Service to quit learning. It is then possible to restart the Monitor:

```
┌─────────────────────────────┐
│  START MONITOR?             │
│                             │
│                             │
│  OK                         │
└─────────────────────────────┘
```

Information!

See also Procedure for configuring and teaching code sequences.

9.3.1.2 SINGLE SLAVE

Main Menü || AS-I SAFETY || TEACH CODES || **SINGLE SLAVE** ||

This menu point allows you to teach the code table for a safe slave. Proceed as follows:

- Use the arrow keys to navigate to the third line (0000) on the display
- Enter the PIN there
- Use the arrow keys to navigate to the fourth line (OK) on the display
- Confirm your entries with OK

```
┌─────────────────────────────┐
│  TEACH CODES                │
│  ENTER PIN                  │
│  0000                       │
│  OK                         │
└─────────────────────────────┘
```
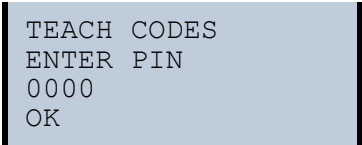
In the following menu:

- Use the arrow keys to select the AS-i circuit (1/2)
- Confirm with OK

```
┌─────────────────────────────┐
│  AS-i CIRCUIT 1             │
│  AS-i CIRCUIT 2             │
└─────────────────────────────┘
```
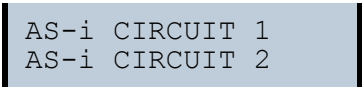
After selecting the AS-i circuit the safe unit switches to configuration mode.

In the following menu:

- Use the arrow keys to navigate to the second line (– –1) on the display

```
┌─────────────────────────────┐
│  TEACH CODES                │
│  SLAVE ADDR.    --1         │
│  ESC            OK          │
│  ...                        │
│  HELP           ⇓           │
└─────────────────────────────┘
```
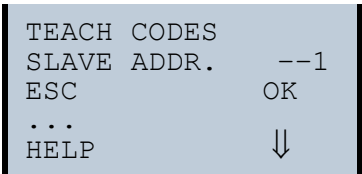
- Confirm with OK (display flashes)
- Use the arrow keys to enter the desired address
- Confirm with OK (display stops flashing)
- Use one of the two arrow keys to exit the input screen
- Save with OK, or cancel the process by pressing ESC.

Information!

Be sure that all slave contacts on the corresponding slave are closed.

The teaching procedure was successful if an OK appears in the third line.

The grafical symbols indicate the state of the contacts:

Message	Description
RR	Both contacts open
RX	Left contact open, right contact closed.
XR	Right contact open, left contact closed.

Press the OK key to save the learned code table or press ESC to discard it.

9.3.1.3 COUPLING SLAVE

Main Menu || AS-I SAFETY || TEACH CODES || **COUPLING SLAVE** ||

This menu point allows you to teach the code table for a coupling slave. To continue, enter the PIN and confirm with OK.

```
TEACH CODES
ENTER PIN
0000
OK
```

In the following menu you select the AS-i circuit.

```
AS-i CIRCUIT 1
AS-i CIRCUIT 2
```

After selecting the AS-i circuit the safe unit switches to configuration mode.

Then enter the slave address.

```
COUPLING SLAVE
SLAVE ADDR.   --1

ESC
```

The teach procedure was successful if after approx. 2 s an OK appears in the display.

```
COUPLING SLAVE
SLAVE ADDR.    --1

ESC         [OK]
```

Save with OK, or cancel the process by pressing ESC.

9.3.1.4   INPUT CODE SEQ.

Main Menu || AS-I SAFETY || TEACH CODES|| **INPUT CODE SEQ.** ||

This menu point allows you to directly enter the code sequence for a particular AS-i safety slave. If the slave address is already indicated, you can directly enter the sequence using the keys and then save or discard it.

To continue, enter the PIN and confirm with OK.

```
TEACH CODES
ENTER PIN
0000
OK
```

In the following menu you select the AS-i circuit.

```
AS-i CIRCUIT 1
AS-i CIRCUIT 2
```

After selecting the AS-i circuit the safe unit switches to configuration mode.

Then enter the code sequence.

```
SLAVE ADDR      --
ENTER CODE       1
   00000000
ESC            OK
```

If no error message is displayed, the teach procedure was successfully completed.

Use OK to save the entries and return to the previous menu. Use ESC to cancel the procedure.

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9.3.2 SAFE OUTPUT CH (channels for the release circuits)

Main Menu || AS-I SAFETY || **SAFE OUTPUT CH** ||

```
SAFE OUTPUT
CHANNELS
CH 1:   ON
CH 2:   OFF
...
CH 16:  OFF
```

In this menu you can read off the status of the 16 release circuits.

9.3.3 SAFE COUPLING (optional menu)

Main menu || AS-I SAFETY || **SAFE COUPLING** ||

```
SAFE COUPLING
ON CHANNEL     2
<ADR        00>
<ENABLE>
```

Information!

This menu is only displayed if there are no coupling slaves in the configuration.

On the 2nd AS-i circuit up to two safe AS-i slaves (coupling slaves) can be created which represent the states of the first two release circuits.

```
SAFE COUPLING
ON CHANNEl     2
<ADR        10>
<DISABLE>
```

After entering the address (using the arrow keys) and confirming (with OK), the display changes from ENABLE to DISABLE. Selecting DISABLE sets the address to "00".

For additional information refer to Safe coupling slaves on the AS-i circuits.

9.3.4 START/STOP (changing the Monitor mode)

Main Menu || AS-I SAFETY || **START/STOP** ||

```
START/STOP
ENTER PIN
0000
OK
```

```
          START/STOP

          STOP
```

In this menu you change the mode of the Monitor.

START:	Sets the Monitor to protecting operating mode
STOP:	Sets the Monitor to configuration mode

9.3.5 CLEAR SAFE CFG (delete safe configuration)

Main Menu|| AS-I SAFETY || **CLEAR SAFE CFG** ||

```
          CLEAR SAFE CFG
          ENTER PIN
          0000
          OK
```
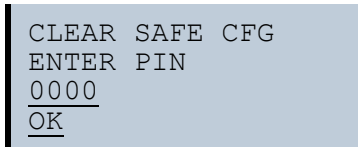
In the CLEAR SAFE CFG menu the stored safe information is deleted. This procedure is PIN protected.

9.3.6 PIN (changing the PIN)

Main Menu || AS-I SAFETY || PIN || CHANGE **PIN** ||

```
          CHANGE PIN
          ENTER PIN
          0000
          OK
```

```
          CHANGE PIN
          ENTER NEW PIN
          0000
          0000
          OK
```
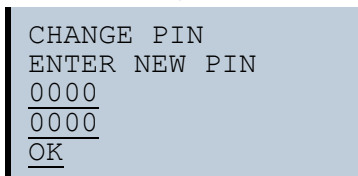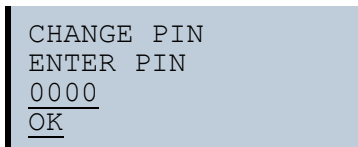
In this menu you change the PIN. This procedure is protected by entering the previous PIN.

> **Information!**
>
> *The default setting for the PIN is "0000" and must not be changed.*

9.3.7   SAFE CHIPCARD

Main Menu || AS-I SAFETY || **SAFE CHIPCARD** ||

```
SAFE CHIPCARD
ACTIVE: BANK B
VIEW
CARD -> MONITOR
MONITOR -> CARD
CLEAR CODES
CLEAR SAFE CARD
```
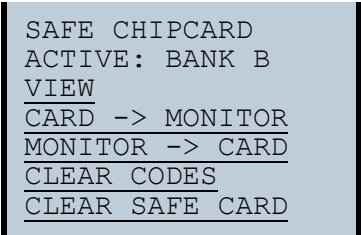
In this menu you can manage the safe area of the chip card.

ACTIVE: BANK X	Displays the active bank on the chip card.
VIEW:	Reads out the safety configuration of a chip card bank.
CARD->MONITOR:	Copies the configuration of a chip card bank to the Monitor.
MONITOR->CARD:	Copies the Monitor configuration to a chip card bank.
CLEAR CODES:	Deletes the safety configuration on the Monitor.
CLEAR SAFE CARD:	Deletes a safe memory bank on the chip card.

9.3.7.1   VIEW BANK X CONFIG (view active bank)

Main Menu || AS-I SAFETY || SAFE CHIPCARD || VIEW || SELECT BANK || **BANK X CONFIG** ||

```
SELECT BANK
A
OK
```

```
BANK A CONFIG
RELEASE DATE:
2006/06/17 18:43
BY:
ROLF BECKER
CONFIG NAME:
L3040 MIT LADEVO
RRICHTUNG LINK U
ND PALETTENWECHS
LER V1.23
RELEASE CODE:
1BDF
```

After selecting the desired memory bank and confirming with OK, the configuration is displayed.

For additional information refer to Chip card.

9.3.7.2 CARD –>MONITOR (copy card data to the Monitor)

Main Menu || AS-I SAFETY || SAFE CHIP CARD || CARD -> MONITOR ||
          ENTER PIN || SELECT BANK || **COPY BANK X -> MONITOR** ||

```
SAFE CHIPCARD
ACTIVE: BANK B
VIEW
CARD -> MONITOR
MONITOR -> CARD
CLEAR CODES
CLEAR SAFE CARD
```

```
ENTER PIN
0000
OK
```

```
SELECT BANK
A
OK
```

```
STOP MONITOR


OK
```

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

```
START MONITOR


OK
```
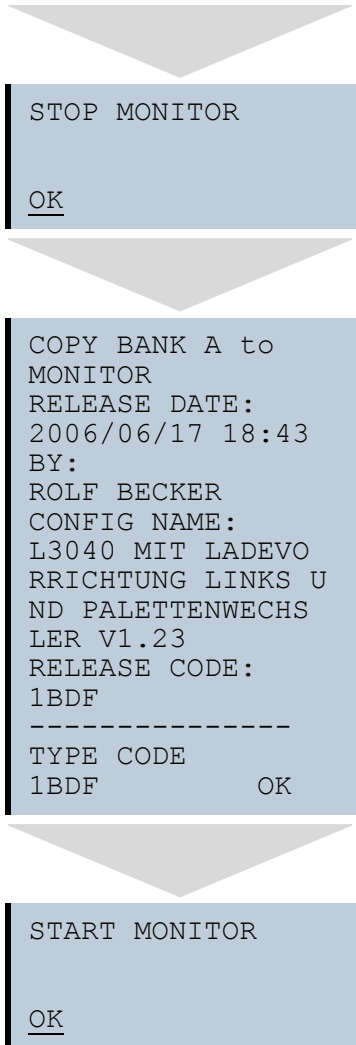
In this menu you send the safe configuration stored on the memory card to the EEPROM on the Monitor. Use the keys to set the release code and confirm with OK.

After a bank on the chip card has been written to, this bank is the active bank. To activate the new configuration, the Safety Monitor must be started.

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9.3.7.3 MONITOR –>CARD (copy Monitor data to the chip card)

Main Menu || AS-I SAFETY || SAFE CHIPCARD || MONITOR -> CARD ||
ENTER PIN || SELECT BANK || **COPY X -> CARD** ||

```
SAFE CHIPCARD
ACTIVE: BANK B
VIEW
CARD -> MONITOR
MONITOR -> CARD
CLEAR CODES
CLEAR SAFE CARD
```

```
CLEAR SAFE CFG
ENTER PIN
0000
OK
```

```
SELECT BANK
A
OK
```

```
STOP MONITOR

OK
```

```
START MONITOR

OK
```
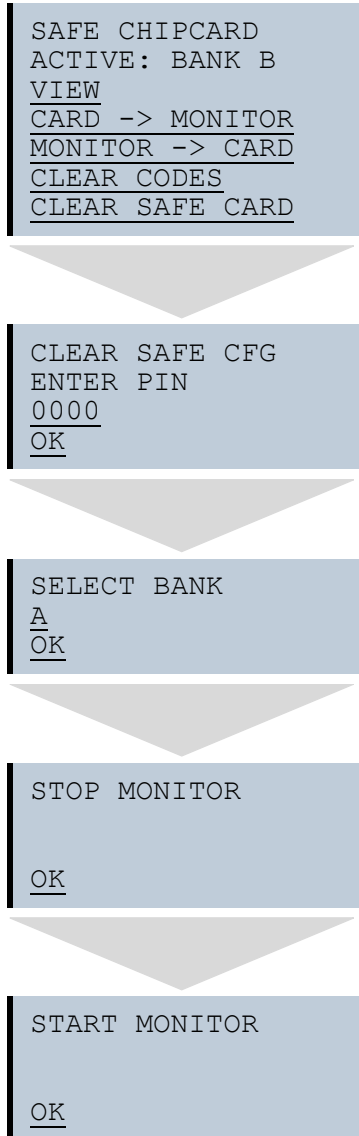
In this menu you sent the safe configuration from the EEPROM on the Monitor to the memory card. This procedure is PIN protected.

9.3.7.4   CLEAR CODES (delete code sequences)

Main Menu || AS-I SAFETY || SAFE CHIPCARD || CLEAR CODES ||
         ENTER PIN || SELECT BANK || **DELETE** ||

```
SAFE CHIPCARD
ACTIVE: BANK B
VIEW
CARD -> MONITOR
MONITOR -> CARD
CLEAR CODES
CLEAR SAFE CARD
```

```
CLEAR CODES
ENTER PIN
0000
OK
```

```
SELECT BANK
A
OK
```

```
SELECT BANK
A
CLEAR
```

```
STOP MONITOR


OK
```

```
START MONITOR


OK
```
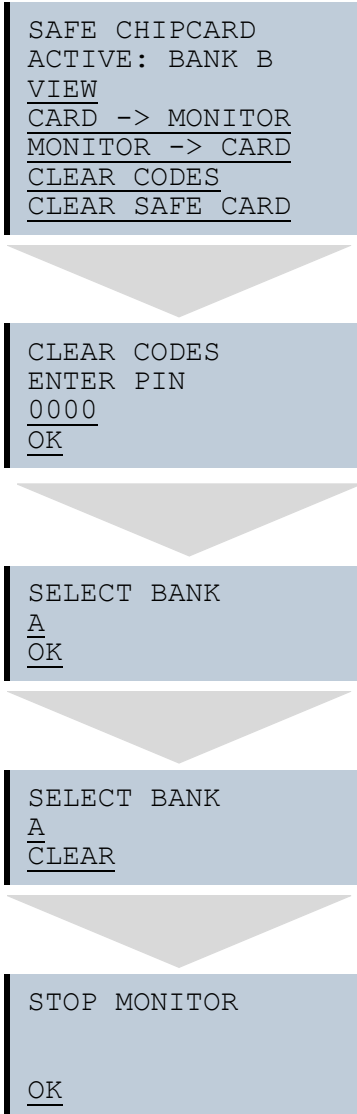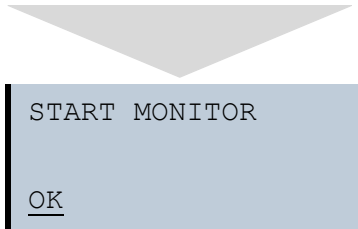
In this menu you delete the code sequences from the selected bank. This proce-
dure is PIN protected.

9.3.7.5 CLEAR SAFE CARD

Main Menu || AS-I SAFETY || SAFE CHIPCARD || CLEAR SAFE CARD || ENTER PIN ||
         SELECT BANK || **CLEAR** ||

```
SAFE CHIPCARD
ACTIVE: BANK B
VIEW
CARD -> MONITOR
MONITOR -> CARD
CLEAR CODES
CLEAR SAFE CARD
```

```
ENTER PIN
0000
OK
```

```
SELECT BANK
A
OK
```

```
SELECT BANK
A
CLEAR
```

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```
STOP MONITOR

OK
```

```
START MONITOR

OK
```

Using this menu you can delete the safe configuration from a chip card bank. This procedure is PIN protected.

9.3.8 PROTECT (protect safe configuration)

Main Menu|| AS-I SAFETY || **PROTECT** ||

```
PROTECT
ENTER PIN
0000
OK
```

This function allows you to protect the safe configuration before downloading over the serial interface.

9.4 DIAGNOSTICS

Main Menu || **DIAGNOSIS** ||

```
SAFETY SLAVES
MONITOR
ERROR COUNTERS
LPF
FAULT DETECTOR
AS-I MONITOR
```

This menu contains the following sub-menus:

SAFETY SLAVES:	Safety input slaves
MONITOR:	Display the diagnosis data for the Safety Monitor
ERROR COUNTERS:	Fault counter for each single AS-i slave
LPF:	List of Peripheral Faults
FAULT DETECTOR:	Informations about the AS-i Fault Detector
AS-I MONITOR:	Display of the software states

9.4.1 AS-I CIRCUIT (Selecting the AS-i circuit)

Main Menu || DIAGNOSIS || SAFETY SLAVES || **AS-I CIRCUIT** ||

```
AS-i CIRCUIT 1
AS-i CIRCUIT 2
```

Please select the required AS-i circuit using the arrow buttons and the OK button. Than you get the diagnostic menu.

9.4.2 SAFETY SLAVES (safety oriented slaves)

Main Menu|| DIAGNOSIS || SAFETY SLAVES || **SAFETY ORIENTED SLAVES** ||

```
SAFETY ORIENTED
SLAVES
            | 1-XX
    2-XR  | 3-RR
    4-    | 5-
```

The list of "Safety Input Slaves" ("AS-i Safety at Work") shows the slaves for which the safety function has been released:

- X: The channel is OK
- R: The channel has released

9.4.3 MONITOR

Main Menu || DIAGNOSIS || MONITOR || **SAFETY MON** ||

```
SAFETY MON
DIAGNOSIS
LAST DIAGNOSIS
VIEW CONFIG
```

This menu contains the following sub-menus:

DIAGNOSIS:	Current diagnosis for the Safety Monitor
LAST DIAGNOSIS:	Diagnosis at the time the Safety Monitor was deactivated.
VIEW CONFIG:	Reads the current configuration of the Safety Monitor.

9.4.3.1 DIAGNOSIS

Main Menu || DIAGNOSIS || MONITOR || SAFETY MONITOR || **DIAGNOSIS** ||

```
SAFETY MONITOR
DIAGNOSIS
LAST DIAGNOSIS
VIEW CONFIG
```

```
DIAGNOSIS
CH          1
OK
```

```
SAFETY MONITOR
DIAGNOSIS
COMPLETE
DIAG INDEX
```

```
SAFETY MONITOR
DIAGNOSIS
CH1.:     ON
...
ASI 1
SLAVES
        | 1-XX
2-RX  | 3-RR
4-    | 5-


....
A     COLOR
32    RED
....
HELP:
X CODE OK
R RELEASED
A DEVICE ADR.
```
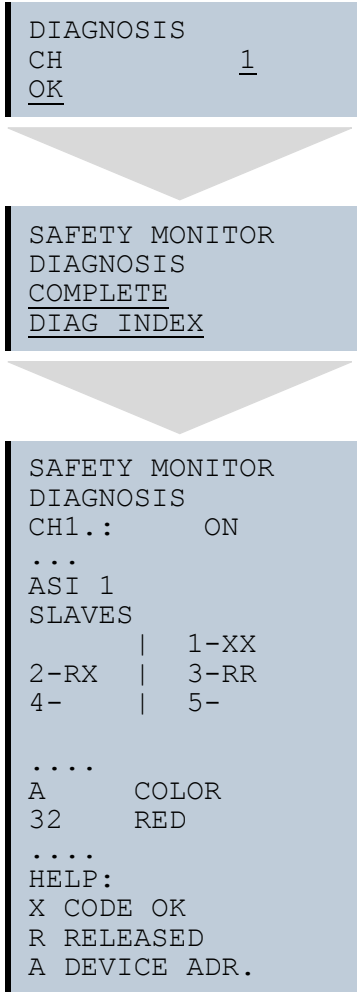
This menu shows the status of the safety AS-i safe slaves and the diagnostics for the integrated Safety Monitor for each release circuit separately.

COMPLETE:	The complete diagnostic is read out.
DIAG INDEX:	The diagnostic is shown as it was configured under the "device_Index_Assignment" in ASIMON.

Information!

If the diagnosis is read using DIAG INDEX, the device count begins at 0, otherwise at 32!

9.4.3.2 LAST DIAGNOSIS

```
SAFETY MONITOR
DIAGNOSIS
LAST DIAGNOSIS
VIEW CONFIG
```

```
DIAGNOSE
CH           1
OK
```

```
LAST DIAGNOSIS
CH1  COMPLETE
DIAG INDEX
```

```
INT SAFETY MON
LAST DIAG CH1
CH1.:   OFF
A COLOR
32 RET
33 GREY
34 YEL FL

....
HELP:
A DEVICE ADDR.
+ CHANGED
```

This menu displays the diagnosis at the time the Safety Monitor was deactivated.

Complete:	The complete diagnostic is read out.
DIAG INDEX:	The diagnostic is shown as it was configured under the "device_index_assignment" in ASIMON

For additional information, please refer to the <ASIMON> documentation.

Issue date: 21.10.2011

> ○
> **Information!**
> *If the diagnosis is read using DIAG INDEX, the device count begins at 0, otherwise at 32!*

9.4.3.3 MONITOR CONFIG

Main Menu|| DIAGNOSIS || MONITOR || VIEW CONFIG || **MONITOR CONFIG** ||

```
SAFETY MONITOR
DIAGNOSIS
LAST DIAGNOSIS
VIEW CONFIG
```

```
MONITOR CONFIG
COMPLETE
CONFIGURATION
FGDG
MON.VER.: 3.0
RELEASED
    BY SA
    ON 2007/11/15
    AT: 14:30
RELEASED CODE:
81FE
```

This menu indicates which configuration is loaded in the integrated Safety Monitor.

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9.4.4   FAULT DETECTOR

Main Menu || DIAGNOSIS || **FAULT DETECTOR** ||

```
FAULT DETECTOR
RESET
HISTORIC:
EFLT OVRV NOIS
ACTUAL:
EFLT OVRV NOIS
DUP ASI ADR:
   0       | 31B
HELP:
EFLT EARTH FAULT
OVRV OVERVOLTAGE
NOIS NOISE
DUP ASI ADDR
   DUPLICATE ASI
   SLAVE ADDRESS
```

The FAULT DETECTOR menu displays information about the AS-i detector and allows you to delete the history of the AS-i Monitor. Also, the HELP section describes the abbreviations in full.

By selecting RESET you can delete the history of the AS-i Monitor.

The HISTORY section lists the fault messages which have occurred for the AS-i Monitor since the last RESET.

The CURRENT section lists the current fault messages for the AS-i Monitor since the last RESET.

The following fault messages are displayed:

- Duplicate addressing (shows the 2 lowest slave addresses for which there is duplicate addressing)

- Earth faults

- Noise

- Overvoltage

Information!

See also chapter Functions of the AS-i Fault Detector for further information.

9.4.5   ERROR COUNTERS

<u>Main Menu</u>|| DIAGNOSIS || **ERROR COUNTERS** ||

```
ERROR COUNTERS
RESET
1A - 0
...
31A - 65535
 1B - 34
...
30B - 0
```

This list displays the fault counter for each single AS-i slave.

In addition, the number of voltage dropouts/undervoltage on AS-i (APF) is displayed.

Selecting RESET resets the fault counter to 0.

9.4.6   LPF (List of Peripheral Faults)

<u>Main menu</u>|| DIAGNOSIS || AS-I CIRCUIT || **LPF LIST OF PERIPH. FAULTS** ||

```
AS-I CIRCUIT 1
AS-I CIRCUIT 2
```

```
LPF LIST OF
PERIPH. FAULTS
        |  1A-X
2A-    |  3A-
4A-X   |  5A-X
....
30A-X | 31A-
        |  1B-X
```

This list shows the list of slaves which have triggered peripheral faults (LPF).

Empty field: Peripheral O.K.
X: Peripheral fault

9.4.7   AS-I MONITOR (Info)

Main Menu || DIAGNOSIS || **AS-I MONITOR** ||

```
SWID:
 12345
SAFE CPU A:
 12345
SAFE CPU B:
 12345
UART CPU 1:
 12345
UART CPU 2:
 1234
```

This function shows information about the version and features of the AS-i master:

Information	Meaning
SWID	Software ID for the AS-i master
FEATURE String	Feature string for the AS-i master
SAFE CPU A	Software ID of the SAFE CPU A
SAFE CPU B	Software ID of the SAFE CPU B
UART 1	Software ID for the Safety UART 1
UART 2	Software ID for the Safety UART 2

9.5   SETUP

Main Menu || **SETUP** ||

```
CHIPCARD
LANGUAGE
FACTORY RESET
```

This menu contains the following sub-menus:

CHIPCARD:	Read/write or delete chip card
LANGUAGE:	Menu language selection
FACTORY RESET:	Restore factory default settings

9.5.1 CHIPCARD

Main Menu|| SETUP || **CHIPCARD** ||

```
CHIPCARD
CARD -> MONITOR
MONITOR -> CARD
CLEAR CHIPCARD
```

This function is used to send unsafe AS-i data between the master and chip card. In addition, the unsafe section of the chip card can be deleted.

CHIPCARD->MONITOR:	Chip card data are copied to the Monitor
MONITOR->CHIPCARD:	Monitor data are copied to the chip card
CLEAR CHIPCARD:	Chip card data are cleared

For additional information refer to Chip card.

9.5.2 Language (menu language)

Main Menu || SETUP || **LANGUAGE** ||

```
LANGUAGE
ENGLISH        X
DEUTSCH
FRANÇAIS
ITALIANO
ESPAÑOL
```

From this menu you can select the menu language. „X" marks the currently selected language.

9.5.3 FACTORY RESET (factory default settings)

Main Menu || SETUP || FACTORY RESET ||

```
FACTORY RESET
DO RESET
```

This function can be used to reset the master to the factory default settings. The "Reset" is done by selecting menu point DO RESET.

STOP

Warning!

This function should only be used in emergency cases, since all previously made settings are restored to the factory defaults, so that errorless communication and function of the Monitor with the AS-i circuit can no longer be assured.

9.6   DISPLAY CONTRAST (set display contrast)

Main Menu || **DISPLAY CONTRAST** ||

```
DISPLAY CONTRAST
DEFAULT

_____
```
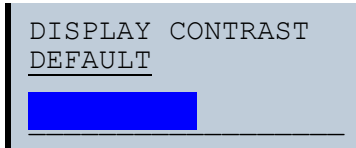
This function allows you to set the display contrast.

- •   Use the arrow keys to select the line with the bar
- •   Confirm your selection with OK (bar flashes)
- •   Use the arrow keys to set the display contrast
- •   Use OK to apply the setting

The factory settings are invoked from the DEFAULT field.

If the contrast is set so that the display can no longer be read, it can be reset to the factory default setting as follows:

- •   Shut the unit off
- •   Press the MODE and SET keys and hold them down.
- •   Shut the unit on.

10. Configuration with Windows Software ASIMON 3 G2

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

11. Diagnostics for AS-i Monitor and networking using AS-i Master

11.1 Introduction

The new AS-i Safety Monitor – in conjunction with Pepperl+Fuchs GmbH AS-i Masters – offers not only superior on-location operation and diagnostics, but also makes this also accessible over the network.

11.2 On-location operation

The Monitor display shows all the diagnostics data directly in the same manner as on the Gateway with integrated monitor.

Information!

The menu is described on the separate menu page.

For characteristics which apply to both the 1st and 2nd AS-i circuit, the circuit is selected with this selection box:

```
AS-I CIRCUIT 1
AS-I CIRCUIT 2
```

11.3 Spontaneous messages

The strategy for spontaneous display of messages for AS-i masters is:

• When the AS-i network is functioning error-free, a smiley is displayed.

• When the fieldbus communication is failed, a text message is displayed.

• When there is a fault on an AS-i slave, this is displayed until the fault is no longer present.

For the Safety Monitor the desire is to keep the concept as similar as possible, since it is so familiar to and accepted by customers.

When there are no faults present, the states of the safety unit are displayed as a text beneath the smiley.

When two local release circuits are present, a line is displayed with their status, or two lines for 4 local circuits.

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

11.4 Diagnostics using Profile S-7.5.5

Information!

The old diagnostics for the Safety Monitor is no longer supported.

11.4.1 Binary data

	D3	D2	D1	D0
Monitor->Master (input)	Serial communication	Serial communication	1: Output 2 either turned off or flashing green	1: Output 1 either turned off or flashing green
Master->Monitor (output)	Change from 0 to 1 resets the fault lamp AS-i 2	Change from 0 to 1 resets Circuit 1 fault lamp	Serial communication	Serial communication

Tab. 11-6.

11.4.2 Transparent input data

Via profile 7.5.5 it is possible to cyclically query the condition of the release circuits (OSSD Safety Control Status) of the safety monitor (Tab. 11-7). For this, it is necessary to allocate an AS-i address (basic address) to the safety monitor, and to reserve an 8-byte analogue input slave in the control configuration for the basic address of the safety monitor. In these 8 bytes the diagnosis data (transparent input data) is listed as in the following table:

Channel	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	AS-i circuit 1							
		RD	YE	GN		UA	DA	EF
1	Status OSSD 2				Status OSSD 1			
2	Status OSSD 6				Status OSSD 5			
3	OSSD 4		OSSD 3		OSSD 2		OSSD 1	
	RF	YF	RF	YF	RF	YF	RF	YF

Tab. 11-7.

Channel	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
0	AS-i circuit 2							
	AU	RD	YE	GN		UA	DA	EF
1	Status OSSD 4				Status OSSD 3			
2	Status OSSD 8				Status OSSD 7			
3	OSSD 8		OSSD 7		OSSD 6		OSSD 5	
	RF	YF	RF	YF	RF	YF	RF	YF

Tab. 11-8.

Channel 0 of the transparent input data describes the status of both AS-i circuits. The upper 8 bits describe the status of the AS-i 2 circuit and the lower 8 bits that of the AS-i 1 circuit.

In channel 1 and 2 the colors of the release circuits follow (at present only 2 are used).

Finally following in channel 3 is the collective information for the colors of the devices in the release circuits.

Then the individual information is listed.

EF	Ground fault	There is a ground fault 1: There is a ground fault 0: There is *not* a ground fault
DA	Duplicate address	There is a duplicate address 1: Duplicate address on AS-i 0: *No* duplicate address on AS-i
GN	Green	Errorless or nearly errorless communication Less than 1% telegram repetitions on AS-i
YE	Warning	More frequent repetitions which need to be clarified depending on the application 1% - 5% telegram repetitions on AS-i
RD	Fault	Serious faults Over 5% telegram repetitions on AS-i
UA	UAS-i	The AS-i voltage is sufficient 1: Voltage is sufficient 0: Voltage is *not* sufficient
AU	AUX 24 V	The 24 V for supplying the safe outputs is present 1: 24 V for supplying the safe outputs is present 0: 24 V for supplying the safe outputs is not present

Tab. 11-9.

Channels 1 and 2 describe the states of the respective release circuits (OSSD's) of the Safety Monitor. For status codes and colors see section Status codes for the release circuits (OSSD).

Channel 3 contains information as to whether there are warnings or faults in a release circuit for one or more of the devices associated with this release circuit. The information is as follows:

YF	Yellow flashing	At least one of the devices associated with this release circuit is in the yellow flashing state
RF	Red flashing	At least one of the devices associated with this release circuit is in the red flashing state

Tab. 11-10.

11.4.2.1 Status codes for the release circuits (OSSD)

Code bit [3..0]	Status / color	Description
0	continuous green	Output on
1	flashing green	Wait time for Stop 1 in effect
2	continuous yellow	Startup / restart active
3	flashing yellow	External test required / acknowledgement / Turn-on delay active
4	continuous red	Output off
5	flashing red	Fault
6	gray or off	Output not assigned
7 ... F	reserved	

Tab. 11-11.

◯
⟁ **Information!**

Monitors supporting less than 8 release circuits set all non-present release circuits to "gray".

11.4.2.2 Transparent output data

The transparent output data are available there to the safe unit as non-safe additional bits, for example for Start keys.

Ch	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	reserved												Start2	EDM 2	Start1	EDM 1

Tab. 11-12.

11.4.3 Acyclical data

Vendor Specific Object 1 – Analyzer status AS-i Circuit 1

Read only.

This object contains a bit pair for all 62 possible slaves which represents the status of the slaves at this address:

Bit	Lamp color
11	red
10	yellow
01	green
00	no slave

Tab. 11-13.

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	3/3A	3/3A	2/2A	2/2A	1/1A	1/1A	–	–
2	7/7A	7/7A	6/6A	6/6A	5/5A	5/5A	4/4A	4/4A
…	…							
16	31B	31B	30B	30B	29B	29B	28B	28B

Tab. 11-14.

11.4.3.1 Vendor Specific Object 2 - Analyzer status AS-i Circuit 2

Read only.

This object contains a bit pair for all 62 possible slaves which represents the status of the slaves at this address:

Bit	Lamp color
11	red
10	yellow
01	green
00	no slave

Tab. 11-15.

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	3/3A	3/3A	2/2A	2/2A	1/1A	1/1A	–	–
2	7/7A	7/7A	6/6A	6/6A	5/5A	5/5A	4/4A	4/4A
…	…							
16	31B	31B	30B	30B	29B	29B	28B	28B

Tab. 11-16.

11.4.3.2 Vendor Specific Object 7 – Device Colors OSSD 1

Read only.

This object contains all the devices associated with Release Circuit 1, the colors as well as additional information for all release circuits.

Information!

If not all 255 devices are used, the Monitor can shorten the S-7.5.5 telegram to save transmission time.

Coding for the states and colors

Byte	Meaning
1	Bit 0 0=Configuration mode, 1=protecting mode Bit 3 ... 1 reserved, 0 Bit 4 State 1.Y1, EDM1 (0=open) Bit 5 State 1.Y2, Start1 (0=open) Bit 6 State 2.Y1, EDM2 (0=open) Bit 7 State 2.Y2, Start2 (0=open)
2	Relay status, Output 1+2 Bit 3 ... 0 State Output 1, `diag_pc.ossd[0].relay-state` Bit 7 ... 4 State Output 2, `diag_pc.ossd[1].relay-state`
3 ... 8	...
9	Relay status, Output 15+16 Bit 3 ... 0 State Output 15, diag_pc.ossd[14].relay-state Bit 7 ... 4 State Output 16, diag_pc.ossd[15].relay-state
10	Bit field for devices which are present. Device 7..0
11 ... 40	...
41	Bit field for devices which are present. Device 248..255
42	Color - Device 1+2 Bit 3..0 Color Device 1, `diag_pc.device[0].color` Bit 7..4 Color Device 2, `diag_pc.device[1].color`
43 ... 168	...
169	Device 255+256 Bit 3..0 Color Device 255, `diag_pc.device[254].color` Bit 7..4 Color Device 256, `diag_pc.device[255].color`

Tab. 11-17.

Bit field coding for devices which are present:

The numbers indicate the position of the bit for the corresponding device.

0:    Device is not present

1:    Device is present

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…	…							
32	255	254	253	252	251	250	249	248

Tab. 11-18.

Coding of states and colors

Code Bit [2 … 0]	State or color
0	green permanent lighting
1	green flashing
2	yellow permanent lighting
3	yellow flashing
4	red permanent lighting
5	red flashing
6	grey or off
7	non existent
Bit 3	0: Device is *not* present in this OSSD 1: Device is present in this OSSD

Tab. 11-19.

Issue date: 21.10.2011

11.4.3.3 Vendor Specific Object 8 - Device Colors OSSD 1 with component index association

Read only.

This object contains all the devices associated with Release Circuit 2, the colors as well as additional information for all release circuits with the component index association for the configuration.

Coding for the states and colors

Byte	Meaning
1	Bit 0 0=Configuration mode, 1=protecting mode Bit 3 ... 1 reserved, 0 Bit 4 status 1.Y1, EDM1 (0=open) Bit 5 status 1.Y2, Start1 (0=open) Bit 6 status 2.Y1, EDM2 (0=open) Bit 7 status 2.Y2, Start2 (0=open)
2	Relay status, Output 1+2 Bit 3 ... 0 State Output 1, `diag_pc.ossd[0].relay-state` Bit 7 ... 4 State Output 2, `diag_pc.ossd[1].relay-state`
3 ... 8	...
9	Relay status, Output 15+16 Bit 3..0 State Output 15, `diag_pc.ossd[14].relay-state` Bit 7..4 State Output 16, `diag_pc.ossd[15].relay-state`
10	Bit field for devices which are present. Device 7..0
11 ... 40	...
41	Bit field for devices which are present. Device 248..255
42	Color - Device 1+2 Bit 3 ... 0 Color Device 1, `diag_pc.device[0].color` Bit 7 ... 4 Color Device 2, `diag_pc.device[1].color`
43 ... 168	...
169	Device 255+256 Bit 3 ... 0 Color Device 255, `diag_pc.device[254].color` Bit 7 ... 4 Color Device 256, `diag_pc.device[255].color`

Tab. 11-20.

Bit field coding for devices which are present:

The numbers indicate the position of the bit for the corresponding device.

0:     Device is not present

1:     Device is present

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…	…							
32	255	254	253	252	251	250	249	248

Tab. 11-21.

Coding of states and colors

Code Bit [2 … 0]	State or color
0	green permanent lighting
1	green flashing
2	yellow permanent lighting
3	yellow flashing
4	red permanent lighting
5	red flashing
6	grey or off
7	non existent
Bit 3	0: Device is *not* present in this OSSD 1: Device is present in this OSSD

Tab. 11-22.

Issue date: 21.10.2011

11.4.3.4 Vendor Specific Object 9 - Device Colors at switch off OSSD 1

Read only.

This object contains the colors for all devices as well as additional information for all release circuits at the time of the last switch-off of Release Circuit 1. Also sent is which devices belong to Release Circuit 1. The information is retrieved using the command "Get Device Colors at switch off" from the safety unit.

Coding for the states and colors

Byte	Meaning
1	Bit 0 0=Configuration mode, 1=protecting mode Bit 3 ... 1 reserved, 0 Bit 4 status 1.Y1, EDM1 (0=open) Bit 5 status 1.Y2, Start1 (0=open) Bit 6 status 2.Y1, EDM2 (0=open) Bit 7 status 2.Y2, Start2 (0=open)
2	Relay status, Output 1+2 Bit 3 ... 0 State Output 1, `diag_pc.ossd[0].relay-state` Bit 7 ... 4 State Output 2, `diag_pc.ossd[1].relay-state`
3 ... 8	...
9	Relay status, Output 15+16 Bit 3 ... 0 State Output 15, `diag_pc.ossd[14].relay-state` Bit 7 ... 4 State Output 16, `diag_pc.ossd[15].relay-state`
10	Bit field for devices which are present. Device 7 ... 0
11 ... 40	...
41	Bit field for devices which are present. Device 248 ... 255
42	Bit field for devices which changed in the last step. Device 7 ... 0
43 ... 72	...
73	Bit field for devices which changed in the last step. Device 248 ... 255
74	Color - Device 1+2 Bit 3..0 Color Device 1, `diag_pc.device[0].color` Bit 7..4 Color Device 2, `diag_pc.device[1].color`
75 ... 200	...
201	Device 255+256 Bit 3..0 Color Device 255, `diag_pc.device[254].color` Bit 7..4 Color Device 256, `diag_pc.device[255].color`

Tab. 11-23.

Issue date: 21.10.2011

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Bit field coding for devices which changed in the last step:

The numbers indicate the position of the bit for the corresponding device.

0:    Device did not change in the last step

1:    Device changed in the last step

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…	…							
32	255	254	253	252	251	250	249	248

Tab. 11-24.

Bit field coding for devices which are present:

The numbers indicate the position of the bit for the corresponding device.

0:    Device is not present

1:    Device is present

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…	…							
32	255	254	253	252	251	250	249	248

Tab. 11-25.

Coding of states and colors

Code Bit [2 … 0]	State or color
0	green permanent lighting
1	green flashing
2	yellow permanent lighting
3	yellow flashing
4	red permanent lighting
5	red flashing
6	grey or off
7	non existent
Bit 3	0: Device is *not* present in this OSSD 1: Device is present in this OSSD

Tab. 11-26.

11.4.3.5 Vendor Specific Object 10 - Device Colors OSSD 1 with component index association

Read only.

This object contains the colors for all devices as well as additional information for all release circuits at the time of the last shut-off of Release Circuit 1, in the order of the component assignment index. Also sent is which devices belong to Release Circuit 1.

Coding for the states and colors

Byte	Meaning
1	Bit 0 0=Configuration mode, 1=protecting mode Bit 3 ... 1 reserved, 0 Bit 4 status 1.Y1, EDM1 (0=open) Bit 5 status 1.Y2, Start1 (0=open) Bit 6 status 2.Y1, EDM2 (0=open) Bit 7 status 2.Y2, Start2 (0=open)
2	Relay status, Output 1+2 Bit 3..0 State Output 1, `diag_pc.ossd[0].relay-state` Bit 7..4 State Output 2, `diag_pc.ossd[1].relay-state`
3..8	...
9	Relay status, Output 15+16 Bit 3..0 State Output 15, `diag_pc.ossd[14].relay-state` Bit 7..4 State Output 16, `diag_pc.ossd[15].relay-state`
10	Bit field for devices which are present. Device 7 ... 0
11 ... 40	...
41	Bit field for devices which are present. Device 248 ... 255
42	Bit field for devices which changed in the last step. Device 7 ... 0
43 ... 72	...
73	Bit field for devices which changed in the last step. Device 248 ... 255
74	Color - Device 1+2 Bit 3 ... 0 Color Device 1, `diag_pc.device[0].color` Bit 7 ... 4 Color Device 2, `diag_pc.device[1].color`
75 ... 200	...
201	Device 255+256 Bit 3 ... 0 Color Device 255, `diag_pc.device[254].color` Bit 7 ... 4 Color Device 256, `diag_pc.device[255].color`

Tab. 11-27.

Bit field coding for devices which changed in the last step:

The numbers indicate the position of the bit for the corresponding device.

0:     Device did not change in the last step

1:     Device changed in the last step

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…	…							
32	255	254	253	252	251	250	249	248

Tab. 11-28.

Bit field coding for devices which are present:

The numbers indicate the position of the bit for the corresponding device.

0:     Device is not present

1:     Device is present

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	7	6	5	4	3	2	1	0
2	15	14	13	12	11	10	9	8
…	…							
32	255	254	253	252	251	250	249	248

Tab. 11-29.

Coding of states and colors

Code Bit [2 … 0]	State or color
0	green permanent lighting
1	green flashing
2	yellow permanent lighting
3	yellow flashing
4	red permanent lighting
5	red flashing
6	grey or off
7	non existent
Bit 3	0: Device is *not* present in this OSSD 1: Device is present in this OSSD

Tab. 11-30.

Issue date: 21.10.2011

11.4.3.6 Vendor-Specific Object 11 ... 70

Objects 11 … 70 correspond to objects 7 … 10, but refer to the following release circuits. The table shows the relationship:

| OSSD	Device Colors	Device Colors with component index	Device Colors at Switch off	Device Colors at Switch off with component index
Pre-proc.	Object 3	Object 4	-	-
1	Object 7	Object 8	Object 9	Object 10
2	Object 11	Object 12	Object 13	Object 14
3	Object 15	Object 16	Object 17	Object 18
4	Object 19	Object 20	Object 21	Object 22
5	Object 23	Object 24	Object 25	Object 26
6	Object 27	Object 28	Object 29	Object 30
7	Object 31	Object 32	Object 33	Object 34
8	Object 35	Object 36	Object 37	Object 38
9	Object 39	Object 40	Object 41	Object 42
10	Object 43	Object 44	Object 45	Object 46
11	Object 47	Object 48	Object 49	Object 50
12	Object 51	Object 52	Object 53	Object 54
13	Object 55	Object 56	Object 57	Object 58
14	Object 59	Object 60	Object 61	Object 62
15	Object 63	Object 64	Object 65	Object 66
16	Object 67	Object 68	Object 69	Object 70

Tab. 11-31.

12.   Status indication, faults and fault elimination

12.1   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
```
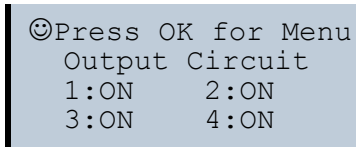
Coding:

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-OPE-RATION 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 alternatingly.

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.

12.2 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.*

12.3 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.*

12.4 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.

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13.   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	No AS-i Master connected or AS-i power fail.
41	AS-i Master is connected.
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.
74	Checksum error in the EEPROM.
75	Error in the internal RAM.
76	Error in the external RAM.
79	Checksum error in the data menu.
88	Display test while starting up the AS-i master

Tab. 13-32.

14. 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 below the threshold on the AS-i cable.

Complete configuration

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

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).

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-16 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.

Inclusion phase

The AS-i master sends a command to an available slave address to detect new slaves. If no reply is received, it immediately begins with the next data exchange 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".

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 $\Rightarrow$ peripheral fault.

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.

Offline phase

In offline phase there is no communication on AS-i.

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

Depending on the slave, an overflow, an overload on the sensor supply, or some other fault affecting the slave peripheral can be displayed.

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.

Release Code

Security code for a safety configuration on the chip card. A 4-character hex 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 ⇒ *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:

⇒ *I/O configuration* and ⇒ *ID-Code*, as well as ⇒ *extended ID1-Code* and ⇒ *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.

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15. Reference List

15.1 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.

15.2 Sources

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3. Vorschlag eines Grundsatzes für die Prüfung und Zertifizierung von „Bus-systemen für die Übertragung sicherheitsrelevanter Nachrichten", Stand 29.2.2000.

4. AS-interface - Die Lösung in der Automation, Ein Kompendium über Tech-nik, Funktion, Applikation (erhältlich, auch in englischer Sprache, bei AS-international Association, http://www.as-interface.net).

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