

# MANUAL

## VBG-PB-K20-DMD-BV AS-Interface/PROFIBUS Gateway





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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### 1 The Explanation of Symbols

 <p>Warning</p>	<p>This symbol warns the user of possible danger. Not following this warning can lead to personal injury or death and/or destruction of the equipment.</p>
--	--

 <p>Attention</p>	<p>This symbol warns the user of a possible failure. Not following this warning can lead to total failure of the device or any other connected equipment.</p>
--	---


 <p>Note</p>	<p><i>This symbol indicates text which contains important information.</i></p>
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#### 1.1 Abbreviations


**AS-i** Actuator Sensor Interface


## 2 Safety

### 2.1 Intended use


 <p><b>Warning</b></p>	<p>The protection of operating personnel and the system against possible danger is not guaranteed if the control interface unit is not operated in accordance with its intended use.</p> <p>The device may only be operated by appropriately qualified personnel in accordance with this operating manual.</p>
--	--

### 2.2 General safety information

 <p><b>Warning</b></p>	<p>Safety and correct functioning of the device cannot be guaranteed if any operation other than that described in this operation manual is performed.</p> <p>Connecting the equipment and any maintenance work to be carried out with voltage applied to the equipment must exclusively be performed by appropriately qualified electrotechnical personnel.</p> <p>In case a failure cannot be repaired, the device must be taken out of operation and kept from inadvertently being put back into operation.</p> <p>Repair work is to be carried out by the manufacturer only. Additions or modifications to the equipment are not allowed and will void the warranty.</p>
--	--

 <p><b>Note</b></p>	<p>The operator is responsible for the observance of local safety standards.</p>
--	--

### 2.3 Waste disposal

	<ul style="list-style-type: none"><li>• All devices and components are to be used properly!</li><li>• Non-usable electrical components are hazardous waste and they should be disposed separately!</li><li>• Local and national guide lines during waste disposal are to be respected!</li></ul>
--	--



## 3 General Information

### 3.1 Product information

This operating instruction holds for the following devices of the Pepperl+Fuchs Group:

**VBG-PB-K20-DMD-BV**

**AS-i 3.0 PROFIBUS Gateway in Stainless Steel,  
Double Master**

The AS-i PROFIBUS gateways are designated to connect AS-i systems with a superior PROFIBUS. They act as a master for the AS-i and as a slave for the PROFIBUS.

**VBG-DN-K20-DMD-BV** is a PROFIBUS double master. The features "RS232 diagnostic interface" and "duplicate address' recognition" are not integrated in the device.

### 3.2 AS-i Specification 3.0

The AS-i 3.0 Gateways already fulfil the AS-i Specification 3.0.

The previous specifications (2.1 and 2.0) are supported as well.

All AS-i functions are provided as well cyclically as acyclically via PROFIBUS DP V1.

In the cyclic data transfer optionally up to 32 bytes I/O data are being transferred for the binary data of one AS-i network. Additionally, analog signals and all further commands of the new AS-i specification can be transferred in the management channel via PROFIBUS.

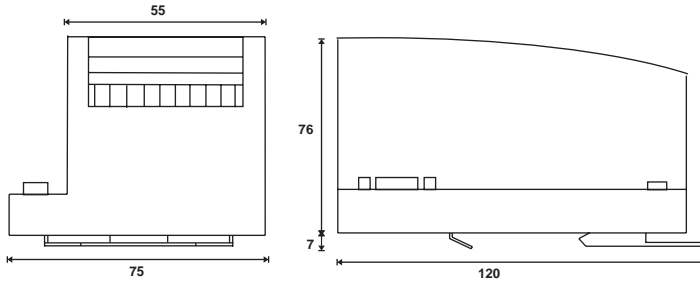
### 3.3 Commissioning and monitoring

The AS-i Gateway can be commissioned with the help of the software "AS-i Control Tools" in combination with the PROFIBUS Master Simulator. The device master file and type files are included in the delivery scope.

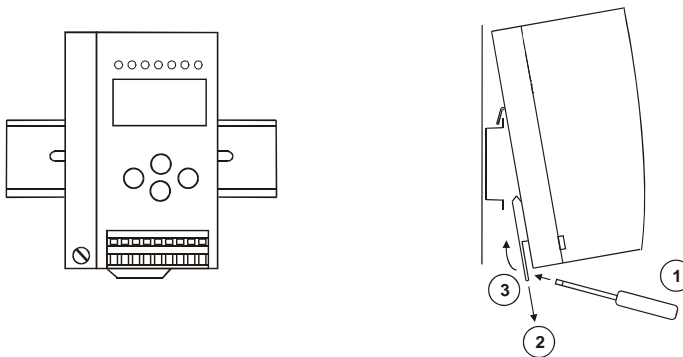
Commissioning, debugging and setting up of the AS-i parameters can also be accomplished with the use of push-buttons on the fronside of the gateway, the display and the LEDs.

## 4 Mounting Instructions

### 4.1 Size



### 4.2 Mounting



For the mounting of the gateways in stainless steel are mounting plates with 35 mm top-hat rail intended.



**Note**

Please refer to chapter "Installation instructions" for detailed information.

### 4.3 Electrical connection

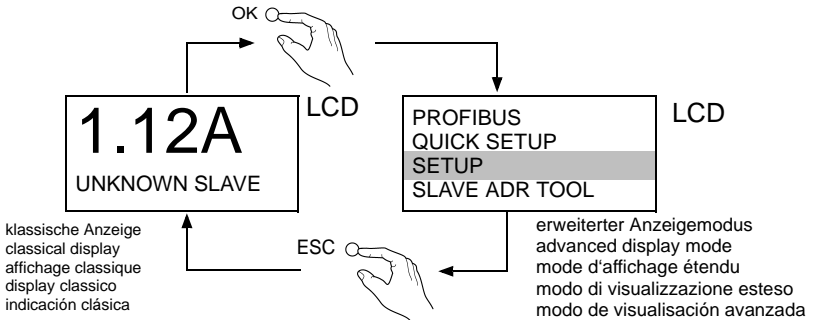


**Note**

Electrical connection is illustrated in chapter "Electrical connection".

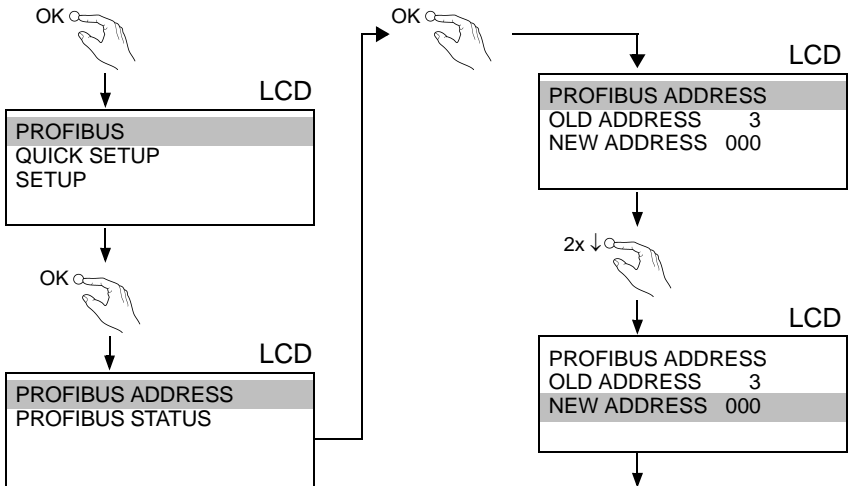
## 4.4 Commissioning of PROFIBUS Double Master

### 4.4.1 Advanced display mode



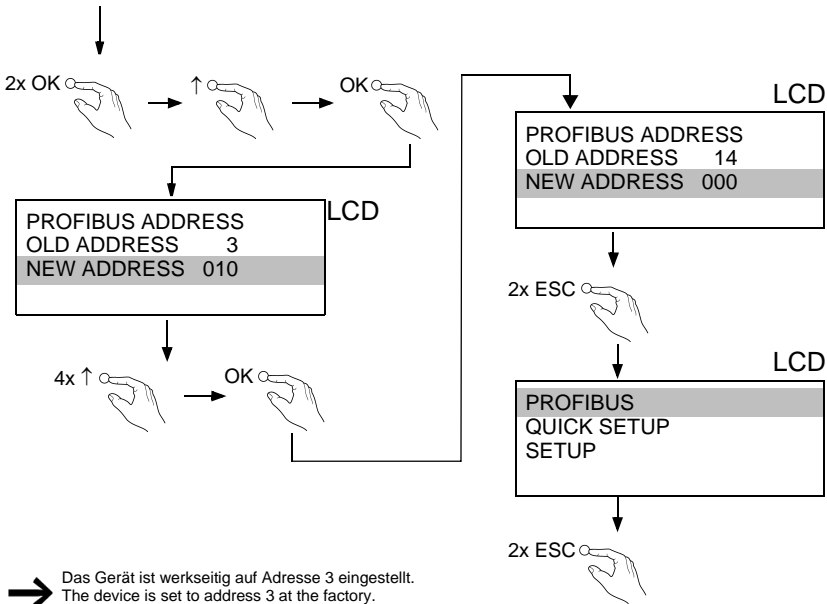
Aufbau siehe Zusatzblatt  
 structure see additional page  
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### 4.4.2 Setting the PROFIBUS DP address



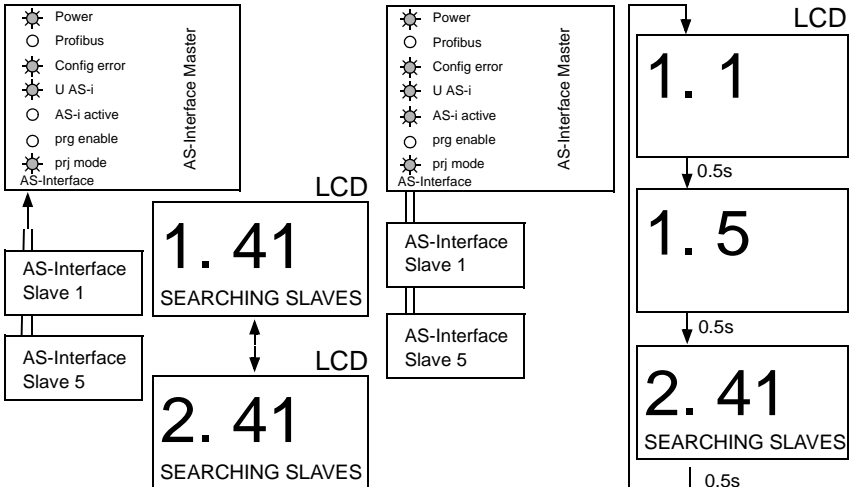
Issue date - 3.1.2008

# AS-Interface Mounting Instructions



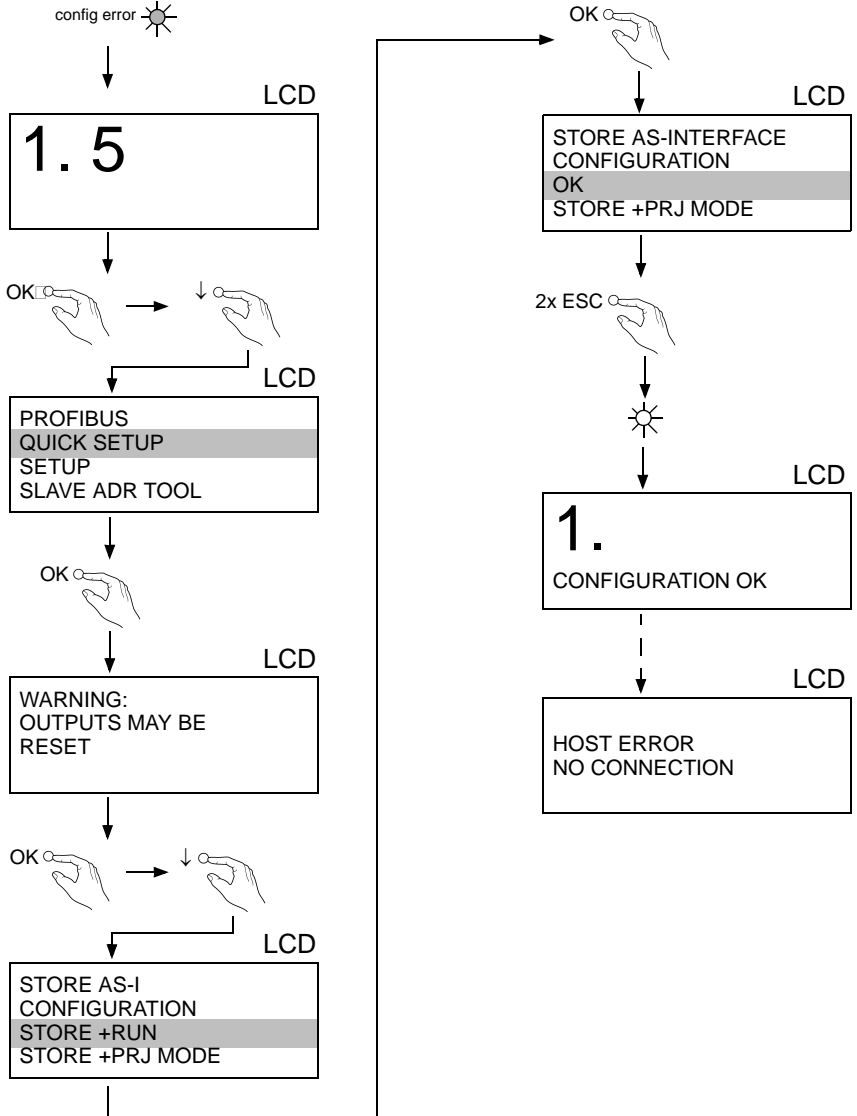
➔ Das Gerät ist werkseitig auf Adresse 3 eingestellt.  
 The device is set to address 3 at the factory.  
 L'appareil est réglé en usine à l'adresse 3.  
 L'apparecchio è messo all'indirizzo 3 dalla fabbrica.  
 El aparato viene ajustado de fábrica con la dirección 3.

## 4.4.3 Connecting AS-i Slaves



Issue date - 3.1.2008

## 4.4.4 Quick Setup

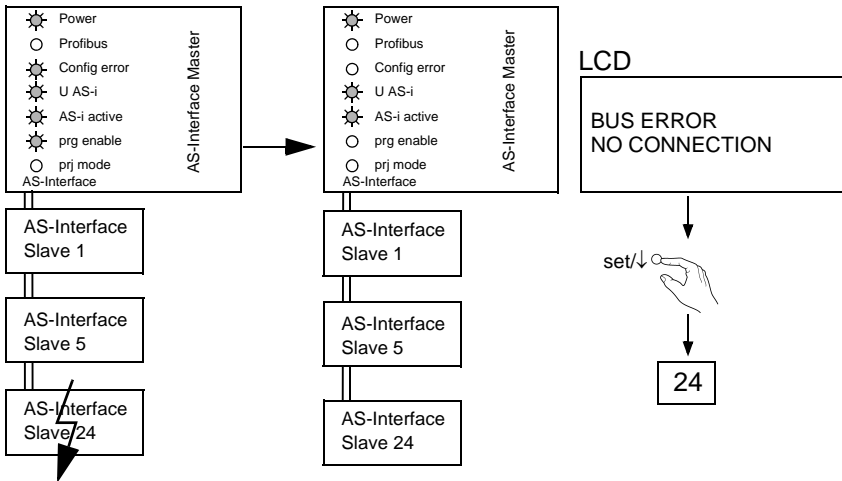


## 4.4.4.1 Error tracing

### 4.4.4.2 Faulty slaves

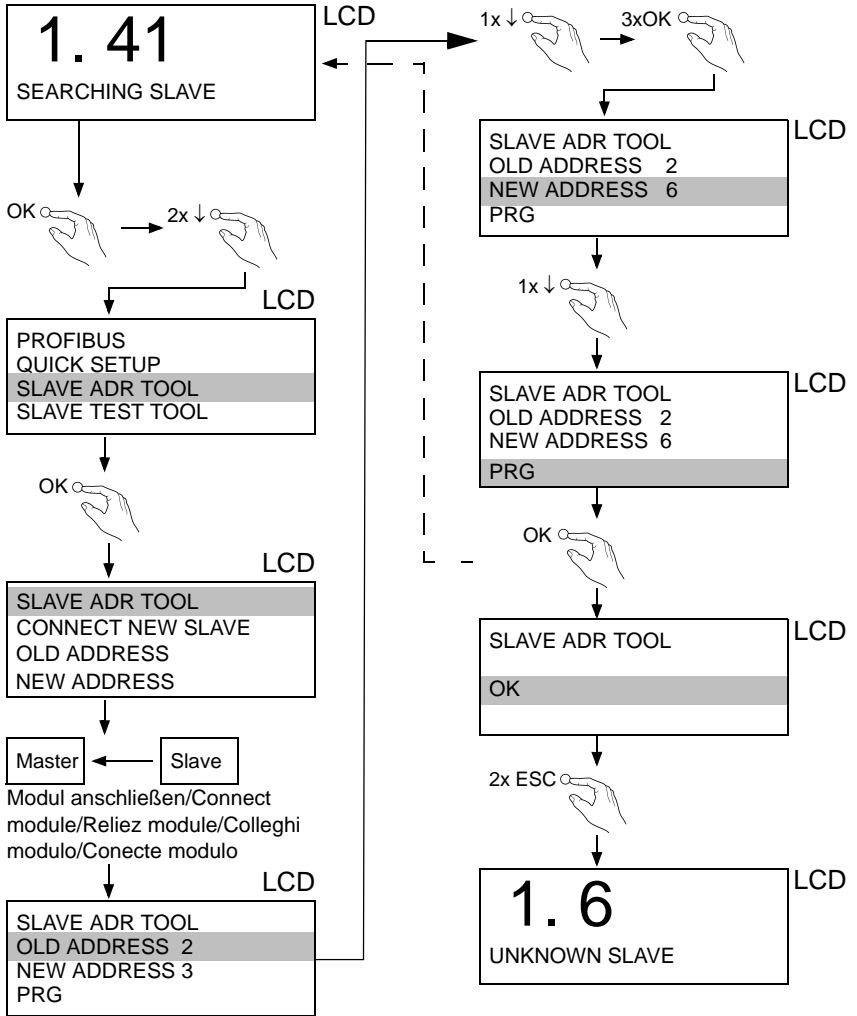


### 4.4.4.3 Error display (last error)



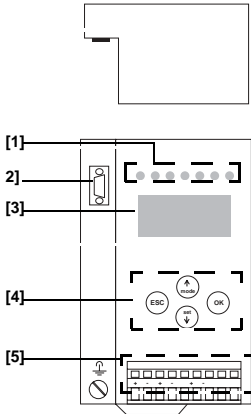
## 4.4.4.4 Addressing

### 4.4.4.5 Programming slave 2 to address 6




## 5 Electrical Connection

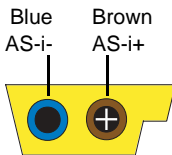
### 5.1 Overview of connections, displays and operating keys



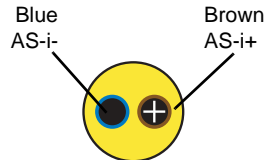
- |   |                                   |
|---|-----------------------------------|
| [1] LEDs                                    | [3] LC-display                    |
| [2] Sub-D socket<br>(as PROFIBUS-interface) | [4] Push-buttons                  |
|   | [5] ASI and power supply terminal |

### 5.2 AS-i bus connection

 <b>Note</b>	<p><i>Work on electrical installations may only be carried out by qualified electricians.</i></p>
---	---



Yellow AS-i ribbon cable



Two-conductor AS-i round cable  
(recommended: flexible power cable H05VV-F2x1.5 acc. to DIN VDE 0281)



## 5.3 Information about the device types



Note

*You'll find a listing of each gateways and its features in <chap. 3.1 "Product information", page 7>.*

## 5.4 Power supply and AS-i terminal assignment



Note

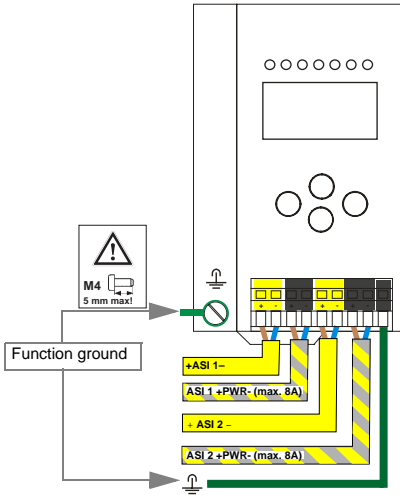
- It is not allowed to connect AS-i power supplies or another master to the yellow marked cable.
- It is not allowed to connect slaves or repeaters to the hatched marked cable.



Note

- The function ground can be connected either at the ground screw or at the terminal.
- The function ground should be connected with a cable as short as possible to guarantee a good EMC property.
- Therefore is to prefer to connect the ground via the ground screw.

## 5.4.1 Electrical connection of double master



Terminal	Signal / description
+ASI 1-	connection to AS-i circuit 1
+ASI 2-	connection to AS-i circuit 2
ASI 1 +PWR-	supply voltage AS- circuit 1 (max. 8 A)
ASI 2 +PWR-	supply voltage AS- circuit 2 (max. 8 A)
FG	function ground

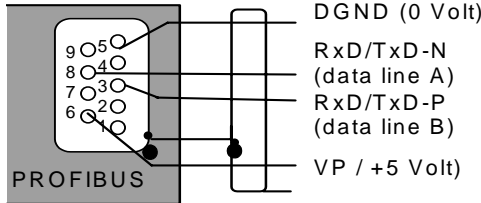


**Note**

*AS-i circle 1 and 2 are supplied by separate power supplies*

## 5.5 PROFIBUS interface

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



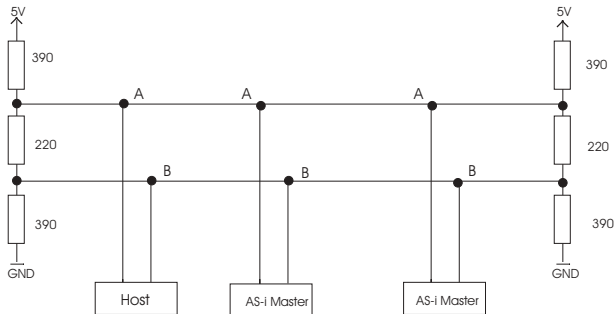
Pins	Designation of the SUB-D connector
Pin 3	Data line B („RxD/TxD-P“)
Pin 5	DGND (0 V)
Pin 6	VP / +5 V
Pin 8	Data line A („RxD/TxD-N“)

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

The pins 5 (0 V) and 6 (5 V) supply 5 V DC for the bus termination.

If the PROFIBUS gateway is connected at the end of the PROFIBUS line, the termination resistors in the PROFIBUS connector have to be switched on.

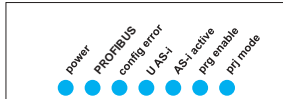
### 5.5.1 Terminating resistors with PROFIBUS circuit



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

## 5.6 Display and operating elements

### 5.6.1 LED-indicators



The LED indicators on the front side of the gateway provide important information:

- Power**                      The master's power supply is sufficient
- PROFIBUS**                LED on: Gateway is allocated to a PROFIBUS Master  
LED off: Gateway is *not* allocated to a PROFIBUS Master
- config err**                Configuration error:  
At least one configured slave is missing, at least one detected slave is not projected or for at least one projected and detected slave the actual configuration data does not match the nominal configuration data.  
This LED flashes if there is at least one periphery fault at one AS-i slave in the AS-i network. If there are configuration errors as well as periphery faults, only configuration error is displayed.
- U AS-i**                      The AS-i circuit is sufficiently powered.
- AS-i active**                Normal operation active (flashes, if a B-slave is displayed).
- prg enable**                Automatic address programming enabled.  
Exactly one slave is missing in protected operating mode. The slave can be replaced by another slave of the same type with address zero. The master addresses the new slave to the faulty address and thus eliminates the configuration error.
- prj mode**                 The AS-i master is in configuration mode.

### 5.6.2 Push-buttons

The push-buttons cause the following:

- Mode/⏪                      Switching between configuration mode and protected operating mode and saving the current AS-i configuration as the nominal configuration.
- Set/⏩                        Selecting and assigning the address to a slave.
- OK                            Changing to the advanced display mode.
- ESC                          This button is used to leave the advanced display mode.

## 6 Operating in Advanced Display Mode



**Note**

The language of displayed messages can be changed with the function LANGUAGE (see chap. "Language of displayed messages").

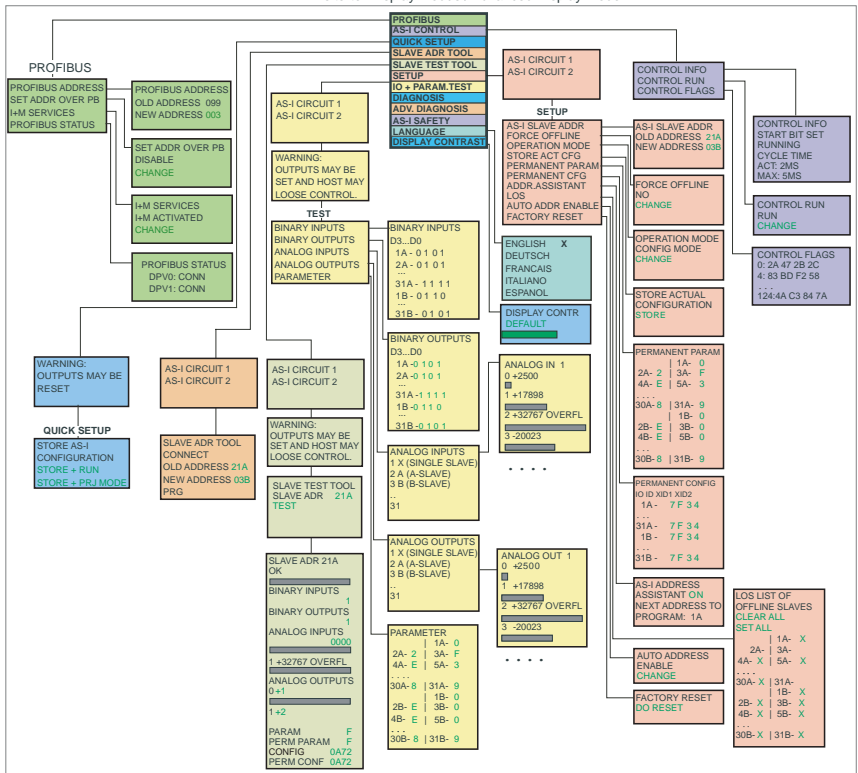
### 6.1 Overview

Klassischer Modus / Classic Mode

1.12A

grün markierte Werte sind editierbar  
green marked data can be edited

Erweiterter Display Modus / Advanced Display Mode



#### Grundsätzliche Bedienung

Das Gerät startet im traditionellen Modus. Mit ESC oder OK kann zwischen beiden Modi gewechselt werden. Im erweiterten Modus wird ein Cursor mit den beiden Pfeil-Tasten bewegt. OK bringt ins nächsthöhere Menü (in der Zeichnung weiter nach rechts). ESC bringt zurück ins vorherige Menü. Wenn Werte editiert werden, werden sie zunächst mit dem Cursor markiert, dann mit OK ausgewählt, mit den Pfeiltasten verändert und schließlich mit OK übernommen. ESC bricht das Editieren ab.

#### 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 menu (in the drawing one step to the right side). ESC puts you back to the previous menu. 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 - 3.1.2008

# AS-Interface Operating in Advanced Display Mode

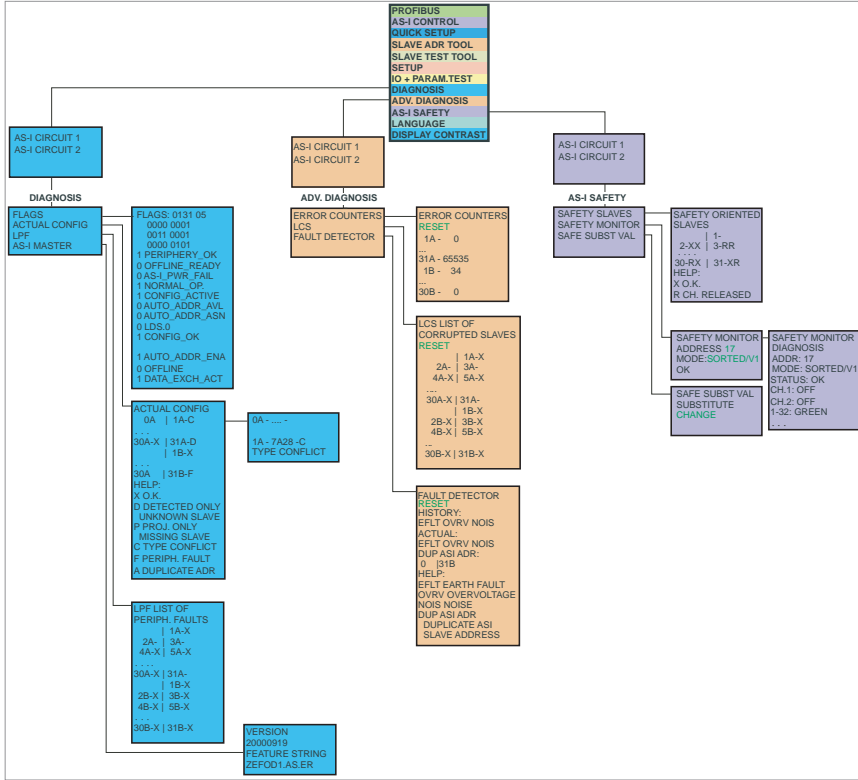
AS-I 3.0 PROFIBUS-Gateway: Inbetriebnahme/Commissioning

Klassischer Modus / Classic Mode

1.12A

grün markierte Werte sind editierbar  
green marked data can be edited

Erweiterter Display Modus / Advanced Display Mode




## Grundsätzliche Bedienung

Das Gerät startet im traditionellen Modus. Mit ESC oder OK kann zwischen beiden Modi gewechselt werden. Im erweiterten Modus wird ein Cursor mit den beiden Pfeil-Tasten bewegt. OK bringt ins nächsthöhere Menü (in der Zeichnung weiter nach rechts). ESC bringt zurück ins vorherige Menü. Wenn Werte editiert werden, werden sie zunächst mit dem Cursor markiert, dann mit OK ausgewählt, mit den Pfeiltasten verändert und schließlich mit OK übernommen. ESC bricht das Editieren ab.

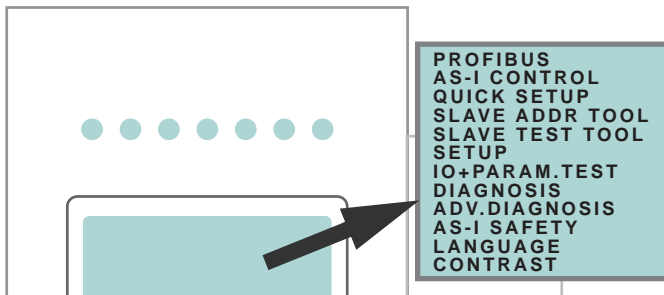
## Basic Operation


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 menu (in the drawing one step to the right side). ESC puts you back to the previous menu. 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 - 3.1.2008

	<p>Classical (Traditional) mode does not guarantee any protection of the settings at the device! In the classical mode, it is possible to change settings while the device is in operation. This can lead to failure of the plant (e. g. changing the address of an AS-i slave).</p>
---	--

## 6.2 Navigating through the advanced display mode



	<p>The settings in the advanced mode are protected, as long as the PROFIBUS Master Class 1 is running. That means that some states are indicated only. Many operations (for example: "change address", "write parameter", "set outputs", and so forth) are not possible over the display during the connection with the control (active PROFIBUS masters Class 1Bus-connection) for the protection of the plant. Before these commands can be executed at the display, first the connection (PROFIBUS Master Class 1 connection) to the control must be deactivated.</p>
---	--

The device starts in the classical mode. Press the OK button to switch to the advanced mode. To return to the classical mode, simply press the ESC button several times.

In the advanced mode, the selection can be moved up and down with the arrow buttons.

Pressing OK will switch to the selected function or menu. Pressing ESC will switch back to the previous menu.

To edit data values highlight them with the selection bar, press OK, then change them with the arrow-buttons and confirm with OK. The ESC-button cancels the editing process.

All possible addresses are displayed one after the other from 1A to 31A and from 1B to 31B. Data for single slaves are displayed at the addresses 1A - 31A.

## 6.3 PROFIBUS (main menu)

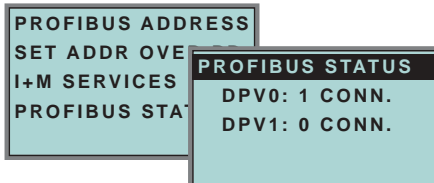
### 6.3.1 PROFIBUS Station Address



This function is used for the setting and changing of the PROFIBUS station address.

The number behind "Old Address" shows the actual station address. By selecting "New Address, this address can be changed.

### 6.3.2 PROFIBUS Status



The function *PROFIBUS Status* indicates if and how many connections are active on each PROFIBUS channel.

DPV0 = cyclic channel:

0: not active

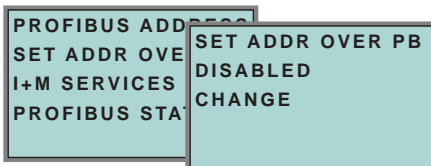
1: active

DPV1 = acyclic channel:

0: not active

≠0: number of connections

### 6.3.3 SET ADDR OVER PB (Set address over PROFIBUS)



With the help of this function changing the address over the PROFIBUS can be switched off and on.

- CHANGE: the display changes between ENABLED and DISABLED

DISABLED: address modification over BUS is not possible.

ENABLED: address modification over BUS is possible.



## 6.3.4 I+M SERVICES (Information and maintenance services)



I+M SERVICES  
DISABLED  
CHANGE

The function *I+M SERVICES* enables or disables the information and maintenance services.

- CHANGE: the display changes between ENABLED and DISABLED

DISABLED: I+M service is *off*

ENABLED: I+M service is *on*.

Switching-off of *I+M SERVICES* sets additional memory in the SPC3 free. The DPV0 length limit will be modified <see chapter 9.3>.

## 6.4 QUICK SETUP

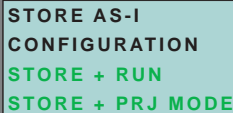
This menu enables a fast configuration of the AS-iAS-Interface network.



WARNING:  
OUTPUTS MAY BE  
RESET

 <p>Warning</p>	<p>Warning: outputs may be reset!</p>
---	---------------------------------------

Pressing "OK" you switch to the submenu "Store AS-iAS-Interface Configuration".



STORE AS-I  
CONFIGURATION  
STORE + RUN  
STORE + PRJ MODE

### "Store+Run"

With "OK" you store the current AS-iAS-Interface network configuration and the attached slaves as the target configuration. The gateway changes into the protected operating mode.

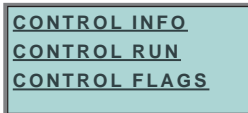
## "Store+Prj Mode"

With "OK" you store the current AS-iAS-Interface network configuration and the attached slaves. The gateway remains in the *project mode*.

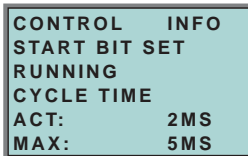
By pressing the "ESC" button you leave this menu and switch back to the main menu.

## 6.5 AS-i CONTROL (option)

### 6.5.1 Structure of menu AS-i CONTROL



### 6.5.2 AS-i Control Information



This function displays the current status of the AS-i control (control program).

START BIT SET: the control program was started.

START BIT RESET: the control program was stopped.

RUNNING: the control program is running.

STOPPED: the control program was stopped.

The control program can be stopped even though the start bit was set. Example: any configuration error occurs, or the master is in the configuration mode.

CYCLE TIME ACT: current cycle time of the control program.

CYCLE TIME MAX: maximal cycle time of the control program since its last start.

### 6.5.3 AS-i Control Run



CONTROL RUN: the control program can be stopped with this function. It modifies the start bit in the menu Control Info.

RUN: the control program has been started. Even if the start bit is set, the control program can be stopped; example: any configuration error occurs, or the master is in the configuration mode.

CHANGE: the configuration program is stopped.

## 6.5.4 AS-i Control flags (flag memory control program)

CONTROL		FLAGS	
0:2A	47	2B	2C
4:83	BD	F2	58
...			
124:	4A	C3	84 7A

The control program can read and modify the flag memory with the function "AS-i Control flags".

### A procedure of modifying flag memory:

- select a line with soft keys
- press *OK* to open the selected menu

5:10111101
4:83 <b>BD</b> F2 58

- select the required flag with hot keys (the selected flag appears in the upper line binary coded)
- press *OK* to edit the selected flag in the upper line.

## 6.6 SLAVE ADR TOOL (Slave Addressing Tool)

This function sets and changes the addresses of both new and configured AS-iAS-Interface slaves. This function replaces the handheld AS-iAS-Interface address programming device.

AS-I CIRCUIT 1
AS-I CIRCUIT 2

Please note that you must have selected the desired AS-i circuit using the arrow and the OK button when you operate a device with two AS-i circuits (see chapter 6.8.1).

```
SLAVE ADR TOOL
CONNECT NEW SLV
OLD ADDRESS
NEW ADDRESS
```

Now the new slave can be connected to the AS-iAS-Interface circuit. After connecting the actual address of the slave is displayed by "OLD ADDRESS".and the notice "CONNECT NEW SLV" disappears.

To give the slave a new address choose the menu entry "NEW ADDRESS". Afterwards the address can be selected with the help of the arrow buttons.The (re-)addressing is carried out by selecting the menu entry "PRG" and pressing the OK button.

```
SLAVE ADR TOOL
OLD ADDRESS 21A
NEW ADDRESS 03B
PRG
```

If an error occurs while addressing a slave, one of the following error messages is displayed for about 2 seconds:

- Failed: SND: slave with old address has not been detected.
- Failed: SD0: slave with address zero has been detected.
- Failed: SD2: slave with new address has been detected.
- Failed: DE: could not delete old address.
- Failed: SE: error setting new address.
- Failed: AT: new address could be stored temporarily only.
- Failed: RE: error reading the extended ID-code 1.

## 6.7 SLAVE TEST TOOL

With this function a single AS-iAS-Interface slave can be tested.

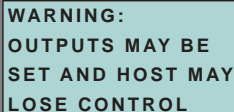
Please note that you must have selected the desired AS-i circuit using the arrow and the OK button when you operate a device with two AS-i circuits (see chapter 6.8.1)



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

Now a warning message is displayed, that possibly by this test outputs are set and the host may loose control of the circuit.

To start the test press the OK button, to cancel press the button ESC.



```
WARNING:
OUTPUTS MAY BE
SET AND HOST MAY
LOSE CONTROL
```

In the following menu the slave to be tested has to be chosen by selecting the slave address.

Afterwards the test is started by confirming the menu entry "Test".



```
SLAVE TEST TOOL
SLAVE ADR  21A
TEST
```

After finishing the test all relevant informations is displayed for the tested slave. A successful test is displayed with "OK" below the address of the tested slave.

The following information are displayed:

- Address of the tested slave
- Existing errors are indicated
- Binary inputs (digital inputs)
- Binary outputs (digital outputs)
- Analog inputs
- Analog outputs
- Param (actual parameters)
- Perm Param (projected parameters)
- Config (actual configuration)
- Perm Conf (projected configuration)

```

SLAVE 15 OK
BINARY INPUTS
  0 1
BINARY OUTPUTS
  0 1
ANALOG INPUTS
0 +17898
1 +32767 OVERFL
ANALOG OUTPUTS
0 +1789
1 +2500
PARAM          F
PERM PARAM     F
CONFIG         7FFE
PERM CONF      7FFE
    
```

## 6.8 SETUP (configuration of AS-iAS-Interface circuit)

### 6.8.1 AS-i circuit

```

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

To reach this setup menu you have to change the desired AS-i circuit by using the arrow and the OK buttons.

The function is only implemented in the double master.

It makes possible to change the AS-i circuit that is currently active for being operated.

The active circuit is marked by the cursor.

### 6.8.2 Structure of menu SETUP

```

AS-I SLAVE ADDR
FORCE OFFLINE
OPERATION MODE
STORE ACT CFG
PERMANENT PARAM
PERMANENT CFG
ADDR. ASSISTANT
LOS
AUTO ADDR ENABLE
FACTORY RESET
    
```

Within the menu "Setup", one of the following submenus can be chosen:

- AS-iAS-Interface Slave Addr (AS-iAS-Interface Slave Address)
- Force Offline (switch AS-iAS-Interface Master offline)

- Operation Mode
- Store Act Cfg (store actual detected configuration)
- Permanent Param (projected parameter)
- Permanent Cfg (projected configuration data)
- Addr. Assistant (address assistant)
- LOS (list of offline-slaves)
- Auto Adr Enable
- Factory Reset (rest for the factory adjustment)

## 6.8.3 AS-I SLAVE ADR (set/change slave address)

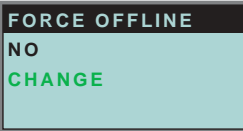


```
AS-I SLAVE ADR
OLD ADDRESS 21A
NEW ADDRESS 03B
```

With this function the address of a slave can be changed.

To change the address select the menu entry "OLD ADDRESS" and afterwards select the address of the slave which address should be changed. The new address of the slave has to be set in the menu entry "NEW ADDRESS". The addressing is carried out by pressing the OK button.

## 6.8.4 FORCE OFFLINE



```
FORCE OFFLINE
NO
CHANGE
```

This function shows the current state of the AS-iAS-Interface Master:

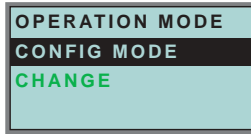
Yes: AS-i Master is offline.

No: AS-i Master is online.

With "Change", this state can be modified.

Switching the AS-iAS-Interface master offline puts the AS-iAS-Interface circuit into the safe state. The AS-iAS-Interface master has to be offline if an AS-iAS-Interface slave should be addressed via the IR-interface.

## 6.8.5 OPERATION MODE



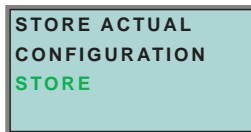
This function shows the current operation mode of the AS-iAS-Interface master:

- Protected Mode: Protected mode
- Config Mode: Configuration mode

With "Change" the operation mode can be changed.

Only in configuration mode parameters and configuration data can be stored.

## 6.8.6 STORE ACT CFG (store actual detected configuration)



This function can only be executed in configuration mode.

This function enables you to store the configuration of all slaves which are connected and detected on the selected AS-iAS-Interface circuit.

If "Store" was successful, the LED "Config error" is off. The configuration is stored, the configuration error has been eliminated.

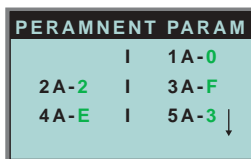
If one of the connected slaves has a peripheral fault, the LED "Config error" will flash.

If the AS-iAS-Interface master is in protected mode, the following error message will appear:

"Failed No Config Mode"

If an AS-iAS-Interface slave with address zero exists, storing the configuration will be confirmed with "OK". However, the configuration error remains because address zero is not a valid operating address for storing a slave.

## 6.8.7 PERMANENT PARAM (projected parameter)



This function allows you to set the permanent parameters. A list of all slaves is displayed from 1A - 31A and from 1B - 31B. The permanent parameters for single slaves are set from address 1A - 31A. The parameter is shown as a hexadecimal value behind the slave address.

Issue date - 3.1.2008



## 6.8.8 PERMANENT CONFIG (projected configuration data)

PERAMNENT CONFIG					
IO	ID	xID1	xID2		
1A	-	7 F	3 4		
2A	-	7 F	3 4	↓	

With this function the projected configuration data can be projected. The values for the configuration data are displayed behind the slave address in the following order:

IO (I/O-configuration) ID (ID-configuration) xID1 (extended ID1)  
xID2 (extended ID2).

## 6.8.9 AS-IAS-INTERFACE ADDRESS ASSISTANT

AS-I ADDRESS
ASSISTANT ON
NEXT ADDRESS TO
PROGRAM 1A

The AS-iAS-Interface address assistant helps you to set up the AS-iAS-Interface circuit quickly. Once you have stored the AS-iAS-Interface configuration, the AS-iAS-Interface address assistant addresses a new AS-iAS-Interface slave with address zero to the desired address.

Selecting "Assistant on" or "Assistant off" switches the AS-iAS-Interface address assistant on or off. The current state of the AS-iAS-Interface address assistant is displayed:

Assistant on: AS-iAS-Interface address assistant is switched on.

Assistant off: AS-iAS-Interface address assistant is switched off.

Procedure:

1. Store AS-iAS-Interface Configuration to the master. This can be done very comfortably with the Windows software AS-i-Control-Tools (Master | Write configuration to the AS-iAS-Interface Master ...), or directly within the advanced mode (see chapter 7).
2. All AS-iAS-Interface slaves have to be addressed to 0 or to the desired address. The slaves must be disconnected from the AS-iAS-Interface circuit.
3. Start the AS-iAS-Interface address assistant.
4. Now connect the AS-iAS-Interface slaves one after the other. The last line of the display of the AS-iAS-Interface address assistant shows which AS-iAS-Interface slave has to be connected next.

**6.8.10 LOS (list of offline slaves)**



See also "Advanced Diagnostics for AS-i Masters", chapter 7.

With "Clear all" and "Set all" you can delete or set a single bit for each AS-iAS-Interface slave address. Underneath there is a list of all slaves, by which the LOS bit can be set or deleted by individually selecting of the LOS bit.

Empty field: LOS bit deleted

X: LOS bit set

**6.8.11 AUTO ADDR ENABLE (enable automatic address)**



With this function can the programming of the automatic address be released or locked.

Meaning of the displayed mode:

Enable: Automatic address programming is released.


Disable: Automatic address programming is locked.

With "Change" the operation mode can be changed.

**6.8.12 FACTORY RESET**



With this function the master can be reseted to the factory setting. The reset can be chosen by selecting the menu entry "DO RESET".

 <b>Warning</b>	<ul style="list-style-type: none"><li>• This function should be used only in an emergency, since all attitudes transacted so far are put back to factory setting and thus perfect communication and functioning of the masters with the AS-i circle are ensured no more.</li><li>• The master and the AS-i circuit have to be recommissioned and reprojected again after a successful "Reset".</li><li>• In case of double masters the "Reset" acts on both AS-i masters!</li></ul>
--	---

Issue date - 3.1.2008

## 6.9 IO + PARAM. TEST

### 6.9.1 AS-i circuit



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

To reach this setup menu you have to change the desired AS-i circuit by using the arrow and the OK buttons.

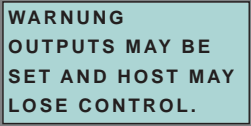
The function is only implemented in the double master.

It makes possible to change the AS-i circuit that is currently active for being operated.

The active circuit is marked by the cursor.

### 6.9.2 Structure of menu IO + PARAM. TEST


The menu IO + PARAM. TEST is used for testing of AS-iAS-Interface inputs/outputs as well as for reading/writing of AS-iAS-Interface parameters



```
WARNUNG
OUTPUTS MAY BE
SET AND HOST MAY
LOSE CONTROL.
```

Before changing to the menu the following warning message will be displayed:

"Warning: Outputs may be set and Host may lose control."



```
BINARY INPUTS
BINARY OUTPUTS
ANALOG INPUTS
ANALOG OUTPUTS
```

The menu "IO + Param.Test" enables you to choose one of the following submenus:

- Binary Inputs
- Binary Outputs
- Analog Inputs
- Analog Outputs
- Parameter

## 6.9.3 BINARY INPUTS

BINARY INPUTS	
	D3...D0
1 A	- 0 1 0 1
2 A	- 0 1 0 1
3 A	- 0 0 0 1

This list shows the state of the binary inputs for all AS-iAS-Interface slaves.

- 0: Input deleted
- 1: Input set

## 6.9.4 BINARY OUTPUTS

BINARY OUTPUTS	
	D3...D0
1 A	- 0 1 0 1
2 A	- 0 1 0 1
3 A	- 0 0 0 1

This function shows the state of the binary outputs for all AS-iAS-Interface slaves.

- 0: Output deleted
- 1: Output set

The binary outputs can be changed after selecting the desired AS-iAS-Interface slave.

## 6.9.5 ANALOG INPUTS

ANALOG INPUTS	
1	X
2	A
3	B

This function shows the state of the analog inputs for all AS-iAS-Interface slaves. The slave-types are characterized as follows:

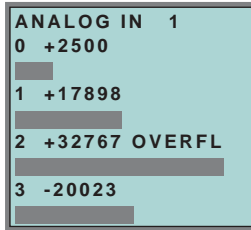
- X:** single slave
- A:** A-slave
- B:** B-slave
- AB** A+B slave
- ...

The data of the slave B start ex channel 2!

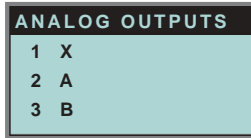
The display is as follows:

AS-iAS-Interface slave address, hexadecimal 16-bit value, bar display indicating the input or output value.

An eventual value overflow is displayed by "Overfl" additionally.



## 6.9.6 ANALOG OUTPUTS

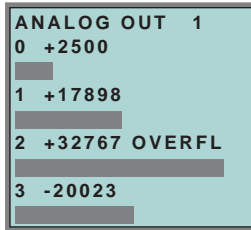


This function shows the state of the analog outputs for all AS-iAS-Interface slaves.

The display is as follows:

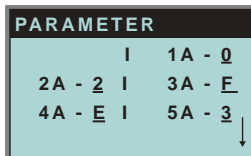
AS-iAS-Interface slave address, hexadecimal 16-bit value, bar display.

OVERFL displays any value overflows additionally.



The analog outputs can be changed after selecting the desired AS-iAS-Interface slave.

## 6.9.7 PARAMETER

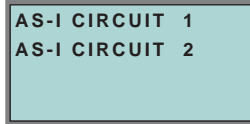


This function shows the hexadecimal value of the current AS-iAS-Interface parameters for all AS-iAS-Interface slaves.

The actual AS-iAS-Interface parameters can be changed after selecting the desired slave address.

## 6.10 DIAGNOSIS (normal AS-iAS-Interface Diagnosis)

### 6.10.1 AS-i circuit



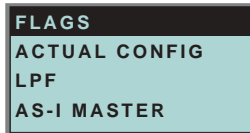
To reach this setup menu you have to change the desired AS-i circuit by using the arrow and the OK buttons.

The function is only implemented in the double master.

It makes possible to change the AS-i circuit that is currently active for being operated.

The active circuit is marked by the cursor.

### 6.10.2 Structure of menu DIAGNOSIS



The menu "Diagnosis" enables you to choose one of the following submenus:

- Flags (EC-Flags: Execution control flags)
- Actual Config (actual configuration)
- LPF (list of periphery faults)
- AS-iAS-Interface Master (Info)

## 6.10.3 FLAGS

```

FLAGS: 0131 05
        0000 0001
        0011 0001
        0000 0101
1 PERIPHERY_OK
0 OFFLINE_READY
0 AS-I_PWR_FAIL
1 NORMAL_OP.
1 CONFIG_ACTIVE
0 AUTO_ADDR_AVL
0 AUTO_ADDR_ASN
0 LDS.O
1 CONFIG_OK

1 AUTO_ADDR_ENA
0 OFFLINE
1 DATA_EXCH_ACT
    
```

This function shows the EC-flags hexadecimally, binary and as single bits beginning with the lowest-order bit.

Arrangement of the bits within the byte:

Byte								
Bit value:	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
Bit.	7	6	5	4	3	2	1	0

**Byte 1:**

Bit 0: Periphery\_OK

This flag is set, if no AS-iAS-Interface slave signs a periphery fault.

### Byte 2:

#### Bit 0: Config\_OK

The flag is set, if the projected configuration corresponds with the actual configuration.

#### Bit 1: LDS.0

The flag is set, if an AS-iAS-Interface slave with address 0 has been detected.

#### Bit 2: Auto\_Addr\_Asn

The flag is set, if the automatic addressing is possible (AUTO\_ADDR\_ENABLE = 1; no "incorrect" AS-iAS-Interface slave is connected to AS-iAS-Interface).

#### Bit 3: Auto\_Addr\_Avl

The flag is set, if the automatic addressing is possible. This means that exactly one slave is failed.

#### Bit 4: Config\_Active

The flag is set in the configuration mode and is reset in the protected mode.

#### Bit 5: Normal\_Op.

The flag is set, if the AS-iAS-Interface master is in normal operation.

#### Bit 6: AS-iAS-Interface Pwr Fail

The flag is set, if the AAS-iAS-Interface circuit is not sufficiently powered.

#### Bit 7: Offline\_Ready

The flag is set, if the AS-iAS-Interface master is in the offline phase.

### Byte 3:

#### Bit 0: Data\_Exch\_Act

If the flag "Data Exchange Active" is set, the data exchange is released with the AS-iAS-Interface slaves in the data exchange phase. If the bit is not set, the data exchange with AS-iAS-Interface slaves will be locked. Instead of data telegrams READ\_ID telegrams will be sent.

The bit is set by the AS-iAS-Interface master by change over in the offline phase.

#### Bit 1: Offline

This bit is set if the operating mode offline is to be or already taken.

#### Bit 2: Auto\_Addr\_Ena

This flag indicates if the automatic addressing is locked (bit = 0) or released (bit = 1) by the user.

(For further information please refer to the manual AS-iAS-Interface 3.0 Command Interface)



## 6.10.4 ACTUAL CONFIG (actual configuration)

ACTUAL CONFIG		
0A	I	1A-Cf
2Ax	I	3Ad
4p	I	5A
		↓

This function shows the state of the actual configuration of the individual AS-iAS-Interface slaves.

At the end of the list there is a help text describing the abbreviations:

X (O.K.): The configuration data of the detected AS-i slave matches the projected configuration data.

D (Detected Only): An AS-i slave is detected at this address, but not projected.

P (Projected Only): An AS-i slave is projected at this address, but not detected.

C (Type Conflict): The configuration data of the detected AS-i slave does not match the projected configuration data. The actual detected configuration of the connected AS-i slave is displayed.

F (Periph. Fault): The AS-i slave has a peripheral fault.

A (Duplicate Adr.): 2 AS-i slaves in the indicated address

After selecting the desired AS-iAS-Interface slave address the values for the actual configuration data are displayed behind the respective address in the following order:

IO (I/O-configuration) ID (ID-configuration) xID1 (extended ID1)  
xID2 (extended ID2)

0A - .... -
1A - 7A28 - C
TYPE CONFLICT

Furthermore the state of the configuration is displayed in plain text.

If no AS-iAS-Interface slave is detected and no AS-iAS-Interface slave is projected at a certain address, four dots instead of the configuration data are displayed.

## 6.10.5 LPF (list of periphery faults)

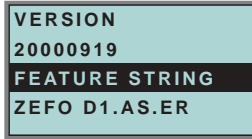
LPF LIST OF PERIPH. FAULTS		
	I	1A-x
2A-	I	3A-
		↓

The list shows AAS-iAS-Interface slaves, which have released a peripheral fault.

Empty field: Periphery O.K.

Empty field: X: Peripheral fault

**6.10.6 AS-iAS-Interface MASTER (info)**

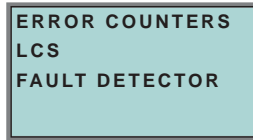


This function shows information about the version and the features of the AS-iAS-Interface master.

Version xxxxxxxx (date of the firmware)

Feature String xxxxxxxxxxxxxxxxx

**6.11 ADV. DIAGNOSIS (advanced AS-iAS-Interface diagnosis)**

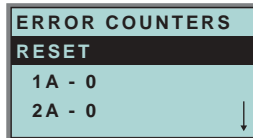


See also "Advanced Diagnostics for AS-Interface Masters", chapter 7.

In the menu "Adv. Diagnosis", the following submenus can be found:

- Error Counters
- LCS (list of slaves, that produced a configuration error)
- Fault Detector

**6.11.1 ERROR COUNTERS**



This list shows the error counter for each single AS-iAS-Interface slave.

Furthermore the number of power failures on AS-iAS-Interface (APF) is displayed.

By selecting "Reset", the error counters are reset to 0.

## 6.11.2 LCS (list of slaves having caused a configuration error)

RESET		
APF-	I	1A-x ↑
2A-	I	3A-
4A-x	I	5A ↓

This list shows for each single AS-iAS-Interface slave whether at least one configuration error was caused by an enormous telegram transmission. This function is especially important if the configuration error only occurs short-time.

Empty field: No error

X: AS-i slave caused a configuration error.

## 6.11.3 FAULT DETECTOR

<b>FAULT DETECTOR</b>
<b>RESET</b>
<b>HISTORIC:</b>
EFLT OVRV NOIS
<b>ACTUAL:</b>
EFLT OVRV NOIS
<b>DUP ASI ADR:</b>
0   31B
<b>HELP:</b>
EFLT EARTH FAULT
OVRV OVERVOLATAGE
NOIS NOISE
DUP ASI ADR
DUPLICATE ASI
SLAVE ADDRESS

The menu "Fault Detector" shows information about the AS-iAS-Interface detector and allows deleting of the AS-iAS-Interface detector's history. Furthermore a list of abbreviations in plain language can be found in the section "Help".

By selecting "Reset" the history of the AS-iAS-Interface detector can be deleted.

In the section "Historic" the appeared error messages of the AS-iAS-Interface detector are listed since the last "Reset".

In the section "Actual" the actual appeared error messages of the AS-iAS-Interface detector are listed.

Following error messages are possible:

- Duplicate address (the 2 lowest slave addresses are displayed, at which a duplicate address exist).
- Earth faults
- Noise
- Overvoltage

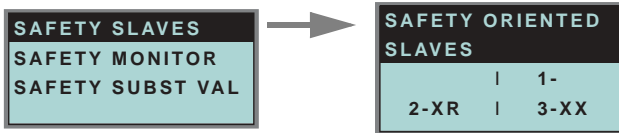
## 6.12 AS-iAS-Interface SAFETY



This function shows information about the safety slaves and the safety monitor:

- Safety Slaves
- Safety Monitor
- Safety Substitute Value

### 6.12.1 SAFETY ORIENTED SLAVES



This list shows the "safety-directed input slaves" ("AS-iAS-Interface Safety at Work"), by which the safety function is released.

X: channel o.k.

R: channel has released

The first area corresponds with the channel 2, the second one with the channel 1. XR means also: channel 2 is OK and channel 2 has released.

The channels can not be evaluate individually, if the substitution of safety slaves input data was disconnected in menu:

- command interface/ function profile

or

- slave value substitute.

Both channels must have the same state, otherwise the indication will not be proper.

### 6.12.2 SAFETY MONITOR

SAFETY MONITOR DIAGNOSIS	
ADDR:	17
MODE:	SORTED/V1
STATUS:	O.K.
CH.1:	OFF
CH.2:	OFF
1-32:	GREEN
...	

The AS-iAS-Interface safety monitor reads the diagnosis data of the AS-iAS-Interface safety monitor and shows on the display. The meaning of the shown diagnosis can be seen in the description of the safety monitor.

### 6.12.3 SAFETY SUBST VAL

SAFETY SUBST VAL SUBSTITUTE CHANGE
--

With this function the input-data-substitution by safety slaves can be turn off/on.  
SUBSTITUTE

The input-data are replaced mit following values:

Both channels released: 0000bin

Channel 1 released: 0011bin

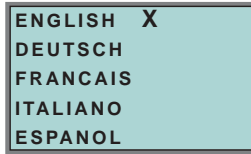
Channel 2 released: 1100bin

No channel has released: 1111bin

NO SUBSTITUTE

The safety slave input data are shown unmodified.

## 6.13 LANGUAGE (language of displayed messages)



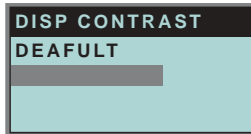
The list of **messages** (like "missing slave" or "unknown slave") that is shown on the screen, can be edited in the desired language by using the softkey + OK buttons. The current language is marked with "x".



Note

The menu-language is English. This attitude cannot be changed! It is only possible to change the language of displayed messages (like "missing slave" or "unknown slave").

## 6.14 DISP CONTRAST (display contrast)



With this function display contrast can be adjusted.

Factory adjustment will be reloaded by selecting DEAFULT.

### Approach to set the display contrast:

- select the bar line with soft keys
- verify with *OK* (the bar line flashes)
- set the display contrast with soft keys
- assume with *OK*.

If the contrast is completely misaligned, set it as follows:

- turn the master off
- press the buttons *MODE + SET* and hold them
- turn the master on.


### 7 Advanced Diagnostics for AS-Interface Masters


The advanced AS-i diagnostics serve to locate occasionally occurring errors and to judge the quality of data transmission on AS-i without additional diagnostics tools.

AS-i Control Tools (software for comfortable commissioning of AS-i and programming of AS-i Control) supports the operation of the advanced diagnostics (LCS, error counters and LOS).

#### 7.1 List of corrupted AS-Interface Slaves (LCS)


The *LCS* contains the history of the delta list. Besides the list of projected slaves (*LPS*), the list of detected slaves (*LDS*) and the list of activated slaves (*LAS*), a fourth list, the **list of corrupted slaves (LCS)**, is created by AS-Interface masters with advanced diagnostics in order to locate occasionally occurring short-time configuration errors. This list contains entries of all AS-Interface slaves which were responsible for at least one configuration error since powering up the AS-i master or reading the list. Short-time AS-i power failures are listed in the *LCS* at the position of AS-i slave with address 0.

 Note	With every read-access the LCS will be deleted.
---	---

 Note	<p>The last short-time configuration error can also be displayed on the AS-i master:</p> <ul style="list-style-type: none"> <li>• Pressing the "Set" button of the AS-i master shows the AS-i slave which was responsible for the last short-time configuration error. If there was a short-time AS-i power failure the display shows "39" after pressing the "Set" button.</li> <li>• This function is only available if the device is in the normal operation mode of the protected mode (display empty) or in the off-line-phase.</li> </ul>
---	---

#### 7.2 Protocol analysis: counters of corrupted data telegrams

The AS-i master with advanced diagnostics has a counter of telegram repetitions for each AS-i slave, which count up every time a corrupted data telegram has been found. This makes possible to judge the quality of the AS-i network, even if only a few corrupted telegrams occurred and the AS-i slave did not cause any configuration errors.

 Note	<ul style="list-style-type: none"> <li>• The counter values can be read via the host interface and will be deleted with every read access.</li> <li>• The counter value is limited to 254. 255 will cause a counter overflow.</li> </ul>
---	--

The protocol analysis is included in the software AS-i Control Tools by using the command master | AS-i Diagnostics.

## 7.3 Offline Phase on Configuration Errors (LOS)

The AS-i masters with advanced diagnostics offer the possibility to put themselves into the offline phase when a configuration error on the AS-Interface occurs. This way the security of the application can be ensured. The reaction to a configuration error is very fast and the host can be relieved from this task. If there are any problems on the AS-i network, the AS-interface can be switched to a secure state.

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


- Every configuration error during normal operation in protected mode releases the off-line phase.
- For each slave address, it can be chosen whether a configuration error on this address will cause the offline phase or not. This information is stored in the list of offline slaves (LOS).

The user himself can decide how the system reacts to a configuration error on the AS-i. The AS-i master can release the off-line phase in critical situations, i. e. only with certain slave addresses, whereas in less critical situations (if one of the other AS-i slaves has a configuration error) only the error message is sent to the host, but AS-i is still running.


The parameterization "off-line phase on configuration error" is also supported by the "AS-i-Control-Tools" (command Master | Identity | Offline on configuration error).

Two ways to reset the error message "OFFLINE BY LOS" are possible:

1. Deleting of the complete list LOS of the affected AS-Interface circuit ("CLEAR ALL").
2. Voltage reset at the affected AS-Interface circuit.

 <p>Attention</p>	By voltage reset at the AS-i circuit 1 the complete double gateway will be shut down.
---	---

## 7.4 Functions of the AS-Interface Fault Detector

 <p>Note</p>	The respective bits <b>ground fault</b> , <b>overvoltage</b> , <b>noise</b> , <b>double address</b> will only be set if AS-i masters are used, which also support these functions.
---	--


### 7.4.1 Duplicate address' recognition

If two slaves have the same address in an AS-Interface circuit, a duplicate address exists. Because of this error the master can not send a request to each slave separately. At that time both responses overlap themselves on the line, it is impossible for the master to recognize the slave response safely. It exists an unstable network behaviour.



The function "**duplicate address' recognition**" allows to recognize a duplicate address and to indicate this both via the superior fieldbus and in the AS-Interface Control Tools.

A duplicate address causes a configuration error und will be shown in the display of the master.

 <b>Note</b>	<p>Duplicate addresses can be recognized only in the segment directly at the master. If both slaves participate in a duplicate address located behind a repeater, the <i>duplicate address' recognition</i> is impossible.</p>
--	--


### 7.4.2 Earth Fault Detector


An *Earth 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 limits the fail-safe characteristic of the AS-Interface transmission substantially.

Earth faults are indicated in the master's display as well as via the superior fieldbus and the AS-i Control Tools.

 <b>Note</b>	<p>By a double master in version 1 power supply for 2 AS-i circuits an earth fault in one of the both circuits causes also an earth fault in the other circuit because of the existing galvanic connection.</p>
--	---

 <b>Note</b>	<p>For recognition of earth faults the master must be grounded with the function earth.</p>
--	---

### 7.4.3 Noise Detector

The noise detector detects alternating voltages on AS-Interface, which are not produced by AS-Interface master or AS-Interface slaves. These interference voltages can cause telegram disturbances.

A frequent cause are insufficiently shielded frequency inverters or awkwardly shifted cables.

Noises are indicated in the master's display as well as via the upstream fieldbus and the AS-i Control Tools.


### 7.4.4 Overvoltage Detector

Overvoltages are present, if the AS-Interface line, whose conductors lie normally electrically symmetrically to the plant earth, are strongly electrically raised. A cause can be e.g. power-on procedures of large consumers. However sometimes overvoltages don't generally disturb AS-Interface communication, but can release incorrect signals of sensors.

Overvoltages are indicated in the master's display as well as via the upstream fieldbus and the AS-i Control Tools.

## 8 PROFIBUS DP

This chapter contains all necessary information to operate the PROFIBUS gateways in a PROFIBUS DP network.

 <b>Note</b>	<p>The respective bits <b>ground fault</b>, <b>overvoltage</b>, <b>noise</b>, <b>double address</b> will only be set if AS-i masters are used, which also support these functions.</p>
--	--

### 8.1 DP Telegrams

#### 8.1.1 Diagnosis

DP Diagnosis - Double Master					
PDU byte	user byte		DP	DP V1	user
1	–	station_status 1	4		
2	–	station_status 2	4		
3	–	station_status 3	4		
4	–	master address	4		
5	–	ident high	4		
6	–	ident low	4		
7	1	header	4	4	
8	2	type		4	
9	3	slot		4	
10	4	spec		4	
11	5	ec-flags (high), circuit 1			4
12	6	ec-flags (low), circuit 1			4
13	7	delta (0 ... 7), circuit 1			4
14	8	delta (8 ... 15), circuit 1			4
...	...	...			...
20	14	delta (56 ... 63), circuit 1			4
21	15	LPF (0 ... 7), circuit 1			4
...	...	...			...
28	22	LPF (56 ... 63), circuit 1			4
29	23	reserved			4
...	...	...			...
36	30	reserved			4
37	31	ec-flags (high), circuit 2			4
38	32	ec-flags (low), circuit 2			4
39	33	delta (0...7), circuit 2			4
40	34	delta (8...15), circuit 2			4
...	...	...			...

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DP Diagnosis - Double Master					
PDU byte	user byte		DP	DP V1	user
46	40	delta (56...63), circuit 2			4
47	41	LPF (0...7), circuit 2			4
	...	...			...
54	48	LPF (56 ... 63), circuit 2			4

ec-flags (high):

- Bit 0:           periphery fault
- Bit 1 ... Bit 2 reserved
- Bit 3:           failure redundant 24 V
- Bit 4:           earth fault
- Bit 5:           over voltage
- Bit 6:           noise
- Bit 7:           duplicate address

ec-flags (low):

- Bit 0:   configuration error
- Bit 1:   slave with address0 detected
- Bit 2:   Auto\_address\_assignment not possible
- Bit 3:   Auto\_address\_assignment available
- Bit 5:   not in normal operation
- Bit 4:   configuration mode active
- Bit 6:   AS-i power fail
- Bit 7:   AS-i master is offline

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

- 1: ConfigError
- 0: no ConfigError

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

- 1: periphery fault
- 0: no periphery fault

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

Each element which is not used will be filled up with zeroes. This way the data elements in the diagnosis telegram will keep its designated position (and clear text diagnosis still fits to the data).

Only if an element at the end of the user diagnosis is not used, the length of the diagnosis will be shortened.

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

- ConfigError ≙ 1
- APF ≙ 1
- PeripheryFault ≙ 1

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

The GSD file includes the following presettings:

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

If a double master is being used, the User-Diagnosis-Bytes 5 to 30 represent AS-i network 1 and the User-diagnosis bytes 31 to 48 represent AS-i network 2.

## 8.1.2 Parameters

With the user parameters you can choose if and which slave list will be displayed in the diagnosis. Furthermore you can select which conditions have to be fulfilled to set the ExtDiag bit within the diagnosis telegram.

DP Parameters - Double Master						
PDU byte	user byte		DP	DP V1	user	default
1	–	Station_Status	4			
2	–	WD_Fact_1	4			
3	–	WD_Fact_2	4			
4	–	min T <sub>sdr</sub>	4			
5	–	Ident High	4			
6	–	Ident Low	4			
7	–	Group_Ident	4			
8	1	DPV Status 1		4		80 <sub>16</sub>
9	2	DPV Status 2		4		00 <sub>16</sub>
10	3	DPV Status 3		4		00 <sub>16</sub>
11	4	User Byte 1, circuit 1			4	0B <sub>16</sub>
12	5	User Byte 2, circuit 1			4	06 <sub>16</sub>
13	6	User Byte 3, circuit 1			4	00 <sub>16</sub>
14	7	User Byte 1, circuit 2			4	0B <sub>16</sub>
15	8	User Byte 2, circuit 2			4	06 <sub>16</sub>
16	9	User Byte 3, circuit 2			4	00 <sub>16</sub>

The bits in "User Byte 1" and "User Byte 3" have the following meanings:

User Byte 1								
	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
	-	-			LPF	-	D	F
default	0	0		0	1	0	1	1

User Byte 2								
	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
	FD	0		CS	PF	APF	CF	-
default	0	0		0	0	1	1	0

User Byte 3								
	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
			–					0
default		0						0

- LPF: 1: LPF will be transmitted in the diagnosis  
0: LPF will not be transmitted
- D: 1: Delta list will be transmitted in the diagnosis  
0: Delta list will not be transmitted
- F: 1: EC-flags will be transmitted in the diagnosis  
0: EC-flags will not be transmitted
- FD: If this bit is set, the PROFIBUS diagnosis is refreshed only if the PROFIBUS norm dictates this ("freeze diagnosis"). In doubt the data of the PROFIBUS masters diagnosis are not up to date.
- CS: 1: ExtDiag will be set if the LCS is not empty  
0: ExtDiag will not be set if the LCS is not empty
- PF: 1: ExtDiag will be set if there is a periphery fault at the AS-i line  
0: ExtDiag will not be set.
- APF: 1: ExtDiag will be set if there is an AS-i Power Fail  
0: ExtDiag will not be set.
- CF: 1: ExtDiag will be set if there is a configuration error  
0: ExtDiag will not be set.

The GSD's default user parameter telegram is:

80 <sub>16</sub>	00 <sub>16</sub>	00 <sub>16</sub>	0B <sub>16</sub>	06 <sub>16</sub>	00 <sub>16</sub>
------------------	------------------	------------------	------------------	------------------	------------------

(DPV1 enabled, diagnosis settings according to chapter 8.1.1)

If a double master is being used, the data for AS-i circuit are transmitted in the user parameter bytes 4 to 6. For circuit 2 3 additional bytes are added.

### 8.1.3 Configuration DP V0 (cyclic data)

The configuration of the AS-i/PROFIBUS gateways is made with the GSD file. Therefore the provided GSD file has to be imported into your PROFIBUS configuration tool.

### 8.1.4 Options

The original data input and outlet data can be used with different „Special IDs“.

The advantages of special input and output IDs are, that they can include up to 64 elements (bytes or words), and that the length of input and output data can be different. Additionally, "manufacturer specific" data bytes describing the ID type are possible. These "manuafaturer specific" data bytes describe the which type ID is.

The GSD file offers here several combinations (several lengths) for transmitting I/O date, command interface (management) and analog data.

Therefore the analog data can be transmitted directly in the process data channel and do not have to be requested by the slower DP V1 commands.

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Maximally 8 modules can be configured.

The detailed possibilities:

<b>Length</b>	<b>Description</b>
4 bytes	digital input (slaves 0 - 7)
8 bytes	digital input (slaves 0 - 15)
12 bytes	digital input (slaves 0 - 23)
16 bytes	digital input (slaves 0 - 31)
20 bytes	digital input (slaves 0 - 7B)
24 bytes	digital input (slaves 0 - 15B)
28 bytes	digital input (slaves 0 - 23B)
32 bytes	digital input (slaves 0 - 31B)

<b>Length</b>	<b>Description</b>
4 bytes	digital output (slaves 0 - 7)
8 bytes	digital output (slaves 0 - 15)
12 bytes	digital output (slaves 0 - 23)
16 bytes	digital output (slaves 0 - 31)
20 bytes	digital output (slaves 0 - 7B)
24 bytes	digital output (slaves 0 - 15B)
28 bytes	digital output (slaves 0 - 23B)
32 bytes	digital output (slaves 0 - 31B)

<b>Length</b>	<b>Description</b>
16 bytes	digital in/out (slaves 0 - 31)
16 Bytes	digital in/out (slaves 0B - 31B)
32 bytes	digital in/out (slaves 0 - 31B)



**Note**

2 command interfaces can be intergrated.

Length	Description
2 bytes	management (command interface)
4 bytes	management (command interface)
8 bytes	management (command interface)
11 bytes	management (command interface)
12 bytes	management (command interface)
34 bytes	management (command interface)
36 bytes	management (command interface)

Length	Description
24 bytes	analog input (slaves 29 - 31)
56 bytes	analog input (slaves 25 - 31)
88 bytes	analog input (slaves 21 - 31)
120 bytes	analog input (slaves 17 - 31)
128 bytes	analog input (slaves 16 - 31)
16 bytes	analog input (slaves 14 - 15)

Length	Description
24 bytes	analog output (slaves 29 - 31)
56 bytes	analog output (slaves 25 - 31)
88 bytes	analog output (slaves 21 - 31)
120 bytes	analog output (slaves 17 - 31)
128 bytes	analog output (slaves 16 - 31)
16 bytes	analog output (slaves 14 - 15)

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Length	Description
2 bytes ... 128 bytes	analog input data circuit 1, dynamic <sup>1</sup>
2 bytes ... 128 bytes	analog output data circuit 1, dynamic <sup>1</sup>
2 bytes ... 128 bytes	analog input data circuit 2, dynamic <sup>1</sup>
2 bytes ... 128 bytes	analog output data circuit 2, dynamic <sup>1</sup>

1. Module parameters necessarily

Length	Description
2 bytes	flags and AS-i detector circuit 1
2 bytes	flags and AS-i detector circuit 2

## 8.2 I/O Data

### 8.2.1 Process data

In V2.1 mode the AS-i I/O data are mapped in the process data as known from the Siemens and AS-i/InterBus masters. This means that the lower nibble describes the data of the AS-i slave with the higher slave address. The ec-flags or hi-flags are additionally mapped at the nibble of AS-i slave 0.

byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
0	flags				slave 1/1A			
	F3	F2	F1	F0	D3	D2	D1	D0
1	slave 2/2A				slave 3/3A			
2	slave 4/4A				slave 5/5A			
3	slave 6/6A				slave 7/7A			
4	slave 8/8A				slave 9/9A			
5	slave 10/10A				slave 11/11A			
6	slave 12/12A				slave 13/13A			
7	slave 14/14A				slave 15/15A			
8	slave 16/16A				slave 17/17A			
9	slave 18/18A				slave 19/19A			
10	slave 20/20A				slave 21/21A			
11	slave 22/22A				slave 23/23A			
12	slave 24/24A				slave 25/25A			
13	slave 26/26A				slave 27/27A			
14	slave 28/28A				slave 29/29A			

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

Flags		
	input data	output data
F0	ConfigError	Offline
F1	APF	LOS master bit
F2	PeripheryFault	→ ConfigurationMode
F3	ConfigurationActive	→ ProtectedMode

ConfigError:           0 = ConfigOK, 1 = ConfigError  
 APF:                    0 = AS-i Power OK, 1 = AS-i Power Fail  
 PeripheryFault:       0 = PeripheryOK, 1 = PeripheryFault  
 ConfigurationActive: 0 = ConfigurationActive, 1 = ConfigurationInactive  
 Offline:                0 = Online, 1 = Offline  
 LOS-Master-Bit        0 = Offline by ConfigError deactivated  
                           1 = Offline by ConfigError activated

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

A rising edge of the "LOS master bit" effects that all bits in the LOS are set. A falling edge effects that all bits are deleted.

### 8.2.2 EC-Flags and AS-i watchdog

In addition to ec-flags, the AS-i watchdog flags will be transferred in diagnostic data too.

Issue date - 3.1.2008

Diagnostic data are assembled as follows:


ec-flags (high):

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

ec-flags (low):

- Bit 0: configuration error
- Bit 1: slave with address0 detected
- Bit 2: Auto\_address\_assignment not possible
- Bit 3: Auto\_address\_assingment available
- Bit 4: configuration mode actice
- Bit 5: not in normal operation

### 8.3 AS-i 16-Bit Data

 <b>Note</b>	<p>A-Slaves map the data on channels 1 and 2.          B-Slaves map the data on channels 3 and 4.</p>
--	---

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

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

AS-i 16-bit data								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	slave 31-n/8, channel 1, high byte							
2	slave 31-n/8, channel 1, low byte							
3	slave 31-n/8, channel 2, high byte							
4	slave 31-n/8, channel 2, low byte							
...	...							
n-3	slave 31, channel 3/slave 31B, channel 1, high byte							
n-2	slave 31, channel 3/slave 31B, channel 1, low byte							
n-1	slave 31, channel 4/slave 31B, channel 2, high byte							
n	slave 31, channel 4/slave 31B, channel 2, low byte							

**8.4 Command Interface**

Only using the IDs of the process data field the PROFIBUS gateway can be used as M0 AS-i master. By using the command interface (see chapter 8.2) the functions of a M3 master become available.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	command							
2	T	circuit						
3	request parameter byte 1							
...	...							
36	request parameter byte 34							

Answer								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	command (mirrored)							
2	result							
3	response parameter byte 1							
...	...							
34	response parameter byte 32							

A command of the command interface will be edited if the toggle bit T<sup>1</sup> has changed. This way the same command can be used repeatedly.

The commands of the command interface can also be activated with PROFIBUS DP V1. Even the process data exchange is possible via the command interface. This way the Windows configuration software "AS-i-Control Tools" can run the whole communication via DP V1.

**8.5 DP V1**

To exchange data between the PROFIBUS master and the AS-i/PROFIBUS gateway via PROFIBUS DP V1 only one data block is used - slot 1, index 16. Within this data block a command interface is installed like the one used in the DP telegram.


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

---

1. A T bit (toggle bit) is only needed to execute two commands directly one after the other.

## 8.6 Restrictions

The SPC3 has only 1,5 KByte DP-RAM available. Therefore the lengths of telegrams and the numbers of DP V1-connections to class 2 masters have to be restricted.

 <b>Note</b>	<p><b>I+M service</b> contains data for identification and maintenance. This service is <i>on</i> by default. Switching the services off provides additional memory into SPC3. This changes the DPVD length-limit.</p>
--	--

<b>Restrictions due to the SPC3</b>		
MSC1	inputs data / outputs data	doppel master: 272 bytes <sup>1</sup>
	diagnosis	62 bytes
	parameter	doppel master: 88 bytes
	configuration <sup>2</sup>	32 bytes
	SetSlaveAddress	4 bytes
MSAC1	SAPs PDU	1 72 bytes <sup>3</sup>
MSAC2	SAPs PDU	2 72 bytes <sup>4</sup>

1. The maximum length of the input and output data can vary up to 272 bytes input or output data if the **I+M** (information+maintenance) **service** is *on* only. The maximum length of the input and output data (both master) is not variable and it is limited to 144 bytes (for input and output data) if the **I+M service** is disabled.

2. Maximally 8 modules can be configured

3. The maximum length is limited to 42 bytes if the **I+M service** is set to *off*.

4. The maximum length is limited to 52 bytes if the **I+M service** is set to *off*.

## 9 Commissioning with AS-i Control Tools

The Windows based software "AS-i Control Tools" is designed to make the commissioning of the AS-i 3.0 PROFIBUS Gateway so easy as possible.

The software communicates with the AS-i/PROFIBUS Gateway using a PROFIBUS DP Master Simulator DP V1 or the serial PROFIBUS master (see chap. 9.2).

### 9.1 Windows software AS-i Control Tools

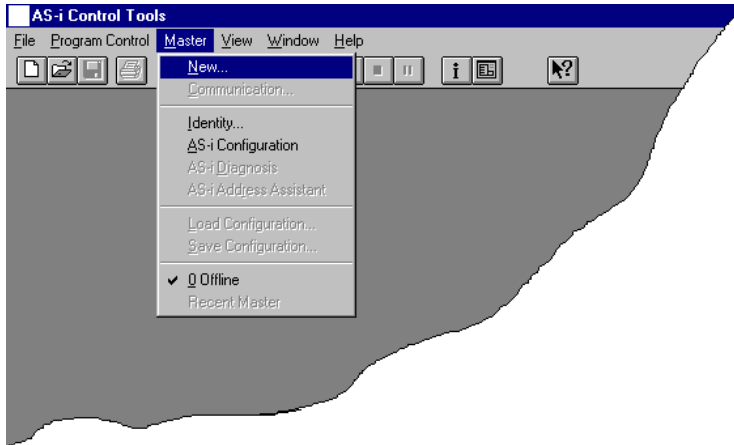


Please install the ASi Control Tools first and the device after it!

In this way the device driver is copied into the proper folder within the ASi Control Tools and should be recognized automatically.

The Windows software "AS-i-Control-Tools" enables you to configure the AS-i circuit in a very comfortable way.

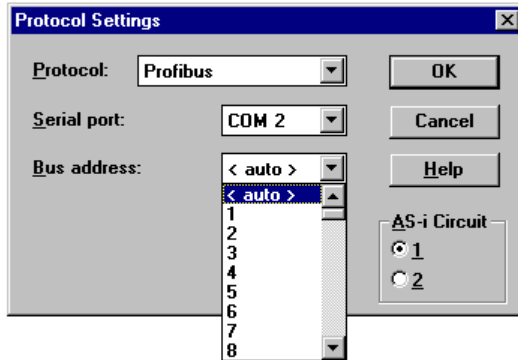
1. For this purpose plug in the PROFIBUS DP Master Simulator DP V1 or a serial PROFIBUS Master to the D-SUB-connector of the AS-i/PROFIBUS Gateway and connect the device over the RS 232 interface with a fully covered cable to a serial interface of your PC.
2. Start the AS-i-Control-Tools.
3. Call the command Master | New.



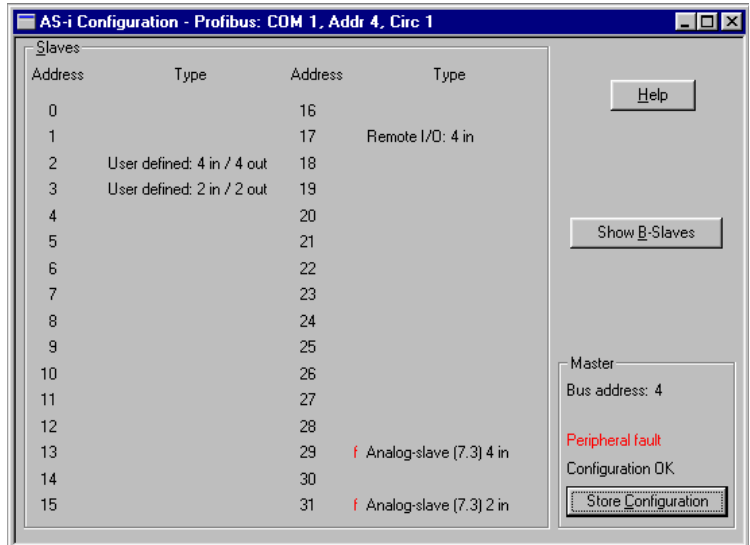
4. Choose PROFIBUS as protocol.

## AS-i 3.0 PROFIBUS Gateway Commissioning with AS-i Control Tools

5. Do the appropriate settings. (e.g. serial interface, COM 1, station address AS-i circuit <1>)

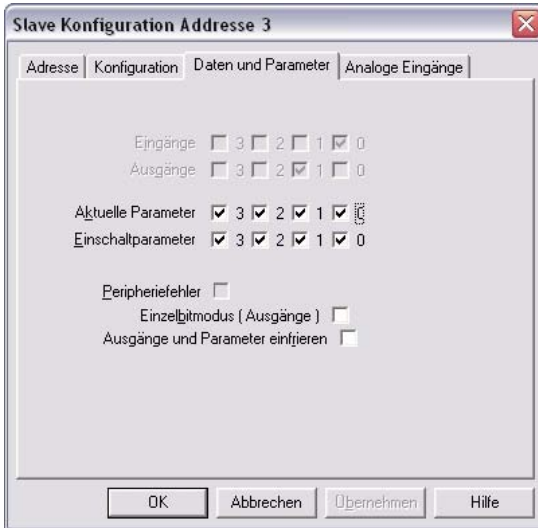


6. Call the command Master | AS-i configuration.  
The AS-i configuration editor will be started. All detected and projected AS-i slaves are displayed in this window.



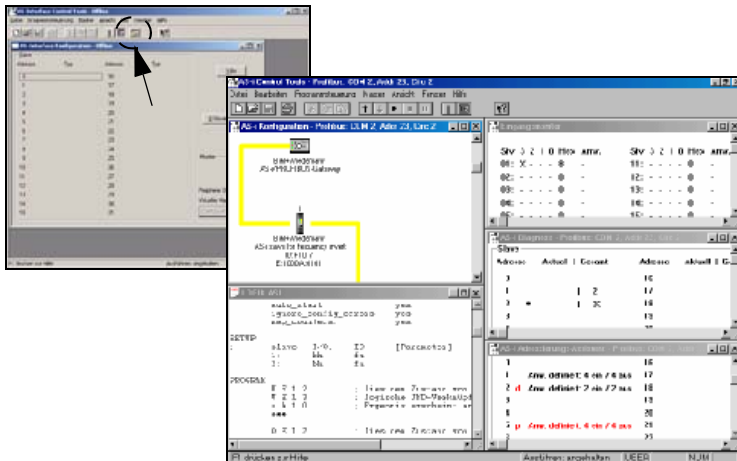
## AS-Interface Commissioning with AS-i Control Tools

7. Click on a slave entry to open the dialog box slave configuration.



Changing a slave address, setting AS-i parameters or AS-i configuration data is possible here. Additionally, inputs and outputs can be tested.

8. Click in the main menu on the second button from the right side to acquire a graphic presentation of the "AS-i Control Tools".



A very easy approach to configure the AS-i circuit is connecting each AS-i slave to the line and setting the AS-i slave address one after the other. After that press the button "Store configuration" to adopt the detected AS-i circuit to the AS-i master as projected data.

Issue date - 3.1.2008



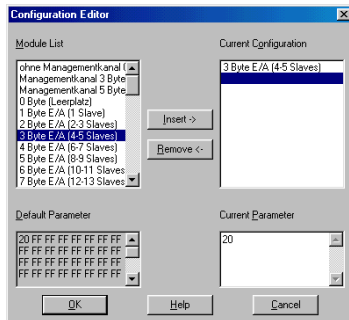
## AS-i 3.0 PROFIBUS Gateway Commissioning with AS-i Control Tools

Furthermore you can use the **AS-i Address Assistant**. This tool automatically changes the address of an AS-i slave to the desired address after connecting the slave to the AS-i line. The desired AS-i configuration can be created offline before and then be stored to a file. When building up the plant you only have to connect the AS-i slaves to the AS-i line one after the other.

Further descriptions to all features of the software can be obtained from the integrated help.

### 9.2 Accessories (optional)

#### 9.2.1 PROFIBUS DP Master Simulator



The PROFIBUS DP Master Simulator is an easy to use software for data exchange with PROFIBUS slaves of almost all manufacturers via PROFIBUS DP. The PROFIBUS DP master simulator can exchange data with many PROFIBUS slaves even without GSD file or type-file. The PROFIBUS slaves can be put into operation with the default I/O window. Input data can be read and output data can be written. Furthermore, the PROFIBUS DP Master Simulator also processes GSD-files. User parameters can be edited and the configuration can be modified and stored. The PROFIBUS station address can be changed with the PROFIBUS DP master simulator as well, this is useful for PROFIBUS I/O modules in protection class IP67 without addressing switches.

The PROFIBUS DP Master Simulator offers the possibility to scan a PROFIBUS network for connected slaves and to display them graphically. In this case, the case the PROFIBUS UART has to be connected directly to a PROFIBUS slave. The I/O data and the PROFIBUS user diagnosis can be displayed binary, hexadecimal and now also as ASCII code. The PROFIBUS output data can be transmitted consistently to the PROFIBUS slave. In **type mode** it is possible to set an output as long as the mouse button is pressed.

The new version of the PROFIBUS DP Master Simulator supports PROFIBUS DP V1. PROFIBUS slaves can be operated in the acyclic mode DP V1. This is especially helpful for commissioning complex field devices like drives, modular I/O systems etc.

The PROFIBUS Master Simulator consists of the software and the **PROFIBUS UART** which is the ideal interface converter between the RS 232 interface of a PC and the PROFIBUS slave. The **UART** does not need any additional external power

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

Besides the software "PROFIBUS DP master simulator", **DLL drivers** for Windows98, Windows Me, Windows 2000 and Windows NT as well as examples written in C come with the PROFIBUS UART. This offers the possibility to **use the PROFIBUS UART in combination with an own software**. However the PROFIBUS UART is a monitoring and commissioning tool for PROFIBUS slaves, it is not designed to control automation processes.

### 9.2.2 Serial PROFIBUS Master

The serial PROFIBUS master fulfills all tasks of the PROFIBUS DP master simulator. Furthermore, it can run the PROFIBUS with up to 1,5 MBaud.

## 10 The First Commissioning of AS-i



**Note**

*In this chapter an example is given, how quickly and easily an AS-i network can be put into operation without the need for external devices. The addressing of the components connected to the AS-i network can be performed directly on the AS-i master. It certainly is more comfortable to do the addressing with a handheld programming device or with the Windows software AS-i Control Tools. However, it is possible to configure even complex networks using only the AS-i master.*

What to do ?	How to go about it?
The AS-i master has to be properly supplied with power.	Using AS-i master with power supply "A": Connect the AS-i power supply unit to the terminals AS-i + and AS-i - of the master, connect the ground terminal. Using AS-i master with power supply "N": Connect the 24 V DC standard power supply with the terminals 24 V and 0 V of the master, connect the ground terminal. Turn on the power supply.
After the self-test: the LEDs "power", "config err", "U ASI" and "prj mode" are on. The LC display shows "": the AS-i master is in the offline phase. Shortly after that a "" will be displayed: the AS-i master stays in the detection phase.	
Switch the device to the projecting mode if the yellow LED does not light up.	Press the "mode" button for approx. five seconds.
The yellow LED "prj mode" lights up. The device is now in projecting mode.	
Add a slave with the address 0 to the AS-i line.	Connect the slave's terminals with the terminals AS-i +/- of the master.
The green LED "ASI active" lights up. The LC display shows "0". This indicates that the AS-i master has detected the slave.	
Change the slave address to address to "1".	Select address "1" by pressing the "set" button shortly, if necessary repeatedly; after each pressing the next free address is displayed. When a "1" appears on the display, press the "set" button for approx. five seconds until the display flashes. Press the "set" button again shortly to assign the new address to the slave.
The AS-i master detects the slave with address "1" and displays "1".	
Connect another slave with address "0" to the AS-i line and allocate the address "2" to it.	Connect the slave to the AS-i line. The addressing can be carried out the same way as the previous slave.

## AS-Interface The First Commissioning of AS-i

What to do ?	How to go about it?
The addresses of all detected slaves are now displayed sequentially.	
Switch to the protected operating mode and store the AS-i configuration.	Leave the configuration mode by pressing the "mode" button for at least five seconds until the "prj mode" LED goes out.
The configuration of the AS-i master is now finished.	

## 11 Codes Indicated by the Display

In the basic state of the configuration mode, the display shows the addresses of all detected slaves at a rate of two per second one after the other. A blank display indicates that the *LDS* 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 "Operation in advanced display mode").

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

39	Advanced AS-i diagnostics: After pressing the 'set'-button a short-time AS-i power failure occurred.
40	The AS-i master is in offline phase.
41	The AS-i master is in detection phase.
42	The AS-i master is in activation phase.
43	The AS-i master starts the normal operating mode.
70	Hardware error: The AS-i master's EEPROM cannot be written.
71	Wrong PIC-type.
72	Hardware error: wrong PIC-processor.
73	Hardware error: wrong PIC-processor.
74	Checksum error in the EEPROM.
75	Error in the internal RAM.
76	Error in the external RAM.
77	control software error: Stack overflow ( control II)
78	control software error: Checksum error in the control program.
80	Error while attempting to exit the configuration mode: A slave with address zero exists.
81	General error while changing a slave address.
82	The front panel operation is blocked. Until repowering-up the device can only be accessed from the host via the interface.
83	Program reset of the AS-i Control programm: The AS-i Control programm is being read out of EEPROM and copied into the RAM.
88	Display test while starting up the AS-i master
90	Error while changing a slave address in protected operating mode: No slave with address 0 existing.
91	Error while changing slave address: Target address is already used.
92	Error while changing slave address: New address could not be set.
93	Error while changing slave address: New address could only be stored volatily in the slave.
94	Error while changing the slave address in protected operating mode: Slave has wrong configuration data.

95	<p>The error 95 is caused by a superfluous slave and not by a missing slave. That is why the slave address is occupied by this superfluous slave. (In the protected mode the slave addresses which caused any configuration error can be displayed by pressing the SET button. AS-i master without graphical display are not able to differentiate between a missing slave, an incorrect slave or a redundant slave. All incorrect addresses are displayed. By pressing the SET button 5 sec. the displayed address starts to flash. Pressing the SET button again the master attempts to program the slave at the address 0 to the incorrect address.)</p>
----	---

## 12 Appendix: Example for startup on a Siemens S7

This example shows you how to start up the AS-i/PROFIBUS-Gateway stainless steel version VBG-PB-K20-DMD on a Siemens S7-300 programmable logic controller.

Hardware used:

SIMATIC S7 power supply	PS 307 5A
SIMATIC S7-CPU with PROFIBUS DP	CPU 315-2DP
	Order No.: 6ES7 315-2AF03-0AB0
	Firmware Version 1.2
AS-i/PROFIBUS-Gateway in stainless steel	VBG-PB-K20-DMD
AS-i-Power-Extender	
AS-i-4E Module	
AS-i-4E Module	
Power supply	Powers the AS-i components through the AS-i Power Extender

Software used:

GSD-File for the AS-i/PROFIBUS-Gateway in stainless steel VBG-PB-K20-DMD

SIMATIC Step7 Version 5.2 Service Pack 1 Version: K5.2.1.0

Associated documentation:

AS-i/PROFIBUS-Gateway Operating Manual

SIEMENS S7-300 documentation

### 12.1 Hardware configuration

#### 12.1.1 Electrical connection for AS-i

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

In the following the desired AS-i slaves are connected to the AS-i circuit.

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

You can set the AS-i slave address using the function "AS-INTERFACE SLAVE ADDR" function from the submenu "SETUP" on the AS-i/Profibus Gateway. For more detailed information, refer to chapter 6.

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

The AS-i/PROFIBUS-Gateway is now ready to run.

### 12.1.2 Electrical connection for PROFIBUS-DP

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

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

## 12.2 SIMATIC Step Configuration

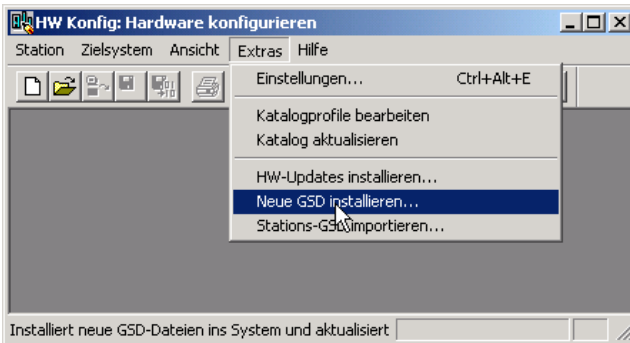
The remainder of this description presumes that a SIMATIC Step7 project has been created and added to an S7-300.

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

### 12.2.1 Configuration of the Hardware

Before configuring the hardware, the GSD file VBG-PB-K20-DMD 576 A1745.gsd supplied with the AS-i/PROFIBUS Gateway must be added to the hardware catalog.

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



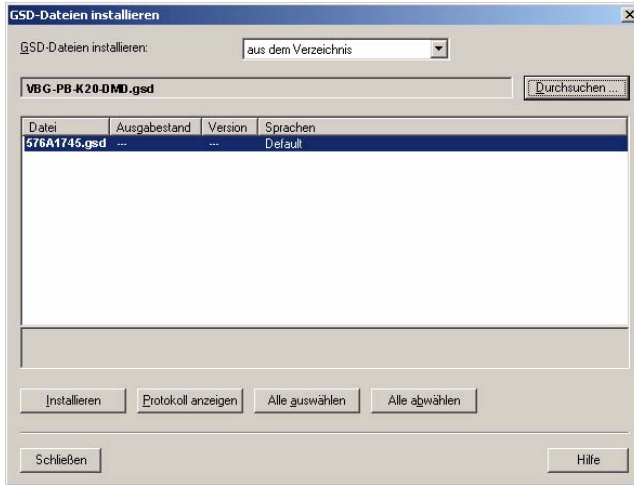
The PROFIBUS properties of the AS-i/PROFIBUS-Gateway are described in the GSD file VBG-PB-K20-DMD 576 A1745.gsd.



## AS-i 3.0 PROFIBUS Gateway

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

Clicking on the "Open" field adds the GSD file VBG-PB-K20-DMD 576 A1745.gsd to the hardware catalog.



Clicking on the "Open" field adds the GSD file VBG-PB-K20-DMD 576 A1745.gsd to the hardware catalog.

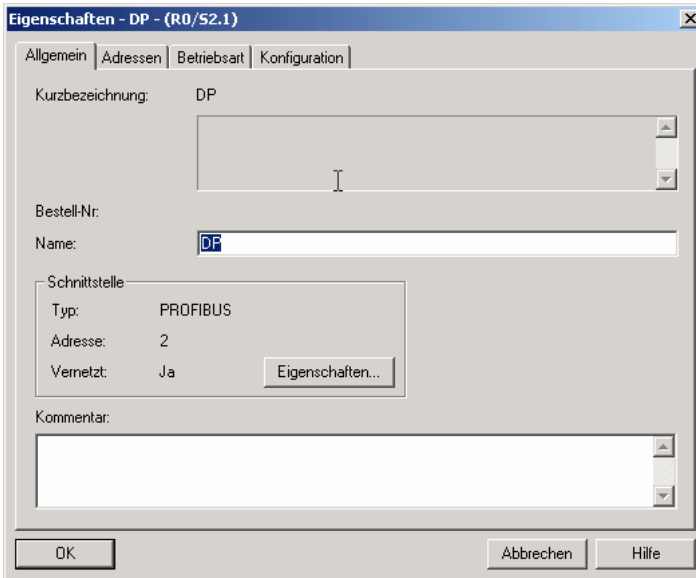
After successful installation of the GSD file you may now open the hardware catalog. The modules contained under SIMATIC 300.

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

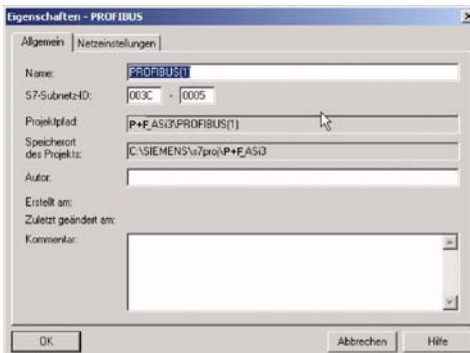
are added to the project. When selecting the CPU module, note the correct hardware version (identifiable by the imprint of the part number at lower left) and the firmware version (identifiable at left beneath the cover).

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

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



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



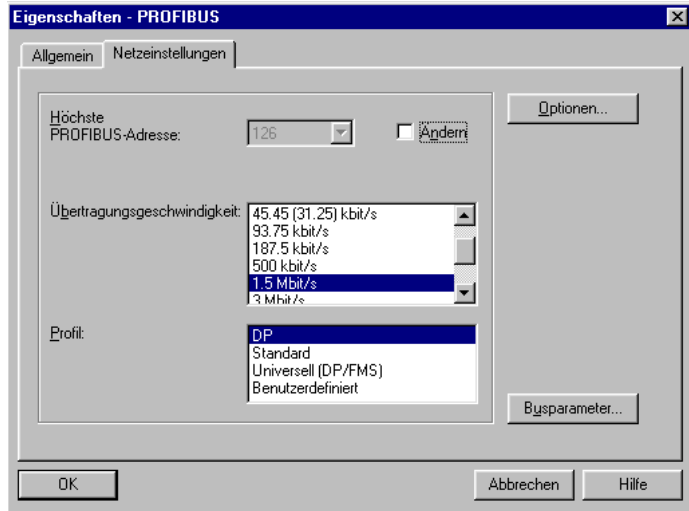
Profile "DP" is generally used as the PROFIBUS profile.

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

# AS-i 3.0 PROFIBUS Gateway

## Appendix: Example for startup on a Siemens S7

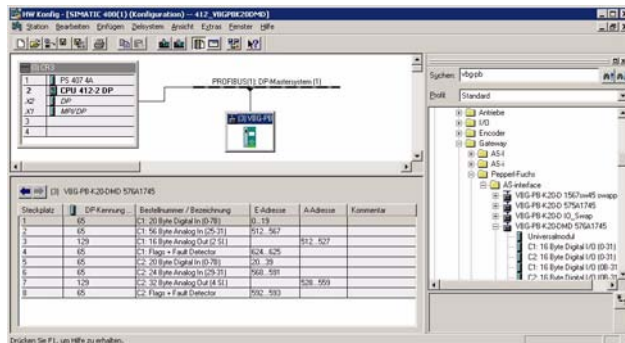
If special adjustments are needed, you can adjust the PROFIBUS parameters using the profile "Properties-PROFIBUS" @ "Network settings" @ "Profile" @ "User defined".



### 12.2.2 Insert AS-i/PROFIBUS Gateway

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

After successfully installing the GSD file 576 A1745.gsd you will find the ASi/PROFIBUS-Gateway in the hardware catalog under PROFIBUS/Other FIELD DEVICES/Gateway/AS-i.



The AS-i/PROFIBUS-Gateway is called VBG-PB-K20-DMD 576 A1745 in the catalog and can now be added to the PROFIBUS branch using drag and drop.

Opening the device VBG-PB-K20-DMD 576 A1745 by clicking on the plug sign in the hardware catalog causes a list to appear of the possible PROFIBUS communication modules.

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

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

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

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

Steck...	DP...	Bestellnummer / Bezeichnung	E-Adresse	A-Adresse	Kommentar
1	150	32 Byte Digital In/Out (0-31B)	0...31	0...31	
2	133	12 Byte Command Interface	512...523	512...523	
3	65	Flags + Fault Detector	32...33		
4	65	24 Byte Analog Input (23-31)	524...547		
5					
6					
7					
8					

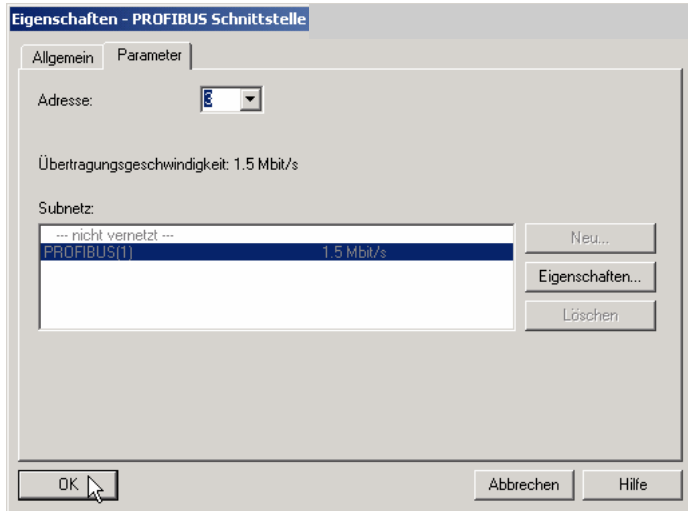
Steck...	DP...	Bestellnummer / Bezeichnung	E-Adresse	A-Adresse	Kommentar
1	150	32 Byte Digital In/Out (0-31B)	0...31	0...31	
2	133	12 Byte Command Interface	512...523	512...523	
3	65	Flags + Fault Detector	32...33		
4	65	24 Byte Analog Input (23-31)	524...547		

In addition to sending the AS-i slave digital data, a communication interface module can be added. The communication interface is used for sending specific commands to the AS-i/PROFIBUS-Gateway. More details about this can be found in chapter 7.

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

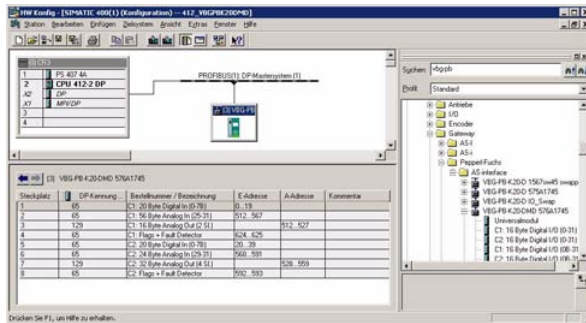
For modules "nn Byte Analog In (n Sl.)" and "nn Byte Analog Out (n Sl.)" the AS-i address of the analog slave can be freely selected.

When adding the AS-i/PROFIBUS-Gateway VBG-PB-K20-DMD 576 A1745 using drag and drop the dialog for assigning the PROFIBUS slave address is shown. The factory default setting for the AS-i/PROFIBUS-Gateway is Address 3.



### 12.2.3 Configuring AS-i/PROFIBUS-Gateway in/output

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



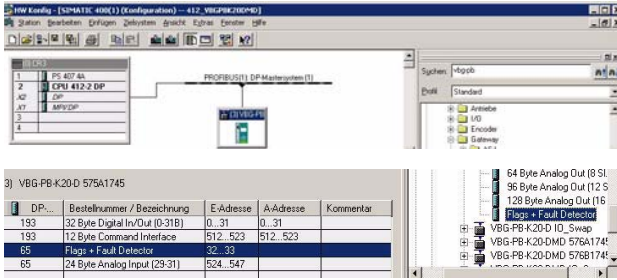
At this point the desired PROFIBUS communication module should be parameterised. This is done in the following steps:

1. Select the AS-i/PROFIBUS-Gateway by clicking on the Slave icon. In the lower edge of the screen a table is shown which contains lines beginning with Slot 0.
2. Select the desired communication module "Flags + Fault Detector" from the hardware catalog. These flags use the individual bits to signal the operating status of the AS-i/PROFIBUS Gateway and should be processed in the application program.

# AS-Interface

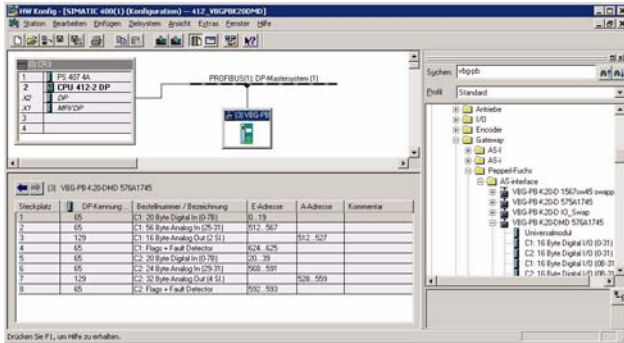
## Appendix: Example for startup on a Siemens S7

3. Drag the selected communication module to the table line for Slot 0.



4. Select the desired communication module from the hardware catalog. Here "20 Byte Digital In/Out (0-31)"

5. Drag the selected communication module to the table line for slot 0.



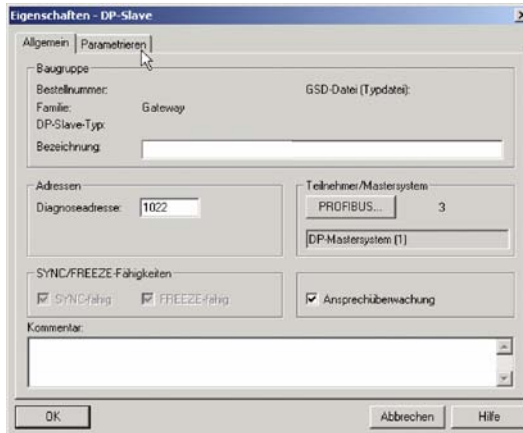
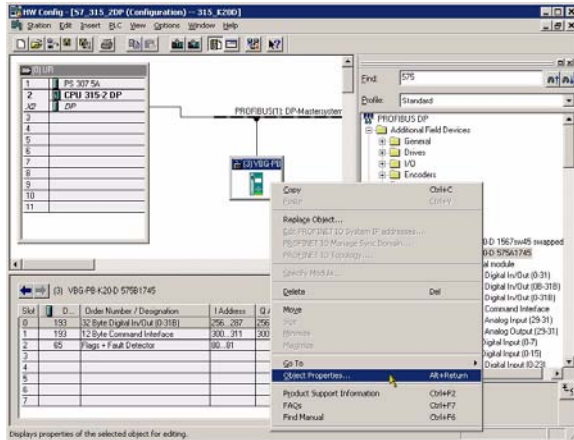
6. If desired, you can now place additional modules for the command interface and analog value transmission in the following slots:

Steckplatz	DP-Kennung	Bestellnummer / Bezeichnung	E-Adresse	A-Adresse	Kommentar
1	65	C1: 20 Byte Digital In (0-7B)	0...19		
2	65	C1: 16 Byte Analog In (25-31)	512...567		
3	129	C1: 16 Byte Analog Out (2-5I)	512...527		
4	65	C1: Flags + Fault Detector	524...529		
5	65	C2: 20 Byte Digital In (0-7B)	20...29		
6	65	C2: 24 Byte Analog In (29-31)	568...591		
7	129	C2: 32 Byte Analog Out (4-5I)	528...559		
8	65	C2: Flags + Fault Detector	592...593		

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

### 12.2.4 AS-i/PROFIBUS Gateway PROFIBUS DP parameters

The AS-i/PROFIBUS-Gateway is symbolically represented as a rectangular window connected with the PROFIBUS branch.



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

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

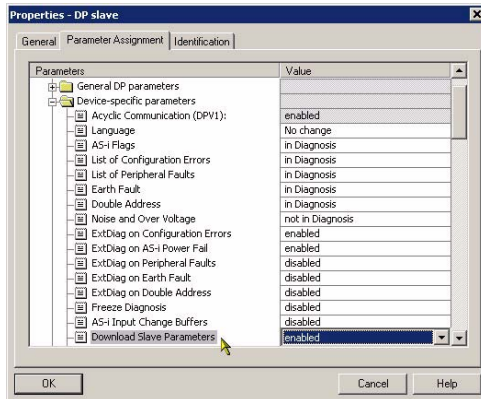
For example: Diagnostic address 1022 @ W#16#3FE

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

### 12.2.4.1 General DP parameters

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

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



### 12.2.4.2 Device-specific parameters

#### Acyclic Communication

Turning acyclic PROFIBUS-DP communication on/off according to the DPV1 standard.

Default: Communication turned on according to DPV1.

#### AS-i Flags

Specifies whether the AS-i flags are sent in the PROFIBUS diagnostic.

Default: Transmission in the PROFIBUS diagnostic data.

#### List of Configuration Errors

The AS-i/DP Gateway saves a list of all AS-i slaves which have triggered a present configuration error. This list can be sent with the PROFIBUS diagnostic data.

Default: Transmission in the PROFIBUS diagnostic data.

#### List of Peripheral Faults

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

Default: Transmission in the PROFIBUS diagnostic data.

#### Earth Fault

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

Default: Transmission in the PROFIBUS diagnostic data.



### Double Address

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

Default: Transmission in the PROFIBUS diagnostic data.

### Noise and Over voltage

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

Default: Not transmitted in the PROFIBUS diagnostic data.

### ExtDiag on Configuration Errors

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

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

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

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

### ExtDiag on AS-i Power Fail

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

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

### ExtDiag on Peripheral Faults

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

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

### ExtDiag on Earth Fault

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

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

### ExtDiag on Double Address

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

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

### Freeze Diagnosis

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

### AS-i Input Change Buffers

Default: Disabled.

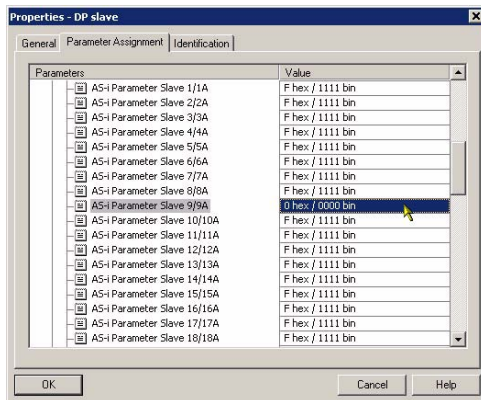
### Download Slave Parameters

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

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

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

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



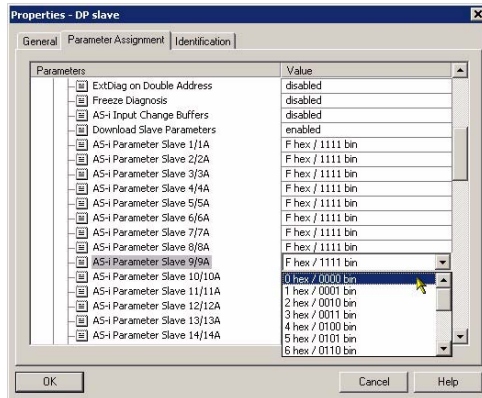
#### 12.2.4.3 Hex parameterizing

##### DPV1\_Status

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

### User\_Prm\_Data

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

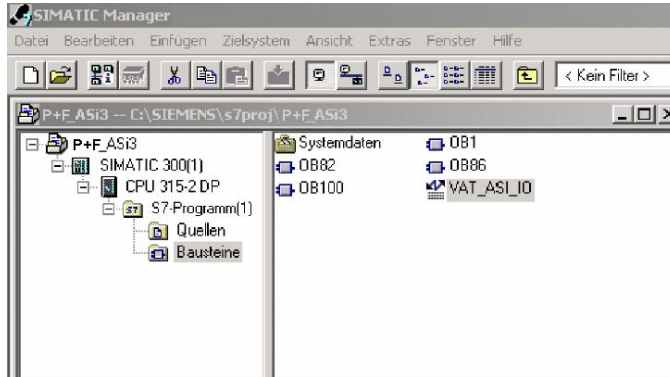


### 12.2.5 SIMATIC Step7 blocks

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

- OB1 Cyclical program block Access to the AS-i data is via the parameterized address space in the in-/outputs process image.
- OB82 PROFIBUS diagnostic alarm. This OB is invoked as soon as a PROFIBUS slave has set the ExtDiag flag in the telegram reply. This ExtDiag flag allows a PROFIBUS slave to report an error condition to a PROFIBUS master. If OB82 is not present, the CPU is stopped when a PROFIBUS slave sets the ExtDiag flag.
- OB86 PROFIBUS peripheral error. This OB is invoked when the PROFIBUS master detects a PROFIBUS slave failure.
- OB100 Startup OB. This OB is run once when the CPU starts up.

VAT\_ASI\_IOVariable table, AS-i startup example.



### 12.2.6 Variable table VAT\_ASI\_IO

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

Flags + Fault Detector

- Bit 0 = Konfigurationsfehler
- Bit 1 = Slave with address ZERO detected
- Bit 2 = Automatic addressing not possible
- Bit 3 = Automatic addressing available
- Bit 4 = Projecting mode active
- Bit 5 = Not in normal mode
- Bit 6 = AS-i-Power Fail
- Bit 7 = AS-i-Master is offline
- Bit 8 = Peripheral error
- Bit 9 = reserved
- Bit 10 = reserved
- Bit 11 = reserved
- Bit 12 = Earth fault
- Bit 13 = Overvoltage
- Bit 14 = Noise
- Bit 15 = Double address

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

# AS-i 3.0 PROFIBUS Gateway

## Appendix: Example for startup on a Siemens S7

VAT ASI IO - @P+F ASI3 SIMATIC 300(1) CPU 315-2 DP\57-Programm(1) ONLINE					
	Operand	Symbol	Symbolkommentar	Anzahl	Statuswert
1	EB 2	'IN_Flags_Slave1'	Bit7-4=Flags Bit3-0=Slave1	BitN	2#0000_1000
2	EB 3	'IN_Slave2_Slave3'	Bit7-4=Slave2 Bit3-0=Slave3	BitN	2#0100_0000
3	EB 4	'IN_Slave4_Slave5'	Bit7-4=Slave4 Bit3-0=Slave5	BitN	2#0000_0000
4	EB 5	'IN_Slave6_Slave7'	Bit7-4=Slave6 Bit3-0=Slave7	BitN	2#0000_0000
5	EB 6	'IN_Slave8_Slave9'	Bit7-4=Slave8 Bit3-0=Slave9	BitN	2#0000_0000
6	E 2.4	'IN_ASI_Config_Error'	0=ConfigOK, 1=ConfigError	BitDCL	false
7	E 2.5	'IN_ASI_Power_Fail'	0=AS-iPowerOK, 1=AS-iPowerError	BitDCL	false
8	E 2.6	'IN_Periphery_Fault'	0=PeripheryOK, 1=PeripherieError	BitDCL	false
9	E 2.7	'IN_Configuration_Active'	0=ConfigActive, 1=ConfigInactiv	BitDCL	false
10					
11	AB 2	'OUT_Flags_Slave1'	Bit7-4=Flags Bit3-0=Slave1	BitN	2#0000_0000
12	AB 3	'OUT_Slave2_Slave3'	Bit7-4=Slave2 Bit3-0=Slave3	BitN	2#0000_0100
13	AB 4	'OUT_Slave4_Slave5'	Bit7-4=Slave4 Bit3-0=Slave5	BitN	2#0000_0000
14	AB 5	'OUT_Slave6_Slave7'	Bit7-4=Slave6 Bit3-0=Slave7	BitN	2#0000_0000
15	AB 6	'OUT_Slave8_Slave9'	Bit7-4=Slave8 Bit3-0=Slave9	BitN	2#0000_0000
16	A 2.4	'OUT_ASI_Off_Line'	0=OnLine, 1=OffLine	BitDCL	false
17	A 2.5	'OUT_LOS_Masterbit'	0=OffLine, when ConfigError, 1=active when ConfigError	BitDCL	false
18	A 2.6	'OUT_Configuration_Mode'	-> Set Configuration Mode	BitDCL	false
19	A 2.7	'OUT_Protected_Mode'	-> Set Protected Mode	BitDCL	false
20					
21	EW 0	'FLags + Fault Detector'	AS-i Diagnose Information	BitN	2#0000_0000_0000_0000
22					

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

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

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

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

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

**12.2.6.1 AS-i flags byte 0, input bits 7 - 4**

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

**AS-i Config Error:**

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

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

**AS-i Power Fail**

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

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

**AS-i Peripheral Error**

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

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

**AS-i Configuration Active**

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

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

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



Note

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

**12.2.6.2 AS-i flags byte 0, output bits 7 - 4**

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

**AS-i Off Line**

Bit 4: 0 = Online, 1 = Offline

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

#### AS-i LOS Masterbit

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

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

#### AS-i Configuration Mode

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

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

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

#### AS-i Protected Mode

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

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

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

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

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

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

	Operand	Symbol	Anzei	Statuswert	Steuerwert
1	EB 0	"IN_Flags_Slave1"	BIN	2#0000_0001	
2	EB 1	"IN_Slave2_Slave3"	BIN	2#0010_0000	
3	EB 2	"IN_Slave4_Slave5"	BIN	2#0000_0000	
4	EB 3	"IN_Slave6_Slave7"	BIN	2#0000_0000	
5	EB 4	"IN_Slave8_Slave9"	BIN	2#0000_0000	
6	E 0.4	"IN_ASI_Config_Error"	BOOL	false	
7	E 0.5	"IN_ASI_Power_Fail"	BOOL	false	
8	E 0.6	"IN_Periphery_Fault"	BOOL	false	
9	E 0.7	"IN_Configuration_Active"	BOOL	false	
10					
11	AB 0	"OUT_Flags_Slave1"	BIN	2#0000_0100	2#0000_0100
12	AB 1	"OUT_Slave2_Slave3"	BIN	2#0000_0000	
13	AB 2	"OUT_Slave4_Slave5"	BIN	2#0000_0000	
14	AB 3	"OUT_Slave6_Slave7"	BIN	2#0000_0000	
15	AB 4	"OUT_Slave8_Slave9"	BIN	2#0000_0000	
16	A 0.4	"OUT_ASI_Off_Line"	BOOL	false	
17	A 0.5	"OUT_LOS_Masterbit"	BOOL	false	
18	A 0.6	"OUT_Configuration_Mode"	BOOL	false	false
19	A 0.7	"OUT_Protected_Mode"	BOOL	false	false
20					

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

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

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

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



# AS-i 3.0 PROFIBUS Gateway

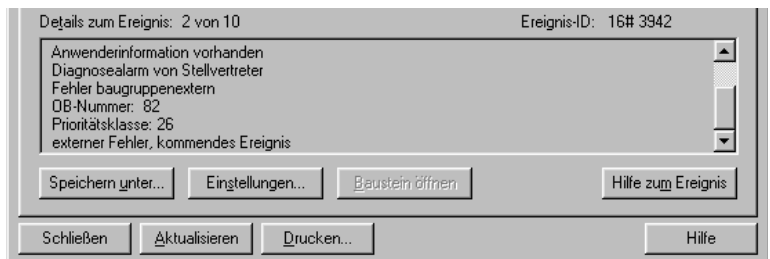
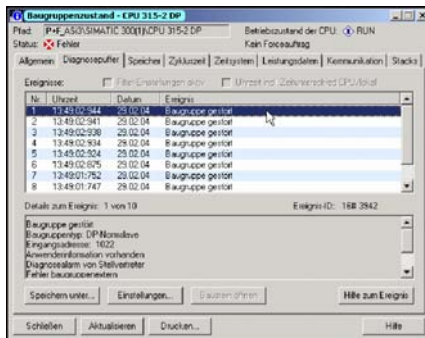
## Appendix: Example for startup on a Siemens S7

Operand	Symbol	Anzeigeforma	Statuswert	Steuerwert	
1	EB 0	"IN_Flags_Slave1"	BIN	2#0001_0000	
2	EB 1	"IN_Slave2_Slave3"	BIN	2#0000_0000	
3	EB 2	"IN_Slave4_Slave5"	BIN	2#0000_0000	
4	EB 3	"IN_Slave6_Slave7"	BIN	2#0000_0000	
5	EB 4	"IN_Slave8_Slave9"	BIN	2#0000_0000	
E	0.4	"IN_ASI_Config_Error"	BOOL	true	
E	0.5	"IN_ASI_Power_Fail"	BOOL	false	
E	0.6	"IN_Periphery_Fault"	BOOL	false	
E	0.7	"IN_Configuration_Active"	BOOL	false	
10					
11	AB 0	"OJT_Flags_Slave1"	BIN	2#0000_0000	
12	AB 1	"OJT_Slave2_Slave3"	BIN	2#0000_0000	
13	AB 2	"OJT_Slave4_Slave5"	BIN	2#0000_0000	
14	AB 3	"OJT_Slave6_Slave7"	BIN	2#0000_0000	
15	AB 4	"OJT_Slave8_Slave9"	BIN	2#0000_0000	
A	0.4	"OJT_ASI_Dif_Line"	BOOL	false	
A	0.5	"OJT_LOS_Masterbat"	BOOL	false	
A	0.6	"OJT_Configuration_Mode"	BOOL	false	false
A	0.7	"OJT_Protected_Mode"	BOOL	false	false
20					

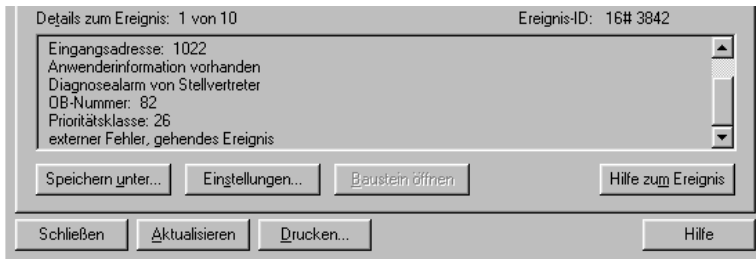
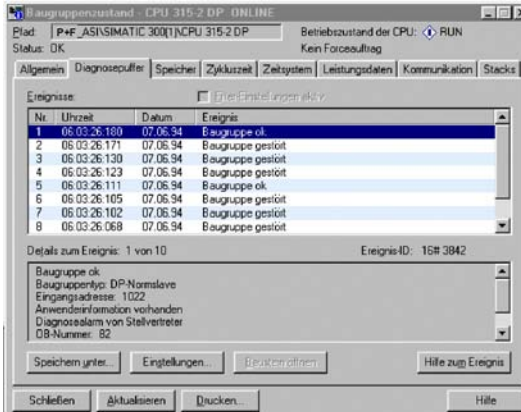
In the diagnostic buffer of the CPU the configuration error which occurred is entered with "Module error".

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

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



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



Entry of the error messages in the diagnostic buffer of the CPU and invoking of the OB82 is a consequence of the set ExtDiag flag for an error in the AS-i/DP Gateway.

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

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

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

The same applies to the other messages.


If the message for various error states of the AS-i Gateway is activated via the PROFIBUS and if the data for the PROFIBUS diagnostic data are enabled, the SIEMENS function module SFC13 can be used to retrieve the PROFIBUS diagnostic

## AS-i 3.0 PROFIBUS Gateway Appendix: Example for startup on a Siemens S7

data of the AS-i Gateway and save them to a data module. Use of SFC13 is described in detail in the SIEMENS documentation for PROFIBUS.

## 13 Appendix: Installation Instructions

### 13.1 Listing of all described gateways

 Note	Please view the <b>chapter 3.1, "Product information,"</b> on <b>page 7</b> for the list of all devices described in this installation instruction.
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**13.2 VBG-PB-K20-DMD-BV**

**AS-i 3.0 PROFIBUS-Gateway in Edelstahl  
AS-i 3.0 PROFIBUS Gateway in Stainless Steel  
Passerelle AS-i 3.0 PROFIBUS DP en boîtier inox  
Gateway AS-i 3.0 PROFIBUS d'acciaio inox  
Pasarela AS-i 3.0 PROFIBUS en acero inoxidable**



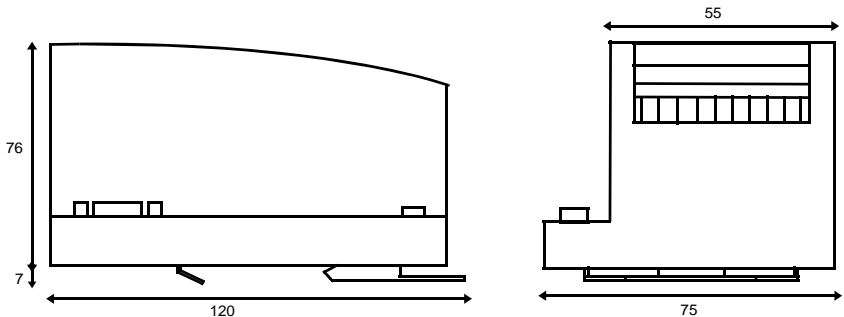
Dokumentation AS-i/PROFIBUS-Gateways (deutsch)  
Documentation AS-i/PROFIBUS-Gateways (english)



**Attention**

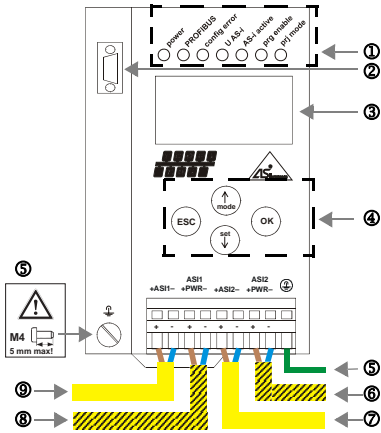
Die Geräte dürfen nur von Fachpersonal aufgebaut, angeschlossen und in Betrieb genommen werden! / Only qualified staff is allowed to mount, connect and set up the modules! / Les modules ne doivent être montés, raccordés et mis en service que par du personnel qualifié! / Gli apparecchi possono essere montati, collegati e messi in funzione soltanto da personale specializzato! / Los aparatos sólo pueden ser montados, conectados y puestos en servicio por personal técnico especializado!

**13.2.1 Dimensions**



Issue date - 3.1.2008

## 13.2.2 Front view and connections



- ① AS-i-Kreis 2/AS-i circuit 2/Bus AS-i 2/ Circuito AS-i 2/ Circuito AS-i 2
- ② AS-i-Netzteil Kreis 1/AS-i Power supply circuit 1/ Alimentation bus 1 AS-i / Alimentazione circuito 1 AS-i / Alimentación circuito 1 AS-i/Circuito AS-i 1
- ③ AS-i-Kreis 1/AS-i circuit 1/Bus AS-i 1/ Circuito AS-i 1/ Circuito AS-i 1

Ambient operating temperature: 0° ... +55°C  
Tightening torque: 7 pound inches

- ① LED-Statusanzeige
  - ② PROFIBUS-Anschluss
  - ③ LCD-Anzeige
  - ④ Tasten für Handbedienung
  - ⑤ Erde
  - ⑥ AS-i-Netzteil Kreis 2
- 
- ① LED status display
  - ② PROFIBUS connection
  - ③ LCD display
  - ④ Buttons for hand operation
  - ⑤ Ground
  - ⑥ AS-i Power supply circuit 2
- 
- ① Affichage d'état DEL
  - ② Raccordement PROFIBUS
  - ③ Affichage LCD
  - ④ Boutons pour commande manuelle
  - ⑤ Terre
  - ⑥ Alimentation bus 2 AS-i

### Hinweis/Hint/Remarque/Indicazione/Nota

AS-i-Kreis 1 und 2 werden aus AS-i-Netzteilen versorgt.  
Am Kabel für das Netzteil dürfen keine Slaves oder Repeater angeschlossen werden.

Am Kabel für den AS-i-Anschluss dürfen keine AS-i-Netzteile oder weitere Master angeschlossen werden.

AS i circuit 1 and 2 are supplied from AS-i power supplies.  
At the cable for power supply no slaves or repeaters may be attached.

At the cable for AS-i circuit no power supplies or further masters may be attached.

Les bus AS-i 1 et 2 sont alimentés par AS-i.

Au câble pour l'alimentation aucun esclave ou répéteur ne peut être raccordé.

Au câble pour le circuit AS-i aucune alimentation ou autre maître ne peut être raccordé.

I circuiti AS-i 1 e 2 sono alimentati da AS-i.

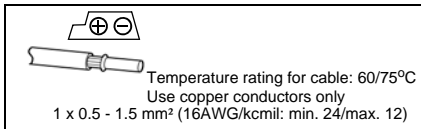
Al cavo per l'alimentazione nessun slave o ripetitore può essere fissato.

Al cavo per il circuito AS-i nessuna alimentazione o altro master può essere fissato.

Los circuitos AS-i 1 y 2 son alimentados de la fuente de poder AS-i.

En el cable de la alimentación AS-i no se deben conectar esclavos o repetidores.

En el cable del circuito AS-i no se debe conectar ninguna fuente de poder AS-i u otro master.

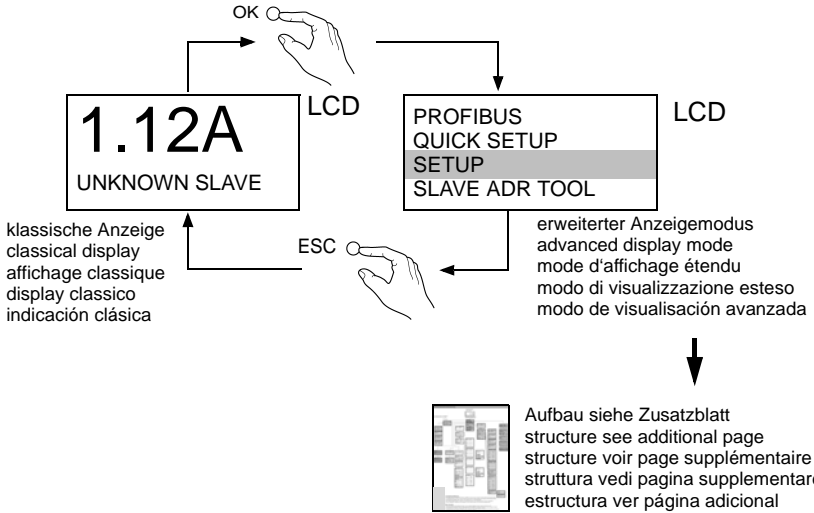


- ① Visualizzazione di stato LED
- ② Collegamento PROFIBUS
- ③ Visualizzazione LCD
- ④ Pulsanti per le impostazioni manuali
- ⑤ Terra
- ⑥ Alimentazione circuito 2 AS-i

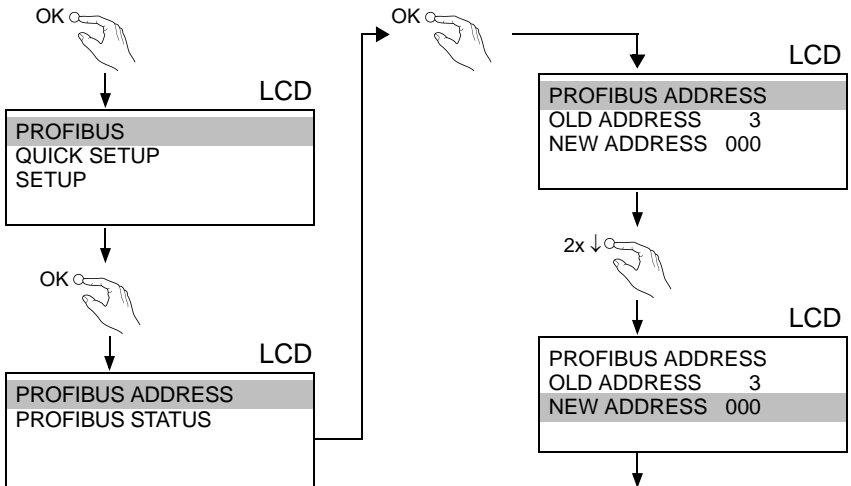
- ① LED visualización
- ② Conexión PROFIBUS
- ③ Display LCD
- ④ Teclas para accionamiento manual
- ⑤ Tierra
- ⑥ Alimentación circuito 2 AS-i

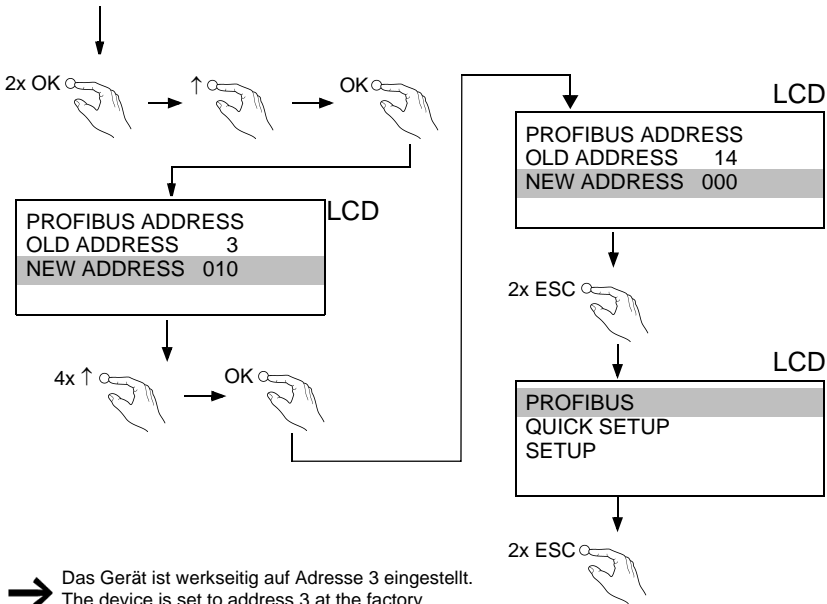
## 13.2.3 Startup

### 13.2.3.1 Switching to advanced display mode



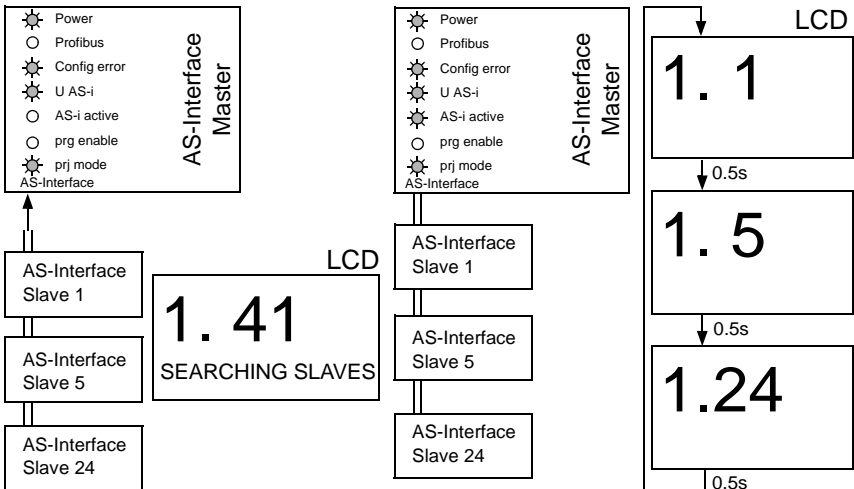
### 13.2.4 Setting the PROFIBUS-DP address





➔ Das Gerät ist werkseitig auf Adresse 3 eingestellt.  
 The device is set to address 3 at the factory.  
 L'appareil est réglé en usine à l'adresse 3.  
 L'apparecchio è messo all'indirizzo 3 dalla fabbrica.  
 El aparato viene ajustado de fábrica con la dirección 3.

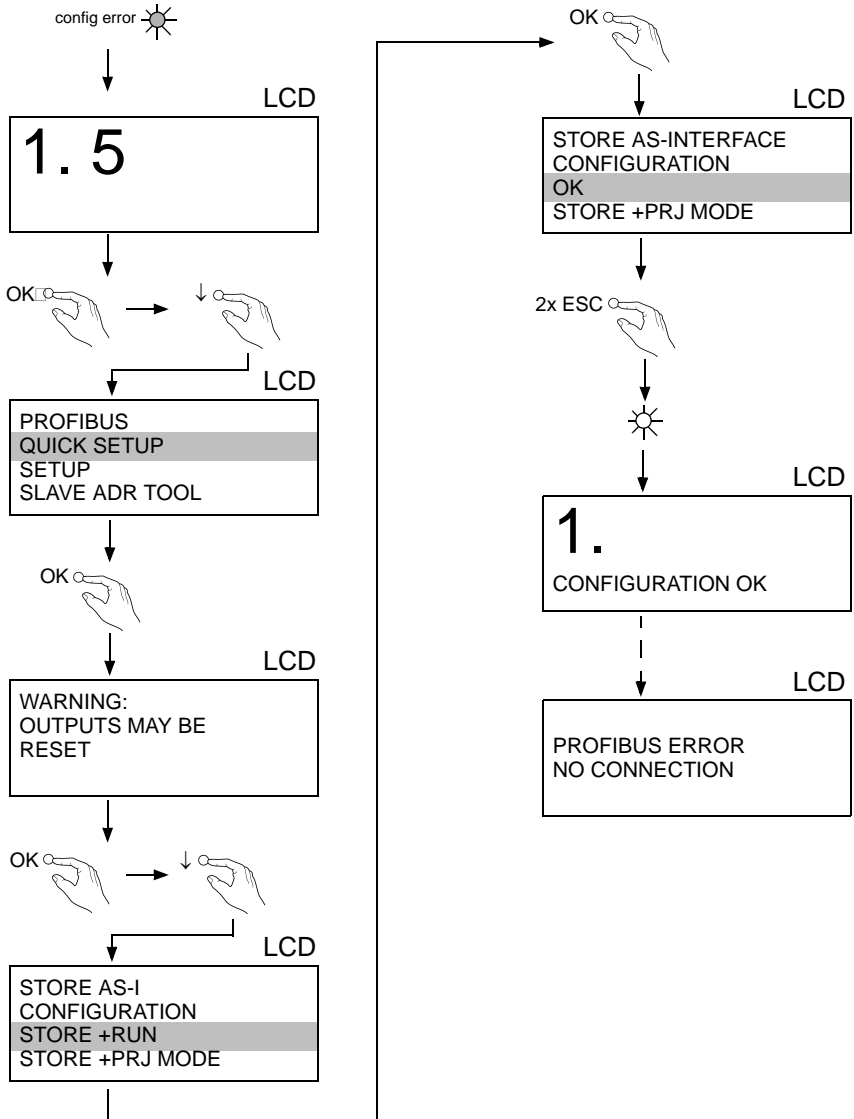
### 13.2.5 Connecting AS-i Slaves



Issue date - 3.1.2008



**13.2.6 Quick setup**



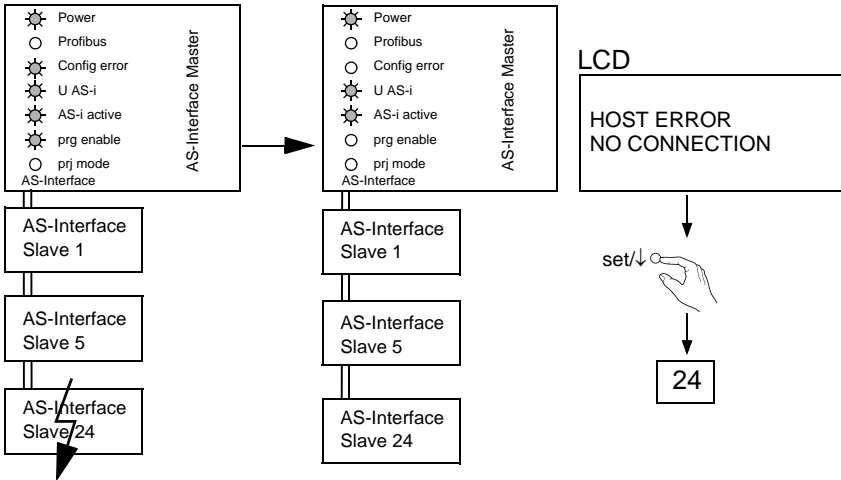
Issue date - 3.1.2008

## 13.2.7 Error tracing

### 13.2.7.2 Faulty slaves

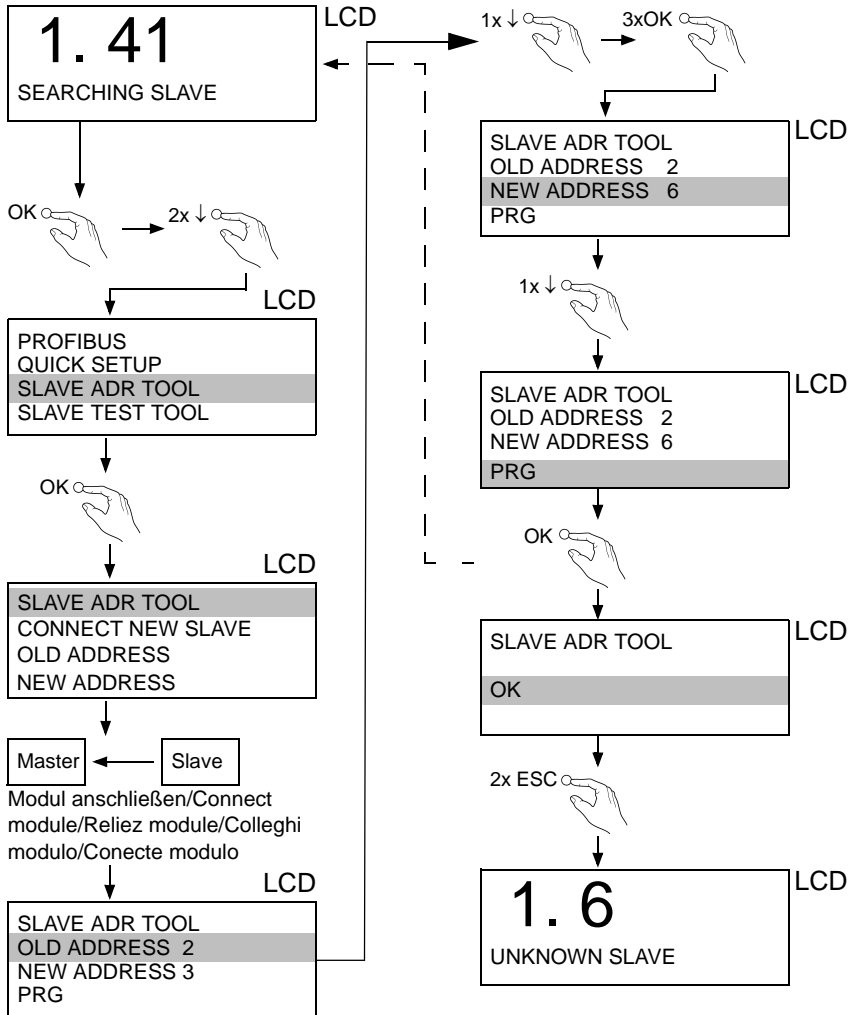


### 13.2.7.3 Error display (last error)



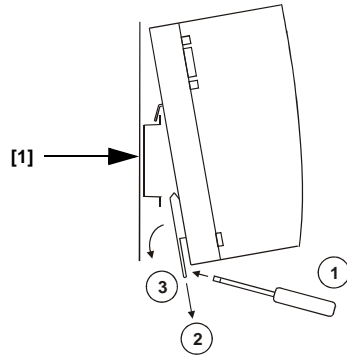
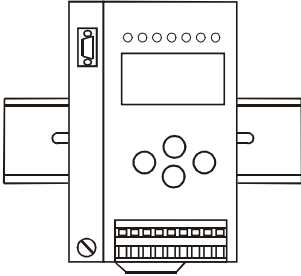
## 13.2.8 Addressing

### 13.2.8.4 Programming slave 2 to address 6



**13.2.9 Montage**

auf Montageplatte mit 35-mm-Hutschiene ①  
on mounting plate with 35 mm top-hat rail ①  
sur plaque de montage avec profilé-support 35 mm ①  
su piastra di montaggio con guida DIN 35 mm ①  
sobre placa de montaje con guía simétrica de 35 mm ①



**13.2.10 Accessories**

- AS-i-Netzteil 4 A/ AS-i Power supply 4 A/ Alimentation 4 A AS-i/ Alimentazione 4 A  
AS-i/ Fuente de poder AS-i 4 A

## **14 Glossary: AS-Interface Terms**

### **A/B slave**

AS-Interface slave with extensible addressing: The address range of an A/B slave runs from 1A to 31A and from 1B to 31B. As the master needs the fourth output data bit for switching between A and B address, A/B slaves only have three output data bits maximum.

### **Activation phase**

In the activation phase the detected slaves are activated by sending the parameter. This is indicated by a "42" on the Master's Display. This phase takes only 10 ms, tops, to short to be displayed.

### **AS-Interface power fail**

Voltage drop on the AS-Interface line; by falling below an assigned value the master changes to the ⇒ *Off-line phase*.

### **Inclusion phase**

After the data exchange with all AS-Interface slaves the master is searching for new slaves. For this purpose an detection telegram is sent to one AS-Interface address and in case of an answer the master tries to read the ⇒ *actual configuration* of the slave. Depending on the mode (⇒ *protected mode* or ⇒ *configuration mode*) and on the actual configuration the detected slave will be activated.

After each data exchange with all AS-Interface slaves only one detection telegram is sent to one slave address. So the AS-Interface cycle is always one telegram longer as expected from the number of activated slaves (⇒ LAS).

### **Autoprogram flags**

Auto Address Enable; flag from the Host to the AS-Interface Master

With this flag, automatic addressing can be enabled or inhibited.

This flag is stored non-volatile in the Master.

Auto Address Assign, Auto Address Possible; flag from the AS-Interface Master to the Host

The automatic programming is not inhibited and there is no configuration error.

A failing slave could be addressed automatically.

Auto Address Available, flag from the AS-Interface Master to the Host

Exactly one AS-Interface slave is missing and the automatic programming is not inhibited. If a slave with the address 0 and the profile of the missing slave is connected, it receives the address of the missing slave automatically.

### IO-Code

The first digit of the slave profile indicates the number of inputs and outputs of the slave. A 4I/4O slave e.g. is associated to "7", a slave with 4 digital Inputs to "0".

#### Detection phase

In the detection phase at start-up the master is scanning for AS-Interface slaves. It remains in this phase until at least one slave is detected. If the master remains in the detection phase this means that no slave was found. The reason for this may be a wrong power supply or a wiring error.

The detection phase is displayed by code "41".

### Protected mode

In protected mode only those slaves are activated which are registered in the ⇒ *LPS* and whose actual configuration matches with the target configuration.

See ⇒ *configuration mode*. This mode is intended for the normal operation, since all AS-Interface protective measures are activated.

### ID code

The ID code is unchangeably set by the manufacturer of the AS-Interface slave. The AS-Interface Association defines the ID codes assigned to a certain category of slaves. All ⇒ *A/B slaves* e.g. possess the ID code "A".

### ID1 code, extended ID1 code

The ID1 code is specified by the manufacturer of the slave. In contrast to the other codes defining the profile this code can be modified by the master or by an addressing unit. The user should make use of this possibility only in exceptional cases, otherwise ⇒ *configuration errors* may occur.

To make the distinction between the A and the B addresses in the case of A/B slaves, the bit with the highest value of the ID1 code is used. That is why only the three lowest bits are relevant for these slaves. Since this code has been introduced with the new AS-Interface specification 2.1, it is also called extended ID1 code.

### ID2 code, extended ID2 code

The ID2 code is unchangeably set by the manufacturer of the slave. The AS-Interface Association defines the ID2 codes assigned to a certain category of slaves. All two-channel 16-bit input slaves with the profile S-7.3 possess the ID2 code "D". Since this code has been introduced with the new AS-Interface specification 2.1, it is also called extended ID2 code.

### Actual configuration

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

⇒ IO code, ⇒ ID code, ⇒ extended ID1code 1, ⇒ extended ID2 code.

### Actual parameter

The AS-Interface parameter that have been sent last to the AS-Interface slave, in contrary to ⇒ permanent parameters.

### Configuration Error/Config Error

An configuration error is indicated, when target and actual configuration of the connected slaves do not match. The following cases may result in configuration errors:

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

Erroneous type of slave:The ⇒ *slave profile* of the connected slave does not comply with the configured one.

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

### LAS - List of Activated Slaves

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

### LDS - List of Detected Slaves

All slaves from which the master was able to read the ⇒ *slave profile* are entered in the LDS.

### LPF - List of Peripheral Faults

There is a list of peripheral faults only for masters fulfilling the new specification 2.1. This list includes an entry for each slave that signals a ⇒ *peripheral fault*.

### LPS - List of Projected Slaves

The list of projected slaves includes all slaves expected by the master. All entries of the ⇒ LDS are taken over to the LPS by storing the actual configuration (except for a not addressed slave with the address 0).

### Offline phase

In the offline phase all input and output data is reset. This phase is entered at start-up of the master, after a ⇒ *AS-Interface power fail*, and at the transition of the ⇒ *configuration mode* to the ⇒ *protected mode*.

Furthermore the master can actively be put into the offline phase with the offline flag.

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

### Peripheral fault

A peripheral fault is shown on the master and on the slave by a red flashing LED. Depending on the slave type it is possible to visualize an overflow, an overload of the sensor's power supply or another fault regarding the peripheral equipment of the slave.

### Permanent configuration

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

### Permanent parameter

The parameter stored in the master that are sent to the slave after start-up of the master in the  $\Rightarrow$  *activation phase*.

### Configuration mode

During the configuration mode the master exchanges data with all connected slaves, no matter which of the slaves are projected. In this mode it is possible to commission a system without being obliged to configure it before.

See also  $\Rightarrow$  *protected mode*.

### Single slave

Compared to an  $\Rightarrow$  *A/B slave* a single slave can only be addressed from the address 1 to 31; the fourth data output bit can be used. All slaves of the older specification 2.0 are single slaves.

There are also slaves fulfilling the new specification 2.1 that are single slaves, e.g. the newer 16-bit slaves.

### Slave profile

The configuration data of a slave consisting of:

$\Rightarrow$  *IO code*,  $\Rightarrow$  *ID code*,  $\Rightarrow$  *extended ID1 code*,  $\Rightarrow$  *extended ID2 code*.

The slave profile is to differentiate between the different slave categories. It is specified by the AS-Interface Association and preset by the slave manufacturer.

AS-Interface 2.0 slaves do not have extended ID1 and ID2 codes. In this case an AS-Interface master 2.1 enters "F" the extended ID1 and the extended ID2 code.



**15 Related Documents**

**15.1 Manual: "AS-i 3.0 Command Interface"**

This manual contains a detailed description of the AS-i 3.0 Command Interface.

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