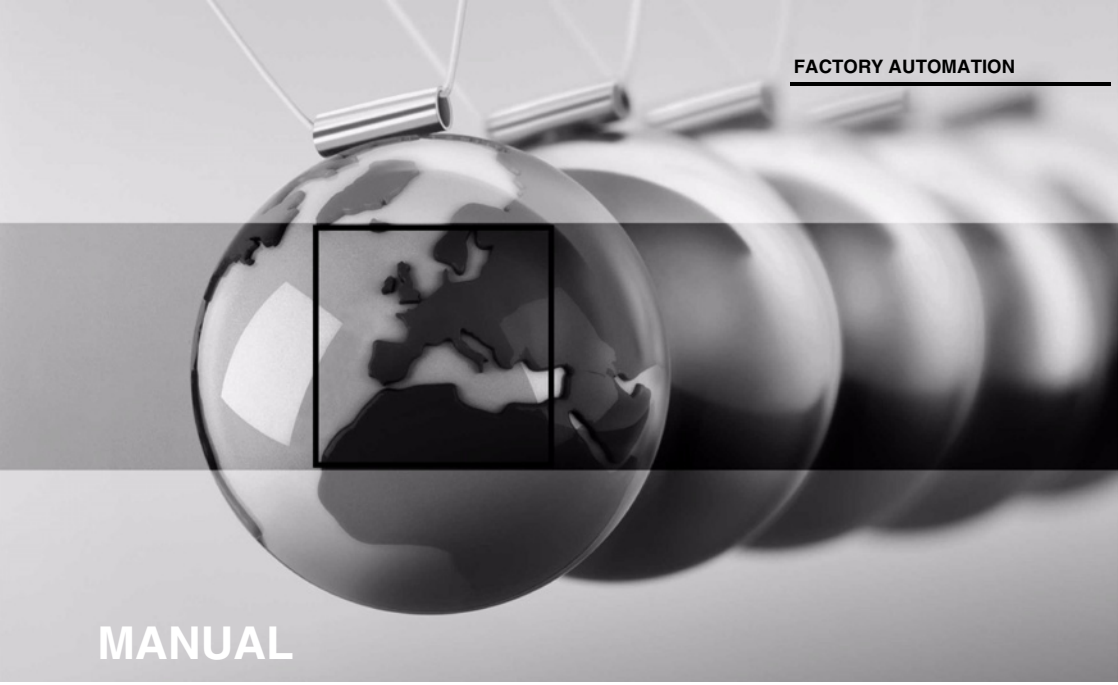

MANUAL

VBG-DN-K20-DMD-BV

AS-Interface/DeviceNet Gateway

Spec.
3.0

PEPPERL+FUCHS
SENSING YOUR NEEDS

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

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1 The Explanation of Symbols

 Warning	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.

 Attention	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.

 Note	*This symbol indicates text which contains important information.*

1.1 Abbreviations

AS-i Actuator Sensor Interface

Issue date - 1.1.2008

2 Safety

2.1 Intended use

 Warning	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. The device may only be operated by appropriately qualified personnel in accordance with this operating manual.

2.2 General safety information

 Warning	Safety and correct functioning of the device cannot be guaranteed if any operation other than that described in this operation manual is performed. 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. In case a failure cannot be repaired, the device must be taken out of operation and kept from inadvertently being put back into operation. 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.

 Note	The operator is responsible for the observance of local safety standards.

2.3 Waste disposal

	• All devices and components are to be used properly! • Non-usable electrical components are hazardous waste and they should be disposed separatelly! • Local and national guide lines during waste disposal are to be respected!

Issue date - 1.1.2008

3 General Information

3.1 Product information

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

VBG-DN-K20-DMD-BV	**AS-i 3.0 DeviceNet Gateway in Stainless Steel, Double Master**

The AS-i/DeviceNet Gateway serves to connect the AS-i to a superordinate DeviceNet. The Gateway acts as a complete Master for the AS-i and as a slave for the DeviceNet.

VBG-DN-K20-DMD-BV is a DeviceNet 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 DeviceNet Gateways already fulfil the AS-i Specification 3.0.
The previous specifications (2.1 and 2.0) are supported as well.

3.3 Commissioning and monitoring

The AS-i 3.0 DeviceNet Gateways can be commissioned with the help of the software "AS-i Control Tools" in combination with the DeviceNet Master Simulator. The EDS file is included in the package.

Commissioning, debugging and setting up of the AS-i parameters without the software can also be accompished with the use of push-buttons, the display and the LEDs directly on the system.

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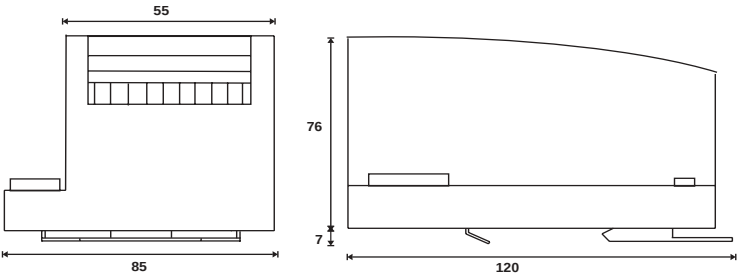
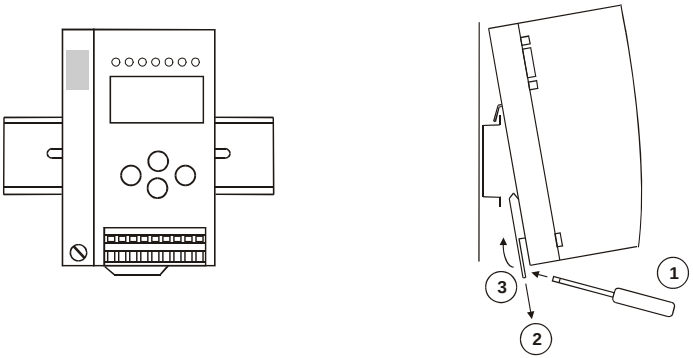
4 Mounting Instructions

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".*

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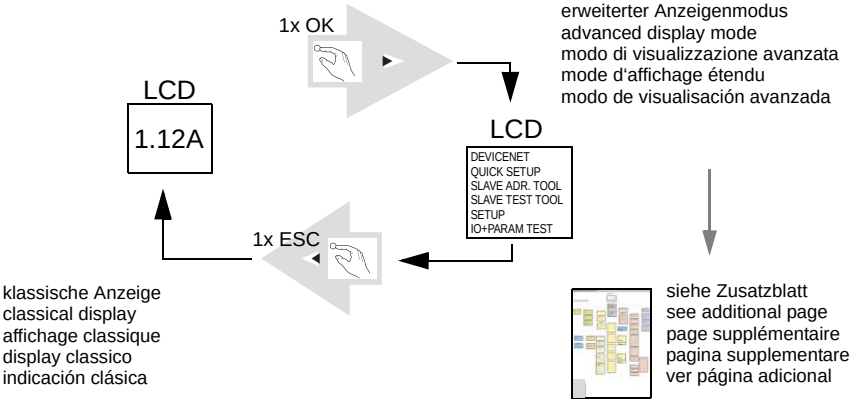
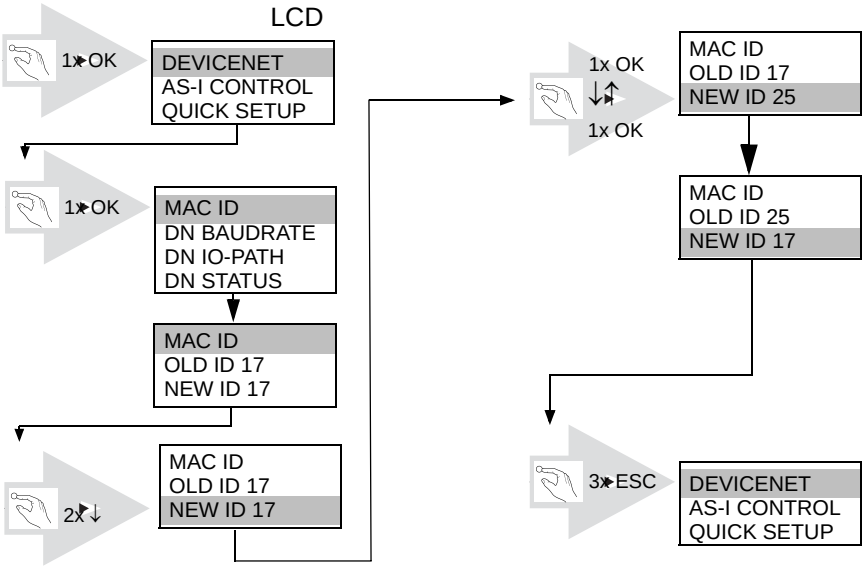
4.4 Double Master

4.4.1 Switching to advanced display mode



4.4.2 Setting the MAC-ID



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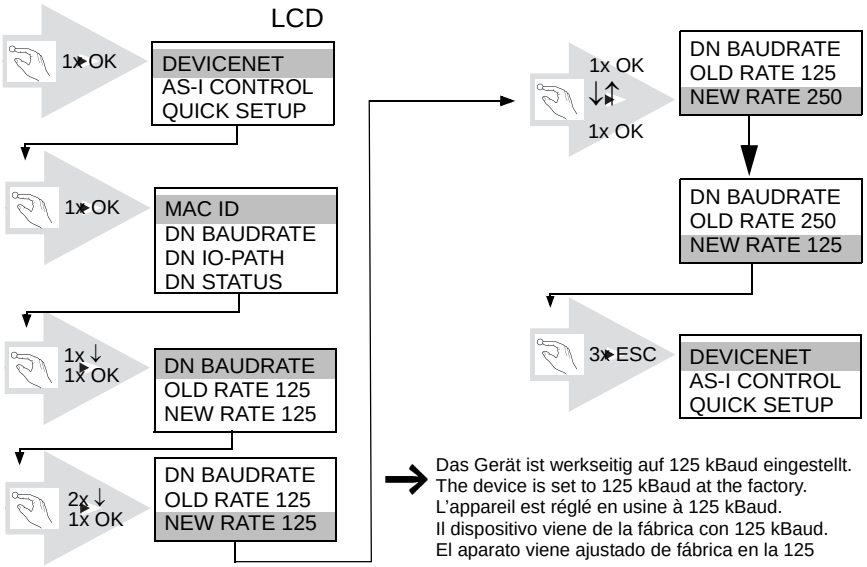
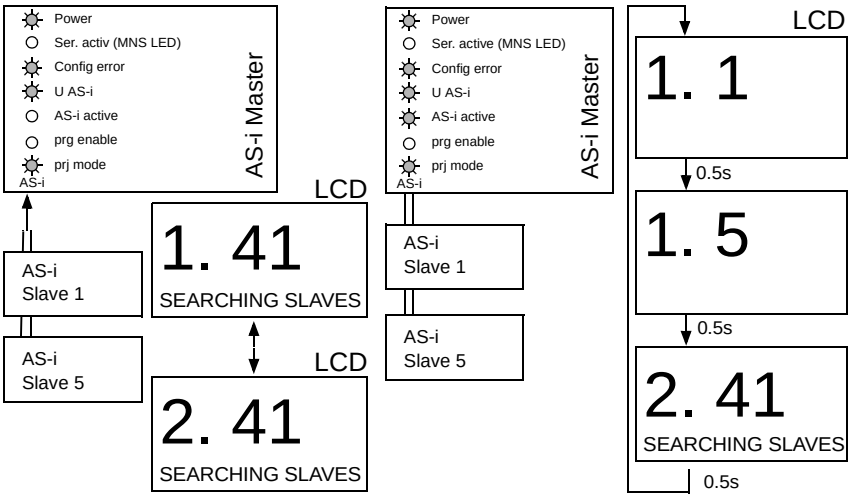
4.4.3 Setting the Baud Rate



4.4.4 Connecting AS-i Slaves



Note	LED description is illustrated in the chapter "Display and operating elements".

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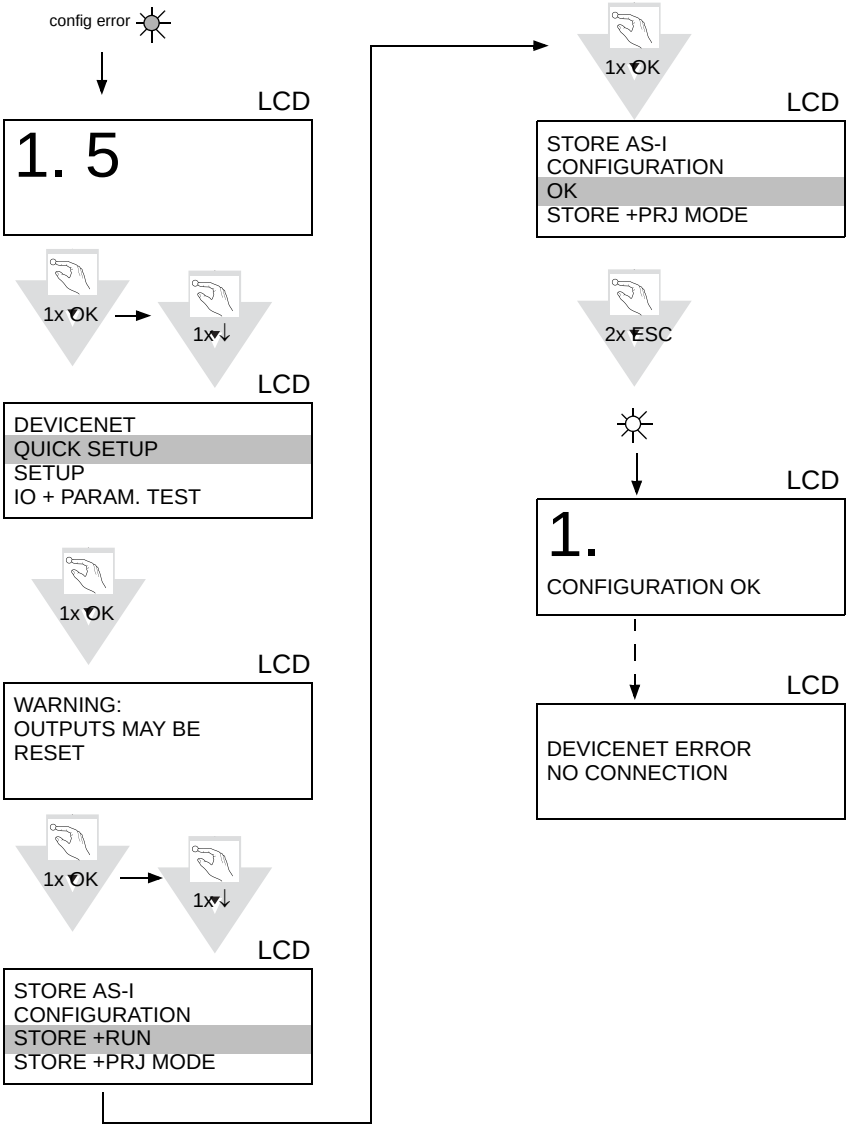
4.4.5 Quick Setup



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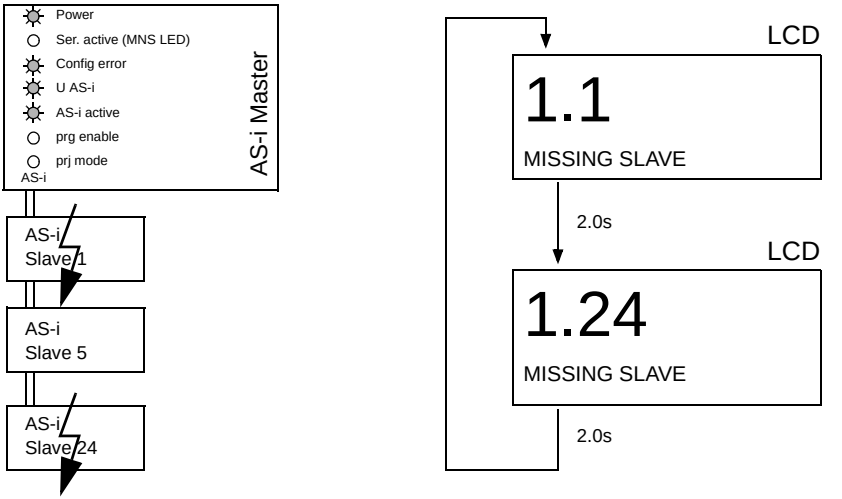
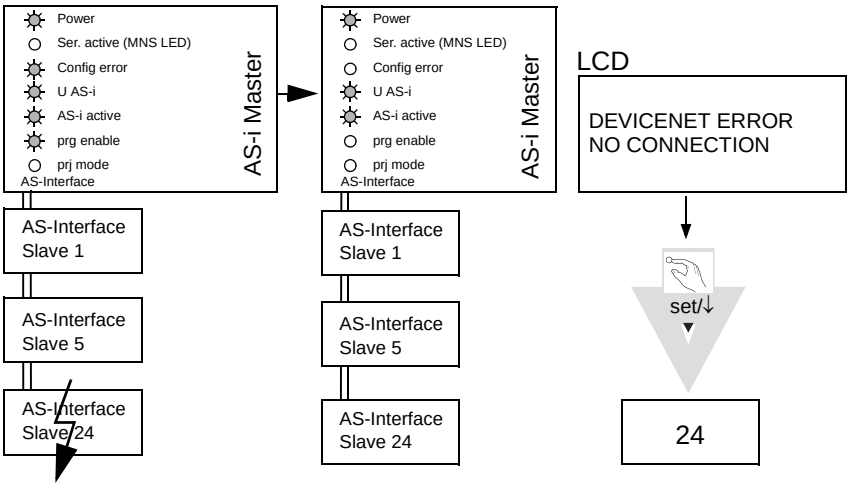
4.4.6 Error tracing

4.4.6.1 Faulty slaves



4.4.7 Error display (last error)



Note	LED description is illustrated in the chapter "Display and operating elements".

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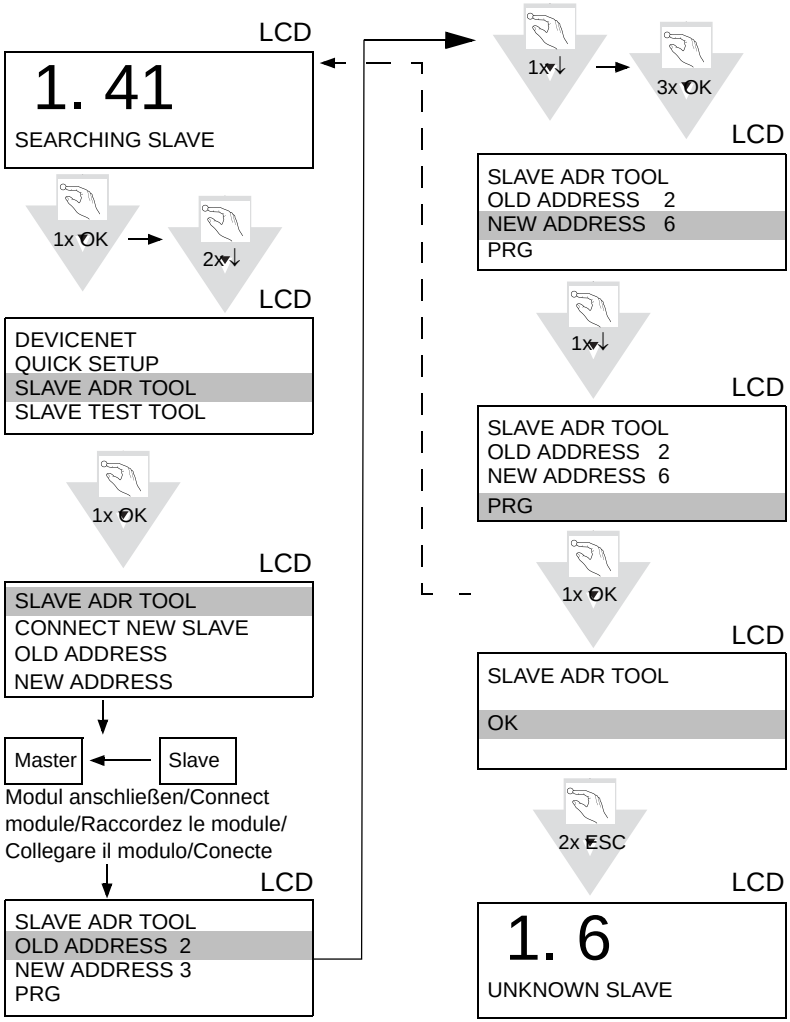
4.4.7.1 Programming slave 2 to address 6



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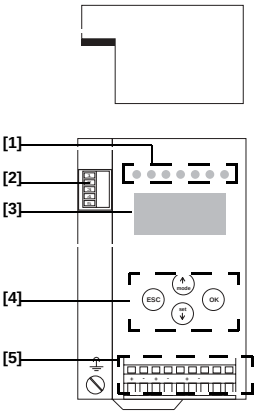
5 Electrical Connection

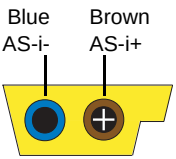
5.1 Overwview of connections, displays and operating elements



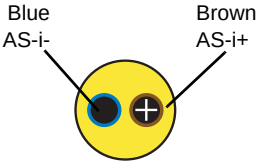
[1] LEDs
[2] CANopen (5-pin plug) connector as DeviceNet-interface
[3] LC display
[4] Push-buttons
[5] ASI and power supply terminal

5.2 AS-i bus connection

Note	*Work on electrical installations may only be carried out by qualified electricians.*



Yellow AS-i ribbon cable



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

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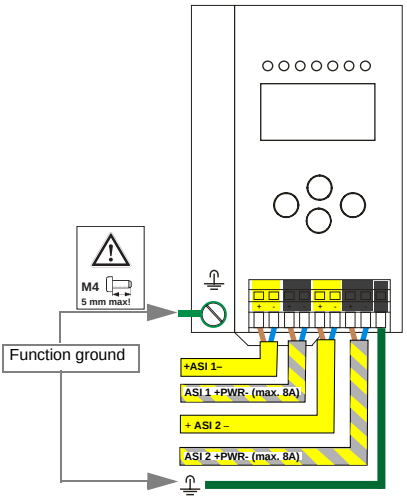
5.3 Power supply and AS-i terminal assignment

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.

5.3.1 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

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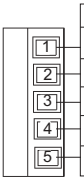
Note

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

5.4 DeviceNet interface



Signal	Color
V+	red
CAN_H	white
Shield	n/a
CAN_L	blue
V -	black

Note

The DeviceNet interface connector is designed as a 5-pin COMBICON connector. It is located on the left hand side of the front panel <chap. 5.1 „Overwview of connections, displays and operating elements“>.
V+ / V- must be connected to 24V!

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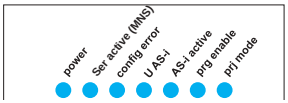
5.5 Display and operating elements

5.5.1 LED display



There are seven light-emitting diodes on the front panel of the gateway . They have the following function:

Power The master‘s power supply is sufficient.

Ser active **MNS** Modul-/Network status LED

red LED flashes:
no CAN communication in “Pre Operational Mode”

green LED flashes:
CAN communication node in “Pre Operational Mode”

green LED on:
CAN communication node in “Operational Mode”

config err 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.

5.5.2 Taster

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.

Ausgabedatum: 1.1.2008

6 Configuration

6.1 Setting DeviceNet Address and Baud Rate

To set the DeviceNet address and baud rate, refer to the front panel of the gateway. Locate the two buttons on the front panel marked "*mode*" and "*set*". By pressing both buttons simultaneously for approximately 5 seconds, the actual DeviceNet address will appear on the LCD display. DeviceNet address can be changed by pressing the "*set*" button until the desired DeviceNet address has been reached. To store the DeviceNet address, press the "*mode*" button. Now the LCD screen displays a 0, 1, or 2. See the chart below for the meaning of the code.

CODE	BAUD RATE
0	125k Baud
1	250k Baud
2	500k Baud

Press the "*set*" button until the desired code is reached. Again press the "*mode*" button to store the baud rate. The setting of the DeviceNet address and baud rate is complete.

The default address is 63 and the default baud rate is 125 kBaud.

6.2 I/O Data interpretation

Input data comes from Assembly Object Instance 100 (single channel) or 118 (double channel).

Output data comes from Assembly Object Instance 118 (single channel) or 154 (double channel).

These bytes of data are as follows:

byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
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			

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

Flags		
	input data	output data
F0	ConfigError	Off-line
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
Off-Line: 0 = OnLine, 1 = Off-Line
LOS-master-bit 0 = Off-Line by ConfigError deactivated
1 = Off-Line by ConfigError activated

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 reset.

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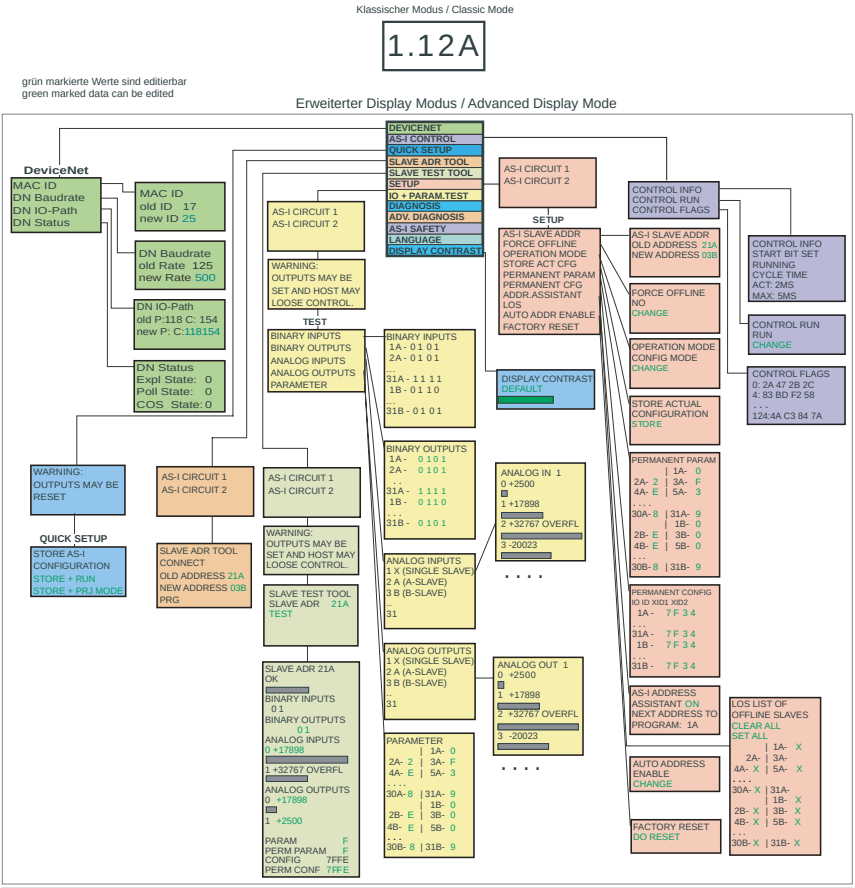
7 Operating in Advanced Display Mode

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

Note

7.1 Overview



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 menue (in the drawing one step to the right side). ESC puts you back to the previous menue. To edit data you first mark them with the cursor and then select them with OK, change them with the arrow buttons and finally apply them with OK. Pushing ESC cancels the editing.

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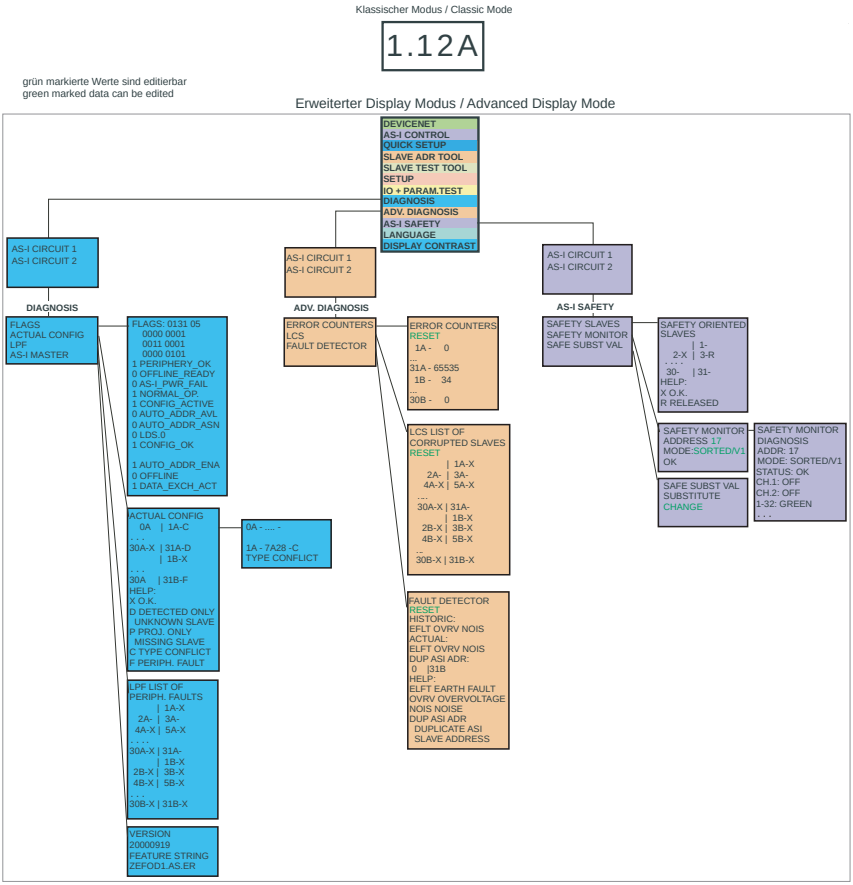
AS-i 3.0 DeviceNet-Gateway: Inbetriebnahme/Commissioning



Grundsätzliche Bedienung

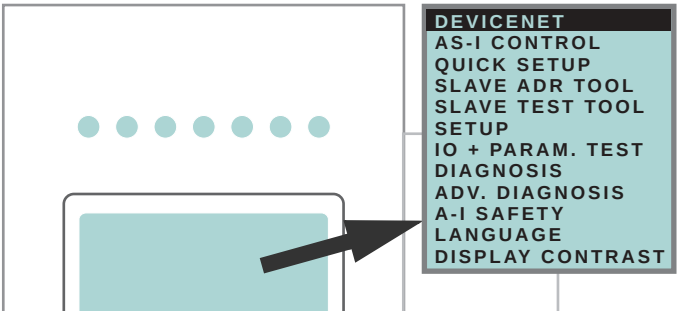
Das Gerät startet im traditionellen Modus. Mit ESC oder OK kann zwischen beiden Modi gewechselt werden. Im Erweiterten Modus wird ein Cursor mit den beiden Pfeil-Tasten bewegt. OK bringt ins nächsthöhere Menü (in der Zeichnung weiter nach rechts). ESC bringt zurück ins vorherige Menü. Wenn Werte editiert 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 menue (in the drawing one step to the right side). ESC puts you back to the previous menue. To edit data you first mark them with the cursor and then select them with OK, change them with the arrow buttons and finally apply them with OK. Pushing ESC cancels the editing.

STOP Warning	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).

7.2 Operating in advanced display mode



Note	The settings in the advanced mode are protected, as long as the upstream fieldbus 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 via the display during the connection with the control (active upstream fieldbus connection) for the protection of the plant. Before these commands can be executed at the display, first the connection (no upstream fieldbus connection) to the control must be deactivated.

The device starts in the classical mode. Press OK to switch to the advanced mode.

In the extended 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.

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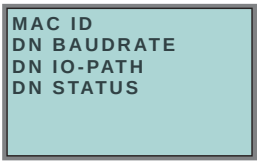
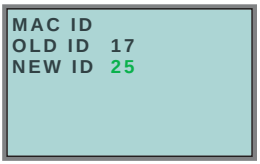
7.3 DeviceNet (Feldbus-Interface)

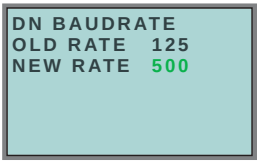


7.3.1 DeviceNet-MAC ID



This function is used for the setting and changing of the DeviceNet address. The number behind "ID" shows the actual station address. By selecting "New ID", this ID can be changed.

7.3.2 DeviceNet Baud Rate



This function is used for setting and changing the DeviceNet Baud Rate.

The number behind "Old Rate" shows the actual baud rate. By selecting "New Rate" you can change this Baud Rate.

Following baud rates can be adjusted:

- 10 kBaud
- 20 kBaud
- 50 kBaud
- 100 kBaud
- 125 kBaud
- 250 kBaud
- 500 kBaud
- 800 kBaud
- 1000 kBaud

On delivery, the Baud Rate is set to 125 kBaud.

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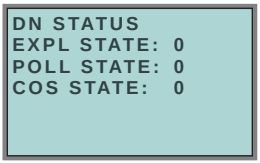
7.3.3 DeviceNet status



The function DeviceNet status indicates if and how many connections are active on each DeviceNet channel. Following status are indicated:

0 = nonexistent

1 = configuring

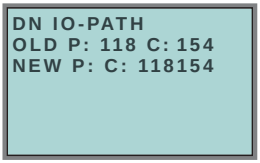
2 = waiting of connection ID

3 = established

4 = timed out

5 = deferred delete

7.3.4 DeviceNet I/O Path



With this function the DeviceNet POLL Connection Production/Consume Path and the Cyclic/COS Production Path can be easily modified. The displayed values are the assembly instances of the Production and Consume Path. If the current path values are inconsistent for this function the old values are marked with "---".

"P" modifies the Production Path of the POLL and the Cyclic/COS connection. "C" the Consume Path of the POLL Connection.

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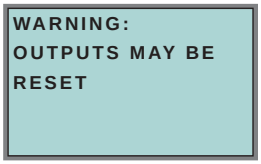
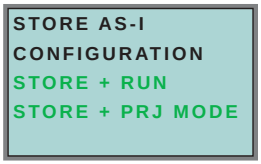
7.4 QUICK SETUP

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



STOP Warning	Warning: outputs may be reset!

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



"Store+Run"

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

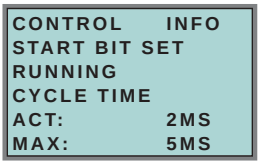
By pressing the "ESC" button you leave this menu and switch back to the main menu.

Issue date - 1.1.2008

7.5 AS-i CONTROL (option)

7.5.1 Structure of menu AS-i CONTROL

7.5.2 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.

7.5.3 AS-i Control Run

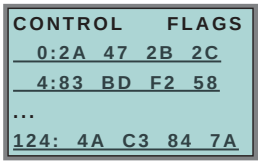
CONTROL RUN: the control program can be stopped with this function. It modifies the start bit in the menu Control Info.

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

CHANGE: the configuration program is stopped.

Issue date - 1.1.2008

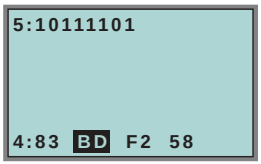
7.5.4 **AS-i Control flags** (flag memory control program)



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

A procedure of modifying flag memory:

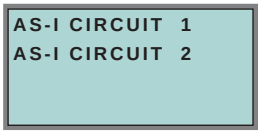
- select a line with soft keys
- press *OK* to open the selected menu



- 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.

7.6 SLAVE ADR TOOL (Slave Addressing Tool)

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

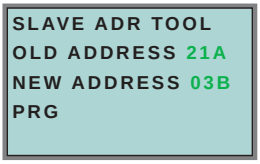


Please note that you must have selected the desired AS-i circuit using the arrow and the OK button when you operate a device with two AS-i circuits (see chap. 7.8.1).

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

Issue date - 1.1.2008

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.



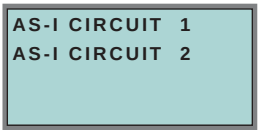
If an error occurs while addressing a slave, one of the following error messages is displayed for about 2 seconds:

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.

7.7 SLAVE TEST TOOL

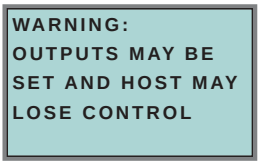
With this function a single AS-i slave can be tested.

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 chap. 7.8.1)



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

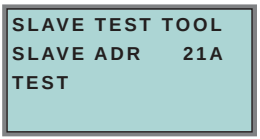
To start the test press the OK button, to cancel press the button ESC.



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

Issue date - 1.1.2008

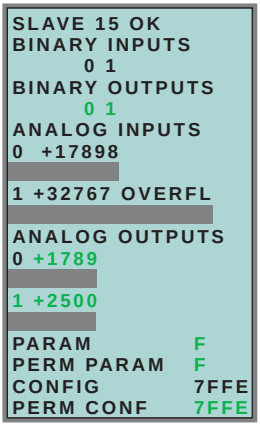
Afterwards the test is started by confirming the menu entry "Test".



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:

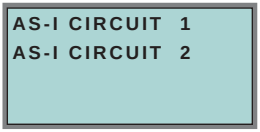
- Address of the tested slave
- Existing errors are indicated
- Binary inputs (digital inputs)
- Binary outputs (digital outputs)
- Analog inputs
- Analog outputs
- Param (actual parameters)
- Perm Param (projected parameters)
- Config (actual configuration)
- Perm Conf (projected configuration)



Issue date - 1.1.2008

7.8 SETUP (configuration of AS-i circuit)

7.8.1 AS-i circuit



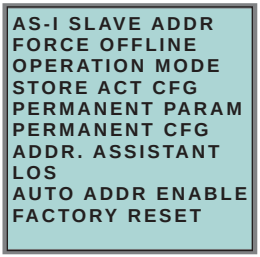
To reach this setup menu you have to change the desired AS-i circuit by using the arrow and the OK buttons.

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.

7.8.2 Structure of menu SETUP



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

- AS-i Slave Addr (AS-i Slave Address)
- Force Offline (switch AS-i Master offline)
- Operation Mode
- Store Act Cfg (store actual detected configuration)
- Permanent Param (projected parameter)
- Permanent Cfg (projected configuration data)
- Addr. Assistant (address assistent)
- LOS (list of offline-slaves)
- Auto Adr Enable
- Factory Reset (rest for the factory adjustment)

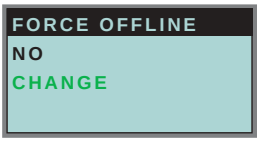
Issue date - 1.1.2008

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

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.

7.8.4 FORCE OFFLINE



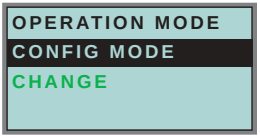
This function shows the current state of the AS-Interface Master:

Yes: AS-i Master is offline.
No: AS-i Master is online.

With "Change", this state can be modified.

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

7.8.5 OPERATION MODE



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

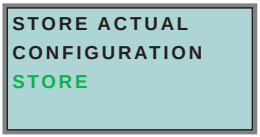
Protected Mode: Protected mode
Config Mode: Configuration mode

With "Change" the operation mode can be changed.

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

Issue date - 1.1.2008

7.8.6 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-i circuit.

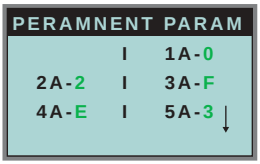
If "Store" was successful, the LED "Config error" is off. The configuration is stored, the configuration error has been eliminated.

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

If the AS-i master is in protected mode, the following error message will appear: "Failed No Config Mode"

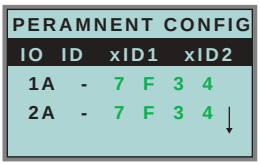
If an AS-i slave with address zero exists, storing the configuration will be confirmed with "OK". However, the configuration error remains because address zero is not a valid operating address for storing a slave.

7.8.7 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.

7.8.8 PERMANENT CONFIG (projected configuration data)



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).

Issue date - 1.1.2008

7.8.9 AS-I ADDRESS ASSISTENT

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

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

Assistant on: AS-i address assistant is switched on.
Assistant off: AS-i address assistant is switched off.

Procedure:

1. Store AS-i 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 chap. 8).
2. All AS-i slaves have to be addressed to 0 or to the desired address. The slaves must be disconnected from the AS-i circuit.
3. Start the AS-i address assistant.
4. Now connect the AS-i slaves one after the other. The last line of the display of the AS-i address assistant shows which AS-i slave has to be connected next.

7.8.10 LOS (list of offline slaves)

See also "Advanced Diagnostics for AS-i Masters", chap. 8.

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

Empty field: LOS bit deleted
X: LOS bit set

Issue date - 1.1.2008

7.8.11 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.

7.8.12 FACTORY RESET

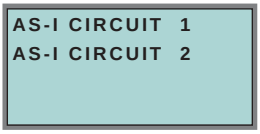
With this function the master can be reseted to the factory setting. The reset can be chosen by selecting the menu entry "DO RESET".

Warning

- 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.
- The master and the AS-i circuit have to be recommissioned and reprojected again after a successful "Reset".
- In case of double masters the "Reset" acts on both AS-i masters!

7.9 IO + PARAM. TEST

7.9.1 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.

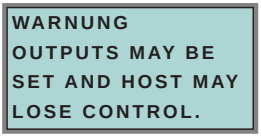
It makes possible to change the AS-i circuit that is currently active for being operated.

Issue date - 1.1.2008

The active circuit is marked by the cursor.

7.9.2 Structure of menu IO + PARAM. TEST

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



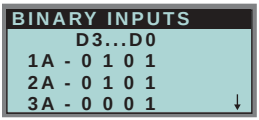
Before changing to the menu the following warning message will be displayed:

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

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

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

7.9.3 BINARY INPUTS

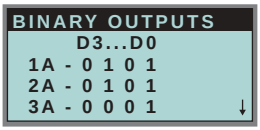


This list shows the state of the binary inputs for all AS-i slaves.

0: Input deleted
1: Input set

Issue date - 1.1.2008

7.9.4 BINARY OUTPUTS



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

0: Output deleted
1: Output set

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

7.9.5 ANALOG INPUTS

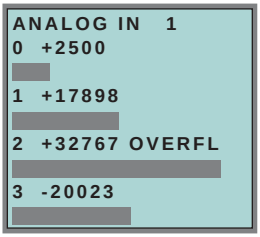
This function shows the state of the analog inputs for all AS-i slaves.
The slave-types are characterized as follows:

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

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



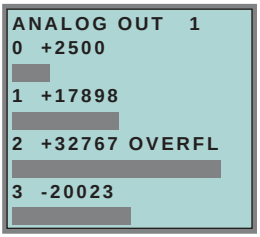
Issue date - 1.1.2008

7.9.6 ANALOG OUTPUTS

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

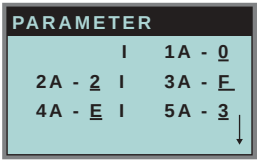
The display is as follows:
AS-i slave address, hexadecimal 16-bit value, bar display.

OVERFL displays any value overflows additionally.



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

7.9.7 PARAMETER



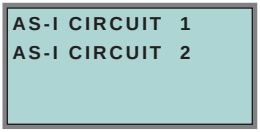
This function shows the hexadecimal value of the current AS-i parameters for all AS-i slaves.

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

Issue date - 1.1.2008

7.10 DIAGNOSIS (normal AS-i Diagnosis)

7.10.1 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.

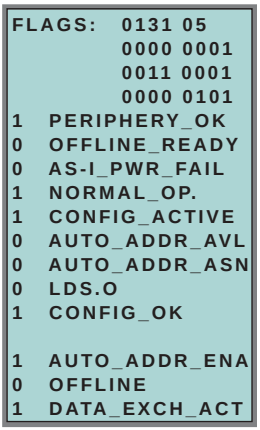
7.10.2 Structure of menu DIAGNOSIS

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-i Master (Info)

Issue date - 1.1.2008

7.10.3 FLAGS



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

Arrangement of the bits within the byte:

Byte								
Bit value:	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit.	7	6	5	4	3	2	1	0

Byte 1:

Bit 0: Periphery_OK
This flag is set, if no AS-i slave signs a periphery fault.

Issue date - 1.1.2008

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-i 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-i slave is conntected to AS-i).

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-i master is in normal operation.

Bit 6: AS-i Pwr Fail
The flag is set, if the AS-i circuit is not sufficiently powered.

Bit 7: Offline_Ready
The flag is set, if the AS-i 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-i slaves in the data exchange phase. If the bit is not set, the data exchange with AS-i slaves will be locked. Instead of data telegramms READ_ID telegramms will be sent.
The bit is set by the AS-i master by change over in the offline phase.

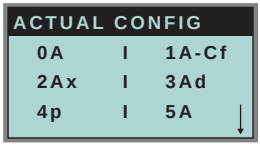
Bit 1: Offline
This bit is set if the operating mode offline is to be or already taken.

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-i 3.0 Command Interface)

Issue date - 1.1.2008

7.10.4 ACTUAL CONFIG (actual configuration)



This function shows the state of the actual configuration of the individual AS-i 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.

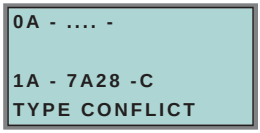
C (Type Conflict): The configuration data of the detected AS-i slave does not match the projected configuration data. The actual detected configuration of the connected AS-i slave is displayed.

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-i slave address the values for the actual configuration data are displayed behind the respective address in the following order:

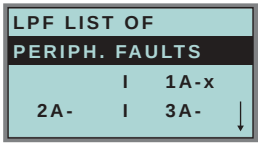
IO (I/O-configuration) ID (ID-configuration) xID1 (extended ID1) xID2 (extended ID2)



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

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

7.10.5 LPF (list of periphery faults)



The list shows AS-i slaves, which have released a peripheral fault.

Empty field: Periphery O.K.

Empty field: X: Peripheral fault

Issue date - 1.1.2008

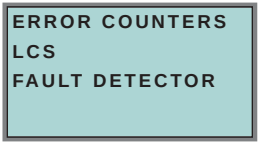
7.10.6 AS-i MASTER (info)

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

Version xxxxxxxx (date of the firmware)

Feature String xxxxxxxxxxxxxxxx

7.11 ADV. DIAGNOSIS (advanced AS-iAS-Interface diagnosis)

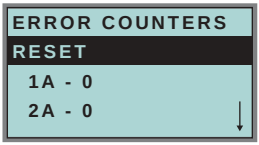


See also "Advanced Diagnostics for AS-Interface Masters", chap. 8.

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

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

7.11.1 ERROR COUNTERS



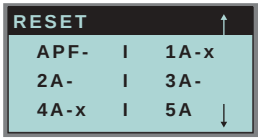
This list shows the error counter for each single AS-i slave.

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

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

Issue date - 1.1.2008

7.11.2 LCS (list of slaves having caused a configuration error)

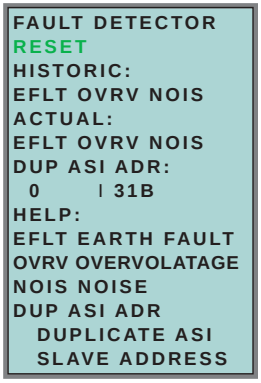


This list shows for each single AS-i slave whether at least one configuration error was caused by an enormous telegram transmission. This function is especially important if the configuration error only occurs short-time.

Empty field: No error

X: AS-i slave caused a configuration error.

7.11.3 FAULT DETECTOR



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

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

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

In the section "Actual" the actual appeared error messages of the AS-i 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

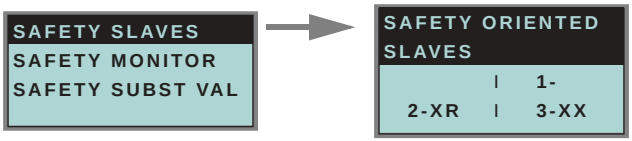
Issue date - 1.1.2008

7.12 AS-i SAFETY

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

- Safety Slaves
- Safety Monitor
- Safety Substitute Value

7.12.1 SAFETY ORIENTED SLAVES



This list shows the "safety-directed input slaves" ("AS-i 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

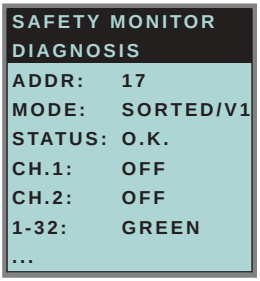
or

- slave value substitute.

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

Issue date - 1.1.2008

7.12.2 SAFETY MONITOR



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

7.12.3 SAFETY SUBST VAL

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

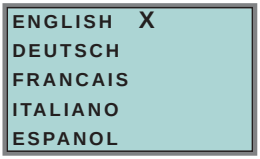
No channel has released: 1111bin

NO SUBSTITUTE

The safety slave input data are shown unmodified.

Issue date - 1.1.2008

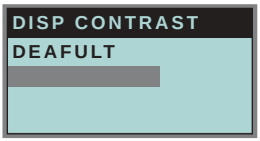
7.13 LANGUAGE (language of displayed messages)



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").

7.14 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.

Issue date - 1.1.2008

8 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).

8.1 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	The last short-time configuration error can also be displayed on the AS-i master: • 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. • 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.

8.2 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 occured and the AS-i slave did not cause any configuration errors.

Note	• The counter values can be read via the host interface and will be deleted with every read access. • The counter value is limited to 254. 255 will cause a counter overflow.

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

Issue date - 1.1.2008

8.3 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.

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

8.4 Functions of the AS-Interface Fault Detector

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

8.4.1 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 seperately. At that time both repsonses overlap themselves on the line, it is impossible for the master to recognize the slave response safely. It exists an unstable network behaviour.

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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 diplay of the master.

Note	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 *duplicate address‘ recognition* is impossible.

8.4.2 Earth Fault Detector

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

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

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.

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

Note	For recognition of earth faults the master must be grounded with the function earth.

8.4.3 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.

8.4.4 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.

Issue date - 1.1.2008

9 DeviceNet Interface

The AS-i 3.0 DeviceNet Gateway operates as a Group 2-Only slave device on the DeviceNet network, supporting polled I/O and explicit messaging. It does not support strobed I/O.

This appendix defines DeviceNet message types, class services and object classes that are supported by the AS-i 3.0 DeviceNet Gateway.

9.1 DeviceNet Message Types

The gateway supports the following message types:

CAN Identifier Field	Group 1 Message Type
01101xxxxxx	Slave's I/O Change of State or Cyclic Message
01111xxxxxx	Slave's I/O Poll Response or Change of State/Cyclic Acknowledge Message

CAN Identifier Field	Group 2 Message Type
10xxxxxx111	Duplicate MAC ID Check Messages
10xxxxxx110	Unconnected Explicit Request Messages
10xxxxxx101	Master I/O Poll Command Message
10xxxxxx100	Master Explicit Request Message
10xxxxxx010	Master's I/O Poll/Change of State/Cyclic Message


Note

xxxxxx = AS-i 3.0 DeviceNet Gateway node address.

9.2 DeviceNet Class Services

The gateway supports the following class services and instance services:

Service Name	Service Code
Reset	0x05
Delete	0x09
Get_Attribute_Single	0x0E
Set_Attribute_Single	0x10
Allocate Master/Slave_Connection_Set	0x4B
Release Master/Slave_Connection_Set	0x4C

Issue date - 1.1.2008

9.3 Object Modelling

According to the DeviceNet philosophy, one should model the properties of the physical device in DeviceNet Objects. For an AS-i Master, the objects could be:

- An "AS-i Master Object" which contains the properties of the Master itself and of the whole AS-i circuit, e.g. ec-flags, lists and functions for slave programming and so on.
- "AS-i Slave Objects", one for every AS-i slave which contains the properties of the individual AS-i slave, e.g. parameters, configuration and so on.

Therefore following Object List ist existing (overview):

Class Code	Object Name	Number of Instances
0x01	Identity	1
0x03	DeviceNet	1
0x04	Assembly	72
0x05	Connections	4
0x15	Parameter object	1
0x64	AS-i master	1 for each AS-i circuit
0x65	AS-i slave	64 for each AS-i circuit
0x66	E/A data	1 for each AS-i circuit
0x67	Advanced diagnosics	1 for each AS-i circuit
0x68	Short command interface	1
0x69	Long command interface	1

9.3.1 Identity Object

Class Code: 1 (0x01)
Number of instances: 1

Instance Attributes

Attribute ID	Access Rule	Name	Value
100	Get	Vendor	645
101	Get	Device Type	100
102	Get	Product Code	single master: 1818 double master: 1820
103	Get	Revision	2.2
104	Get	Status	see overwiev listed below
105	Get	Serial Number	unique number, 32-bit
106	Get	Product Name	AS-i 3.0 DeviceNet Gateway
109	Get/Set	Heartbeat Interval	

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Status

Bit 0	owned	0 = not owned 1 = owned (group 2 allocated to master)
Bit 1	reserved	always 0
Bit 2	configured	always 0
Bit 3	reserved	always 0
Bit 4-7	vendor specific	all 0
Bit 8	minor cfg. fault	0 = no error 1 = minor configuration fault
Bit 9	minor device fault	0 = no error 1 = minor device fault
Bit 10	major cfg. fault	0 = no error 1 = major configuration fault
Bit 11	major device fault	0 = no error 1 = major device fault
Bit 12,13	reserved	always 0
Bit 14,15	reserved	always 0

Common Services

Service Code	Class	Instance	Service Name
0x05	no	yes	Reset
0x10	yes	yes	Get_Attribute_Single
0x0E	yes	yes	Get_Attribute_Single

9.3.2 DeviceNet Object

Class Code: 3
Number of Instances: 1

Instance Attributes

Attribute ID	Access Rule	Name	DeviceNe Data Type	Data Value
1	Get/Set	MAC ID	USINT	Range 0-63
2	Get/Set	Baud Rate	USINT	Range 0-2
3	Get/Set	BOI	BOOL	Range 0-1
4	Get/Set	Bus-off Counter	USINT	Range 0-255
5	Get	Allocation Information: Allocation Choice Byte Master´s Node Address	Structure of: BYTE USINT	0-63=Master Address 255=unallocated

Issue date - 1.1.2008

Common Services

Service Code	Class	Instance	Service Name
0x0E	yes	yes	Get_Attribute_Single
0x10	no	yes	Set_Attribute_Single
0x4B	no	yes	Allocate_M/S_Connection_Set
0x4C	no	yes	Release_M/S_Connection_Set

9.3.3 Assembly Object

Class Code 4 (0x04)
Number of instances: 72

The Assembly Object bundles data from the application objects.

The Assembly Object Instances consist of (in case of a double master):

- A-slaves and/or single slaves from circuit 1
- Single, A- and B-slaves (all slaves) from circuit 1
- A-slaves and/or single slaves from both circuits
- Single, A- and B-slaves (all slaves) from both circuits
- No 16-bit data
- 16-bit data from slaves 29 … 31 from circuit 1
- 16-bit data from slaves 29 … 31 from both circuits
- No command interface
- Short command interface
- Long command interface

Attribute ID	Access Rule	Name	Data Value
3		Data Item(s)	

Instances 100 (0x64) … 135 (0x87) can only be read, while instances 136 (0x88) … 171 (0xAB) can be read and written.

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Assembly Instance			Data Item		
Input	**Output**	**Size (Byte)**	**Digital**	**Analog**	**Command interface**
100 (0x64)	136 (0x88)	16	AS-i circuit 1, Single- and A-slaves		
101 (0x65)	137 (0x89)	28	AS-i circuit 1, Single- and A-slaves		short
102 (0x66)	138 (0x8A)	52	AS-i circuit 1, Single- and A-slaves		long
103 (0x67)	139 (0x8B)	40	AS-i circuit 1, Single- and A-slaves	AS-i circuit 1, Analog slaves 29 ... 31	
104 (0x68)	140 (0x8C)	52	AS-i circuit 1, Single- and A-slaves	AS-i circuit 1, Analog slaves 29 ... 31	short
105 (0x69)	141 (0x8D)	76	AS-i circuit 1, Single- and A-slaves	AS-i circuit 1, Analog slaves 29 ... 31	long
106 (0x6A)	142 (0x8E)	64	AS-i circuit 1, Single- and A-slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	
107 (0x6B)	143 (0x8F)	76	AS-i circuit 1, Single- and A-slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	short
108 (0x6C)	144 (0x90)	100	AS-i circuit 1, Single- and A-slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	long
109 (0x6D)	145 (0x91)	32	AS-i circuit 1, all slaves		
110 (0x6E)	146 (0x92)	44	AS-i circuit 1, all slaves		short
111 (0x6F)	147 (0x93)	68	AS-i circuit 1, all slaves		long
112 (0x70)	148 (0x94)	56	AS-i circuit 1, all slaves	AS-i circuit 1, Analog slaves 29 ... 31	
113 (0x71)	149 (0x95)	68	AS-i circuit 1, all slaves	AS-i circuit 1, Analog slaves 29 ... 31	short
114 (0x72)	150 (0x96)	92	AS-i circuit 1, all slaves	AS-i circuit 1, Analog slaves 29 ... 31	long
115 (0x73)	151 (0x97)	80	AS-i circuit 1, all slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	
116 (0x74)	152 (0x98)	92	AS-i circuit 1, all slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	short
117 (0x75)	153 (0x99)	116	AS-i circuit 1, all slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	long
118 (0x76)	154 (0x9A)	32	AS-i circuite 1+2, Single- and A-slaves		
119 (0x77)	155 (0x9B)	44	AS-i circuite 1+2, Single- and A-slaves		short
120 (0x78)	156 (0x9C)	68	AS-i circuite 1+2, Single- and A-slaves		long
121 (0x79)	157 (0x9D)	56	AS-i circuite 1+2, Single- and A-slaves	AS-i circuit 1, Analog slaves 29 .. 31	
122 (0x7A)	158 (0x9E)	68	AS-i circuite 1+2, Single- and A-slaves	AS-i circuit 1, Analog slaves 29 ... 31	short
123 (0x7B)	159 (0x9F)	92	AS-i circuite 1+2, Single- and A-slaves	AS-i circuit 1, Analog slaves 29 ... 31	long

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Assembly Instance			Data Item		
Input	**Output**	**Size (Byte)**	**Digital**	**Analog**	**Command interface**
124 (0x7C)	160 (0xA0)	80	AS-i circuite 1+2, Single- and A-slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	
125 (0x7D)	161 (0xA1)	92	AS-i circuite 1+2, Single- and A-slaves	AS-i circuite 1+2, Analog slaves 29 .. 31	short
126 (0x7E)	162 (0xA2)	116	AS-i circuite 1+2, Single- and A-slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	long
127 (0x7F)	163 (0xA3)	64	AS-i circuite 1+2, all slaves		
128 (0x80)	164 (0xA4)	76	AS-i circuite 1+2, all slaves		short
129 (0x81)	165 (0xA5)	100	AS-i circuite 1+2, all slaves		long
130 (0x82)	166 (0xA6)	88	AS-i circuite 1+2, all slaves	AS-i circuit 1, Analog slaves 29 ... 31	
131 (0x83)	167 (0xA7)	100	AS-i circuite 1+2, all slaves	AS-i circuit 1, Analog slaves 29 ... 31	short
132 (0x84)	168 (0xA8)	124	AS-i circuite 1+2, all slaves	AS-i circuit 1, Analog slaves 29 ... 31	long
133 (0x85)	169 (0xA9)	112	AS-i circuite 1+2, all slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	
134 (0x86)	170 (0xAA)	124	AS-i circuite 1+2, all slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	short
135 (0x87)	171 (0xAB)	148	AS-i circuite 1+2, all slaves	AS-i circuite 1+2, Analog slaves 29 ... 31	long

Instances 136 (0x88) ... 171 (0xAB) have the same structure but with 16-bit and binary outputs. They can be read and written.

The are only instances 100 (0x64) ... 105 (0x69) and 109 (0x6D) ... 114 (0x72) in case of a single master. In case of single master, instance 100 (0x64) is the default connection path for produced data and instance 136 (0x88) for consumed data.

In case of double master, instance 118 (0x76) is the dafault connectionn path for produced data and instance 154 (0x9A) for consumed data.

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9.3.4 Connection Object

Class Code: 5
Number of Instances: 3

Note

If the polled I/O message connection leaves the established state (3) the AS-i output data will be cleared.

Instance 1 Attributes (Explicit Message Connection)

Attribute ID	Access Rule	Name	DeviceNet-Data Type	Data Value
1	Get	State	USINT	1 = configuring 2 = waiting for connection ID 3 = estabilshed 4 = timed out 5 = deferred delete
2	Get	Instance Type	USINT	0 = explicit message
3	Get	Transport Class Trigger	USINT	83 (hex.)
4	Get	Produced Connection ID	UINT	10xxxxxx011 (binary) xxxxxx=Node Address
5	Get	Consumed Connection ID	UINT	10xxxxxx100 (binary) xxxxxx=Node Address
6	Get	Initial Comm. Characteristics	USINT	21 (hex.)
7	Get	Produced Connection Size	UINT	204 (dec.)
8	Get	Consumed Connection Size	UINT	204 (dec.)
9	Get/Set	Expected Packet Rate	UINT	0 (ms)
12	Get	Watchdog Timeout Action	USINT	0 = timeout 1 = auto delete 2 = auto reset 3 = deferred delete
13	Get	Produced Connection Path Length	USINT	0
14	Get	Produced Connection Path		null (no data)
15	Get	Consumed Connection Path Length	USINT	0
16	Get	Consumed Connection Path		null (no data)
17	Get	Production Inhibit Time	UINT	

Issue date - 1.1.2008

Common Services

Service Code	Class	Instance	Service Name
0x05	yes	yes	Reset
0x09	yes	yes	Delete
0x0E	yes	yes	Get_Attribute_Single
0x10	no	yes	Set_Attribute_Single

Instance 2 Attributes (Polled I/O Message Connection)

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	State	USINT	1 = configuring 2 = waiting for connection ID 3 = estabilshed 4 = timed out 5 = deferred delete
2	Get	Instance Type	USINT	1 = I/O message
3	Get	Transport Class Trigger	USINT	83 (hex.)
4	Get	Produced Connection ID	UINT	01111xxxxxx (binary) xxxxxx=Node Address
5	Get	Consumed Connection ID	UINT	10xxxxxx101 (binary) xxxxxx=Node Address
6	Get	Initial Comm. Characteristics	USINT	01 (hex.)
7	Get	Produced Connection Size	UINT	20 (hex.)
8	Get	Consumed Connection Size	UINT	20 (hex.)
9	Get/Set	Expected Packet Rate	UINT	0 (msec)
12	Get	Watchdog Timeout Action	USINT	0 = timeout 1 = auto delete 2 = auto reset 3 = deferred delete
13	Get	Produced Connection Path Length	USINT	6
14	Get/Set	Produced Connection Path	Structure of: USINT USINT USINT USINT USINT USINT Structure of: USINT USINT USINT USINT USINT USINT	single master (default): 20 (hex.) 04 (hex.) 24 (hex.) 64 (hex.) 30 (hex.) 03 (hex.) double master (default): 20 (hex.) 04 (hex.) 24 (hex.) 76 (hex.) 30 (hex.) 03 (hex.)
15	Get	Consumed Connection Path Length	USINT	6

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16	Get	Consumed Connection Path	Structure of: USINT USINT USINT USINT USINT USINT Structure of: USINT USINT USINT USINT USINT USINT	single master (default): 20 (hex.) 04 (hex.) 24 (hex.) 88 (hex.) 30 (hex.) 03 (hex.) double master (default): 20 (hex.) 04 (hex.) 24 (hex.) 9A (hex.) 30 (hex.) 03 (hex.)
17	Get/Set	Production Inhibit Time		

Common Services

Service Code	Class	Instance	Service Name
0x05	yes	yes	Reset
0x09	yes	yes	Delete
0x0E	yes	yes	Get_Attribute_Single
0x10	no	yes	Set_Attribute_Single

Instance 4 Attributes (Cyclic/Change of State)

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	State	USINT	1 = configuring 2 = waiting for connection ID 3 = estabilshed 4 = timed out 5 = deferred delete
2	Get	Instance Type	USINT	1 = I/O message
3	Get	Transport Class Trigger	USINT	12 (hex.)
4	Get	Produced Connection ID	UINT	01101xxxxxx (binary) xxxxxx=Node Address
5	Get	Consumed Connection ID	UINT	10xxxxxx010(binary) xxxxxx=Node Address
6	Get	Initial Comm. Characteristics	USINT	01 (hex.)
7	Get	Produced Connection Size	UINT	20 (hex.)
8	Get	Consumed Connection Size	UINT	20 (hex)
9	Get/Set	Expected Packet Rate	UINT	0 (ms)
12	Get	Watchdog Timeout Action	USINT	0 = timeout 1 = auto delete 2 = auto reset 3 = deferred delete
13	Get	Produced Connection Path Length	USINT	6

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14	Get/Set	Produced Connection Path	Structure of: USINT USINT USINT USINT USINT USINT Structure of: USINT USINT USINT USINT USINT USINT	single master (default): 20 (hex.) 04 (hex.) 24 (hex.) 64 (hex.) 30 (hex.) 03 (hex.) double lmaster (default): 20 (hex.) 04 (hex.) 24 (hex.) 76 (hex.) 30 (hex.) 03 (hex.)
15	Get	Consumed Connection Path Length	USINT	4
16	Get	Consumed Connection Path	Structure: USINT USINT USINT USINT	single master (default): 20 (hex) 2B (hex) 24 (hex) 01 (hex)
17	Get/Set	Production Inhibit Time		

Common Services

Service Code	Class	Instance	Service Name
0x05	yes	yes	Reset
0x09	yes	yes	Delete
0x0E	yes	yes	Get_Attribute_Single
0x10	no	yes	Set_Attribute_Single

Issue date - 1.1.2008

9.3.5 Parameter Object

Class Code: 15

Instance 1: I/O Data

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get/Set	Parameter Value	UINT	byte 1: Production Instance, byte 2: Consume Instance
2	Get	Link Path Size		0x00
3	Get	Link Path		
4	Get	Descriptor	UINT	0x20
5	Get	Data Type	EPATH	0xC7
6	Get	Data Size	USINT	0x02

With this parameter the DeviceNet POLL Connection Production/Consume Path and the Cyclic/COS Production Path can be easily modified. The values are the assembly instances of the Production and Consume Path. If the current path values are inconsistent for this parameter the reading is 0.

Byte 1 modifies the Production Path of the POLL and the Cyclic/COS connection. Byte 2 the Consume Path of the POLL Connection.

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9.3.6 AS-i Master Object

Class Code: 100 (0x64)

1 instance for each AS-i circuit

Attribute ID	Access Rule	Name	DeviceNet Data Type	Default Data Value
100 (0x64)	Get	ec-flags	UINT (16-bit)	
101 (0x65)	Get/Set	hi-flags	USINT	
102 (0x66)	Get/Set	operational mode	BOOL	
103 (0x67)	Get	LDS	ULINT	
104 (0x68)	Get/Set	LPS	ULINT	
105 (0x69)	Get	LAS	ULINT	
106 (0x6A)	Get	LPF	ULINT	
107 (0x6B)	Get/Set	Store_Actual_Configuration	BOOL	
108 (0x6C)	Get/Set	Store_Actual_Parameters	BOOL	
109 (0x6D)	Get/Set	Change_Slave_Adress	UINT	
110 (0x6E)	Get/Set	Lock Pushbuttons	BOOL	

EC-flags (16-bit)

EC-flags (16-bit)								
2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Pok	OR	APF	NA	CA	AAv	AAs	S0	Cok

Pok Periphery_Ok
S0 LDS.0
AAs Auto_Address_Assign
AAv Auto_Address_Available
CA Configuration_Active
NA Normal_Operation_Active
APF APF
OR Offline_Ready
Cok Config_Ok

Issue date - 1.1.2008

Hi-flags (8-bit):

Hi-flags		
2^2	2^1	2^0
AAe	OL	DX

AAe Auto_Address_Enable
OL Off-line
DX Data_Exchange_Active

Operational mode (8-bit):

1: configuration mode
0: protected mode

LDS, LAS, LPS, LPF (64-bit):

LDS, LAS, LPS, LPF								
byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	7A	6A	5A	4A	3A	2A	1A	0A
…	…							
7	31B	30B	29B	28B	27B	26B	25B	24B

Store actual parameter/store actual configuration/lock push-buttons:

True: proceed the action

Change slave address (16-bit):

Change slave address								
Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	–		B	source address				
1	–		B	target address				

Meaning of the bit B:

B = 0: Single-AS-i slave oder A-slave
B = 1: B-slave

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9.3.7 AS-i Slave Object

Class Code: 101 (0x65)

64 instances for every AS-i circuit, 1 for every AS-i slave

Instance ID	AS-i-Slave
1	Slave 0, circuit 1
2	Slave 1A, circuit 1
…	…
32	Slave 31A circuit 1
33	empty, circuit 1
34	Slave 1B, circuit
…	…
64	Slave 31B, circuit 1
65	Slave 0, circuit 2
…	…
96	Slave 31A, circuit 2
97	leer, circuit 2
…	…
98	Slave 1B, circuit 2
…	…
128	Slave 31B, circuit 2

Attribute ID	Access Rule	Name	DeviceNet Data Type	Remark
0x64	Get	Actual configuration	UINT	
0x65	Get/Set	Permanent configuration	UINT	Slave 0, 32: not read-/writeable
0x66	Get/Set	Actual parameters	USINT	
0x67	Get/Set	Permanent parameters	USINT	
0x68	Get/Set	xID1	USINT	Slave 0: writeable only, slave 0 - 32: readable

Actual configuration/permanent configuration (16-bit):

Actual configuration/permanent configuration															
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
ID				IO				xID2				XID1			

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Parameter xID1 (8-bit):

Parameter xID1							
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
–				data			

9.3.8 I/O Data Object

Class Code: 102 (0x66)

Input and Output Data

1 instance for each AS-i circuit

Attribute ID	Access Rule	Name	DeviceNet Data Type	Default Data Value
100 (0x64)	Get	Input Data Image, Single and A-slaves	ARRAY[16] of USINT	
101 (0x65)	Get	Input Data Image, B-slaves	ARRAY[16] of USINT	
102 (0x66)	Get/Set	Output Data Image Single and A-slaves	ARRAY[16] of USINT	
103 (0x67)	Get/Set	Output Data Image, B-slaves	ARRAY[16] of USINT	
104 (0x68)	Get	16-bit Input Data slave 1	ARRAY[4] of INT	
…	…	…	…	…
134 (0x86)	Get	16-bit Input Data slave 31	ARRAY[4] of INT	
135 (0x87)	Get/Set	16-bit Output Data slave 1	ARRAY[4] of INT	
…	…	…	…	…
165 (0xA5)	Get/Set	16-bit Output Data slave 31	ARRAY[4] of INT	

Input and Output Data Image:

Byte	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
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			

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

Flags		
	Input data	Output data
F0	ConfigError	Off-line
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
Off-Line: 0=On-Line, 1=Off-Line
LOS-master-bit 0=Off-Line by ConfigError deactivated
1=Off-Line by ConfigError activated.

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16-bit values:

16-bit values															
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

16-bit data:

Note

A-Slaves map the data on channels 1 and 2.
B-Slaves map the data on channels 3 and 4.

In addition to the access via the command interfaces, the 16-bit data for or by the slaves with 16-bit value can by 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 attemps on 16-bit output data will not be blocked by every other. If 16-bit 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 16-bit data is as easy as accessing digital data.

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							

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9.3.9 Advanced Diagnostics Object

Class Code: 103 (0x67)

1 instance for each AS-i circuit

Attribute ID	Access Rule	Name	DeviceNet Data Type	Default Data Value
100 (0x64)	get/set	los (list of offline slaves)	ULINT	
101 (0x65)	get	error counters a	ARRAY[32] of USINT	
102 (0x66)	get	error counters b	ARRAY[32] of USINT	

Error counter:

Single- and A-Slaves	
Index	Error Counter
1	Slave 1/1A
2	Slave 2/2A
3	Slave 3/3A
…	…
31	Slave 31/31A

B-Slaves	
Index	Error Counter
1	Slave 1B
2	Slave 2B
3	Slave 3B
…	…
31	Slave 31B

9.3.10 Short Command Interface Object

Class Code: 104 (0x68)

1 instance

Attribute ID	Access Rule	Name	DeviceNet Data Type	Default Data Value
100 (0x64)	get/set	content command toggle-bit and as-i circuit data	ARRAY[12] of USINT [0] [1] [2 … 11]	

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9.3.11 Long Command Interface Object

Class Code: 105 (0x69)

1 instance

Attribute ID	Access Rule	Name	DeviceNet Data Type	Default Data Value
100 (0x64)	get/set	content command toggle-bit and as-i circuit data	ARRAY[36] of USINT [0] [1] [2 … 35]	

For special details acc. the command interface commands see separat manual AS-i 3.0 Command Interface (see also <chap. 16.1>).

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10 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 DeviceNet Gateway so easy as possible.

The software communicates with the AS-i/DeviceNet Gateway using a DeviceNet Master Simulator with USB interface or the integrated RS 232 diagnostic interface (if existing) .

10.1 Windows software AS-i Control Tools

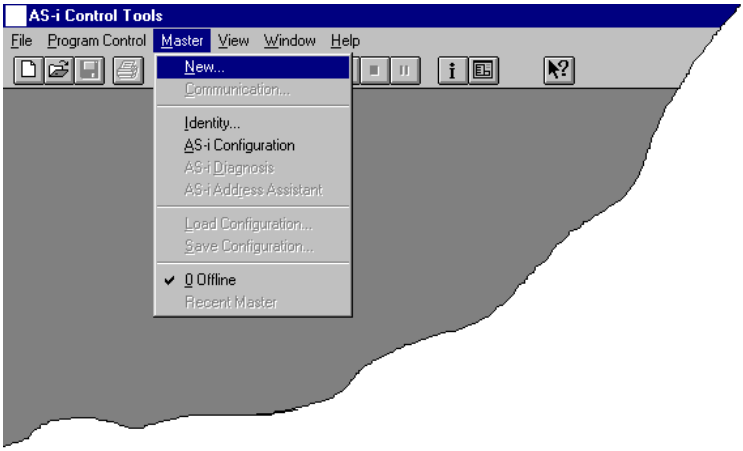
Note

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 Master Simulator to the CAN-connector of the AS-i/DeviceNet Gateway and connect the device over the RS 232 interface with a fully covered cable to a USB interface of your PC.
2. Start the AS-i-Control-Tools.
3. Call the command Master | New.



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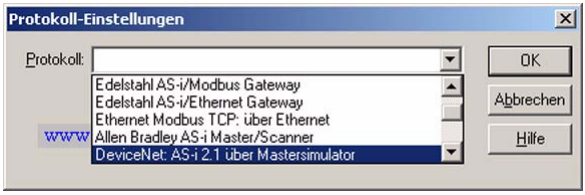
4. Choose DeviceNet as protocol.



5. Do the appropriate settings. (e.g. USB interface, bus-address, baud rate, 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.
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

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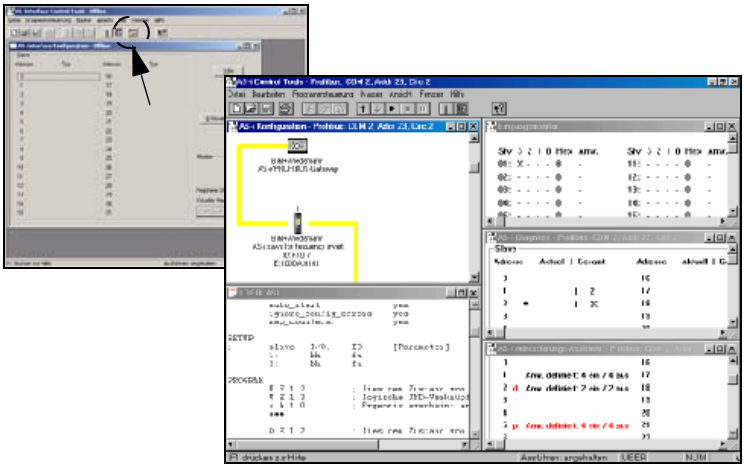
possible here. Additionally, inputs and outputs can be tested.

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.

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.

10.2 Accessories (optional)

10.2.1 DeviceNet Master Simulator with USB Interface

The DeviceNet Master Simulator is an easy to use device for data exchange with DeviceNet slaves of different suppliers. No DeviceNet Master is essential.

Attribute:

- reading respectively writing of input respectively output data
- data and the DeviceNet diagnosis can be displayed
- reading and writing of any objects independent of the state of communication
- possibility to scan a DeviceNet network and to find all connected slaves
- digital I/O data and DeviceNet diagnosis can be displayed binary, hexdecimal and also as ASCII code

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- analog I/O data are displayed decimal. The DeviceNet output data can be transmitted consistently to the DeviceNet slave.

The DeviceNet Master Simulator consists of the software and a CAN dongle. The CAN dongle is the ideal interface converter between the USB interface of a PC and DeviceNet. The converter needs for power supply only the USB interface. Therefore it is also suitable for mobile use with a laptop or a notebook.

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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 "Operationg 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 occured.
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.

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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 volatilely in the slave.
94	Error while changing the slave address in protected operating mode: Slave has wrong configuration data.
95	The error 95 is caused by a superfluous slave and not by a missing slave. That is why the slave address is ocupated 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.)

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12 Appendix: Commissioning Instruction

12.1 Listing of all described gateways

Note	Please refer to <chapter 3.1 “Product information”, page 12> for the list of all devices described in the following installation instruction.

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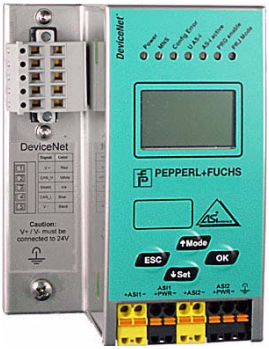
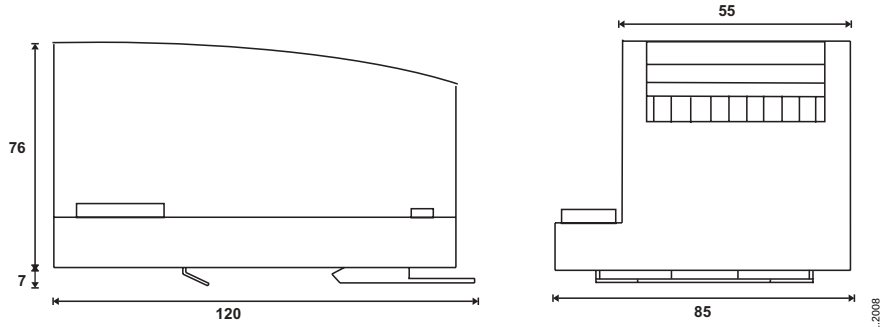
12.2 VBG-DN-K20-DMD-BV	**AS-i 3.0 DeviceNet-Gateway in Edelstahl** **AS-i 3.0 DeviceNet Gateway in Stainless Steel** **Passerelle AS-i 3.0 DeviceNet en boîtier inox** **Gateway AS-i 3.0 DeviceNet d'acciaio inox** **Pasarela AS-i 3.0 DeviceNet en acero inoxidable**



Dokumentation AS-i 3.0 DeviceNet-Gateway (deutsch)
Documentation AS-i 3.0 DeviceNet Gateway (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!

12.2.1 Dimensions



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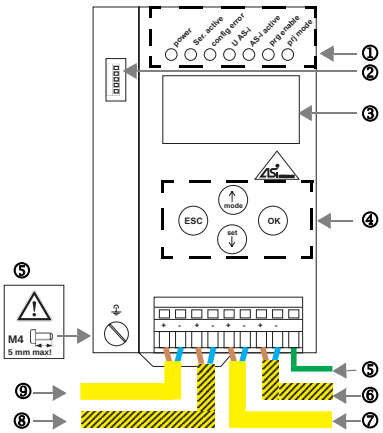
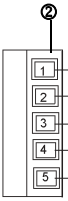
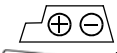
12.2.2 Front view and connections





Signal	Color
V+	rot/ red/ rouge/ rosso/ rojo
CAN_H	weiss/ white/ blanc/ bianco/ blanco
Shield	n/a
CAN_L	blau/ blue/ bleu/ blu/ azul
V -	schwarz/ black/ noir/ nero/ negro



Temperature rating for cable: 60/75°C
Use copper conductors only
1 x 0.5 - 1.5 mm² (16AWG/kcmil: min. 24/max. 12)

⑦ AS-i-Kreis 2/AS-i circuit 2/Bus AS-i 2/ Circuito AS-i 2/ Circuito AS-i 2

⑧ 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-iCircuito AS-i 1

⑨ 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 CAN-Anschluss
③ LCD-Anzeige
④ Tasten für Handbedienung
⑤ Erde
⑥ AS-i-Netzteil Kreis 2

① LED status display
② CAN 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 CAN
③ Affichage LCD
④ Boutons pour commande manuelle
⑤ Terre
⑥ Alimentation bus 2 AS-i

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

① LED visualización
② Conexión CAN
③ Display LCD
④ Teclas para accionamiento manual
⑤ Tierra
⑥ Alimentación circuito 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.
V+ / V- muss an 24V angeschlossen werden.

AS i circle 1 and 2 are supplied fromAS-it 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.
V+ / V- must be connected to 24V.

Les bus AS-i 1 et 2 sont alimentés à partir de l'alimentation 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.
V+ / V- nécessite une alimentation de 24V.

I circuiti AS-i 1 e 2 sono alimentati dall'alimentatore AS-i.
Al cavo per l'alimentazione nessun slave o ripetitore può essere fissato.
Al cavo per il circuito AS-i nessun alimentatore o altro master può essere fissato.
V+ / V- deve essere collegato a 24V.

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

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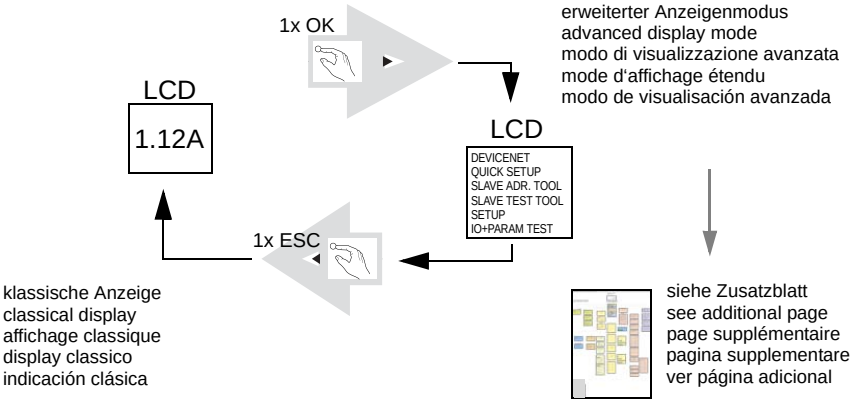
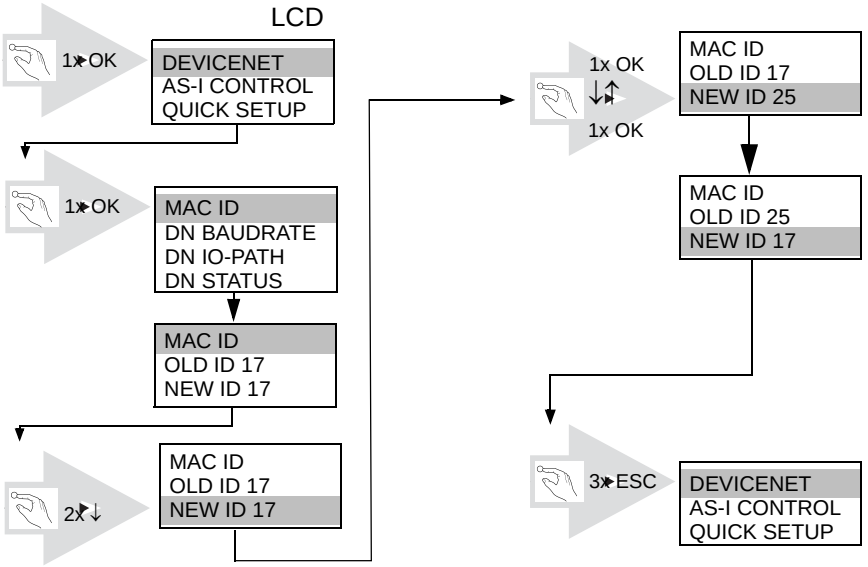
12.2.3 Startup

12.2.3.1 Switching to advanced display mode



12.2.3.2 Setting the MAC ID



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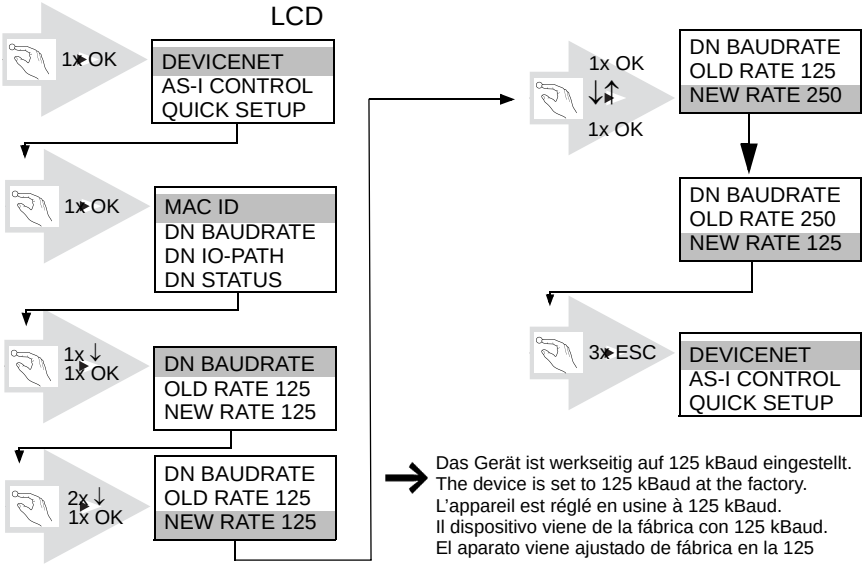
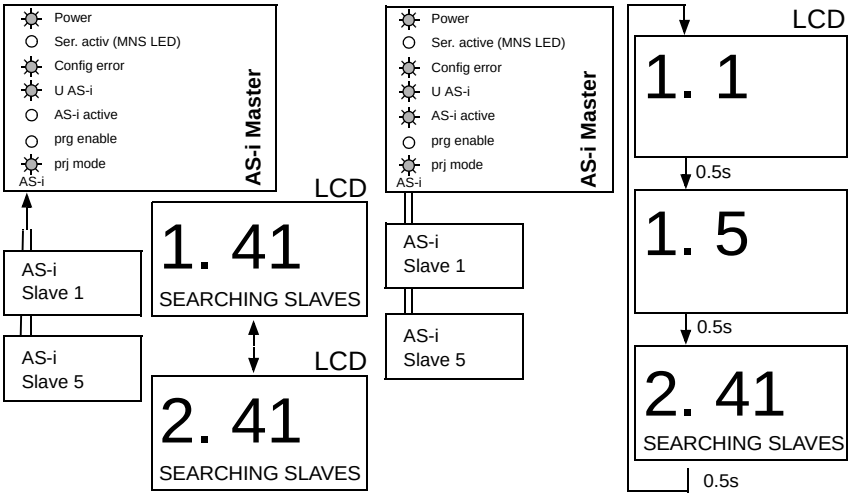
12.2.3.3 Setting the Baud Rate



12.2.4 Connecting AS-i Slaves



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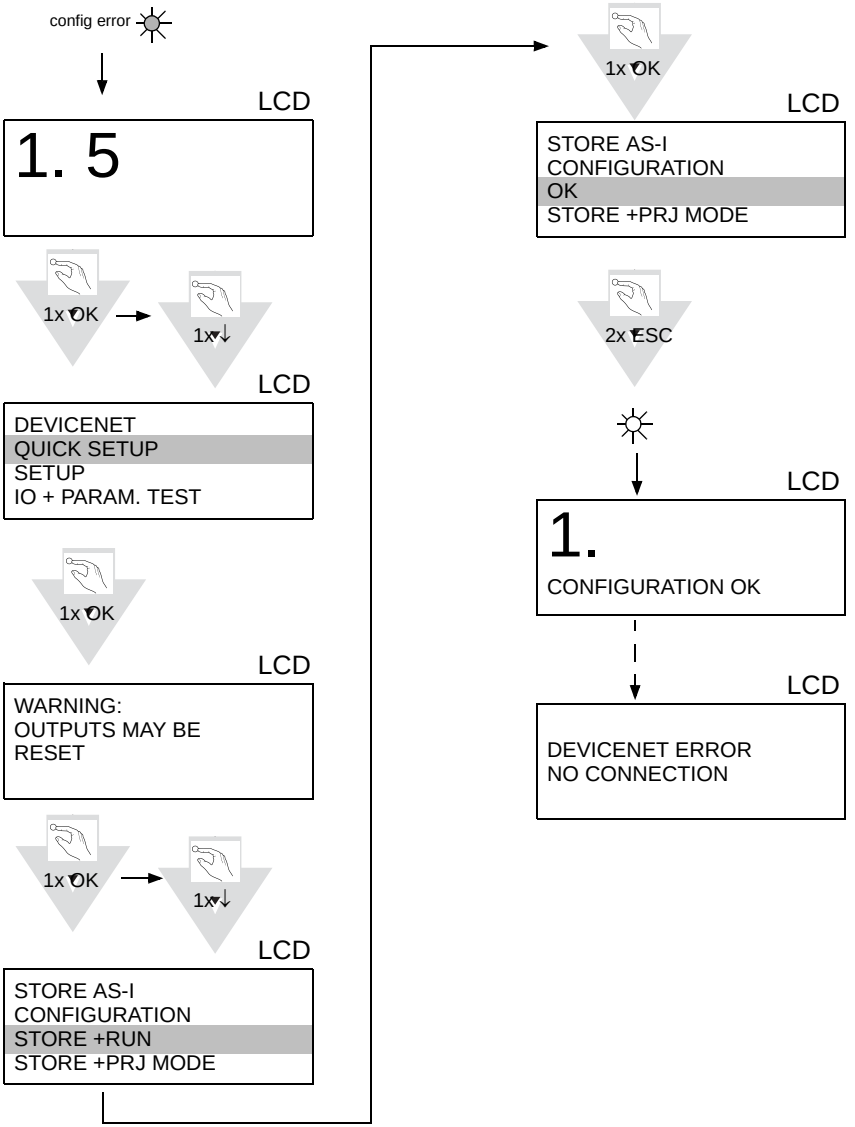
12.2.5 Quick Setup



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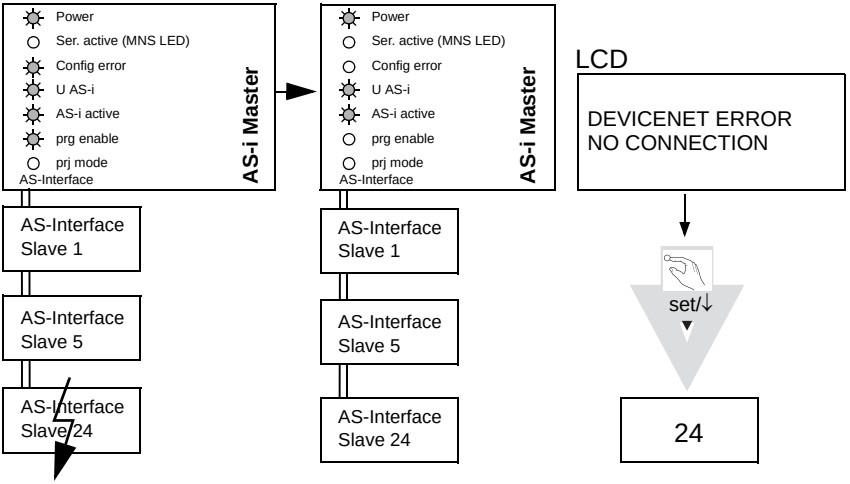
12.2.6 Error tracing

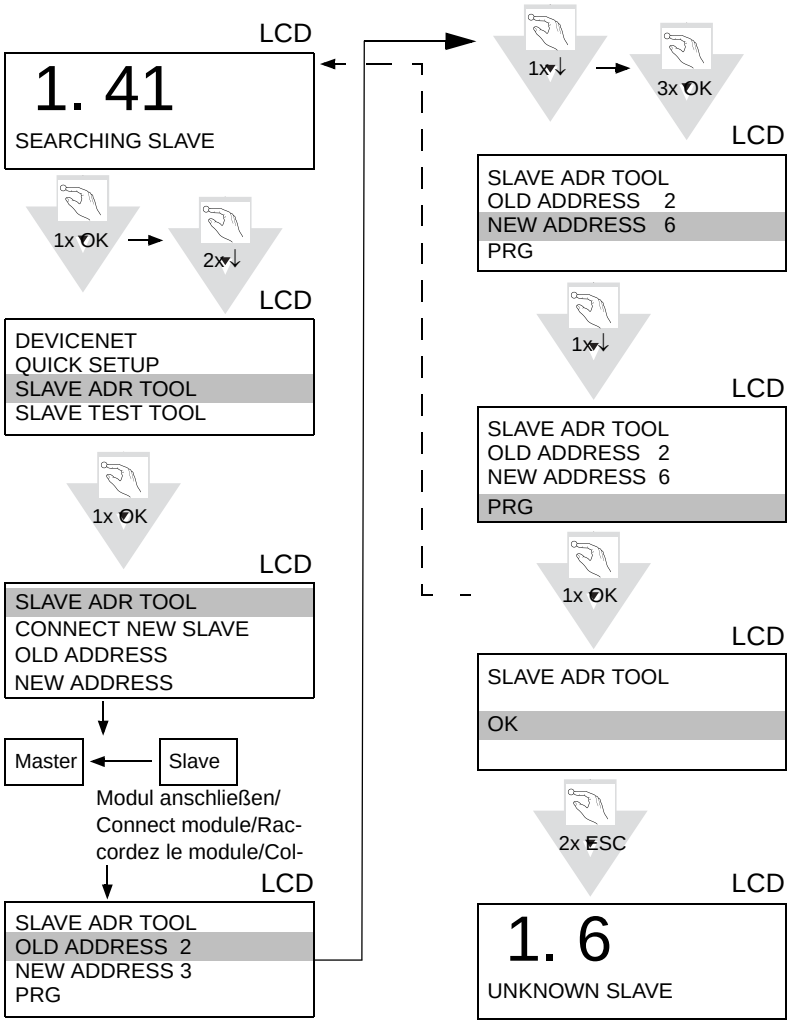
12.2.6.4 Faulty slaves

12.2.6.5 Error display (last error)



12.2.7 Addressing

12.2.7.6 Programming slave 2 to address 6



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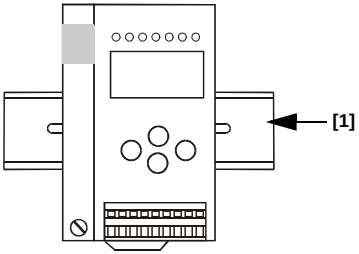
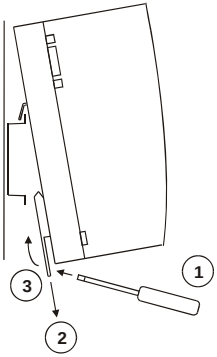
12.2.8 Montage





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

12.2.9 Accessories

- DeviceNet-Mastersimulator / DeviceNet-Master Simulator / Simulateur maître DeviceNet / Simulatore master DeviceNet / DeviceNet-Simulador principal.
- Kabel für AS-i-CAN-Gateways / Cable for AS-i Gateways with CAN interface / Câble pour passerelle AS-i/CAN / Cavo per gateway AS-i / CAN / cable para AS-i CAN interfaz.
- AS-i Netzteil 4 A/ AS-i Power Supply 4 A / Alimentation AS-i 4 A / Alimentazione AS-i 4 A / Fuente de poder AS-i 4 A.

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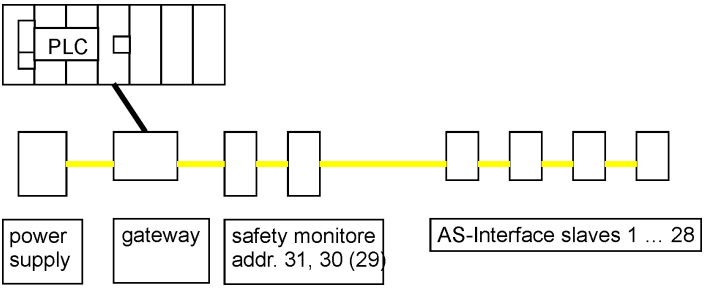
13 Appendix: integration into Rockwell PLC

This chapter shows exemplarily the integration of an AS-i/DeviceNet Gateway into a Rockwell PLC.

The example exists out of a Rockwell PLC, a SDN 1756 card as DeviceNet scanner and an AS-i 3.0 DeviceNet Gateway with a connected AS-i circuit as well as the software package „RSNetWorx for DeviceNet“.



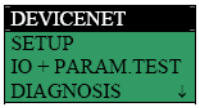
Configuration example (scheme)

For integration of the gateway into a Rockwell PLC it is necessary first to configurate the AS-i 3.0 DeviceNet gateway (adjusting the node address and the DeviceNet baudrate). After this configuration the gateway can be integrated into the PLC.

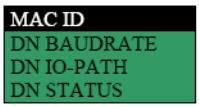
13.1 Configuration of the AS-i DeviceNet Gateway

13.1.1 Adjusting the Node Adress in the DeviceNet Circuit

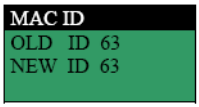
- Connect the gateway to AS-i power supply.
- Connect the ASi-network cable(s) to the gateway, switch on AS-i power supply.
- Call the configuration menu of the gateway by pressing the "OK" button.



- Press the "OK" button.



- Press the "OK" button.



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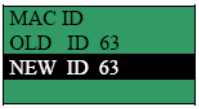
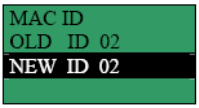
- Change to line "NEW ID" by pressing the button "set/⇓" twice.



- Press the "OK" button.
- Change the first digit by pressing the buttons "set/⇓" or "mode/⇑".
- Press the "OK" button.
- Change the second digit by pressing the buttons "set/⇓" or "mode/⇑".
- Press the "OK" button.



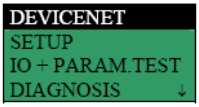
(example)

- To leave the configuration menu, press three times the "ESC" button.

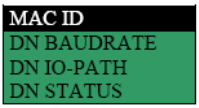
Now the gateway works with a new ID.

13.1.2 Adjusting the DeviceNet Baudrate

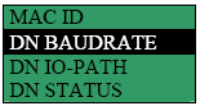
- Call the configuration menu of the gateway by pressing the "OK" button.



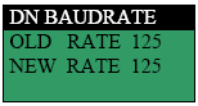
- Press the "OK" button.



- Change to line "DN BAUDRATE" by pressing the button "set/⇓".



- Press the "OK" button.



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- Change to line "NEW RATE" by pressing the button "set/⇓" twotimes.

- Press the "OK" button.
- Change the baudrate by pressing the buttons "set/⇓" or "mode/⇑".
- To acknowledge your choice, press the "OK" button.

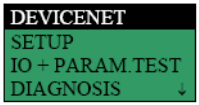
(example)

- To leave the configuration menu, press three times the "ESC" button.

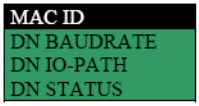
Now the gateway works with a new baudrate.

13.1.3 Adjusting the DeviceNet I/O Path

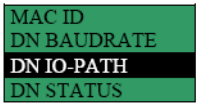
- Call the configuration menu of the gateway by pressing the "OK" button.



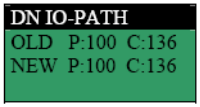
- Press the "OK" button.



- Change to line "DN IO-PATH" by pressing the button "set/⇓" twice.



- Press the "OK"-button.



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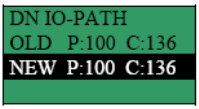
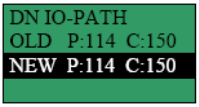
- Change to line "NEW" by pressing the button "set/⇓" twice.



- Press the "OK" button.
- Change the instance ID (P) by pressing the buttons "set/⇓" or "mode/⇑".
- To acknowledge your choice, press the "OK" button.
- Change the complementary ID (C) by pressing the buttons "set/⇓" or "mode/⇑".
- To acknowledge your choice, press the "OK" button.



(example)

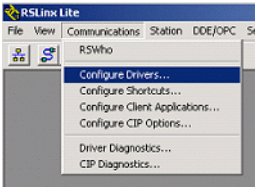
- To leave the configuration menu, press three times the "ESC" button.

Now the gateway works with a new I/O path.

13.2 Configuring the AS-i Gateway in the DeviceNet Scanner

13.2.1 Configuring the AS-i Gateway in the DeviceNet Scanner by using RSLinx

- Open RSLinx.



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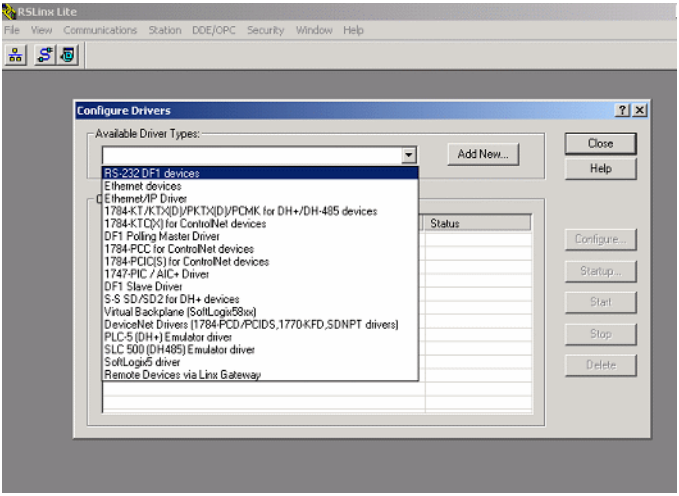
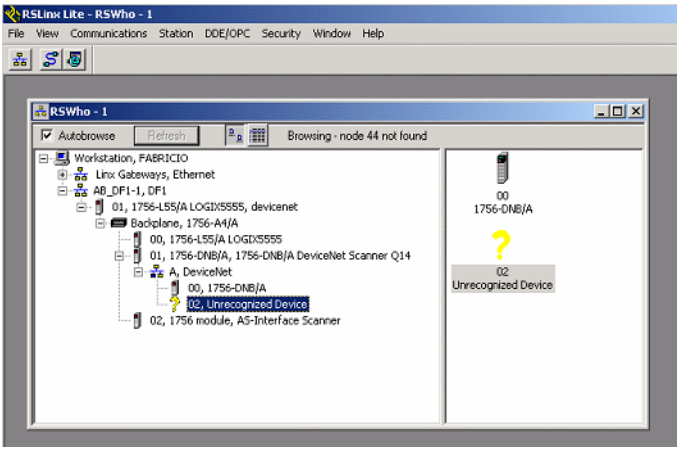
- → "Communications" → "Configure Drivers …".



- Select the driver you need and click on "Add New …".
- Configure the driver.



- Check in "RS-Who", whether your driver is configured or not.
  (If you find an unrecognized device, you have not integrated the EDS file. You can download the EDS file from the homepage of Bihl+Wiedemann - http://www.bihl-wiedemann.de → "Download Area"→ "GSD and EDS Files"
  a) EDS file for AS-i/DeviceNet Gateway with graphic display (single master), specification 2.1"
  b) EDS file for AS-i/DeviceNet Gateway with graphic display (double master), specification 2.1"
  How to integrate the EDS file is shown in the next steps.)

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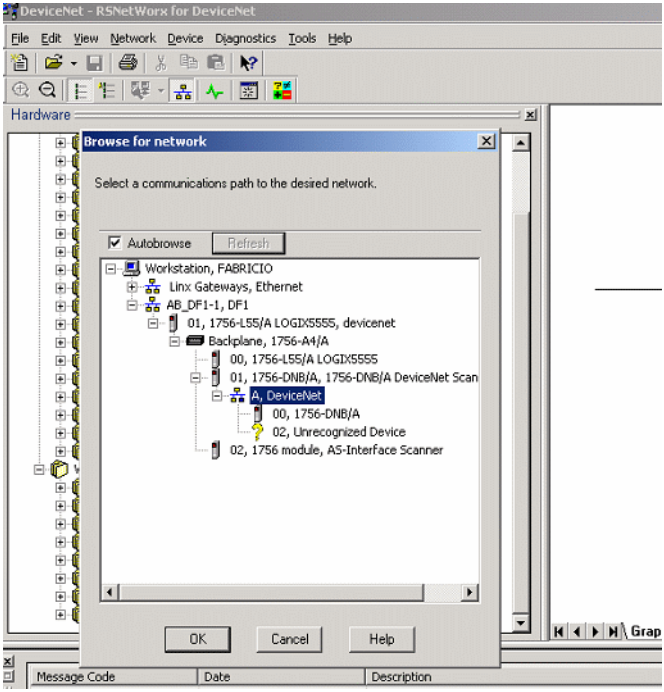
13.2.2 Configuring the AS-i Gateway in the DeviceNet Scanner by using RSNetWorx

- Open RSNetWorx.
- Press F10.



- Select your DeviceNet path and click on "OK".

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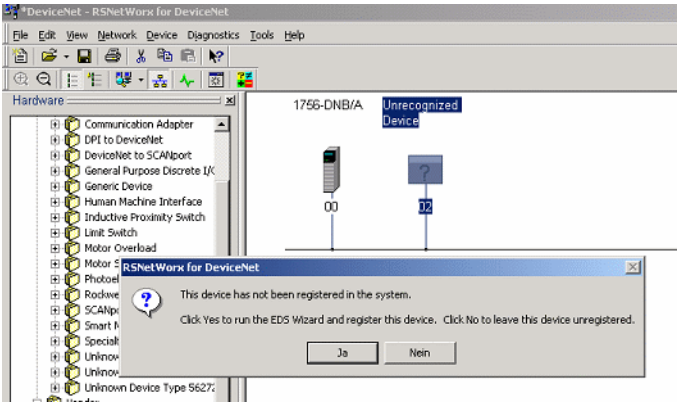
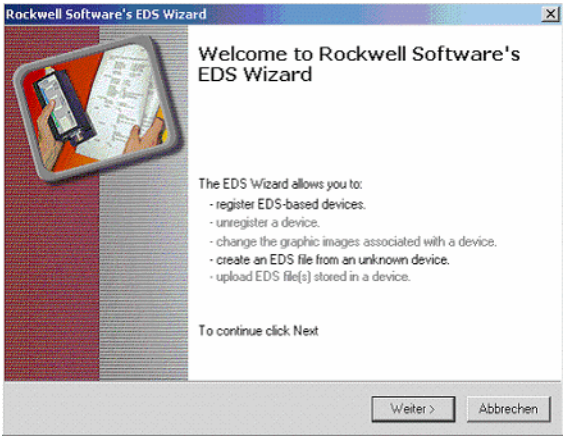
13.2.2.1 Configuring the EDS File



- Double-click on the "Unrecognized Device" and click "Yes" on the opening window.



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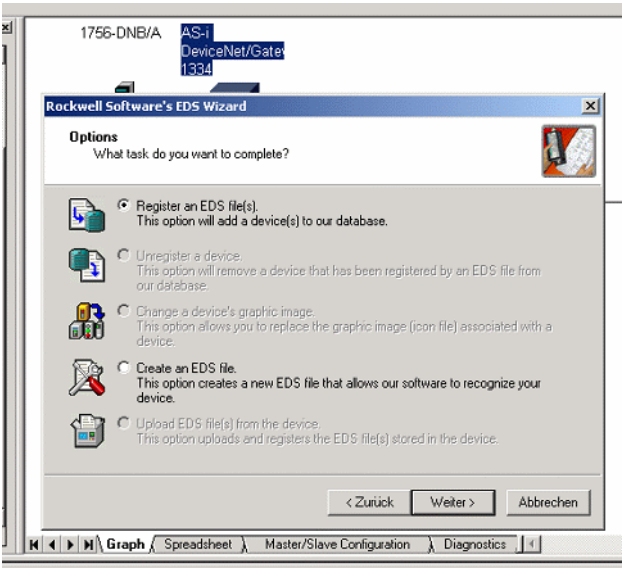
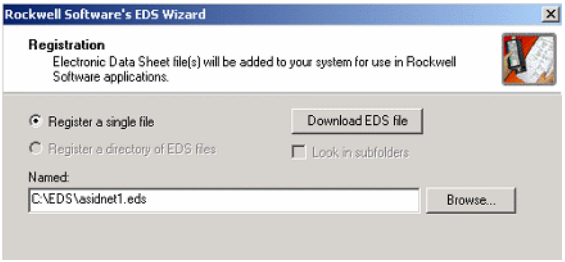
- Click "Next".

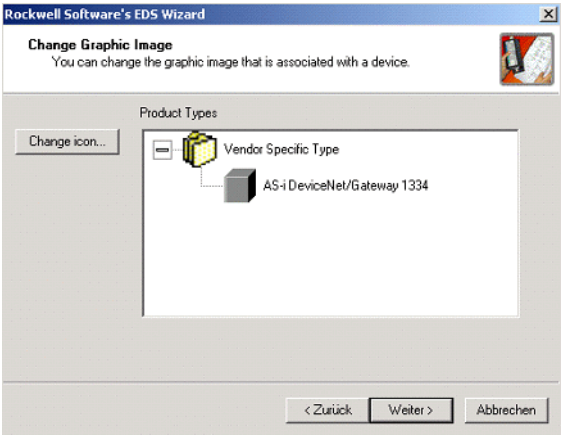


- Click "Register an EDS file(s)".
- Click "Next".

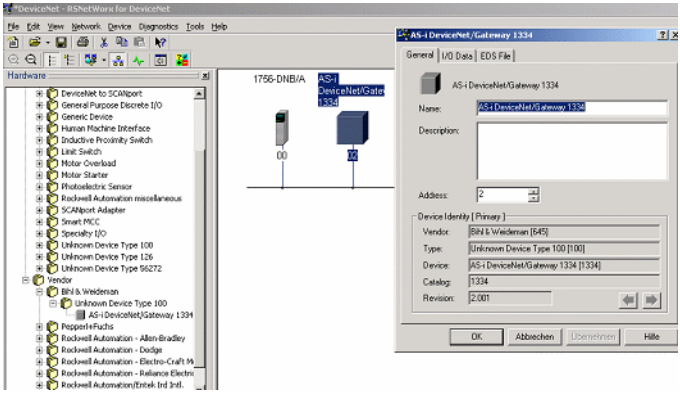


- Click on "Browse …" and choose the folder, where you have stored the EDS file.
- Click "Next".

- Ignore the warning and click "Next".



- Click twice "Next" and then "Finish".



(Now your gateway is detected, if you double-click on the device, you can check information).

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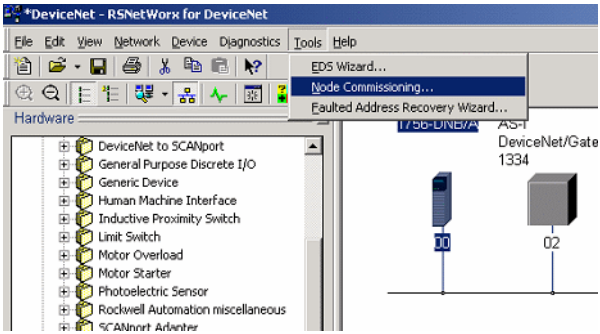
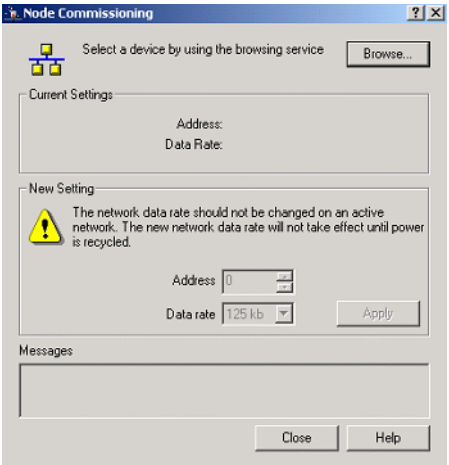
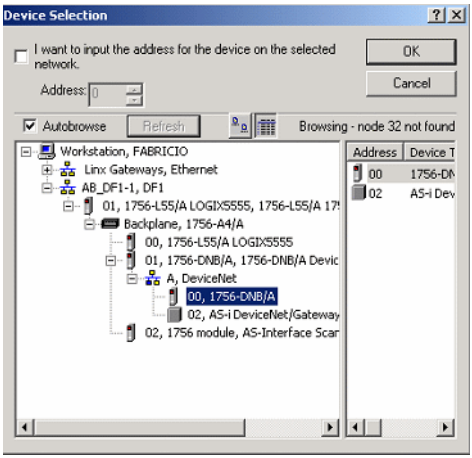
13.2.2.2 Configuring the Node Address and the Data Rate



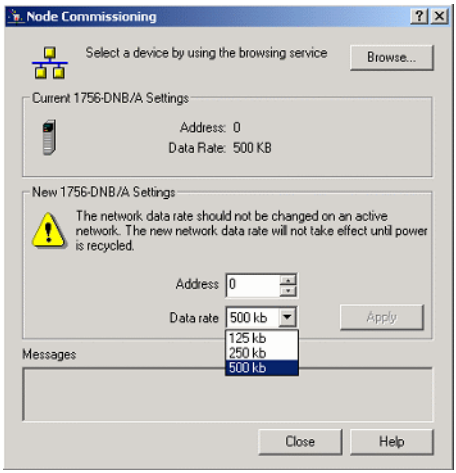
- Click on → "Tools"→ "Node Commissioning ...".



- Click on "Browse …".



- Double-Click on your scanner-icon.



(Now you can change your address and data rate. Remember that the data rate of the DeviceNet scanner has to be the same as the baudrate of the AS-i scanner.).

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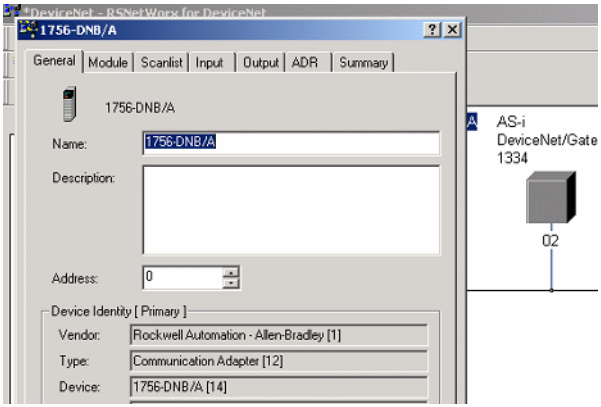
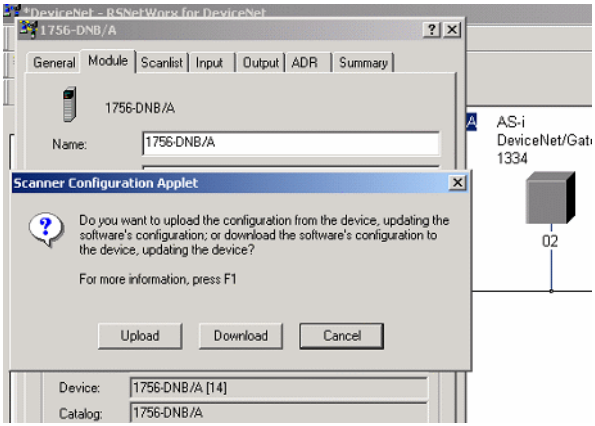
13.2.2.3 Configuring the Scanlist

- Double-click on your DeviceNet scanner.



- Click on "Module".



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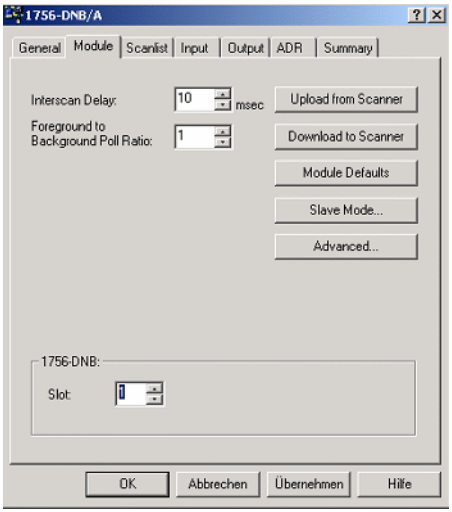
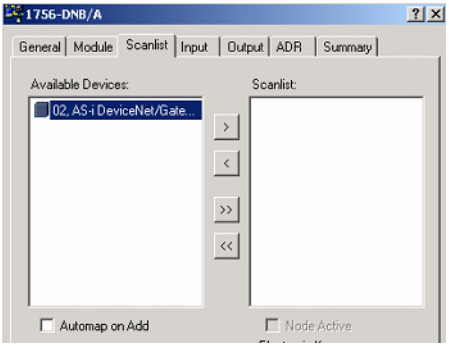
- Click on "Upload".



- Check the 1756-DNB slot number.
- Click on "Scanlist".



- Uncheck "Automap on Add".

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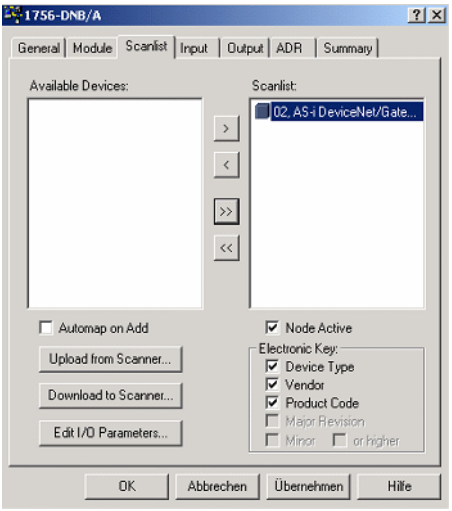
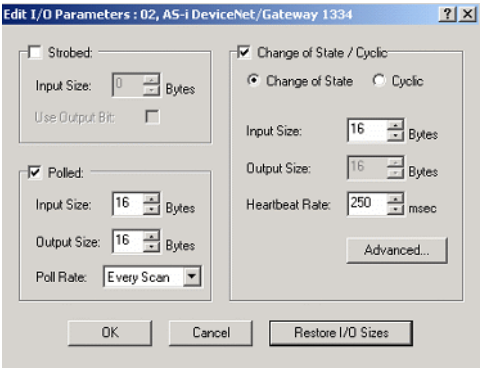
- Click the double-arrow.



- Click on "Edit I/O Parameters …".



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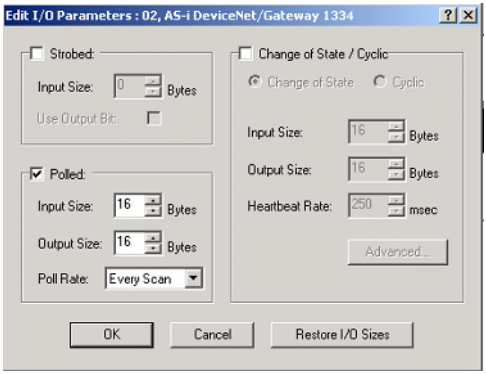
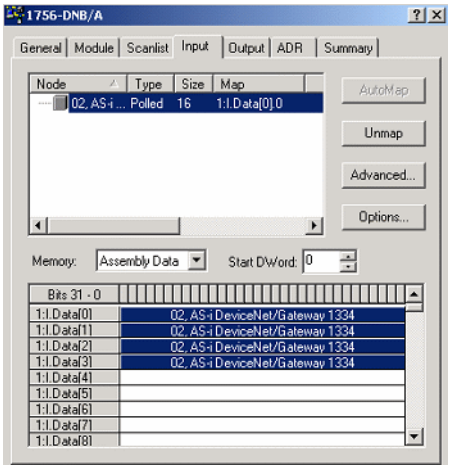
- Uncheck "Change of State / Cyclic".



- Click "OK".



- Click on "Input".
- Check, where your input data is mapped.
- Click on "Output".
- Check, where your output data is mapped.
- Click "Apply".
- Download your changes.

Now your AS-i gateway is configured.

Issue date - 1.1.2008

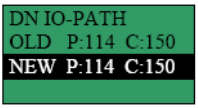
13.3 Configuring the I/O Path

If you like more I/O data mapped in the plc controller tags, you have to configure the AS-i gateway.

For example:

You like map the data of all binary AS-i slaves, the 16-bit data of slaves 29 … 31 and the data of the long mailbox.

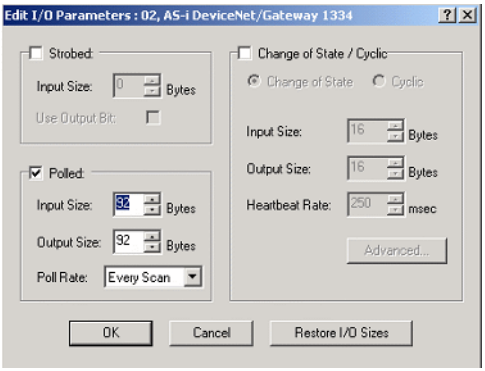
Choose the "Instance ID" 114 and the "Complementary ID" 150.



(See chapter 13.1.3 of this documentation)

Adjust the input and output size by RSNetWorx.

("Input Size: 92 Bytes"; "Output Size: 92 Bytes").



(See chapter 13.2.2.3 of this documentation)

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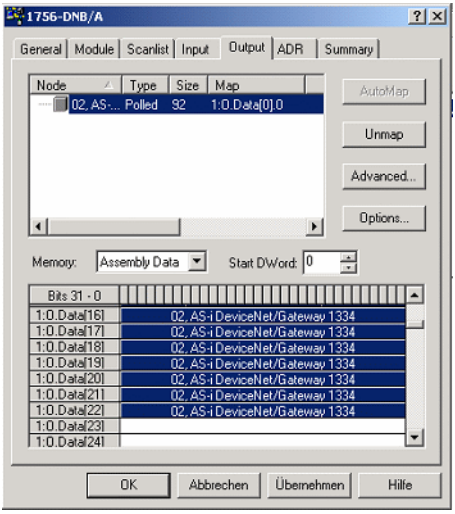
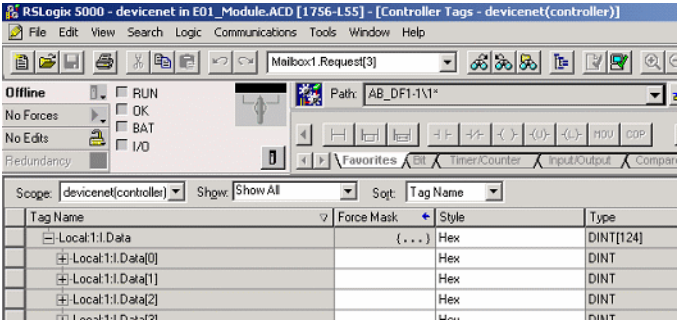
Check where your I/O data is mapped by RSNetWorx.



(See chapter 13.2.2.3 of this documentation.)

In our case the data is mapped in the controller tags of RS Logix 5000:

Local:1:I.Data[0] ... Local:1:I.Data[22]
Local:1:O.Data[0] ... Local:1:O.Data[22]



...

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Here for our example three tables, which shows you the meaning of the data.

	Digital AS-i Slaves					
	Tag	Bit No.	AS-i address	Tag	Bit No.	AS-i address
ControlLogix ControlTags	A slaves: 1:I.Data(0) B slaves: 1:I.Data(4)	0-3	1	A slaves: 1:I.Data(0) B slaves: 1:I.Data(4)	0-3	1
		4	ConfigError		4	flags
		5	APF		5	LOS-m-b
		6	Pery.Fault		6	Conf.Mode
		7	Conf.Active		7	Prot.Mode
		8-11	3		8-11	3
		12-15	2		12-15	2
		16-19	5		16-19	5
		20-23	4		20-23	4
		24-27	7		24-27	7
		28-31	6		28-31	6
	A slaves: 1:I.Data(1) B slaves: 1:I.Data(5)	0-3	9	A slaves: 1:I.Data(1) B slaves: 1:I.Data(5)	0-3	9
		4-7	8		4-7	8
		8-11	11		8-11	11
		12-15	10		12-15	10
		16-19	13		16-19	13
		20-23	12		20-23	12
		24-27	15		24-27	15
		28-31	14		28-31	14
	A slaves: 1:I.Data(2) B slaves: 1:I.Data(6)	0-3	17	A slaves: 1:I.Data(2) B slaves: 1:I.Data(6)	0-3	17
		4-7	16		4-7	16
		8-11	19		8-11	19
		12-15	18		12-15	18
		16-19	21		16-19	21
		20-23	20		20-23	20
		24-27	23		24-27	23
		28-31	22		28-31	22
	A slaves: 1:I.Data(3) B slaves: 1:I.Data(7)	0-3	25	A slaves: 1:I.Data(3) B slaves: 1:I.Data(7)	0-3	25
		4-7	24		4-7	24
		8-11	27		8-11	27
		12-15	26		12-15	26
		16-19	29		16-19	29
		20-23	28		20-23	28
		24-27	31		24-27	31
		28-31	30		28-31	30

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	16-Bit AS-i Slaves					
	Tag	Bit No.	AS-i addess	Tag	Bit No.	AS-i adress
ControlLogix ControlTags	1:I.Data(8)	0-7	31 ch1 LB	1:O.Data(8)	0-7	31 ch1 LB
		8-15	31 ch1 HB		8-15	31 ch1 HB
		16-23	31 ch2 LB		16-23	31 ch2 LB
		24-31	31 ch2 HB		24-31	31 ch2 HB
	1:I.Data(9)	0-7	31 ch3 LB	1:O.Data(9)	0-7	31 ch3 LB
		8-15	31 ch3 HB		8-15	31 ch3 HB
		16-23	31 ch4 LB		16-23	31 ch4 LB
		24-31	31 ch4 HB		24-31	31 ch4 HB
	1:I.Data(10)	0-7	30 ch1 LB	1:O.Data(10)	0-7	30 ch1 LB
		8-15	30 ch1 HB		8-15	30 ch1 HB
		16-23	30 ch2 LB		16-23	30 ch2 LB
		24-31	30 ch2 HB		24-31	30 ch2 HB
	1:I.Data(11)	0-7	30 ch3 LB	1:O.Data(11)	0-7	30 ch3 LB
		8-15	30 ch3 HB		8-15	30 ch3 HB
		16-23	30 ch4 LB		16-23	30 ch4 LB
		24-31	30 ch4 HB		24-31	30 ch4 HB
	1:I.Data(12)	0-7	29 ch1 LB	1:O.Data(12)	0-7	29 ch1 LB
		8-15	29 ch1 HB		8-15	29 ch1 HB
		16-23	29 ch2 LB		16-23	29 ch2 LB
		24-31	29 ch2 HB		24-31	29 ch2 HB
	1:I.Data(13)	0-7	29 ch3 LB	1:O.Data(13)	0-7	29 ch3 LB
		8-15	29 ch3 HB		8-15	29 ch3 HB
		16-23	29 ch4 LB		16-23	29 ch4 LB
		24-31	29 ch4 HB		24-31	29 ch4 HB

LB = low byte; HB = high byte

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	Mailbox					
	Tag	Bit No.	Response	Tag	Bit No.	Request
Control Logix Controller Tags	1:I.Data(14)	0-7	command	1:O.Data(14)	0-7	command
		8-14	circuit		8-13	circuit
					14	-
		15	toggle bit		15	toggle bit
		16-23	resp.byte1		16-23	req.byte1
		24-31	resp.byte2		24-31	req.byte2
	1:I.Data(15)	0-7	resp.byte3	1:O.Data(15)	0-7	req.byte3
		8-15	resp.byte4		8-15	req.byte4
		16-23	resp.byte5		16-23	req.byte5
		24-31	resp.byte6		24-31	req.byte6
	1:I.Data(16)	0-7	resp.byte7	1:O.Data(16)	0-7	req.byte7
		8-15	resp.byte8		8-15	req.byte8
		16-23	resp.byte9		16-23	req.byte9
		24-31	resp.byte10		24-31	req.byte10
	1:I.Data(17)	0-7	resp.byte11	1:O.Data(17)	0-7	req.byte11
		8-15	resp.byte12		8-15	req.byte12
		16-23	resp.byte13		16-23	req.byte13
		24-31	resp.byte14		24-31	req.byte14
	1:I.Data(18)	0-7	resp.byte15	1:O.Data(18)	0-7	req.byte15
		8-15	resp.byte16		8-15	req.byte16
		16-23	resp.byte17		16-23	req.byte17
		24-31	resp.byte18		24-31	req.byte18
	1:I.Data(19)	0-7	resp.byte19	1:O.Data(19)	0-7	req.byte19
		8-15	resp.byte20		8-15	req.byte20
		16-23	resp.byte21		16-23	req.byte21
		24-31	resp.byte22		24-31	req.byte22
	1:I.Data(20)	0-7	resp.byte23	1:O.Data(20)	0-7	req.byte23
		8-15	resp.byte24		8-15	req.byte24
		16-23	resp.byte25		16-23	req.byte25
		24-31	resp.byte26		24-31	req.byte26
	1:I.Data(21)	0-7	resp.byte27	1:O.Data(21)	0-7	req.byte27
		8-15	resp.byte28		8-15	req.byte28
		16-23	resp.byte29		16-23	req.byte29
		24-31	resp.byte30		24-31	req.byte30
	1:I.Data(22)	0-7	resp.byte31	1:O.Data(22)	0-7	req.byte31
		8-15	resp.byte32		8-15	req.byte32
		16-23	resp.byte33		16-23	req.byte33
		24-31	resp.byte34		24-31	req.byte34

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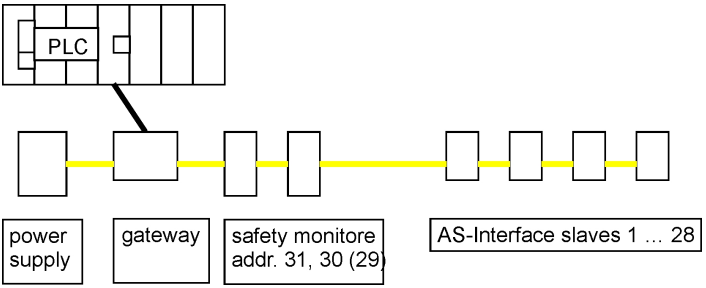
14 Appendix: integration into Rockwell PLC PLC5

This chapter shows exemplarily the integration of an AS-i/DeviceNet gateway into a Rockwell PLC PLC5.

The example exists out of a Rockwell PLC PLC5, a SDN 1771 card as DeviceNet scanner and an AS-i 3.0 DeviceNet Gateway with connected AS-i cicuit as well as the software package „RSNetWorx for DeviceNet“.



Configuration example (scheme)

For integration of the gateway into a Rockwell PLC PLC5 it is necessary first to configurate the AS-i 3.0 DeviceNet gateway (adjusting the node address and the DeviceNet baudrate). After this configuration the gateway can be integrated into the PLC.

14.1 Configuration of the AS-i 3.0 DeviceNet Gateway

14.1.1 Adjusting the Node Address in the DeviceNet Circuit

1. Connect the gateway to power supply (24 V DC).
2. connect the AS-i network cable(s) to the gateway, switch on AS-i power supply.
3. Call the configuration "mode/diagnostics" menu at the gateway by pressing the "OK"-button.
4. Highlight the line "DeviceNet" by pressing "mode/⇑" and select with the "OK" button. Now select "MAC ID" and confirm with the "OK" button.
5. At the display is now to be seen: "MAC ID", "OLD ID" and "NEW ID", showing the actual node address in the DeviceNet network.
6. Change to line "NEW ID" by pressing the button "set/⇓".
7. Go to edit mode by pressing "OK".
8. Now the flashing tenfold number of the node address can be changed by pressing the buttons "mode/⇑" and "set/⇓". After confirming by the "OK" button you can adjust the flashing lower number of the address.
9. Once the node adress is correctly, save it as the actual by pressing the "OK"-button.
10. Leave the menu by pressing "ESC“.

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Now the DeviceNet address is adjusted and stored in the gateway.

14.1.2 Adjusting the DeviceNet Baudrate

1. Go to menu "DeviceNet".
2. Go to mark "DN BAUDRATE" by pressing "set/⇓", confirm with "OK".
3. Now the display shows the actual DeviceNet baudrate (i. e. 125, 250 or 500).
4. Change to the line "NEW RATE" by pressing "set/⇓" and go to edit mode by pressing "OK".
5. Select the wanted baudrate by "⇑⇓" and acknowledge with "OK".
6. Leave the menu "configuration/diagnostics" by three times pressing "ESC".

Now the gateway changes the operation mode to run mode.

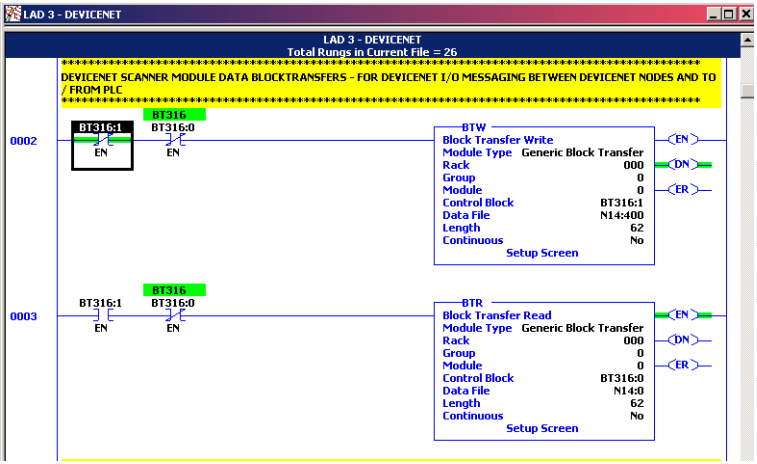
14.2 Communication of the Gateway to the PLC

The data exchange with the PLC mostly is done in polling mode. Here are transmitted even 32 bytes of input- and output data.

The gateway has to be configured in the DeviceNet scanner. If using a PLC 5 controller, this means a SDN 1771 DeviceNet scanner module. For getting the communication between the controller and the DeviceNet scanner established, you have to program blocktransfer operations in the controllers logic.

By the length of the blocktransfers they are defined as DeviceNet I/O polling messages.

The scanner interpretes blocktransfers with a length of 62, 61, ... 57 words as "I/O message polling" transfers automatically. A 64 word long transfer, however, is used for "explicit messaging I/O" functionality, which is usually not needed:



Blocktransfers write/read in the PLC program

In the example a 62 word blocktransfer is used to transfer AS-i data via the gateway to the controller and vice versa. The configuration of the data transfer has to be done in the RSNetworx for DeviceNet software as follows:

- Import the EDS file of the gateway in "RSNetworx for DeviceNet"
- Implement the SDN 1771 and the gateway into the *.dnt file
- Open the scanlist of the SDN 1771 scanner module and add the gateway to the scanlist
- Verify the I/O mapping of the gateway in the SDN 1771 module:
  - Confirm the gateway as polled I/O with 16 bytes RX and 16 bytes TX
  - Select the datatable in the 62 word blocktransfer (example: starting at word 0)

In the example the datatable for the 62 word blocktransfer is set as follows:

BTR to N14:0	Inputs (data from AS-i)
BTW to N14:400	Outputs (data from AS-i)

The data table for both blocktransfers begins at the address 0. This word 0 generally is used for internal purposes, and so the AS-i data are to be found starting at word 1. The gateway uses in each case 17 bytes for read and write data, which are structured as follows:

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	Read (Inputs from AS-i Slaves)			Write (Outputs to AS-i Slaves)		
	Word	Bit No.	AS-i Addrese	Word	Bit No.	AS-i Address
PLC data table	N14:1	0 - 7	not used	N14:401	0 - 7	not used
		8 - 11	1		8 - 11	1
		12 - 15	0		12 - 15	0
	N14:2	0 - 3	3	N14:402	16 - 19	3
		4 - 7	2		20 - 23	2
		8 - 11	5		24 - 27	5
		12 - 15	4		28 - 31	4
	N14:3	0 - 3	7	N14:403	0 - 3	7
		4 - 7	6		4 - 7	6
		8 - 11	9		8 - 11	9
		12 - 15	8		12 - 15	8
	N14:4	0 - 3	11	N14:404	16 - 19	11
		4 - 7	10		20 - 23	10
		8 - 11	13		24 - 27	13
		12 - 15	12		28 - 31	12
	N14:5	0 - 3	15	N14:405	0 - 3	15
		4 - 7	14		4 - 7	14
		8 - 11	17		8 - 11	17
		12 - 15	16		12 - 15	16
	N14:6	0 - 3	19	N14:406	16 - 19	19
		4 - 7	18		20 - 23	18
		8 - 11	21		24 - 27	21
		12 - 15	20		28 - 31	20
	N14:7	0 - 3	23	N14:407	0 - 3	23
		4 - 7	22		4 - 7	22
		8 - 11	25		8 - 11	25
		12 - 15	24		12 - 15	24
	N14:8	0 - 3	27	N14:408	16 - 19	27
		4 - 7	26		20 - 23	26
		8 - 11	29		24 - 27	29
		12 - 15	28		28 - 31	28
	N14:9	0 - 3	31	N14:409	0 - 3	31
		4 - 7	30		4 - 7	30

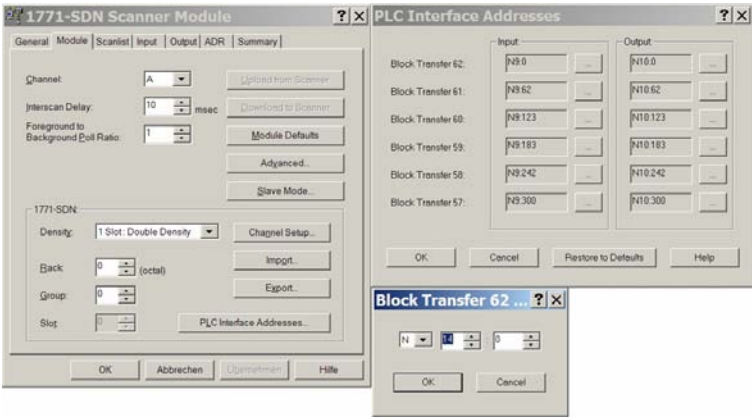
14.3 Configuring the AS-i Gateway in the DeviceNet Scanner

Import the EDS file of the AS-i gateway in "RSNetWorx for DeviceNet". In the menu "Hardware" choose "Bihl & Wiedeman - Communication Adapter" and add the device to the DeviceNet structure.

The gateway now can be adressed and configured: right click or double-click on it to open the menu "Properties".

Using the "Module" folder the address ranges for the data communication can be defined. Therefore the density, placement in the rack and data channel are verified

and at least the interface adresses for input and output data blocktransfers are determined. In generally they are predefined to start at N9:0.



Configure data exchange presets and interface addresses

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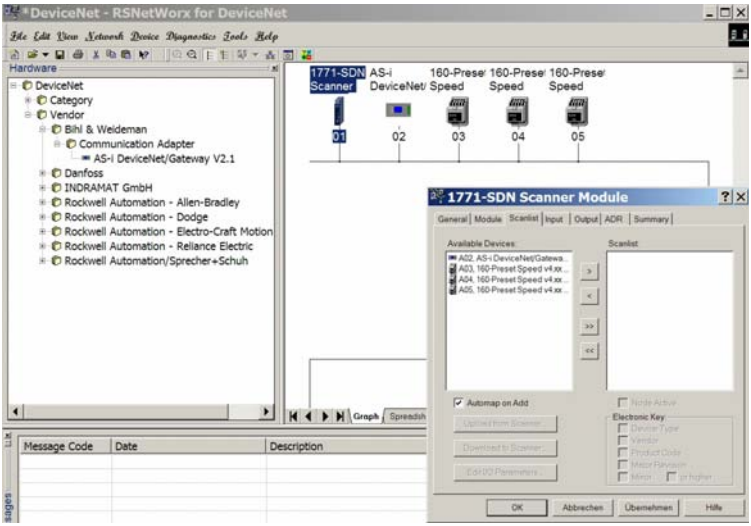
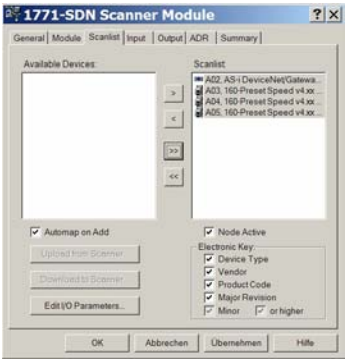
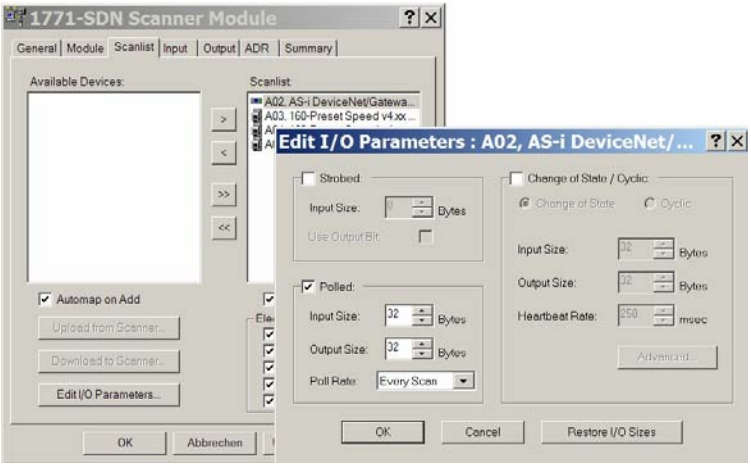
In the folder "Scanlist" the gateway is now selected in the available devices table and added by clicking ">" and "apply" into the module´s scanlist. The field "Automap on Add" should be activated at this time:





Insert gateway into the scanlist of the DeviceNet module

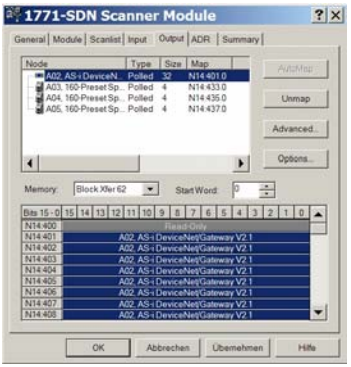
The folder "Edit I/O Parameters" allows defining the method of data exchange: polled, change of state or strobed. Usually "polled" is choosen, and change of state is deactivated:



Defining data exchange

The adress range for input and output data were automatically reserved by adding the gateway to the scanner module´s scanlist with activated "Automap" function. The range is to be found in the folders "Input" respective "Output". If needed, they can be adjusted:

Folder "Input"



Folder "Output"

Finally, save the DeviceNet structure in RSNetworx for DeviceNet and download it to the network.

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15 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).

Autoprog 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 Adress 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.

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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 exeptional 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:

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⇒ *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 proteced 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".

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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 (⇒ *slave profile*). If the permanent configuration differs from the ⇒ *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 ⇒ *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 ⇒ *protected mode*.

Single slave

Compared to an ⇒ *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:

⇒ *IO code*, ⇒ *ID code*, ⇒ *extended ID1 code*, ⇒ *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.

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16 Related Documents

16.1 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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