ibaBM-DP

PROFIBUS bus monitor

Manual

Issue 2.2

Measurement Systems for Industry and Energy

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2.2	02-2026	Notes on webinterface access using Windows 11	st	v01.05.002

Certification

The product is certified according to the European standards and directives. This product meets the general safety and health requirements.

Other international and national standards were observed.

Contents

1 About this documentation

This documentation describes the construction, the use and the operation of the device *ibaBM-DP*.

1.1 Target group and previous knowledge

This documentation is aimed at qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her specialist training, knowledge and experience and knowledge of the standard regulations.

This documentation in particular addresses persons who are concerned with the configuration, test, commissioning or maintenance of Programmable Logic Controllers of the supported products. For the handling *ibaBM-DP* the following basic knowledge is required and/or useful:

- Windows operating system
- Basic knowledge of *ibaPDA*
- Knowledge of configuration and operation of the relevant measuring device/system

1.2 Notations

In this manual, the following notations are used:

Action	Notation
Menu command	Menu *Logic diagram*
Calling the menu command	*Step 1 – Step 2 – Step 3 – Step x* Example: Select the menu *Logic diagram – Add – New function block*.
Keys	<Key name> Example: <Alt>; <F1>
Press the keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Key name> Example: <OK>; <Cancel>
Filenames, paths	`Filename`, `Path` Example: `Test.docx`

1.3 Used symbols

If safety instructions or other notes are used in this manual, they mean:

Danger!

The non-observance of this safety information may result in an imminent risk of death or severe injury!

Observe the specified measures.

Warning!

The non-observance of this safety information may result in a potential risk of death or severe injury!

Observe the specified measures.

Caution!

The non-observance of this safety information may result in a potential risk of injury or material damage!

Observe the specified measures.

Note

A note specifies special requirements or actions to be observed.

Tip

Tip or example as a helpful note or insider tip to make the work a little bit easier.

Other documentation

Reference to additional documentation or further reading.

2 Introduction

The *ibaBM-DP* bus monitor is used for the cyclical data acquisition in PROFIBUS DP networks via the acquisition software *ibaPDA*. The device can be connected to two separate PROFIBUS networks independently through two PROFIBUS connections. Transmission rates up to 12 Mbit/s are supported by the device and are automatically detected. Using the sniffer function of *ibaBM-DP*, the cyclical data traffic on PROFIBUS (acc. to DP-V0) can be monitored and acquired. Internal slaves can be activated in parallel on the device and can have data written on them directly from the master.

On the optical-fiber side, *ibaBM-DP* works with the *ibaNet* protocol 32Mbit Flex by default. Thus, measurement and configuration data are transferred via a bidirectional fiber optic connection. Therefore, a fibre optics card *ibaFOB-D* is required at the *ibaPDA* side. The sampling rate and the data formats can be configured flexibly. Up to 4060 bytes max. can be transmitted with a cycle time of 1.4 ms. The amount of data falls with faster sampling rates. Data output from *ibaPDA* via *ibaBM-DP* slaves is also possible with 32Mbit Flex.

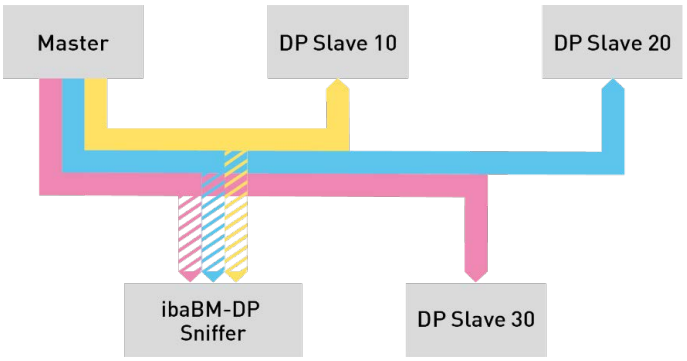
The device offers moreover modes of compatibility for the *ibaNet* protocols 32Mbit and 3Mbit. This makes it possible to exchange the previous devices *ibaBM-DPM-S* and *ibaBM-DPM-S-64* without changing the configuration in *ibaPDA*. The compatibility modes can also be used with previous fibre optics cards.

For special applications, additional operating modes such as redundancy mode, simulation mode, mirror mode, mapping mode and P2P mode are available. Additional licenses are required for redundancy mode, simulation mode, mirror mode and mapping mode.

Sniffer function

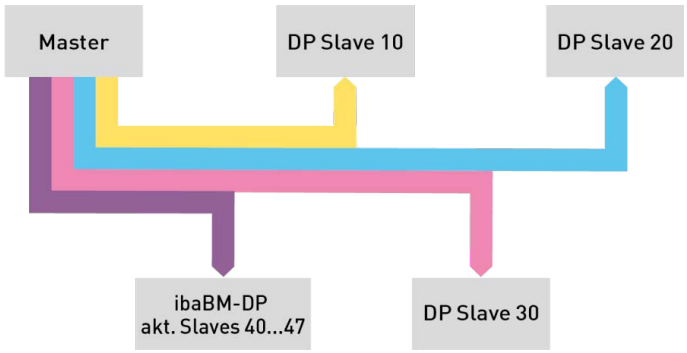
Due to the sniffer function, *ibaBM-DP* can read all data sent on PROFIBUS DP (cyclical data exchange according to DP-V0). The device only needs to be connected to the PROFIBUS. The device does not need to be configured as a PROFIBUS slave in order to use the sniffer function.

The acquisition of slave-to-slave communication (DP-V2) is not supported.



Active slave

Up to 8 slaves (extension to 16 slaves is possible with additional license) can be activated on the *ibaBM-DP* bus monitor. The maximum output data range of each slave is 244 bytes, which can be written by the master. Active slaves have to be configured by means of the provided GSD file. The active slaves can be distributed to both PROFIBUS connections. The sniffer function and the active slaves can be used simultaneously.



Redundancy mode

With the redundancy mode option, *ibaBM-DP* can read and acquire data on redundant PROFIBUS lines on S7-400H control systems, both as sniffer and as active slave. *ibaBM-DP* monitors the telegram traffic on both PROFIBUS lines and dynamically detects, over which line valid data are currently being sent that are recorded with *ibaPDA*. This procedure offers the advantage that data do not need to be acquired twice.

ibaBM-DP immediately identifies error situations such as the switching of a CPU to STOP, the failure of a slave connection or broken cables and automatically switches to the intact bus system.

P2P mode

The P2P mode (peer-to-peer) enables a bidirectional system interconnection via PROFIBUS with iba devices with an *ibaNet* 32Mbit interface (e. g. via ibaLink-VME to VME-based control systems). For this purpose, the data from the ibaNet interface are mapped on up to 8 PROFIBUS slaves.

Simulation mode

With the simulation mode option, software and the configuration of a DP master station can be tested without the need for a peripheral system of the PROFIBUS to be physically present. This means, for example, that a new control program can be tested in a test environment. This way, expensive down times during commissioning can be reduced.

The PROFIBUS slaves that have been configured in the master, but are not physically present, are simulated on the device. It is not necessary to carry out a PROFIBUS configuration in *ibaBM-DP*, since the device evaluates the configuration telegrams from the master and creates the corresponding slave automatically.

The input values of the slaves are simulated using a TCP/IP telegram interface and the output values are requested. This TCP/IP interface for simulating the system can be used with any tool (e. g. *ibaLogic*).

The simulation mode is approved for the use with PROFIBUS masters supplied by Siemens only.

Mirror mode

The mirror mode option is ideal for modernizations in which a new control system is to run in test mode parallel to the current system. With a PROFIBUS connection, *ibaBM-DP* is coupled into the original PROFIBUS line. The second connection is connected to the new control system. *ibaBM-DP* mirrors and simulates the slaves from the original line to the parallel system. The in-

put data are also copied. This way, the new controller can be tested in parallel with the original slaves and real input data. Signals from the original and parallel system can be recorded and compared simultaneously with *ibaPDA* using the sniffer function.

Mapping mode

The mapping mode provides extensive possibilities to exchange data between two PROFIBUS systems connected to Bus0 and Bus1 interfaces. This option is suitable for modernizations but also for plain data coupling on a PROFIBUS level. A classic DP-DP coupler is available for transfer of output data of one slave to the input data range of an assigned slave in a bidirectional way. In addition the output data of existing slaves of the PROFIBUS system Bus0 can be sniffed and transferred to the input data range of an assigned slave. In total up to 8 of these mapping assignments can be used (when using the expansion of active slaves even 16). The functionality of the mapping mode therefore offers much more than just a classic DP-DP coupler.

Overview of the most important characteristic values:

- Bus monitor for PROFIBUS DP
- Connections for 2 PROFIBUS lines up to 12 Mbit/s
- Sniffer function for interference free acquisition of the cyclic master slave communication (DP-V0)
- Up to 8 or 16 active slaves[1)] can be configured; can be distributed as required on both connections
- Acquisition of up to 244 bytes per active slave
- Flexible configuration of sampling rate, data format and data volume
- Support of *ibaNet* protocol 32Mbit Flex: Transmission of configuration and measurement data via bidirectional FO connection
- Compatibility mode 3Mbit and 32Mbit allows the exchange of previous devices *ibaBM-DPM-S* and *ibaBM-DPM-S-64*
- Request procedure can be used with *ibaPDA* for SIMATIC S7, FM458 and TDC
- For special applications, additional operating modes such as redundancy mode, simulation mode, mirror mode, mapping mode and P2P mode are available.

  Additional licenses are required for redundancy mode, simulation mode, mirror mode and mapping mode.

License model

Additional licenses are needed for some functional expansions:

- Expansion of active slaves on the device from 8 to 16
- Redundancy mode
- Simulation mode

1) Additional license required

- Mirror mode
- Mapping mode

Note

Licenses for functional expansions are tied to the serial number of the device. The licenses are activated via the web interface of the device or via the I/O Manager in *ibaPDA* by entering a license key. For buying a license key for one or more functions, please contact iba AG.

Order data

Order no.	Product name	Description
13.121001	ibaBM-DP	Bus monitor: Data acquisition on PROFIBUS DP
13.321001	ibaBM-DP-Upgrade-8Slaves	Upgrade with 8 more DP slaves
13.321021	ibaBM-DP-Upgrade-Redundancy	Upgrade for redundancy mode
13.321011	ibaBM-DP-Upgrade-Simulation	Upgrade for simulation mode
13.321031	ibaBM-DP-Upgrade-Mirror	Upgrade for mirror mode
13.321032	ibaBM-DP-Upgrade-Mapping	Upgrade for mapping mode

3 Scope of delivery

After unpacking, check that the delivery is complete and undamaged.

The scope of delivery includes:

- Device *ibaBM-DP*
- Information sheet for setting the operating mode
- USB cable
- Data medium "iba Software & Manuals" with the following content:
  - GSD files
  - USB driver
  - Application examples

4 Safety instructions

Observe the following safety instructions for *ibaBM-DP*.

4.1 Intended Use

The device is electrical equipment and may only be used for the following applications:

- Measurement data acquisition and measurement data analysis
- Automation of industrial plants
- Applications of iba software products (e. g. *ibaPDA*) and hardware products of iba AG

The device may only be used as defined in the "Technical Data", see chapter ↗ *Main data, page 181*.

4.2 Special safety instructions

Warning!

This is a class A device. This equipment may cause radio interference in residential areas. In this case, the operator will be required to take appropriate measures.

Caution!

Observe the operating voltage range
The device may not be operated at voltages exceeding +24 V DC (±10%). An overly high operating voltage destroys the device!

Caution!

Connecting the PROFIBUS cable

A conflict between several slaves with the same number can lead to a complete failure of communication on the PROFIBUS and even to a system shutdown.

To ensure that there are no duplicate slave numbers, do not connect the PROFIBUS cable until the configuration of the active slaves has been correctly carried out in *ibaPDA*.

Caution!

Before working on or dismounting the device, disconnect it from the power supply.

Note

Do not open the device! Opening the device will void the warranty!

Note

To clean the device, use a dry or slightly moistened cloth.

5 System requirements

Observe the following requirements for using the device *ibaBM-DP*.

Hardware

24 V DC, 0.5 A current supply

For the device configuration and for measuring:

- PC as recommended for use with *ibaPDA*:
  - Multicore CPU 2 GHz, 8 GB RAM, 512 GB HDD
  - At least one free PCI/PCIe slot

On the iba homepage http://www.iba-ag.com you will find suitable computer systems with desktop and industrial housing.

- At least one FO input and output card of the *ibaFOBD*, *ibaFOBDexp* type or *ibaFOB-io-ExpressCard*.
- Compatibility mode 32Mbit: at least one fiber optics input card of the *ibaFOB-X*, *ibaFOB-D* or *ibaFOB-Dexp* type or *ibaFOB-io-ExpressCard*.
- Compatibility mode 3Mbit: at least one fiber optics input card of the *ibaFOB-S*, *ibaFOB-X*, *ibaFOB-D* or *ibaFOB-Dexp* type or *ibaFOB-io-ExpressCard*.
- One *ibaNet* fiber optics patch cable for bidirectional connection of *ibaBM-DP* and *ibaPDA* computer
- Compatibility mode 3/32Mbit: unidirectional FO patch cable sufficient
- Compatibility mode 32Mbit: Ethernet connection to *ibaPDA* computer
- PROFIBUS DP network with PROFIBUS master

Software

- *ibaPDA* / *ibaQDR* from version 6.20.2 for measuring and recording data in 32Mbit compatibility mode
- *ibaPDA* / *ibaQDR* from version 6.26.3 for measuring and recording data on redundant PROFIBUS in 32Mbit compatibility mode
- *ibaPDA* / *ibaQDR* from version 6.32.0 for measuring and recording data with 32Mbit Flex.

Note

As of version 6.20.2 of *ibaPDA*-V6, the following request access procedures are also possible with *ibaBM-DP*:

- ibaPDA-Request-S7
- ibaPDA-Request-FM458
- ibaPDA-Request- TDC

For further information, please read the product manuals.

6 Mounting and dismounting

In the following, you will learn how to *ibaBM-DP* install, connect and remove the device. Also refer to the notes in chapter ↗ *Safety instructions*, page 15.

6.1 Mounting and connecting

1. Insert DIN-rail clip on the back of the device into the rail at the top.
2. Press the device downwards and backwards until it snaps into the DIN-rail.
3. If there is the provision in the plant that the device has to be grounded, then connect the device to the ground (shield connector X29).
4. Connect the DC 24 V power supply. Observe the correct polarity.
5. Establish the following connections:
   - Fibre optics to the *ibaPDA* system (unidirectional or bidirectional depending on the mode of operation)
   - Network connection via Ethernet TCP/IP (in compatibility mode 32Mbit)

Caution!

Connecting the PROFIBUS cable

A conflict between several slaves with the same number can lead to a complete failure of communication on the PROFIBUS and even to a system shutdown.

To ensure that there are no duplicate slave numbers, do not connect the PROFIBUS cable until the configuration of the active slaves has been correctly carried out in *ibaPDA*.

6.2 Dismounting

Caution!

Before working on or dismounting the device, disconnect it from the power supply.

1. Remove all connections from the device.
2. Hold the top of the appliance with your hand.

   Press the device down lightly so that it lies securely in both hands and does not fall.
3. Grasp the bottom of the appliance with your other hand and pull it up to the front.

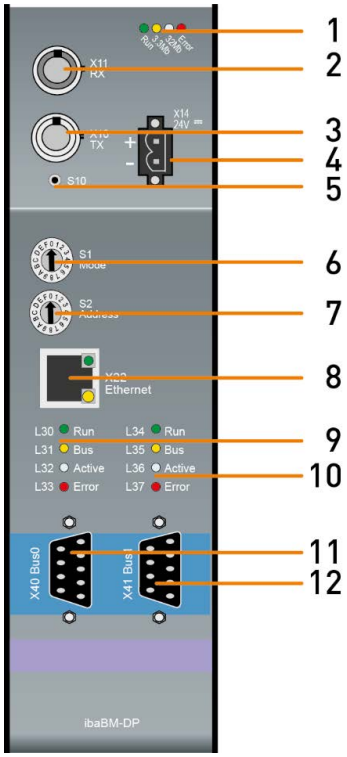
→ The device will get detached from the DIN-rail.

7 Device description

Here you will find views and descriptions of the device *ibaBM-DP*.

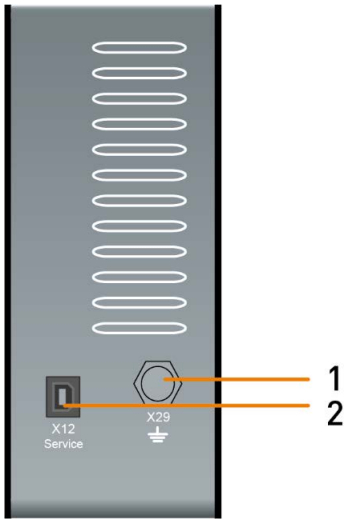
7.1 Device views

Front view



1	Operating state display	7	Rotary switch S2
2	FO input (RX) X11	8	Ethernet connection X22
3	FO output (TX) X10	9	PROFIBUS status LEDs Bus0
4	Power supply X14	10	PROFIBUS status LEDs Bus1
5	Push button S10	11	DP connection X40 Bus0
6	Rotary switch S1	12	DP connection X41 Bus1

Bottom view



1 Grounding screw X29

2 USB interface X12 (only for service purposes)

7.2 Indicating elements

On the device, colored light diodes (LED) show the operating status of the device.

Operating status

LED	State	Description
Run (green)	flashing	ready for operation, power supply connected
	flashing rapidly	update mode or reset to default settings (S10 pushbutton)
	on	boot phase
3.3Mb (yellow)	off	no 3Mbit input signal detected
	flashing	3Mbit input signal connected, but the device is not configured for this mode
	flashing irregularly	32Mbit Flex mode: TCP/UDP/IP telegram detected via FO
	on	compatibility mode: valid 3Mbit signal detected
32Mb (white)	off	no 32Mbit input signal detected
	flashing	32Mbit input signal connected, but the device is not configured for this mode
	on	valid 32Mbit input signal detected
Error (red)	off	normal operation
	flashing	failure (configuration error)
	on	hardware error

PROFIBUS

LED	State	Description
Run (green)	off	boot phase
	flashing	normal operation
Bus (yellow)	off	boot phase / no PROFIBUS communication detected
	flashing rapidly	at least one master active on the DP, but none of the configured slaves is active
	flashing	at least one master and one slave active on the DP, but not all slaves that have been configured.
	on	all configured masters and slaves active on the DP
Active (white)	off	boot phase / no active slave configured in the device
	flashing rapidly	no active slave in data exchange (with bus connected)
	flashing	not all active slaves in data exchange (with bus connected)
	on	all active slaves in data exchange (with bus connected)
Error (red)	off	normal operation
	flashing	sporadic failures on the DP
	on	error on the DP line

7.3 Operating elements and connections

7.3.1 Fiber optics connections X10 (TX) and X11 (RX)

On the *ibaPDA* system, a FO input/output card of the *ibaFOB-D* or *ibaFOB-Dexp* type or *ibaFOB-io-ExpressCard* has to be installed for receiving and sending the data.

X11 (RX) FO- receive interface

X10 (TX) FO- send interface

For compatibility mode 32Mbit, an FO input card of the *ibaFOB-X* type is sufficient. The prerequisite for compatibility mode 3Mbit is an FO input card of the *ibaFOB-S* type.

Maximum distance of fiber optic connections

The maximum distance of fiber optic connections between 2 devices depends on various influencing factors. This includes, for example, the specification of the fiber (e. g. 50/125 µm, 62.5/125 µm, etc.), or the attenuation of other components in the fiber optic cable plant such as couplers or patch panels.

However, the maximum distance can be estimated on the basis of the output power of the transmitting interface (TX) or the sensitivity of the receiving interface (RX). A model calculation can be found in chapter ↗ *Example for FO budget calculation, page 186*.

The specification of the transmitter's output power and the receiving sensitivity of the fiber optic components installed in the device can be found in chapter ↗ *Main data, page 181* "Technical data" under "ibaNet interface".

7.3.2 Power supply X14

The *ibaBM-DP* device has to be operated with an external DC voltage 24 V (unregulated) with a maximum current consumption of 500 mA. The operating voltage should be supplied using the 2-pin Phoenix screw connector included in delivery. If desired, you can order DIN-rails or plug-in power supply units from iba.

The device can be switched off by disconnecting it from the voltage supply.

Switching the device on and off is without interferences regarding the PROFIBUS, i. e. the PROFIBUS communication on the DP line will continue without disruption when the device is switched off.

Note

In case you use active slaves in *ibaBM-DP*, the master detects these slaves as failed. Take the right measures in the program of the master for coping appropriately with slave failures (e. g. by configuring the error OBs with a SIMATICS7 CPU).

Note

If *ibaBM-DP* should be the last device on the bus line, the bus has to be terminated via the termination resistor on the PROFIBUS connector. When switching off *ibaBM-DP*, the correct termination is not guaranteed any longer, as the voltage supply for the bus is missing. This may lead to malfunctions on the PROFIBUS.

7.3.3 Push button S10

Use the S10 button to reset all settings (network parameters, passwords, signal configuration) to the factory settings.

1. Switch off the device.
2. Switch on the device while holding down button S10.
3. Press and hold the button until the green “Run” LED of the operating status indicator starts flashing rapidly.
4. Release the button again.

→ When the green “Run” LED stops flashing rapidly, the factory settings have been applied. The device is ready for immediate use and does not need to be switched off and on again.

Note

The device must not be switched off during the process.

For detailed notes on the factory settings, please see chapters ↗ *Ethernet interface, page 37* (network) and ↗ *Accessing the web interface, page 44* (password).

7.3.4 Rotary switches S1 and S2

The operating modes (rotary switch S1) and the device address (rotary switch S2) are being set with the rotary switches.

S1	S2	ibaNet protocol	Data volume / timebase	Note
Compatibility mode 3Mbit				
0	0	3Mbit	64A + 64D in 1 ms	up to 2 slaves no sniffer function
Compatibility mode 32Mbit				
1	0	32Mbit	512A + 512D in 1 ms max. data volume of analog values: 1984 Bytes	sniffer function + up to 8 active slaves redundancy mode* can be used
32Mbit Flex mode**				
1	1…F	32Mbit Flex	1024A + 1024D max. data volume depends on time-base max. possible data volume: 4060 Bytes at 1.4 ms timebase min. timebase: 0.5 ms at max. possible data volume of 1540 Bytes	sniffer function + up to 8 active slaves redundancy mode* can be used
P2P mode				
4	0	32Mbit		
Simulation mode*				
5	0	not used		
Mirror mode*				
6	0	32Mbit	see compatibility mode 32Mbit	sniffer function, no active slaves
6	1...F	32Mbit Flex	see 32Mbit Flex mode	sniffer function, no active slaves
Mapping mode*				
7	0	not used		no data acquisition possible

* additional license required

** default setting (with S2 = 1)

Note

Compatibility mode 3Mbit/32Mbit

In contrast to the predecessor,i*ibaBM-DP* does not have any PROFIBUS terminating resistors and no switch for bridging the buses 0 and 1. Please use instead the terminating resistors on the PROFIBUS connectors. For connecting the buses 0 and 1, you may use a cable bridge.

7.3.4.1 Device setting compatibility mode 3Mbit (DP-64 mode)

To use the compatibility mode 3Mbit (DP-64 mode), set the rotary switches as follows: S1 = 0 and S2 = 0

With this setting, the device replaces the predecessor devices *ibaBM-DPM-S-64*, *ibaBM-DPM-64* and *DPM64*. The devices can be used for data acquisition with *ibaPDA*, but also as system coupling without *ibaPDA*.

In this mode, the device provides up to 2 slaves, which can be operated in different modes. Up to 64 analog and 64 digital values can be transmitted in 1 ms. A sniffer function is not available.

The device can be operated in DP-64 mode also with an older *ibaFOB-S* or *ibaFOB-X* card.

For further information see chapter ↗ *Data acquisition compatibility mode 3Mbit (DP-64 mode), page 36* and chapter ↗ *Compatibility mode 3Mbit (DP-64 mode), page 140*.

7.3.4.2 Device setting compatibility mode 32Mbit

To use the compatibility mode 32Mbit, set the rotary switches as follows: S1 = 1 and S2 = 0

With this setting, the device replaces the predecessor device *ibaBM-DPM-S* in existing installations and works with a fixed 32Mbit telegram on the FO side. A unidirectional FO connection is needed to the *ibaPDA* system. The configuration data is transmitted from *ibaPDA* to the device via an Ethernet connection. Sniffer function and active slaves can be used simultaneously.

In this mode, up to 512 analog (a total max. of 1984 bytes for analog values) and 512 digital values can be acquired. Up to 8 active slaves can be optionally assigned to Bus0/1.

The redundancy mode can be used in compatibility mode 32Mbit, see chapter ↗ *Redundancy mode, page 128*. The use of redundancy mode requires an additional license.

The device can be operated in 32Mbit mode also with an older *ibaFOB-X* card. The compatibility mode is also a good solution, if an existing *ibaPDA* system is to be extended, but no FO outputs are available or cannot be retrofitted.

For further information, see chapter ↗ *Ring topology with 32Mbit Flex, page 29*, ↗ *Data acquisition on the redundant PROFIBUS compatibility mode 32Mbit, page 31* and ↗ *Notes on the compatibility mode 32Mbit, page 70*.

7.3.4.3 Device setting 32Mbit Flex mode

To use the 32Mbit Flex mode, set the rotary switches as follows: S1 = 1 and S2 = 1 … F

32Mbit Flex mode is the delivery state of the device (with S2 = 1)

With this setting, the device operates with 32Mbit Flex telegram on the FO side. A bidirectional FO connection is needed to the *ibaPDA* system. The configuration data is transferred from *ibaPDA* to the device via FO connection. Sniffer function and active slaves can be used simultaneously.

Depending on the timebase, up to 4060 bytes per cycle can be acquired and recorded with up to 1024 analog values and 1024 digital values. When transferring the maximum data volume of 4060 Bytes the timebase must not be faster than 1.4 ms. With a timebase of 1 ms, up to 3100 bytes can be transferred. The shortest cycle time is 0.5 ms (1540 bytes). The data types BYTE, WORD, DWORD, INT, DINT, FLOAT and S5 FLOAT in big/little endian format are supported.

When the device is operated in a ring topology with other 32Mbit Flex devices, the data volume that can be transmitted, decreases accordingly.

Up to 8 active slaves can be optionally assigned to Bus0/1.

With 32Mbit Flex, output signals of *ibaPDA* can be sent to the PROFIBUS master. Thus, e. g. certain signal values can be monitored, a warning message is being issued in case a limit value is exceeded or other events are signalized.

Note

ibaPDA processes output signals with lower priority compared to the acquisition of input signals with a cycle not faster than 50 ms depending on the I/O configuration.

The redundancy mode can be used in 32Mbit Flex mode, see chapter ↗ *Redundancy mode, page 128*. The use of redundancy mode requires an additional license.

For further information, see chapter ↗ *Data acquisition 32Mbit Flex, page 29*, ↗ *Data acquisition on the redundant PROFIBUS 32Mbit Flex, page 31* and ↗ *First steps for the configuration in ibaPDA, page 61*.

7.3.4.4 Device setting P2P mode

To use the P2P mode (peer-to-peer), set the rotary switches as follows: S1 = 4 and S2 = 0

The P2P mode enables a bidirectional system interconnection via PROFIBUS with iba devices with an *ibaNet* 32Mbit interface (e. g. via *ibaLink-VME* to VME-based control systems). For this purpose, the data from the *ibaNet* interface are mapped on up to 8 PROFIBUS slaves: The data received by *ibaBM-DP* via fiber optic cable are output via the input area of the PROFIBUS slaves. Data which *ibaBM-DP* receives over the output area of the PROFIBUS slave, are output via fiber optic cables.

The P2P mode is applied in couplings of controllers with a *ibaNet* 32Mbit interface (e. g. SIMATIC TDC with *ibaLink-VME*) to new controllers via PROFIBUS, e. g. in modernization projects.

For further information see chapter ↗ *P2P mode, page 32* and chapter ↗ *Coupling of PROFIBUS DP with third party systems, page 36*.

7.3.4.5 Device setting simulation mode

To use the simulation mode, set the rotary switches as follows: S1 = 5 and S2 = 0

If you want to use the simulation mode, you need an additional license (order data see chapter ↗ *Order data*, page 13).

With the simulation mode option, software and the configuration of a DP master station can be tested without the need for a peripheral system of the PROFIBUS to be physically present. This means, for example, that a new control program can be tested in a test environment. This way, expensive down times during commissioning can be reduced.

The PROFIBUS slaves that have been configured in the master, but are not physically present, are simulated on the device. It is not necessary to carry out a PROFIBUS configuration in *ibaBM-DP*, since the device evaluates the configuration telegrams from the master and creates the corresponding slave automatically.

The input values of the slaves are simulated using a TCP/IP telegram interface and the output values are requested. This TCP/IP interface for simulating the system can be used with any tool (e. g. *ibaLogic*).

The simulation mode is approved for the use with PROFIBUS masters supplied by Siemens only.

For further information see chapter ↗ *Simulation mode, page 33* and chapter ↗ *Simulation mode, page 169*.

7.3.4.6 Device setting mirror mode

To use the mirror mode, set the rotary switches as follows:

- S1 = 6 and S2 = 0 for mirror mode with compatibility mode 32Mbit
- S1 = 6 and S2 = variable 1…F for mirror mode with 32Mbit Flex

If you want to use the mirror mode, you need an additional license (order data see chapter ↗ *Order data*, page 13).

The mirror mode option is ideal for modernizations in which a new control system is to run in test mode parallel to the current system. With a PROFIBUS connection, *ibaBM-DP* is coupled into the original PROFIBUS line. The second connection is connected to the new control system. *ibaBM-DP* mirrors and simulates the slaves from the original line to the parallel system. The input data are also copied. This way, the new controller can be tested in parallel with the original slaves and real input data. Signals from the original and parallel system can be recorded and compared simultaneously with *ibaPDA* using the sniffer function.

For further information see chapter ↗ *Mirror mode, page 34* and chapter ↗ *Mirror mode, page 175*.

7.3.4.7 Device setting mapping mode

To use the mapping mode, set the rotary switches as follows: S1 = 7 and S2 = 0

If you want to use the mapping mode, you need an additional license (order data see chapter ↗ *Order data*, page 13).

The mapping mode provides extensive possibilities to exchange data between two PROFIBUS systems connected to Bus0 and Bus1 interfaces. A classic DP-DP coupler is available for transfer of output data of one slave to the input data range of an assigned slave in a bidirectional way. In addition the output data of existing slaves of the PROFIBUS system Bus0 can be sniffed and transferred to the input data range of an assigned slave. In total up to 8 of these mapping assignments can be used (when using the expansion of active slaves even 16).

For further information see chapter ↗ *Mapping mode, page 35* and chapter ↗ *Mapping mode, page 55*.

7.3.5 Ethernet connection X22

Via the Ethernet interface (RJ45 connector) the device can be connected to a computer or a network.

The interface has a unique MAC address and is used for transmitting the configuration files (device parameters) in compatibility mode 32Mbit.

7.3.6 PROFIBUS DP connections X40 (Bus0) and X41 (Bus1)

The connection is established via standard PROFIBUS DP connector (9-pin D-Sub):

- One PROFIBUS line can be connected to each of these connectors.
- You can use connectors with incoming and outgoing lines as well as end plugs with only incoming lines.

The PROFIBUS lines are terminated in the connector.

7.3.7 USB interface X12

The USB interface (type B) at the bottom of the device is designated for service purposes. If an Ethernet connection is not available, a temporary access to the web interface of the device is possible via the USB interface. The connection between the USB interface X12 and the computer is established using a standard USB cable.

The USB interface is set to a fixed IP address 192.168.0.1 and cannot be changed.

For further information, see chapter ↗ *USB interface, page 39*.

7.3.8 Grounding screw X29

Screw for connecting the protective ground. Depending on the configuration of the control cabinet, it might be necessary to connect the shields of the PROFIBUS cable to the shield connector X29.

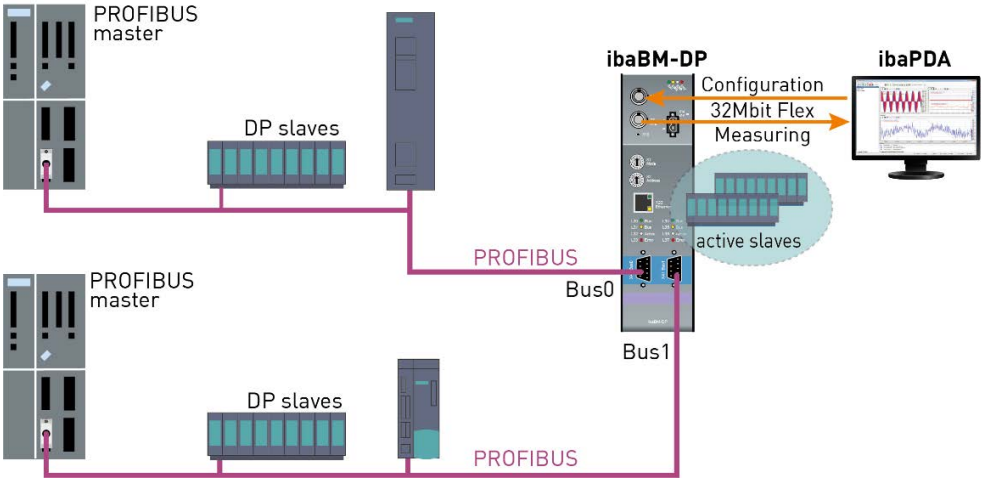
If the shields of the PROFIBUS cables have been connected yet to the protective ground of the control cabinet, also connect the shield connector X29 to the protective ground of the control cabinet.

8 System integration

The following examples show different typical system integrations with the *ibaBM-DP* device.

8.1 Data acquisition 32Mbit Flex

In the following example, the device is connected to two separate PROFIBUS lines.



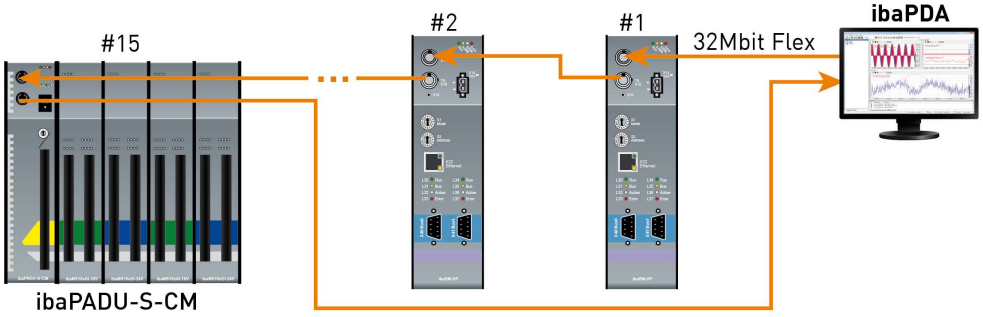
Using the sniffer function the device can acquire all data sent on both PROFIBUS lines. To use the sniffer function, the device does not have to be considered in the configuration of the DP master.

Simultaneously, active slaves can be configured in the device, which then are supplied with data in a targeted way. For this purpose, the device has to be entered via the GSD file in the configuration of the DP master. The slaves (up to 8) can be optionally distributed on both DP lines.

ibaBM-DP is connected to the *ibaPDA* system via a bidirectional FO cable (*ibaFOB-D* card). The configuration and the acquired data are exchanged via FO between *ibaPDA* and *ibaBM-DP*.

8.1.1 Ring topology with 32Mbit Flex

In a ring with 32Mbit Flex protocol, up to 15 devices can be connected. All configuration and measurement data are transmitted in the ring.



ibaPDA automatically detects the devices in the ring and automatically determines the maximum possible sampling rate, depending on the type and number of the devices.

In the ring, also other 32Mbit Flex capable iba devices can be integrated, e. g. *ibaPADU-S-CM* like in the example above. The devices in the ring are addressed using the rotary switch for the device address (rotary switch S2 for *ibaBM-DP*).

The individual devices in the ring can work with different cycle times. However, these cycle times have to be an integer multiple of the smallest cycle. Example: Device #1 works with 0.5 ms, device #2 with 1 ms, device #3 with 4 ms, etc. If the max. data rate is exceeded, *ibaPDA* issues an error message that advices you to enhance the timebase and decrease the data amount.

The calculation of the maximum data amount depends on the fastest device in the ring. This means: If you increase the cycle time of slow devices in the ring topology, this does not mean that a higher amount of data can be transferred. Only when the cycle time of the fastest device in the ring is increased, the data amount can be increased.

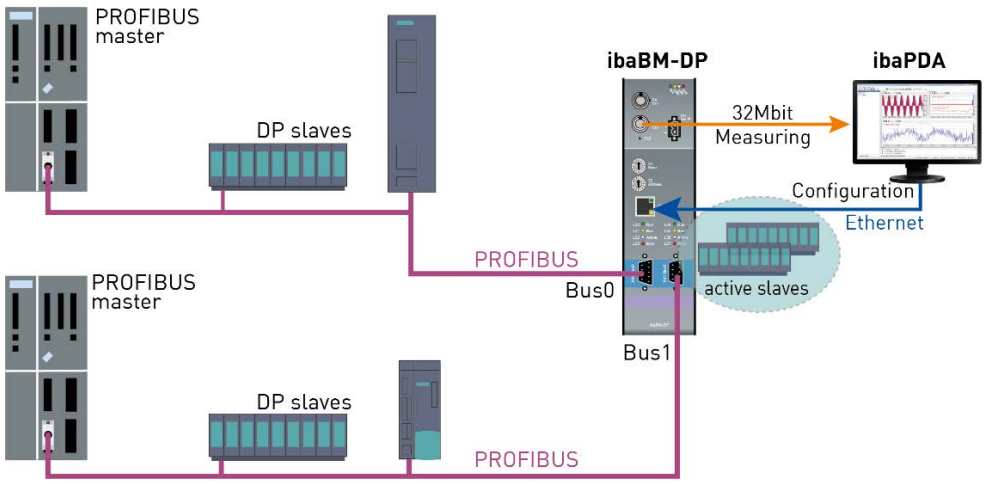
For more information about data allocation in a 32Mbit Flex ring, see chapter ↗ *Calculation of the telegram size with 32Mbit Flex, page 121*.

Note

Due to the large data amounts which are usually acquired with *ibaBM-DP*, it is appropriate in most cases to operate only one device on a 32Mbit Flex link, see chapter ↗ *Data acquisition 32Mbit Flex, page 29*.

8.2 Data acquisition compatibility mode 32Mbit

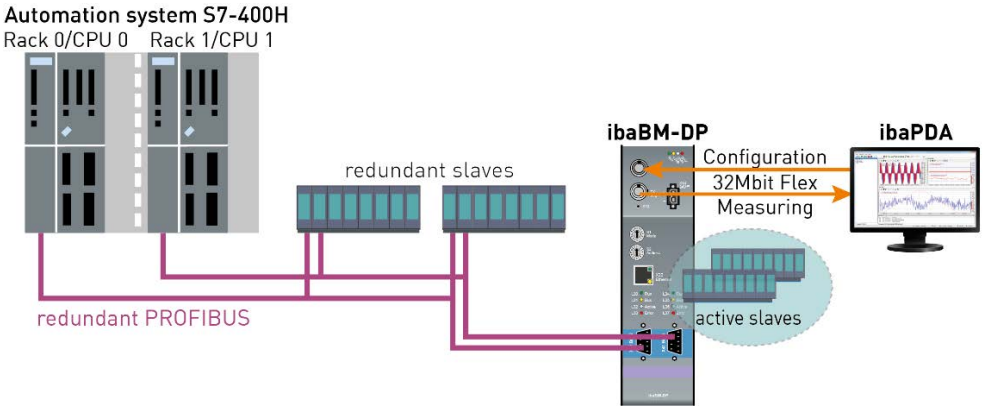
If the device is operated in compatibility mode 32Mbit, only a unidirectional connection is needed for acquiring the data in the *ibaPDA* system. The configuration data is transmitted over an Ethernet connection.



Regarding the configuration as sniffer or active slave, the same is true as shown in the example with 32Mbit Flex, see chapter ↗ *Data acquisition 32Mbit Flex, page 29*.

8.3 Data acquisition on the redundant PROFIBUS 32Mbit Flex

When using the highly available automation system S7-400H, there are two parallel redundant PROFIBUS lines. *ibaBM-DP* is connected to both lines using the two DP connections Bus0 (X40) and Bus1 (X41).



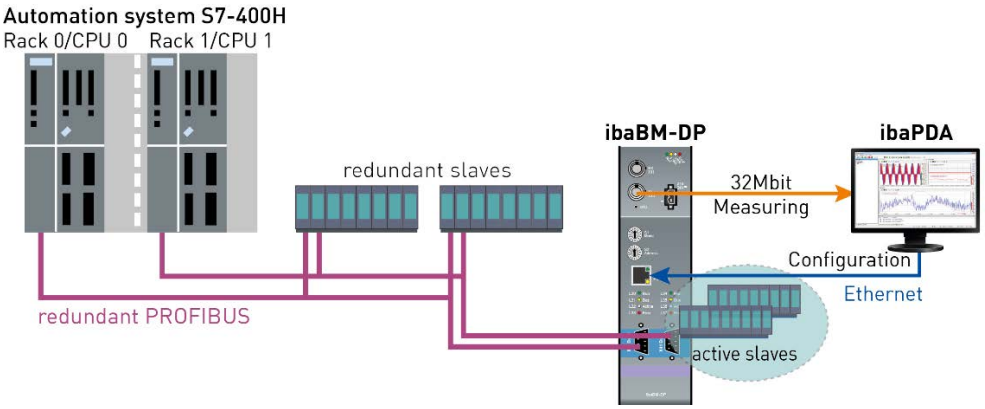
Up to 8 pairs of active slaves (one slave with the same number on Bus0/1) can be created.

Identical to the system setup with non-redundant PROFIBUS, the device configuration and the recorded data are exchanged with *ibaPDA* via a bidirectional fiber optic connection.

For further explanations concerning the redundancy mode, please see chapter ↗ *Redundancy mode, page 128*.

8.4 Data acquisition on the redundant PROFIBUS compatibility mode 32Mbit

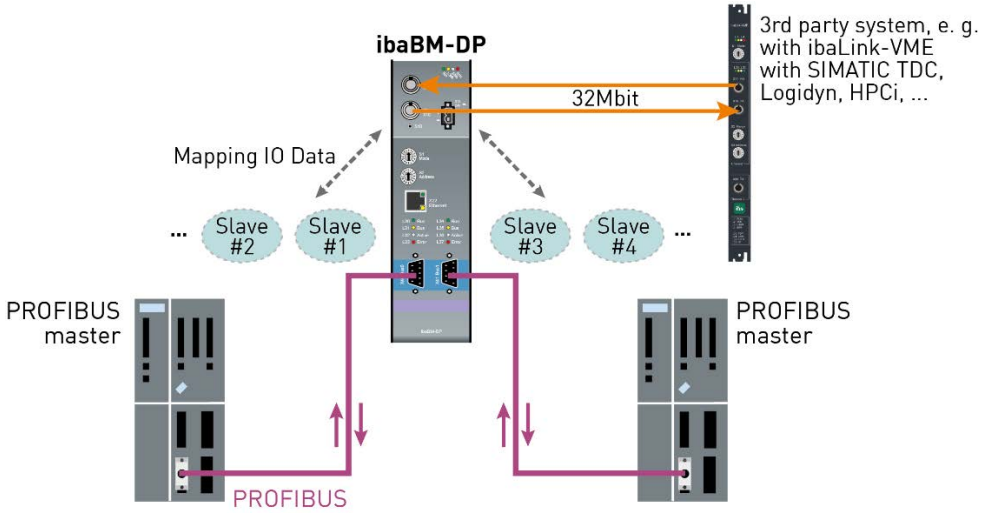
Also in compatibility mode 32Mbit, the device can be operated on the redundant PROFIBUS of a highly available automation system S7-400H.



The same notes apply as for chapter ↗ *Data acquisition on the redundant PROFIBUS 32Mbit Flex, page 31*.

8.5 P2P mode

The P2P mode (peer-to-peer) enables a bidirectional system interconnection via PROFIBUS with iba devices with an *ibaNet* 32Mbit interface (e. g. via *ibaLink-VME* to VME-based control systems).



For this purpose, data from the *ibaNet* interface are mapped on up to 8 PROFIBUS slaves that can be arbitrarily distributed over the two DP lines: The data received by *ibaBM-DP* via fiber optic cable are output via the input area of the PROFIBUS slaves. Data which *ibaBM-DP* receives over the output area of the PROFIBUS slave, are output via fiber optic cables. The slaves have to be defined via the GSD file in the configuration of the PROFIBUS master.

The P2P mode is applied in couplings of controllers with a ibaNet 32Mbit interface (e. g. SIMATIC TDC with *ibaLink-VME*) to new controllers via PROFIBUS, e. g. in modernization projects.

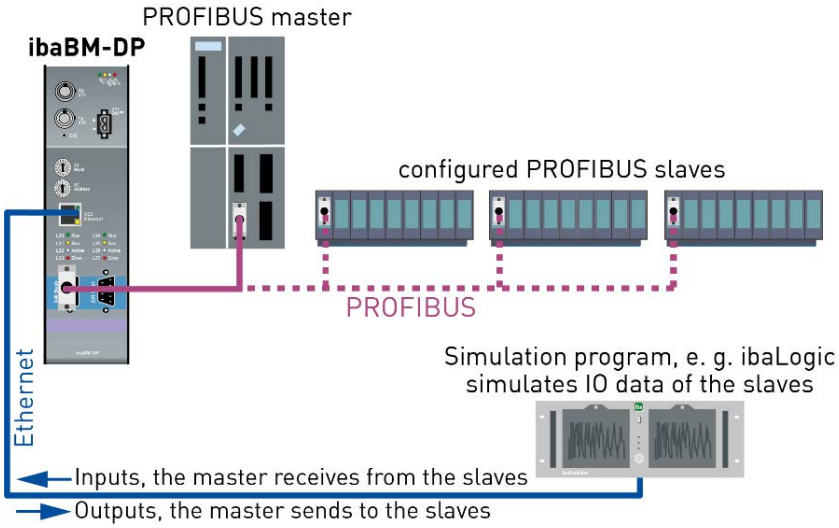
Configuration of the slaves and the data mapping is done exclusively in the web dialog of *ibaBM-DP* (see chapter ↗ *P2P mode, page 52*).

Note

In P2P mode, the *ibaBM-DP* device is operated without *ibaPDA*. It is only used to couple the 32Mbit *ibaNet* interface and the PROFIBUS slaves. You cannot record data in parallel via *ibaPDA*.

8.6 Simulation mode

With the simulation mode option, software and the configuration of a DP master station can be tested without the need for a peripheral system of the PROFIBUS to be physically present. This means, for example, that a new control program can be tested in a test environment.



The PROFIBUS slaves configured in the master, which are not physically present on the bus, are simulated in the device. It is not necessary to carry out a PROFIBUS configuration in *ibaBM-DP*, since the device evaluates the configuration telegrams from the master and creates the corresponding slave automatically.

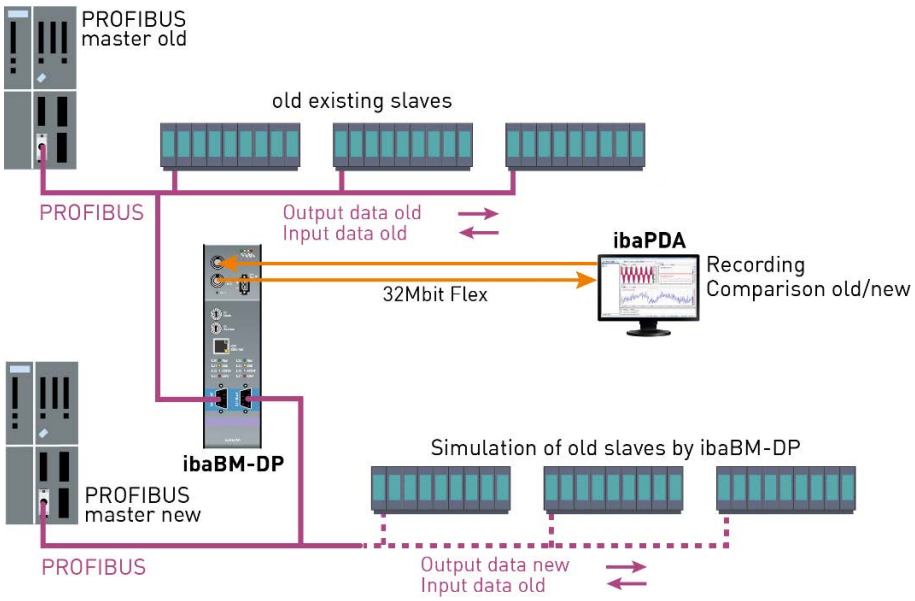
The input values of the slaves are simulated using a TCP/IP telegram interface and the output values are requested. This TCP/IP interface for simulating the system can be used with any tool (e. g. *ibaLogic*).

The simulation mode is approved for the use with PROFIBUS masters supplied by Siemens only.

For further information on the simulation mode, see chapter ↗ *Simulation mode, page 169*.

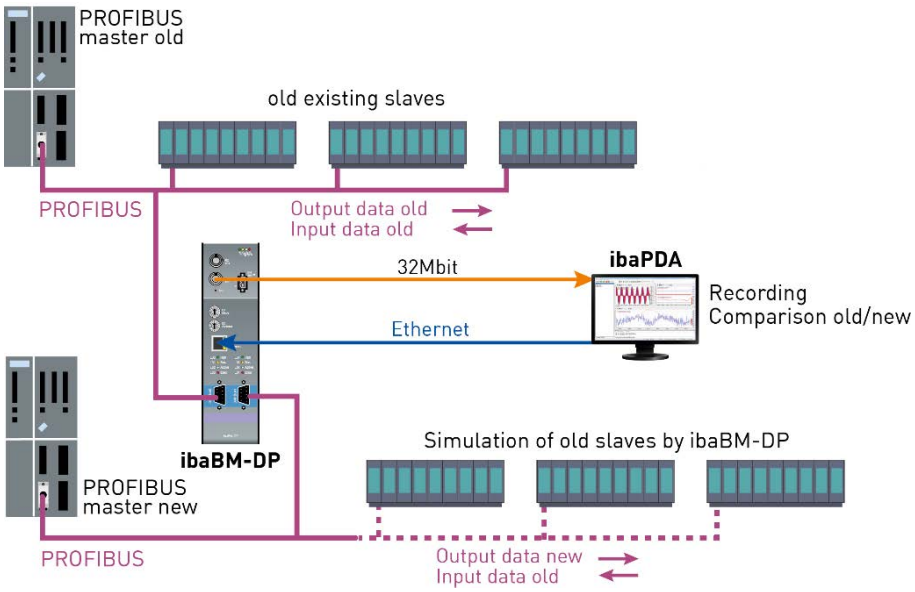
8.7 Mirror mode

In the example below, an existing old controller ("PROFIBUS master old") including existing periphery shall be replaced by a new controller. The peripherals are to remain unchanged after the old controller had been removed and should be operated with the new controller. Using the mirror mode, the new controller can be tested and commissioned in parallel to the running plant.



The PROFIBUS system of the old controller is connected to the X40 connection of *ibaBM-DP*. The new controller is connected to X41. *ibaBM-DP* automatically detects and then duplicates the slaves of the old system including input data of the new system. The new controller works with the duplicated slaves. Now the program can be tested with real input data. The output data will not be duplicated. Simultaneously, you can record data via *ibaPDA* from both PROFIBUS systems using sniffer modules.

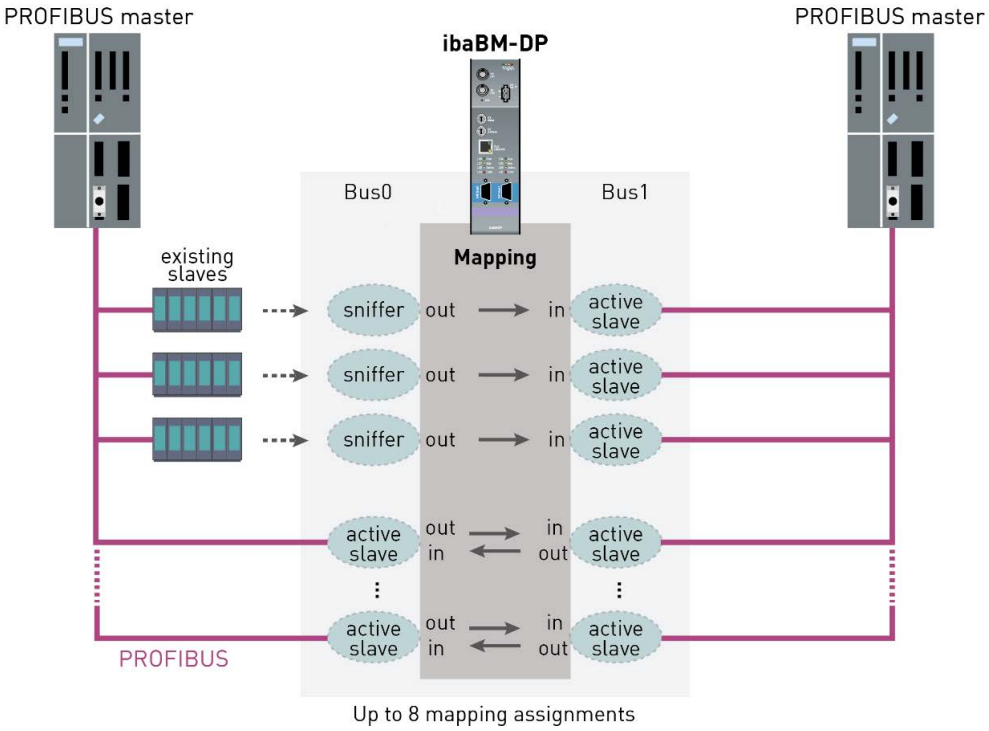
Thus, you can compare the old system to the new system. In mirror mode, the data can also be acquired in compatibility mode 32Mbit.



For further information on the mirror mode, see chapter ↗ *Mirror mode, page 175*.

8.8 Mapping mode

In the example shown in the figure below data should be exchanged between the PROFIBUS masters connected to Bus0 and Bus1. By configuring pairs of active slaves assigned to each other the master on Bus0 can send data to the master on Bus1 and vice versa. This is done by mapping the output data range of an active slave to the input data range of the respectively assigned slave.



Additionally in the example real external slaves exist in the PROFIBUS system of Bus0 (e. g. Remote IO stations, drives etc.). The output data sent by the master to these slaves can be sniffed and mapped to the input data range of an assigned active slave on Bus1. Sniffing existing slaves is only possible on Bus0.

In total up to 8 of these mapping assignments can be used in parallel. When using the additional license for extending the number of slaves (see chapter ↗ *Order data*, page 13) up to 16 mapping assignments can be used.

For further information on the mapping mode, see chapter ↗ *Mirror mode, page 175*.

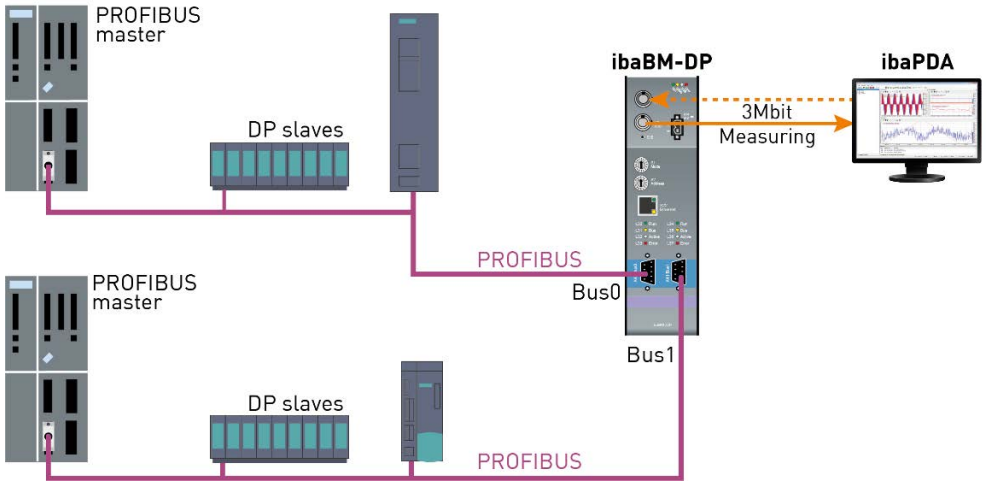
Note

In mapping mode, the *ibaBM-DP* device is operated without *ibaPDA*. It is only used to couple the PROFIBUS systems on Bus0 and Bus1. You cannot record data in parallel via *ibaPDA*.

8.9 Data acquisition compatibility mode 3Mbit (DP-64 mode)

8.9.1 Uni-/bidirectional connection between DP master and ibaPDA

In compatibility mode 3Mbit, you can set up two slaves on the *ibaBM-DP* device. The configuration of the slaves is done in the web dialogs of *ibaBM-DP*.

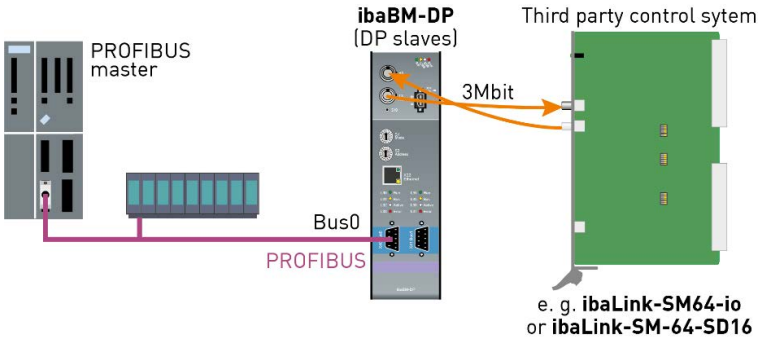


Depending on the configuration of the slaves, you can send data for acquisition to *ibaPDA* (unidirectional FO connection) or use the bidirectional data exchange with *ibaPDA* (bidirectional FO connection).

Further explanations on the 3Mbit compatibility mode can be found in chapter ↗ *Compatibility mode 3Mbit (DP-64 mode), page 140*.

8.9.2 Coupling of PROFIBUS DP with third party systems

The topology in the figure above is a typical configuration for a system coupling. The *ibaLink-SM64-io/-SD16* modules are interface cards for the control systems Simatic S5, Simadyn D or Simicro MMC. The modules have an *ibaNet* 3Mbit fiber optics interface.



The data from the *ibaNet* 3Mbit interface are mirrored to 2 configurable PROFIBUS slaves. Thus, the data can be exchanged bidirectionally.

The configuration of the slaves is done in the web dialogs of *ibaBM-DP*. You do not need *ibaPDA* for operating this system coupling.

Further explanations on the 3Mbit compatibility mode can be found in chapter ↗ *Compatibility mode 3Mbit (DP-64 mode), page 140*.

9 Configuration of the device

9.1 Basic principles

The operating mode of the device is chosen using the rotary switches S1 and S2.

The further configuration of the device is done in the I/O Manager of *ibaPDA*. With 32Mbit Flex, the parameters are transmitted over FO cables to the device, in compatibility mode 32Mbit via the Ethernet interface.

Moreover, the device possesses a web server. The web server can be accessed with a web browser (e. g. Internet Explorer or Mozilla Firefox) via all interfaces (32Mbit Flex, Ethernet and USB).

The following functions are available in the web interface:

- Overview of general device information (device name, serial number, hardware and firmware version, MAC address, IP address, existing licenses)
- Display of status information (position of rotary switches, selected mode)
- Network settings for Ethernet interface (IP address, DHCP setting)
- Performing firmware updates
- Add additional licenses (additional active slaves, redundancy mode, simulation mode, mirror mode, mapping mode)

Note

If the device is operated with 32Mbit Flex, it is not necessary to use the Ethernet or USB interface.

9.2 Establishing communication links

If the device is operated in 32Mbit Flex mode, it is not necessary to use the Ethernet or USB interface. In Flex mode, you have got access to the device directly via the FO interface (e. g. the web interface, see chapter ↗ *Accessing the web interface, page 44*).

9.2.1 Ethernet interface

Via an Ethernet connection, the web interface of the device can be accessed. In addition, the Ethernet interface is used for transmitting the configuration in compatibility mode 32Mbit.

Each *ibaBM-DP* device has a unique MAC address for identification in the network.

Tip

You find the MAC address on the type label at the front of the device.

In addition, each device can be addressed with a name in the network.

Hostname: **DP_xxxxxx**

xxxxxx corresponds to the 6-digit serial number of the device (see type label), example: DP_000007.

For compatibility mode 32Mbit, the device disposes of a second alternative hostname: dpms_*nnnn*

nnnn corresponds to the last four characters/digits of the MAC address.

Example: The device with the MAC address 0015BA000101 has the name dpms_0101.

With the initial setup of the device, please select an IP address that is fitting for the existing network. You can enter the IP address via the web interface, see chapter ↗ *Network, page 48*. Here, you can also select whether DHCP (dynamic allocation of IP address) is to be used or a fixed IP address.

Note

The factory setting for the Ethernet interface of *ibaBM-DP* is the fixed IP address 192.168.1.1. When resetting to the factory settings, this IP address is restored, see chapter ↗ *Push button S10*, page 23.

For establishing a network connection via the Ethernet interface (X22), please proceed as follows:

1. Connect the PC and the device using a network cable, either directly or via a switch or hub. Computer and device must be in the same network.
2. Set the network interface of the computer to the same subnet address 255.255.255.0 as the device and assign a suitable IP address, e. g. 192.168.1.2:
   - Windows XP: *Control Panel – Network Connections*
   - Windows 7, Windows 10 and Windows 11:*Control Panel – Network and Sharing Center - Change Adapter Settings*

   Note

   The IP address of your computer must not be 192.168.1.1, as this is the address of *ibaBM-DP*. Select another IP address in the format 192.168.1.x.
3. Start a web browser on the computer and enter the IP address of the device as URL: http://192.168.1.1

Note

As a prerequisite for DHCP, a DHCP server has to be available in the network that assigns IP addresses automatically. Experience shows that in the field of automation technology, rather fixed IP addresses are used, i. e. there is no DHCP server.

If DHCP is activated in the network settings of *ibaBM-DP*, please proceed as follows for establishing a network connection:

1. Connect the computer and the device to a hub, switch or router by means of a network cable.

   A DHCP server has to be in the network.

2. Switch on the device.

→ As soon as the LED "Run" is blinking regularly, the device is ready for operation.

→ The DHCP server automatically assigns an IP address to the device.

3. Set the network interface of the computer also to DHCP by clicking on *Control Panel – Network and Sharing Center – Change adapter settings*.

→ The DHCP server automatically assigns an IP address to the computer.

4. Start a web browser on the computer and enter the host name of the device into the URL, e. g. “http://dp_000007”.

For further information, please see chapter ↗ *Network, page 48*.

Note

For communicating with *ibaBM-DP* via Ethernet (only relevant in compatibility mode 32Mbit), the following TCP port is being used in *ibaPDA*, which possibly has to be released in a firewall in the network.

ibaPDA-PC --> ibaBM-DP, Port **999**.

9.2.2 USB interface

The USB interface is located at the bottom of the device and can also be used for accessing the web interface.

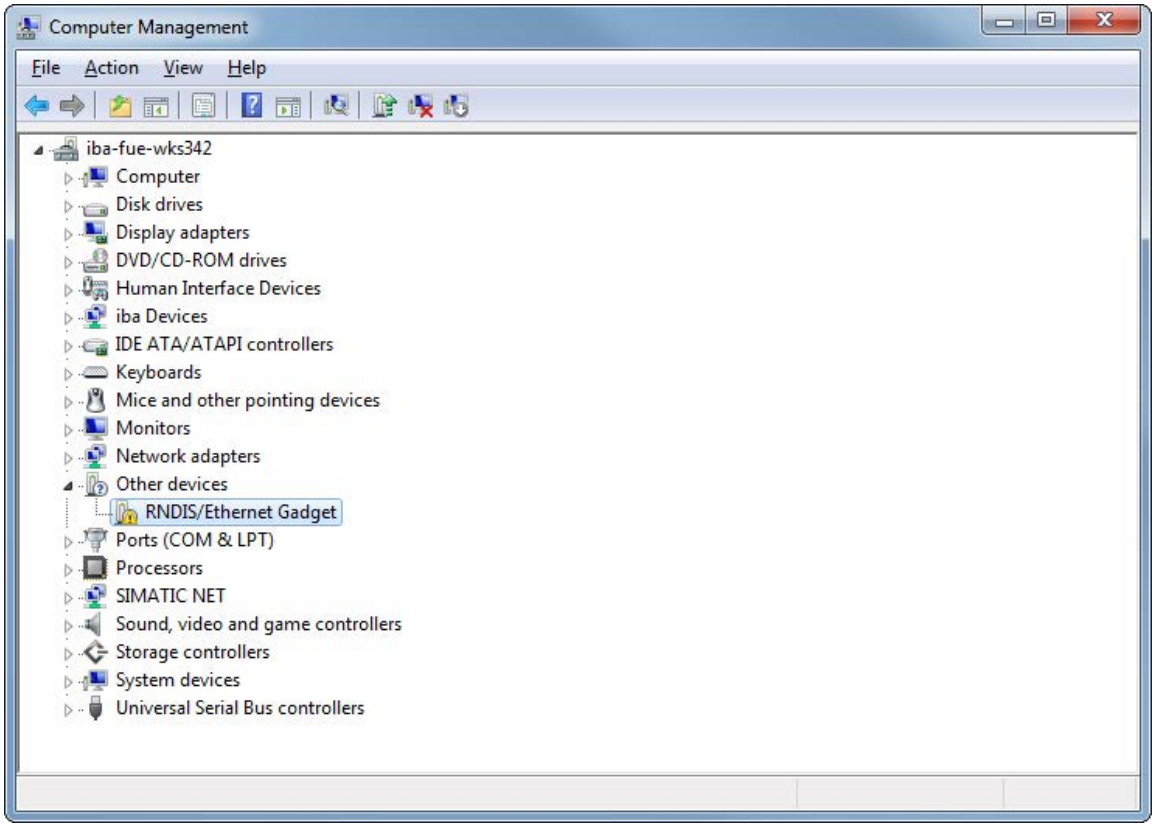
To set up access via the USB interface, you need the driver files from the "iba Software & Manuals" data storage medium. In the directory `02_iba_Hardware\ibaBM-DP\01_USB_Driver\` you will find drivers for Windows XP, Windows 7 or Windows 8/8.1 and Windows 10.

1. Connect the computer or laptop to the USB interface of the device via a standard USB cable.
2. Open the device manager.

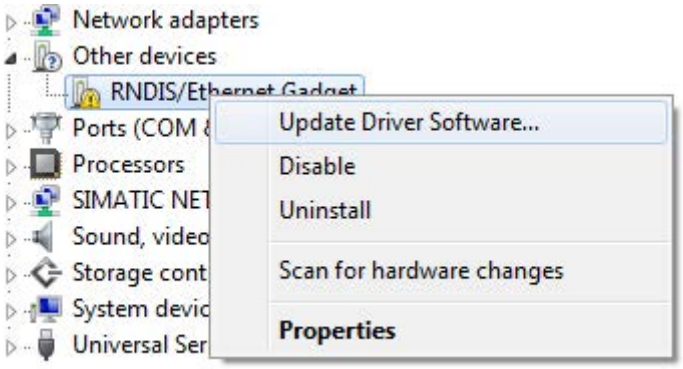
   A new device is displayed: Depending on the Windows version in different sections and with different names:

   - Windows XP: "RNDIS/Ethernet Gadget" under "Network adapters"

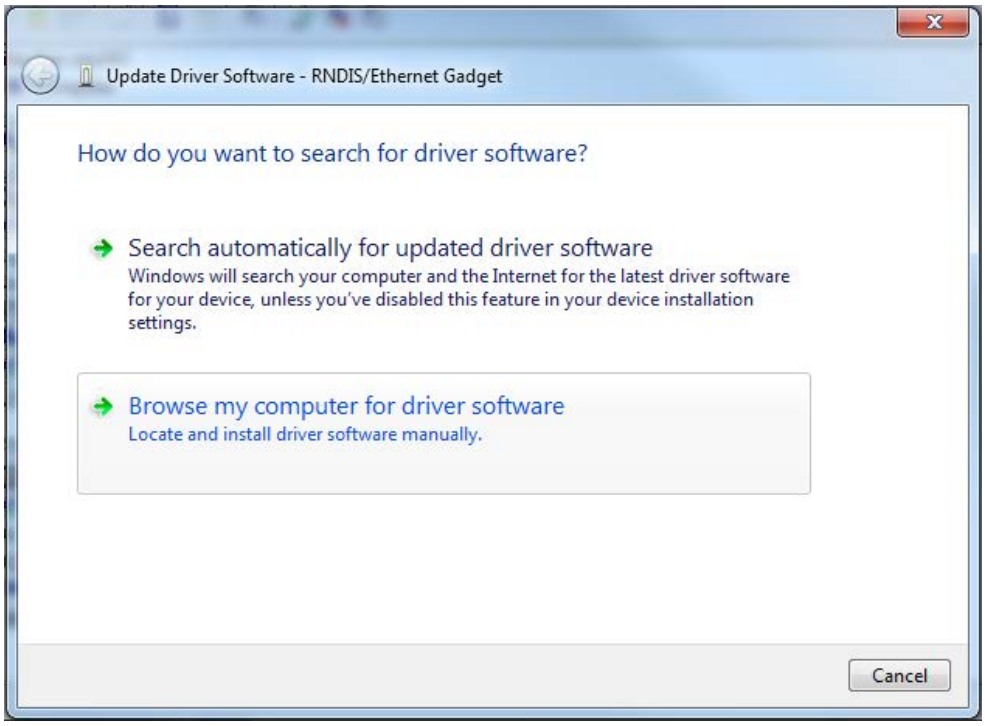
- Windows 7: "RNDIS/Ethernet Gadget" under "Other devices"
- Windows 10: "Serial USB device" under "Ports (COM & LPT)".



3. Mark the device.
4. Right-click to open the submenu and select *Update Driver Software...*.

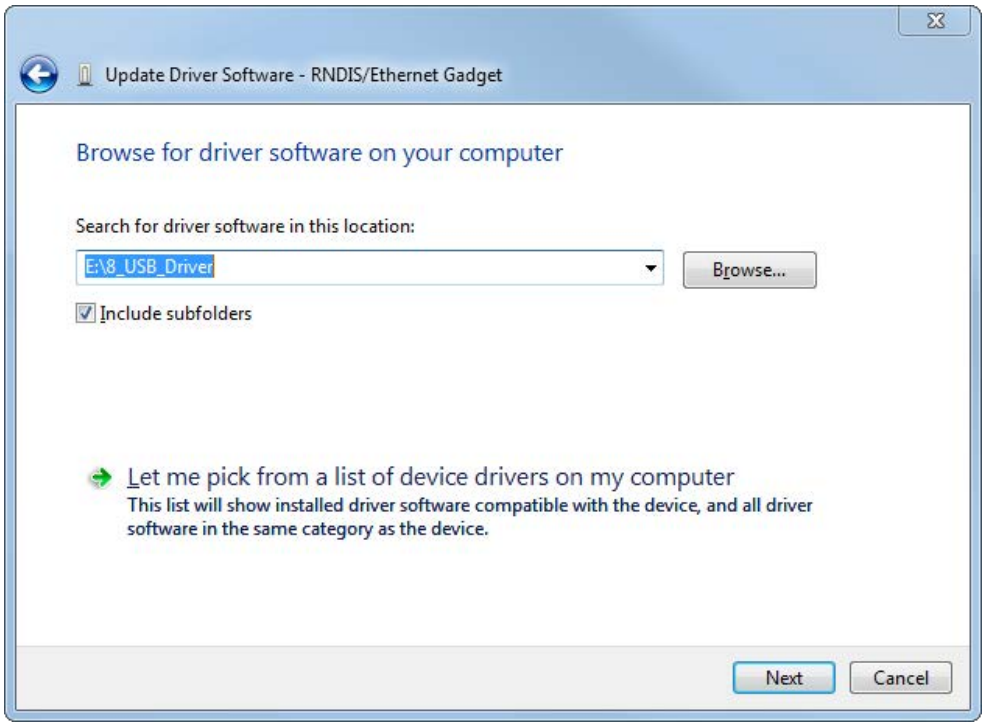


5. In the following dialog, select *Browse my computer for driver software* and tap <Next>.

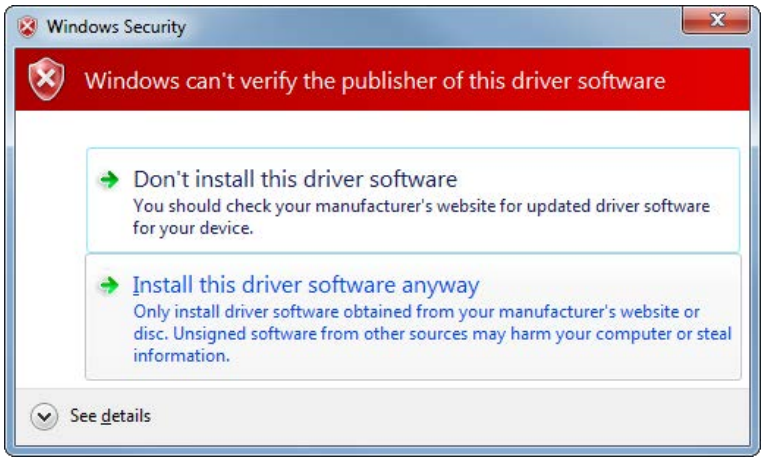


6. Insert the data medium “iba Software & Manuals” (included in delivery) and click on <Browse> in the following dialog.

   Select the directory with the drivers: `02_iba_Hardware\ibaBM-DP\01_USB_Driver\`



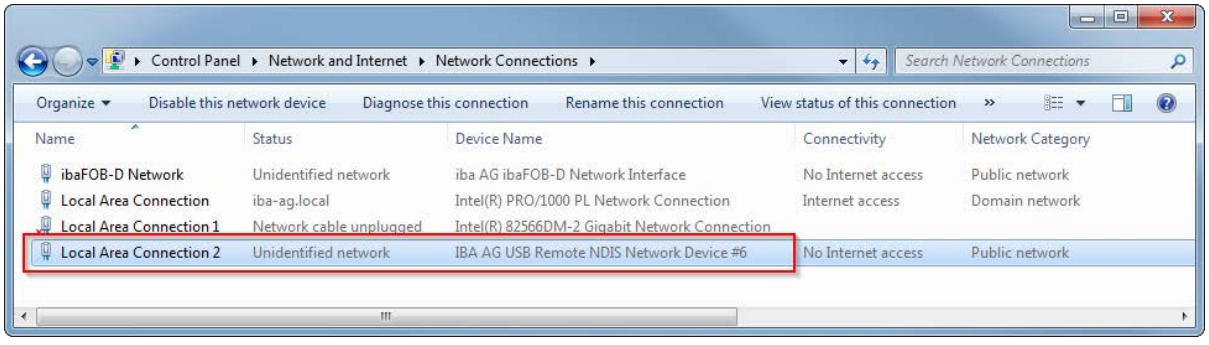
7. Select *Install this driver software anyway* at the Windows security notice.



→ When the driver installation has been finished successfully, the following message is shown.

8. To check, open the overview of network adapters via *Control Panel – Network and Sharing Center – Change adapter settings*.

→ A new network adapter of the type "IBA AG USB Remote NDIS Network Device" should be displayed. ibaBM-DP assigns automatically a suitable IP address to the new network adapter from the subnet 192.168.0.x using DHCP.

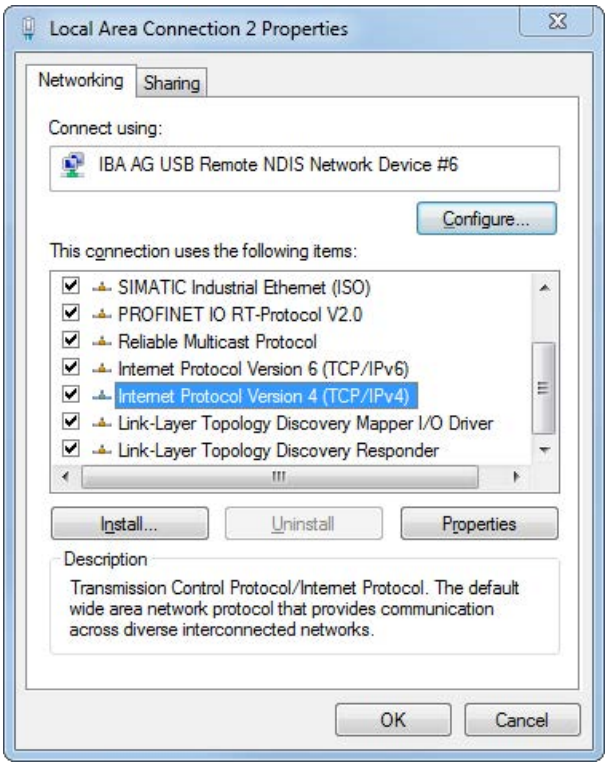


9. To access the web interface of the ibaBM-DP, start your web browser and enter the address "http://192.168.0.1".

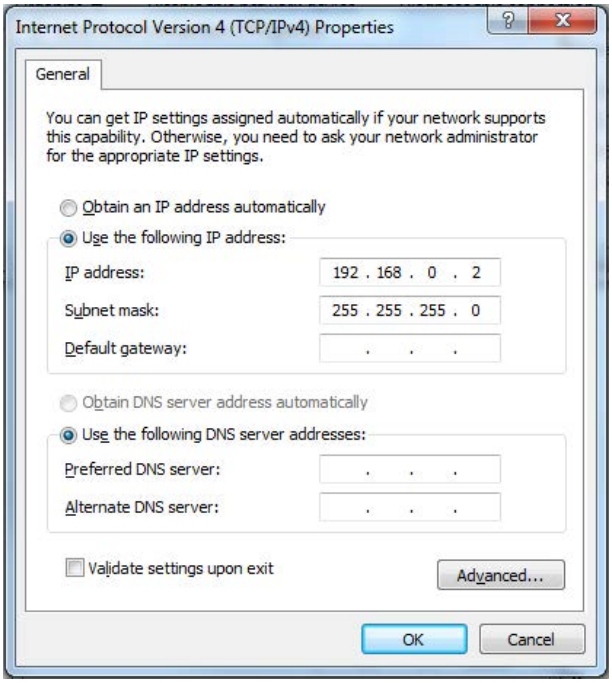
10. If there are connection problems, the IP address allocation with DHCP may not work properly. If this is the case, assign manually an IP address to the new network adapter "IBA AG USB Remote NDIS Network Device".

    Open the dialog for the properties of the network adapter with the right mouse button.

Mark the entry "Internet protocol Version 4 (TCP/IPv4)" and click on <Properties>.



→ A new *Internet Protocol Version 4 Properties* dialog opens.



11. Select *Use the following IP address* and enter an address in the *IP address* field which belongs to the same subnet like the fixed IP 192.168.0.1 of the USB interface of *ibaBM-DP*. This can be e. g. the address "192.168.0.2". Under "Subnet mask", you have to enter "255.255.255.0".
12. End the dialog by clicking on <OK> and the preceding dialog with <Close>.
13. Now, try to open the web interface of the device with your web browser again. Enter the address “http://192.168.0.1” in the web browser.

Note

The USB interface of *ibaBM-DP* has the fixed IP address 192.168.0.1. This address cannot be modified.

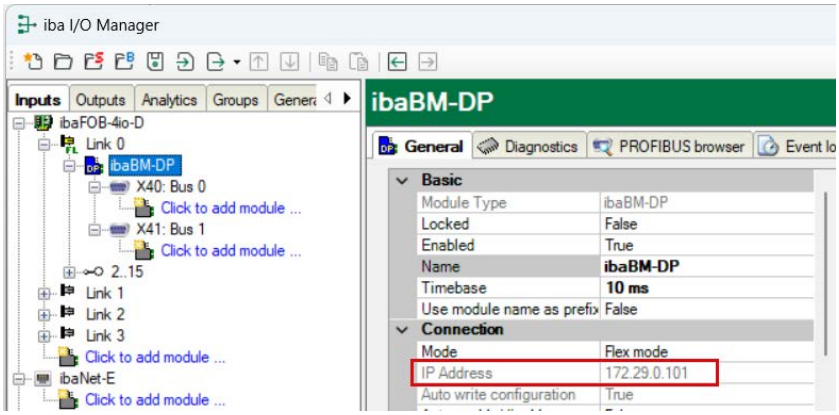
The web interface in the browser can only be opened with the address http://192.168.0.1. The host name cannot be resolved via the USB interface.

9.3 Web interface

9.3.1 Accessing the web interface

Prerequisite: Your computer is connected to *ibaBM-DP* via 32Mbit Flex, Ethernet or USB.

1. Start your web browser.
2. Enter one of the following URL:

If connected via …	Then URL …
32Mbit Flex	IP address, that appears in the I/O Manager of *ibaPDA* on the *General* tab in the field *IP Address*, when the device has been configured or detected automatically. In the example below "http://172.29.0.101"  The device name cannot be resolved.
Ethernet TCP/IP interface	IP address of the device, e. g. “http://192.168.1.1” or device name “http://dp_xxxxxx” or “http://dpms_nnnn”
USB interface	Fixed IP address of the device: “http://192.168.0.1” The device name cannot be resolved.

Note

IP address in 32Mbit Flex mode

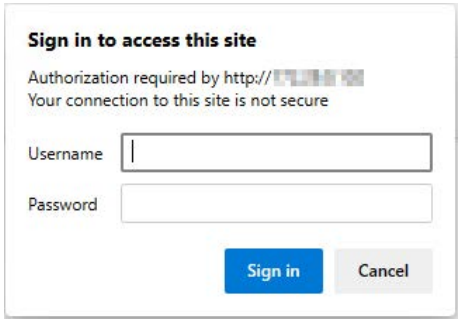
The IP address which is assigned automatically in 32Mbit Flex mode, consists of 4 positions, e.g. 172.29.0.101.

The first two positions (172.29) are equivalent to the IP address of the *ibaFOB-D* network adapter, the third position (0) corresponds to the number that is displayed in the display of the *ibaFOB-D* card in the computer + link number the device is connected to. The fourth position (101) is the device address selected on the rotary switch S2 +100.

Tip

In case you use the Internet Explorer as browser, it might be necessary - depending on the security level of the Internet Explorer - to enter the address “http://dp_xxxxxx” or - depending on the way of access - the IP based URL as a trusted website.

The *Network*, *Settings* and *Administration* pages can only be accessed by administrators and are protected by a password.



Factory settings for the user account:

User name	admin
Password	1234

Only experienced users should have access, in order to prevent an accidental change of the settings. An unintentional change of the network parameters can have as consequence that an access to the device via Ethernet is not possible anymore and the device parameters have to be reset to the factory settings. Therefore, please change the password immediately, if possible. As characters, all numbers and letters in upper or lower case are allowed.

Tip

You can reset the password together with the device settings to the factory settings, e. g. if you have forgotten a password. For further information, see chapter
↗ *Push button S10*, page 23

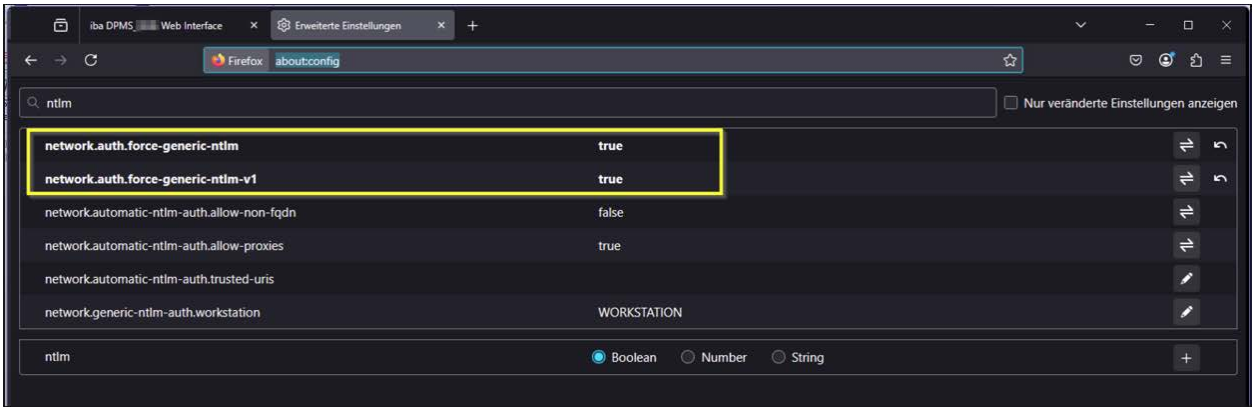
Accessing the web interface using Windows 11

If you are using Windows 11, you may be repeatedly asked to re-enter your user ID credentials when you attempt to enter them.

Remedy in Firefox

Change the settings in Firefox as follows:

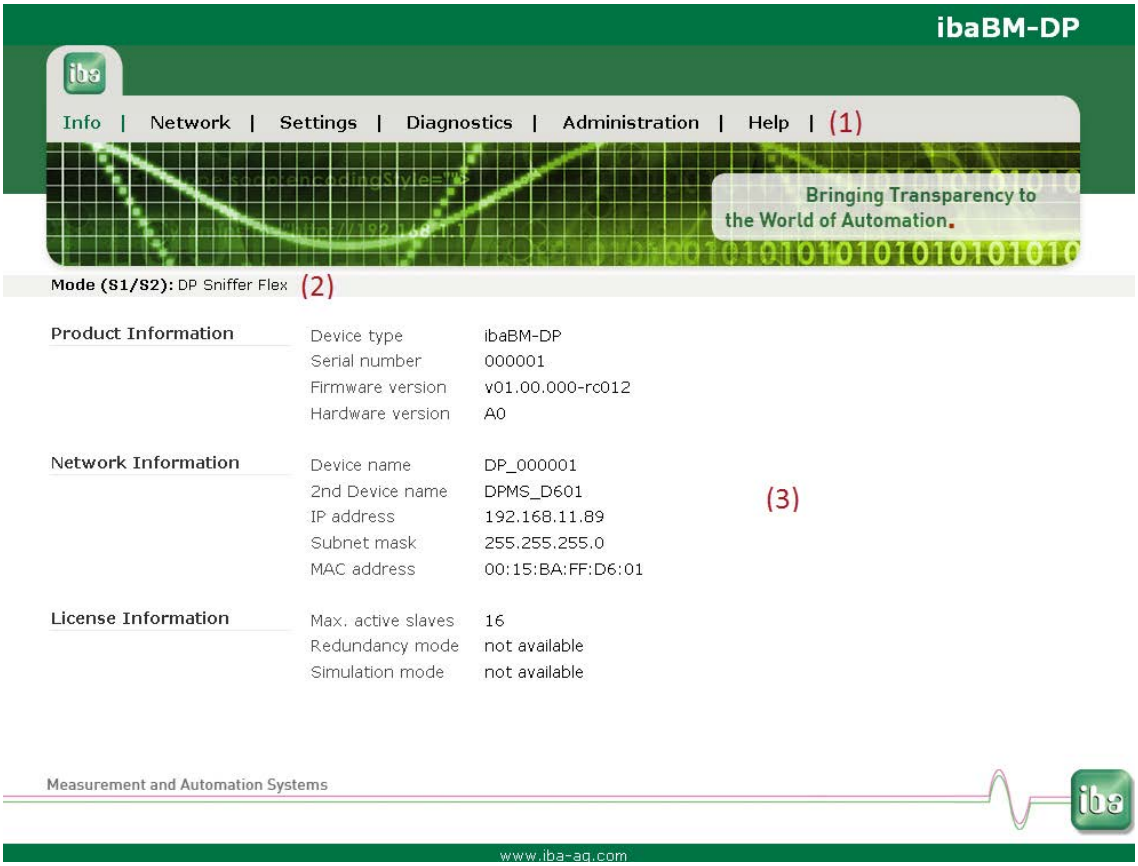
1. Enter “about:config” in the address bar of Firefox.
2. Search for „ntlm“.
3. Set the following setting to true: *network.auth.force-generic-ntlm* and *network.auth. force-generic-ntlm-v1*:



Note

iba AG recommends using the Firefox browser, as not all browsers support this function.

9.3.2 Info – Homepage



The basic structure is the same for the webpages:

(1) Navigation field for selecting the webpages. The webpage currently displayed is marked in green.

(2) In the status bar, the currently selected operating mode is shown. The status bar is updated automatically.

(3) Display area for detailed data, depending on the page selected in the navigation field.

Note

For ensuring that the status bar is updated automatically, the web browser has to allow for the execution of JavaScript.

You find an overview of the most important device data on the *Info* page:

Product Information
serial number of the device, installed firmware version, hardware version

Network Information
device names in the network, current IP settings of the Ethernet interface

License Information
currently available licenses

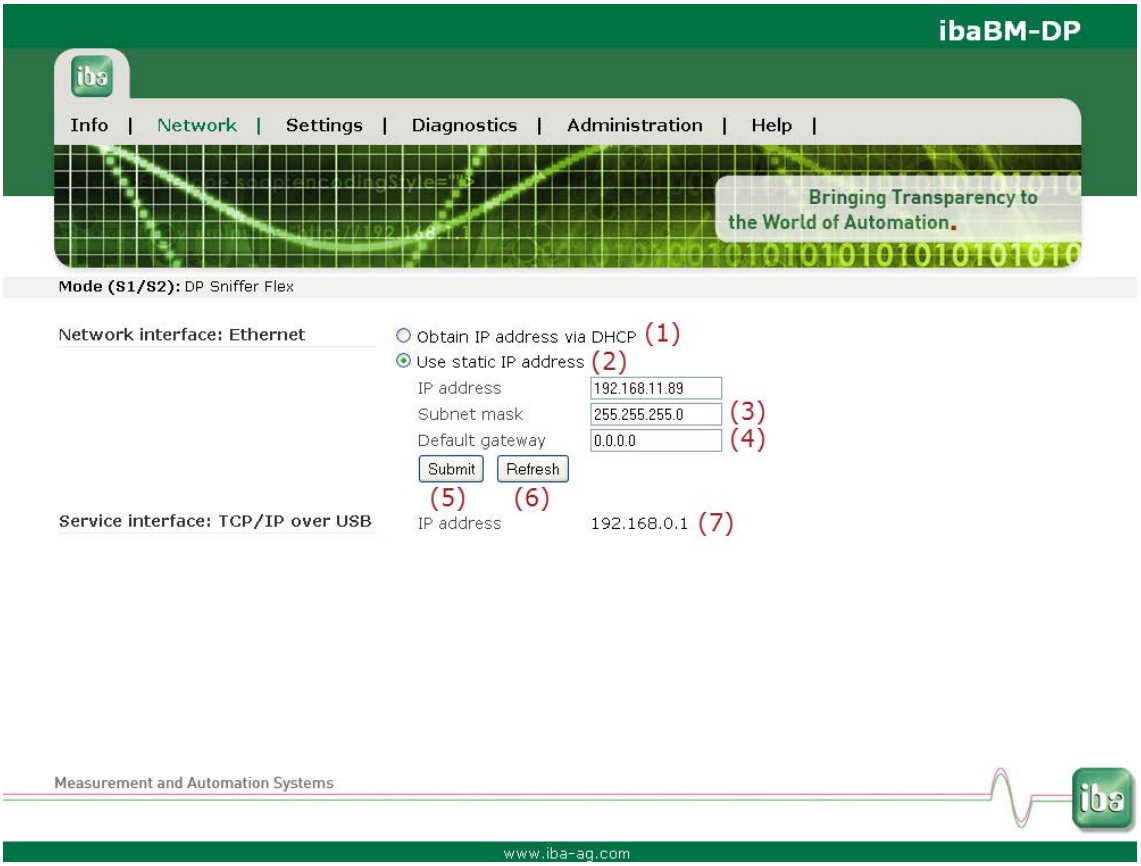
9.3.3 Network

This *Network* page can only be accessed by the "admin" user.

This page shows both network adapters of the device:

Network interface: Ethernet
Describes the settings of the LAN interface X22.

Service interface: TCP/IP over USB
Describes the settings of the USB connection type X12.



(1) If selected, a DHCP server available in the network is used.

(2) If selected, a fixed IP address is used.

(3) The *Subnet mask* suitable for the network.

(4) Specification of the *Default Gateway*. In case no gateway is used, enter “0.0.0.0”.

(5) With the <Submit> button, the entries for the network interface "Ethernet" are stored in the device.

(6) With the <Refresh> button, the display of the entries can be updated (e. g. relevant for DHCP).

(7) Fixed IP address of the USB connection that cannot be changed.

Note

Ask your network administrator for an IP address suitable for your network.

The following IP addresses are not permitted:

- 0.0.0.0
- broadcast: 255,255,255,255
- Localhost-addresses (also known as loopback addresses): 127.0.0.0 to 127.255.255.255
- Multicast addresses 224.0.0.0 to 239.255.255.255 (224.0.0.0/4)

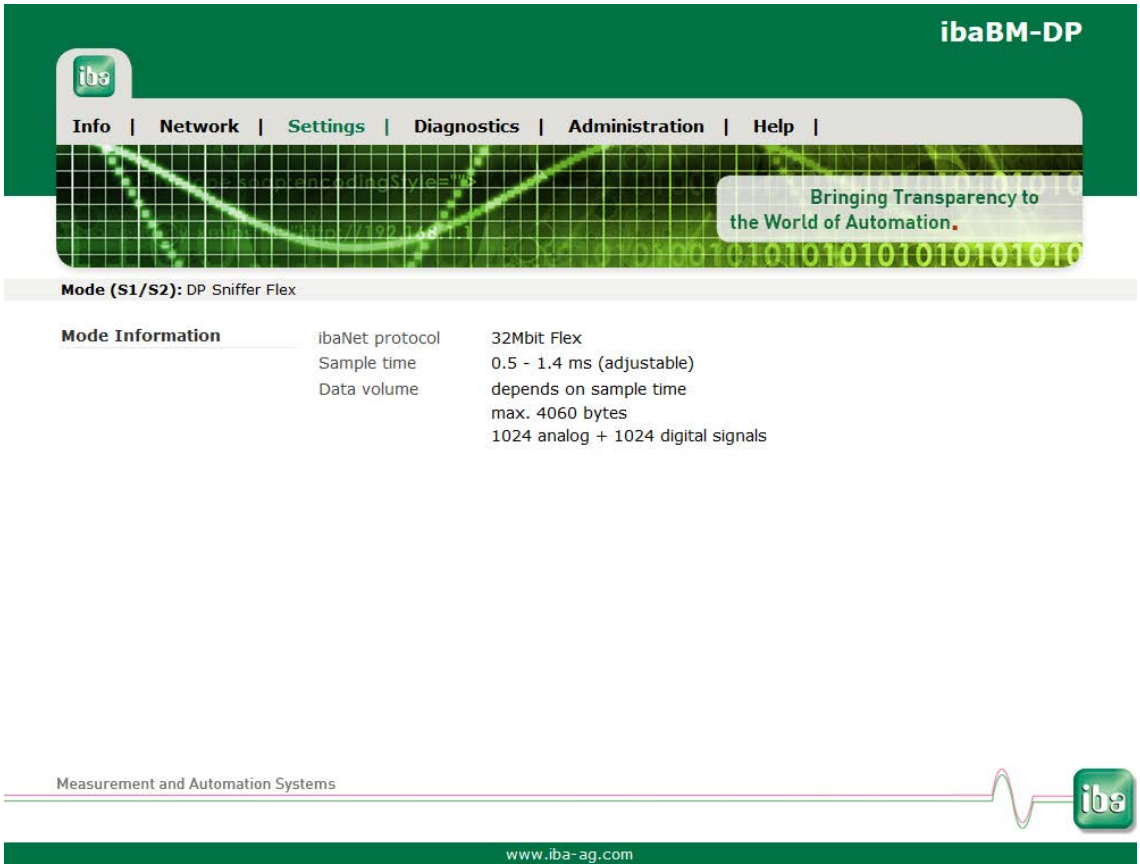
For the IP address, the "standard IPv4 dotted-decimal format“ without a leading zero is used. If you have entered any leading zeros, they will be automatically eliminated as soon the IP address is being accepted.

Tip

If you make incorrect entries, there is a risk that you will no longer have access after the restart. You can reset the network parameters together with the device settings to the factory settings. For further information, see chapter ↗ *Push button S10*, page 23

9.3.4 Settings

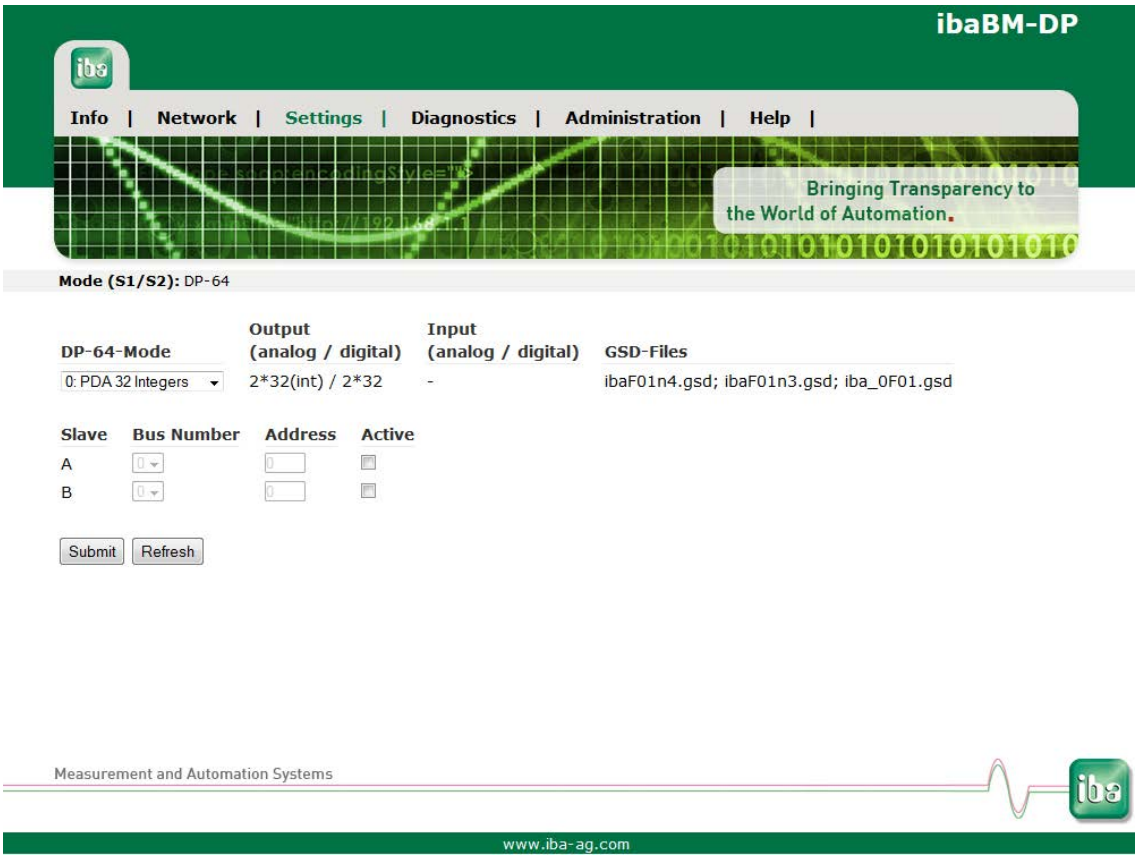
This *Settings* page can only be accessed by the "admin" user. Depending on the selected mode, current device settings are displayed on this page.



When compatibility mode 3Mbit, P2P mode or mapping mode are selected, further detail settings must be done here.

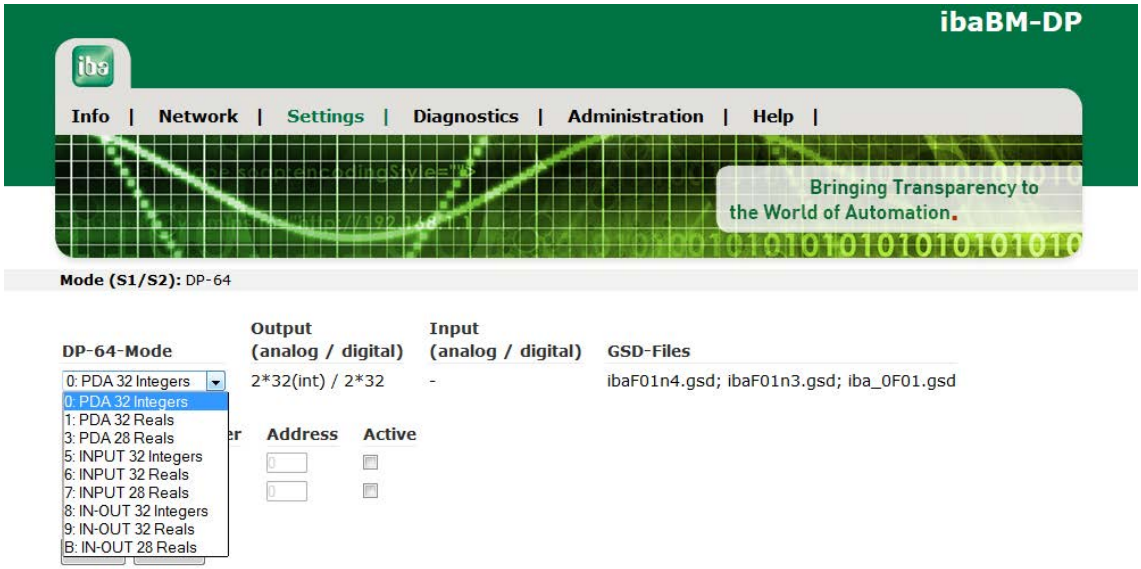
9.3.4.1 Compatibility mode 3Mbit (DP-64 mode)

The following figure shows the *Settings* page with the 3Mbit compatibility mode (DP-64 mode).



In this mode, further settings must be made on the *Settings* page.

Select the desired operating mode in the DP-64-Mode selection list. The mode names correspond to those described in chapter ↗ *Operating modes overview, page 143*.

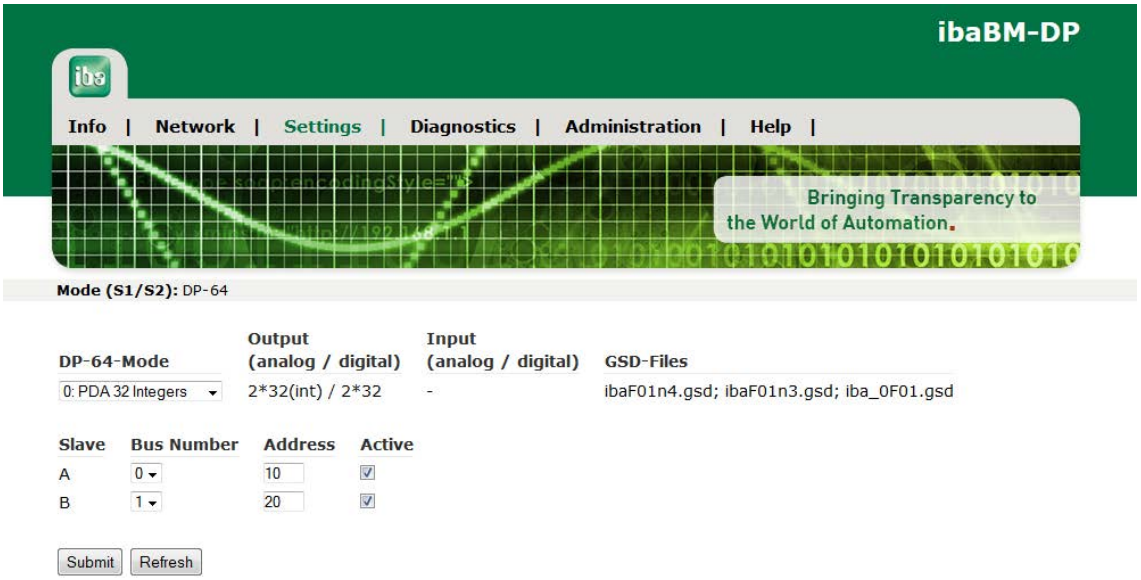


Make sure that the two slaves are assigned to the correct bus line (bus 0 – connector X40, bus 1 – connector X41). Enter the slave address for each slave, as they are given in DP project engineering. The allowed address range reaches from 0 to 126.

Note

You can deactivate the slave with the checkbox *Active*.

In the following example, the first slave with the PROFIBUS address 10 is activated on bus 0, the second slave with the address 20 is activated on bus 1. The FO interface is set to "0: PDA 32 Integers“ mode. This means, that each of both slaves has an output range for 32 analog signals (Integer) and 32 digital signals. The data is transferred via the FO interface to e. g. *ibaPDA*.



Use the <Submit> button to save the settings in the device.

Use the <Refresh> button to refresh the settings display.

For further information about DP-64 mode, please see chapter .↗ *Compatibility mode 3Mbit (DP-64 mode), page 140*

9.3.4.2 P2P mode

In the P2P mode, the following settings can be configured in the *Settings* page:

Transmission mode
The P2P mode uses the 32Mbit *ibaNet* protocol. In the transmission mode field, you define how this protocol is assigned. You can choose from the following transmission modes:

- 4: 1024 Integer + 1024 Digital in 800 µs
- A: 512 Real + 512 Digital in 800 µs
- C: 2872 bytes in 1000 µs

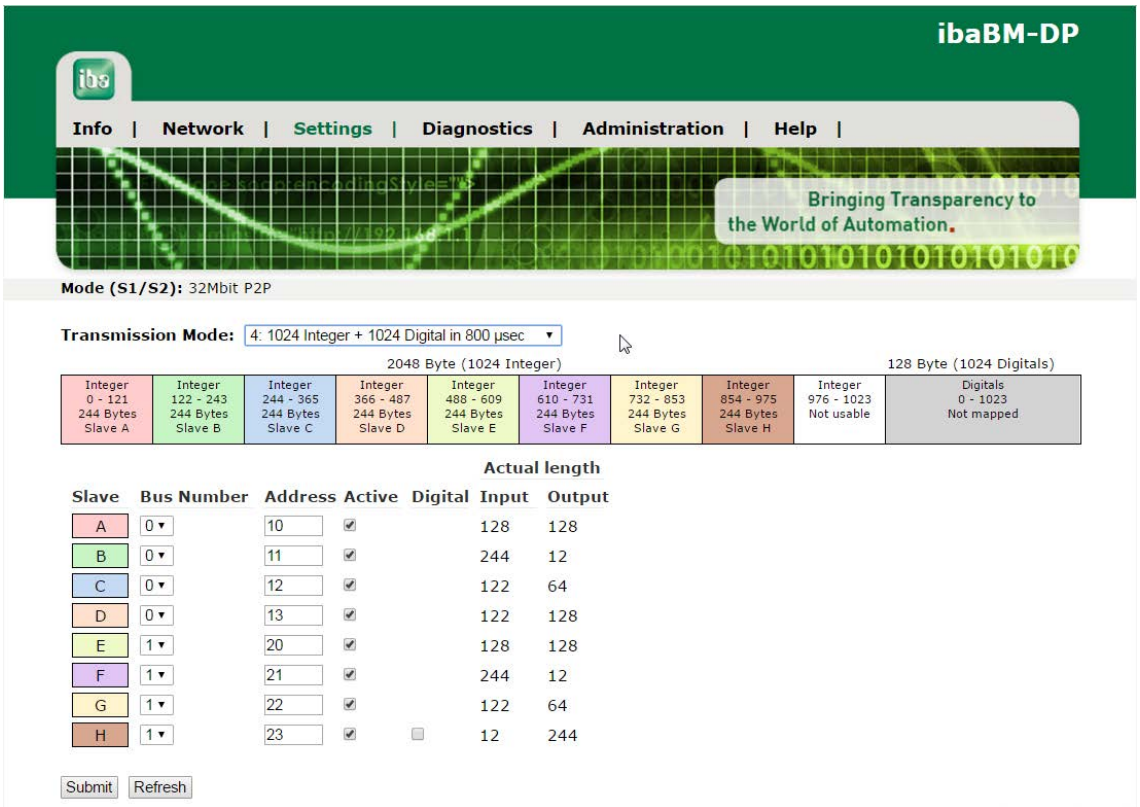
The setting has to correspond with the setting in the 32Mbit communication partner (e. g. *ibaLink-VME*).

For each slave: bus number, address and active
The data from the *ibaNet* telegrams are mapped in send and receive direction on up to 8 slaves (A - H). For each slave, you can choose, on which bus it is to be activated, which PROFIBUS address should be assigned and if you want to use this slave at all.

Digital
The Slave H can be used in the transmission modes 4 and A, either for the analog value range or the digital value range. If you want to use the slave H for the digital values, then activate the "Digital" setting.

Submit
You activate changed settings by clicking on <Submit>.

Refresh
With a click on <Refresh>, the mask will be updated.



The colored bar visualizes the mapped data from the ibaNet-telegram. The mapping of the data is always identically for both directions.

	Mode		
	4: 1024 Integer + 1024 Digital	**A: 512 Real + 512 Digital**	**C: 2872 bytes**
Slave A	Integer 0 – 121	Real 0 -60	Bytes 0 – 243
Slave B	Integer 122 – 243	Real 61 – 121	Bytes 244 – 487
Slave C	Integer 244 – 365	Real 122 – 182	Bytes 488 – 731
Slave D	Integer 366 – 487	Real 183 – 243	Bytes 732 – 975
Slave E	Integer 488 – 609	Real 244 - 304	Bytes 976 – 1219
Slave F	Integer 610 – 731	Real 305 – 365	Bytes 1220 - 1463
Slave G	Integer 732 – 853	Real 366 – 426	Bytes 1464 – 1707
Slave H	Integer 854 – 975 or digital values 0 - 1023	Real 427 – 487 or digital values 0 - 512	Bytes 1708 – 1951
Not to be used	Integer 976 - 1023	Real 488 - 512	Bytes 1952 - 2872

Note

In total, the *ibaNet*-telegram always contains more data than can be mapped on 8 slaves (each with 244 bytes). This is why a part of the telegram cannot be used.

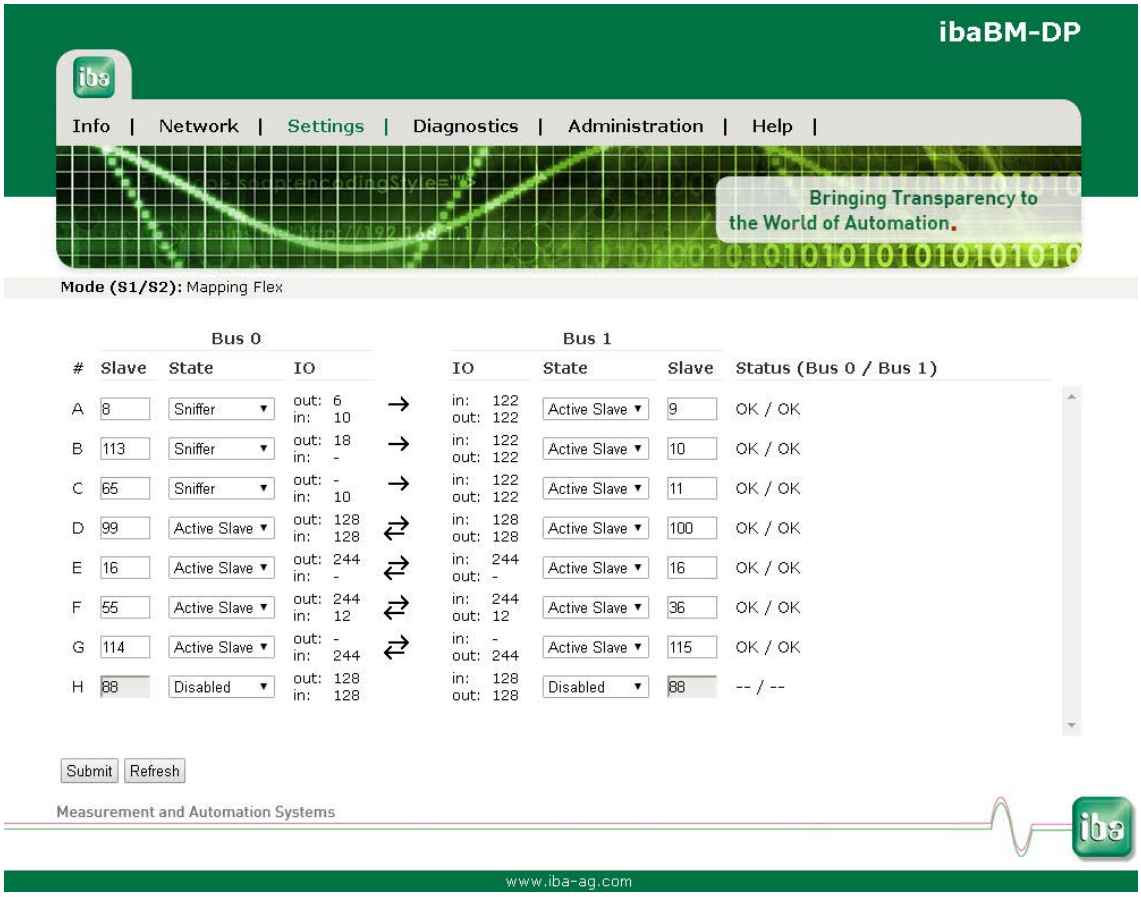
Under *Actual length* you can see the length of the inputs and outputs in the web dialog that has been detected for the respective slave. This corresponds to the configured length in the PROFIBUS configuration (e. g. Step 7 HWConfig).

Note

In the PROFIBUS configuration, there are limitations for the maximum length to be configured for the inputs and outputs. Under Step 7, for example, the sum of the configured inputs and outputs of a slave may not exceed a maximum length of 256 bytes.

9.3.4.3 Mapping mode

The mapping mode is completely configured via the web interface. *ibaPDA* is not required for using the mapping mode.



Up to 8 mapping assignments can be configured on the page (lines A - H). If the device has a license extension to use up to 16 slaves, up to 16 mapping assignments can be configured. In general two types of mapping assignments are possible:

- Sniffer / Active Slave

  On Bus0 the output data range of an existing slave is sniffed and this data is mapped (copied) to an active slave on Bus1. In this case data is transferred only from Bus0 to Bus1. It is not possible to configure a Sniffer on Bus1.

- Active Slave / Active Slave

  On Bus0 as well as on Bus1 an active slave exists. In both directions the respective output data range is mapped to the input data range of the assigned slave.

Settings and displayed data

Slave
Configure the address of the slave here. In case you use a sniffer this is the address of the existing slave you want to "sniff". When you use an "Active Slave" a slave with this address will be generated in *ibaBM-DP*.

State
Choose if you want to use a "Sniffer" or "Active Slave". Additionally you can choose "Disabled".

IO
The length of the output and input address range of the slave is automatically detected and shown here. The length is determined by the configuration of the slave using the corresponding GSD file.

Arrows
The arrows show in which direction data is exchanged with the current settings.

Status
Status information regarding the state of the bus system is shown here.

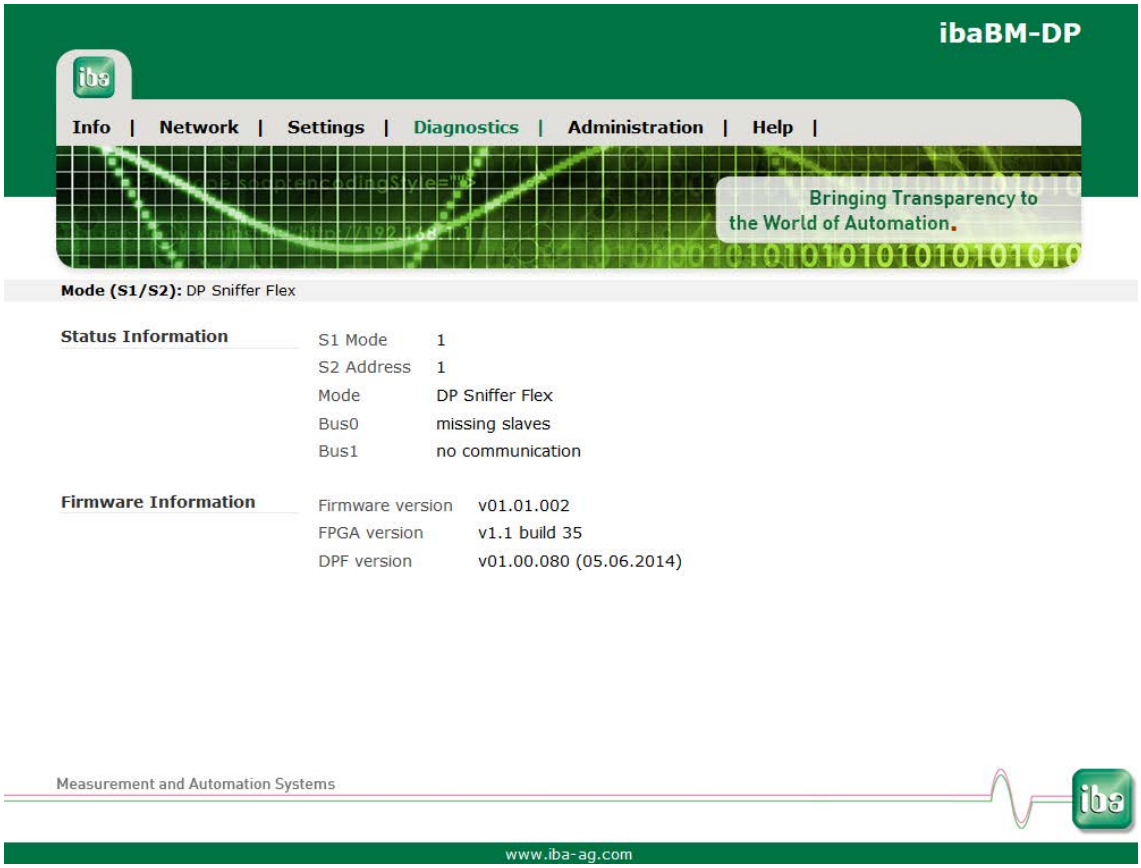
For configuration of the active slaves in your PROFIBUS configuration the GSD file "ibaDPMSi.gsd" is required. You find this file on the data storage medium "iba Software & Manuals" included in delivery in the directory `02_iba_Hardware\ibaBM-DP\02_GSD_Files\01_General\`.

Just configure the input and output ranges required for your application. The length of inputs and outputs do not have to match. If the output range is shorter than the input range, the remaining input range remains unused. Its data content is undetermined. When the output range is longer than the input range only the fitting output range is mapped. The remaining data is discarded.

Note

In the PROFIBUS configuration, there are limitations for the maximum length to be configured for the inputs and outputs. The maximum length of the output and input range in general is 244 bytes. Under Step 7, for example, the sum of the configured inputs and outputs of a slave may not exceed a maximum length of 256 bytes.

9.3.5 Diagnostics



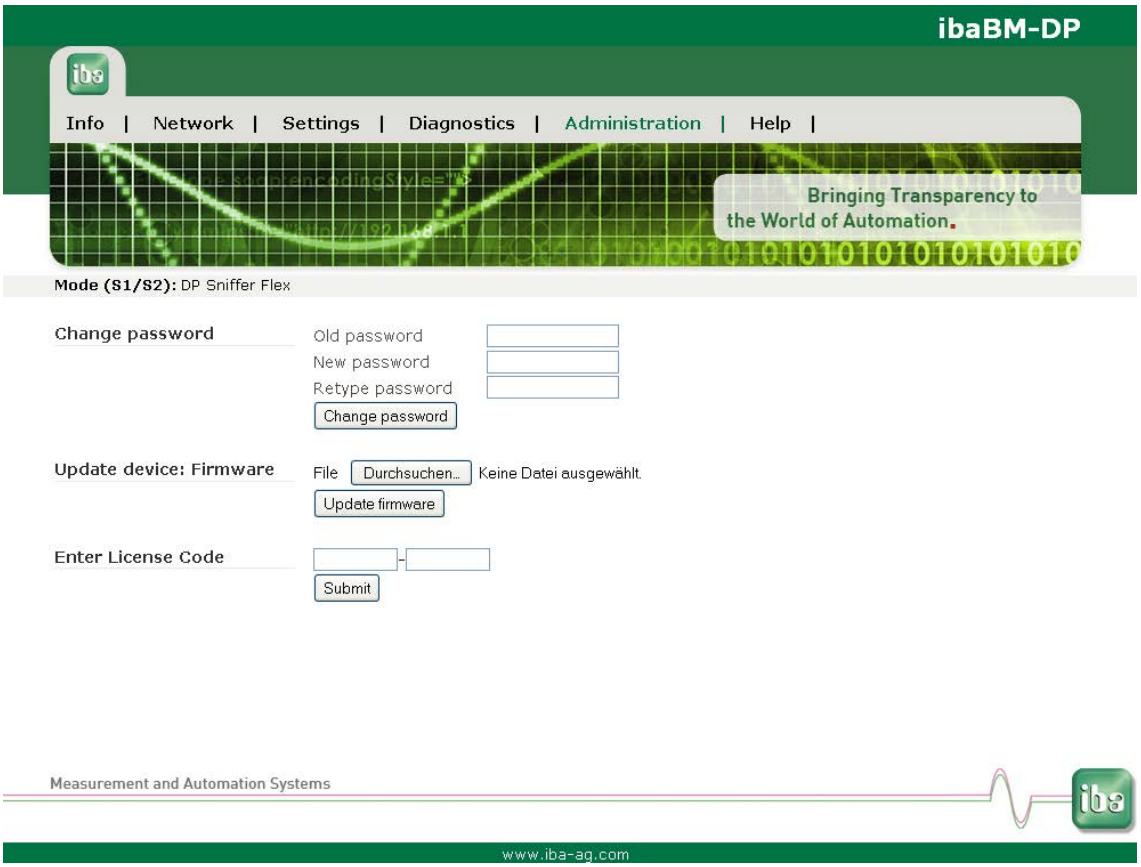
On the *Diagnostics* page, the following information is displayed:

- Settings of the rotary switches S1 and S2
- Selected operating mode
- Communication status of the PROFIBUS lines
- Firmware information

9.3.6 Administration

This *Administration* page can only be accessed by the "admin" user.

On the *Administration* page, the password can be changed for the administrator, new firmware can be loaded and additional licenses can be activated.



Change password

1. In case you want to change a password, enter it in the fields.

   For safety reasons, the previous password must be entered and the new password must be entered twice.

2. Tap on <Change password>.

→ The changes are applied.

Firmware update

Note

If a firmware update should be needed, please contact the iba support. We then supply you with the files you need and further information about the update.

Tip

The firmware update can also be done in the I/O Manager of *ibaPDA* (see chapter ↗ *PROFIBUS browser, page 106*).

1. Tap on the <Browse...> button and choose the update file `dp_ v[xx.yy.zzz].iba`.
2. To start the update, tap <Update firmware>.

→ The progress of the update is shown in the status bar.

Note

The firmware update takes some minutes. When the update is running, the device must not be switched off! Otherwise, there is a risk that the device does not work anymore.

Activating licenses

Note

Licenses are always bound to a device, i.e. they are not portable between devices.

Tip

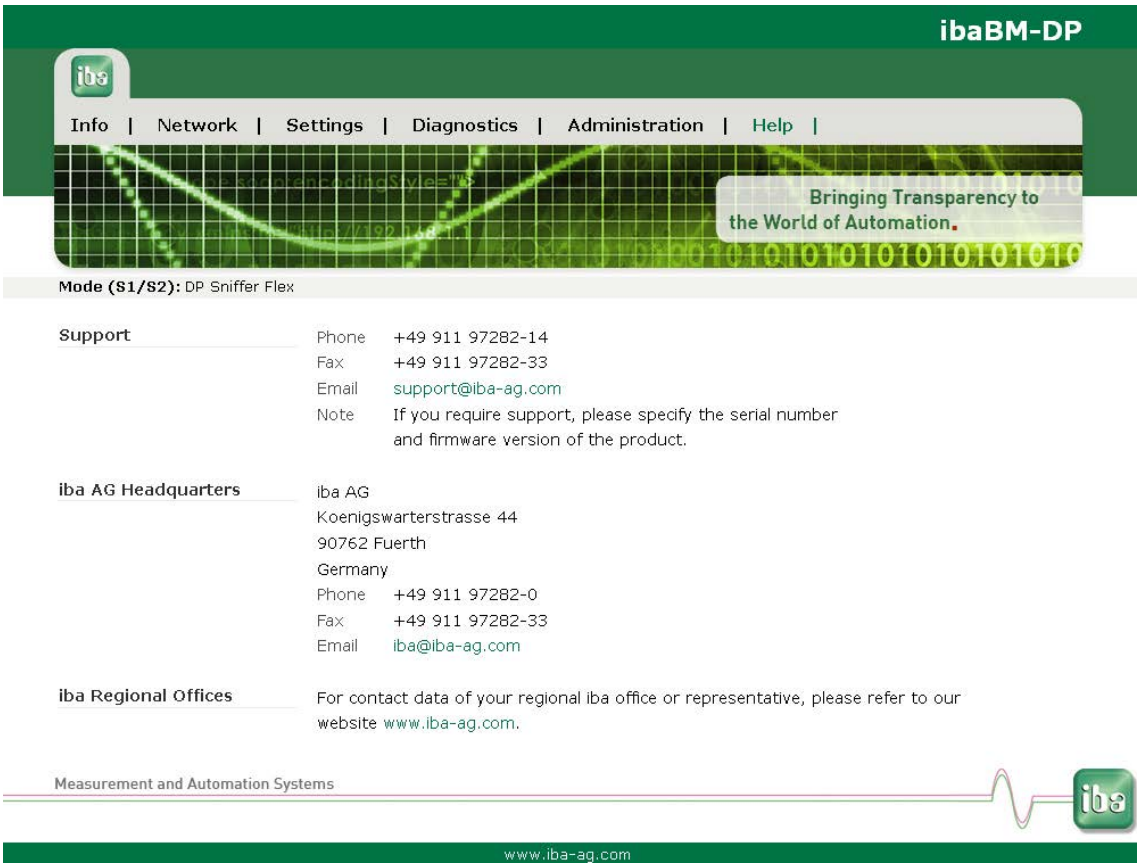
Activating an additional license is also possible via the I/O Manager in *ibaPDA*, see chapter ↗ *PROFIBUS browser, page 106*.

1. If you have purchased an additional license (redundancy, mirror or simulation mode), please enter in the *Enter Licence Code* fields the two numeric keys, iba has sent you.
2. Tap on the <Submit> button.

→ The device automatically detects which licenses are activated.

9.3.7 Help

The *Help* page contains important contact details for getting support for the device.



10 Configuration with ibaPDA

For measuring and recording data over *ibaBM-DP* in 32Mbit Flex mode, you need *ibaPDA* version 6.32.0 or higher.

For measuring and recording data over *ibaBM-DP* in compatibility mode 32Mbit, you need *ibaPDA* version 6.20.2 or higher.

For *ibaPDA* versions older than version 6.32.0, you can use the device module *ibaBM-DPM-S*. For further information on the *ibaBM-DPM-S* module, see the manual for "ibaBM-DPM-S" manual.

Caution

When changing the slave configuration of the *ibaBM-DP* device (add, delete active slaves or transferring them on another bus) during operation, this results in a temporal decoupling of the slaves from the PROFIBUS. The communication to the DP master is interrupted. If the PLC (e .g. SIMATIC S7®) is not secured by OBs, this will result in a stop of the PLC!

When changing addresses and data within slaves that have been already defined, there will be no disturbances in the PROFIBUS communication!

Attention

For preventing disturbances on the PROFIBUS, use for active slaves only free slave numbers that are not used by other devices!

10.1 First steps for the configuration in ibaPDA

By means of the following instruction, you learn how to integrate *ibaBM-DP* step by step into *ibaPDA* and how to configure measurement signals. The description refers to the **32Mbit Flex mode**, see chapters ↗ *Device setting 32Mbit Flex mode*, page 26 and ↗ *Data acquisition 32Mbit Flex*, page 29.

Special features and deviations that must be taken into account in 32Mbit compatibility mode can be found in chapter ↗ *Notes on the compatibility mode 32Mbit, page 70*.

Note

Make sure that 32Mbit Flex mode has been selected using the S1 and S2 rotary switches, see chapter ↗ *Device setting 32Mbit Flex mode*, page 26.

The basic device settings like network settings, passwords etc. should be done in advance via the web interface.

With *ibaPDA*, you can define the PROFIBUS slave addresses and configure analog and digital measurement signals. The following description refers to *ibaPDA* version 6.32.0 or higher.

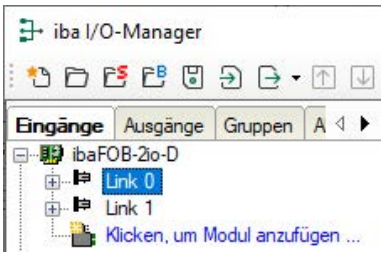
Preparation

1. Connect the device to a voltage source and switch on the device, see chapter ↗ *Indicating elements*, page 21.
2. Establish a FO connection between the TX connector of the device and a free RX input of an *ibaFOB-D* card as well as a FO connection between the RX connector and a free TX output of the *ibaFOB-D* card.

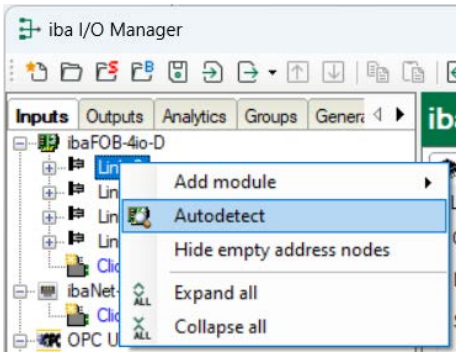
   The TX/RX connectors of the *ibaFOB-D* card belong together in pairs, i. e. you cannot use just any free TX/RX connectors.

   - Dark gray fibre optic connections are receiving RX inputs.
   - Light gray FO connections are transmitting TX outputs.
3. Start the *ibaPDA* client .
4. Open the I/O Manager .

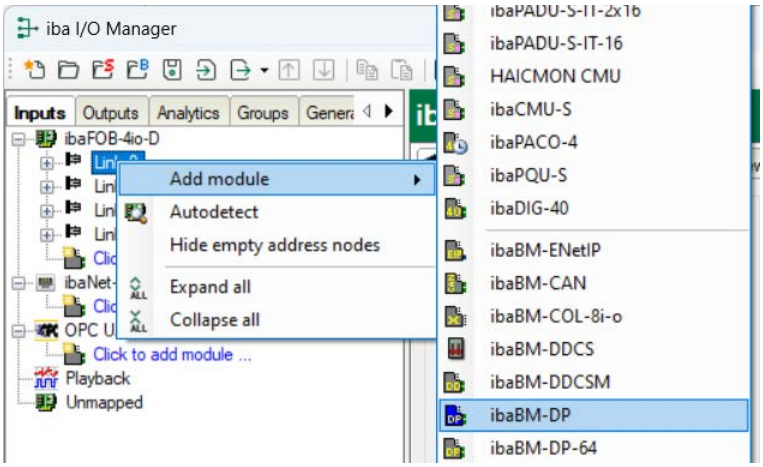
   On the left-hand side in the I/O Manager, the available system interfaces are displayed.
5. Choose the right *ibaFOB-D* card and mark the link, *ibaBM-DP* is connected to.



6. Click with the right mouse button on the link and select *Autodetect*.



   The device is identified automatically and displayed in the module tree. Depending on the Flex address (switch S2), the device appears at the respective address position 1-15. See also chapter ↗ *Device setting 32Mbit Flex mode*, page 26.
7. Optionally, you can also add the device manually. In this case select *Add module – ibaBM-DP* in the context menu.

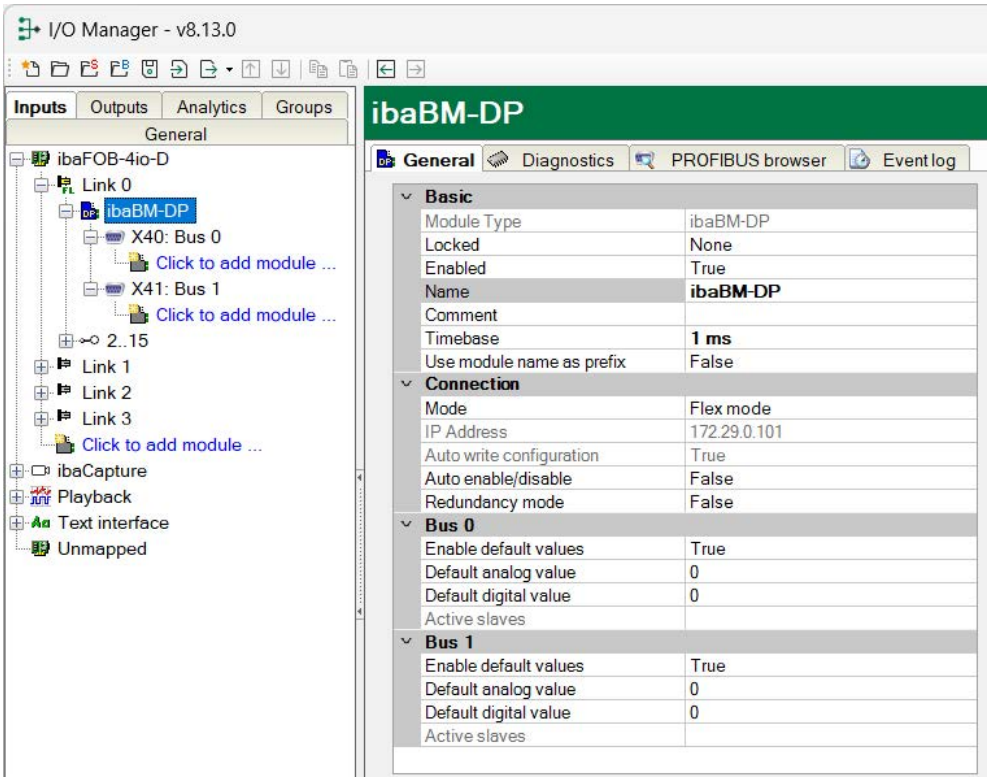


According to the selected Flex address (switch S2), the device has to be dragged to the correct address position using drag & drop. See also chapter ↗ *Device setting 32Mbit Flex mode*, page 26.

8. On the *General* tab define the parameters of *ibaBM-DP*.

   The following parameters are important:

   - *Name*: Assign a meaningful name to the connected device.
   - *Timebase*: Set the time base with which the device data is to be acquired in *ibaPDA*.

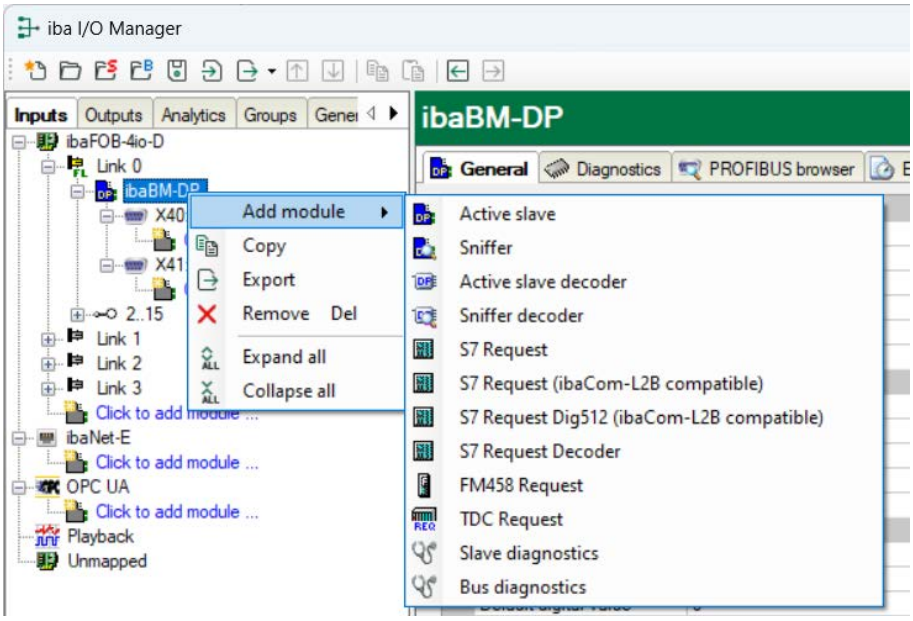


9. Decide whether *ibaBM-DP* should work with active slaves and/or only as a sniffer.

   If the device is to be connected with one or more active slaves to the PROFIBUS, you first have to configure the PROFIBUS on the PLC side for defining the slave numbers of the active slaves of the device, see chapter ↗ *Operation as active slave, page 125*.

Moreover, the PROFIBUS parameters of all participants are needed, you want to measure data from (slave no., length of inputs and outputs and data types). These are also needed for the pure sniffer operation.

10. Add a module under the “ibaBM-DP” device module. To do this, right-click on the “ibaBM-DP” device module and select in the desired module from the list via *Add module* from the context menu.



Optionally, for adding a module, you can also select the option "Click to add module..." marked in blue under the bus connection. Depending on the license, the following modules are available:

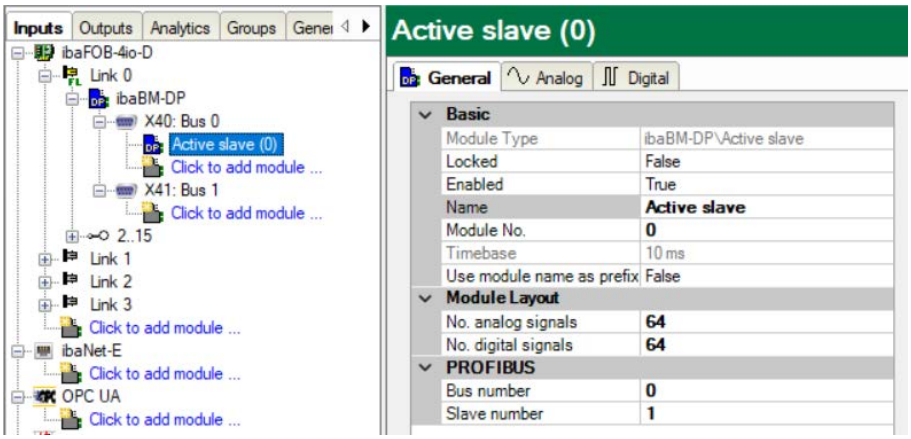
- Active slave, Sniffer, Active slave decoder, Sniffer decoder, Slave diagnostics, Bus diagnostics
- With additional *ibaPDA* license: S7 Request, S7 Request Decoder, FM458 Request, TDC Request.

  For information regarding these modules, please read the respective manuals.

Configure active slave ("Active slave" module)

With this module, you create a single active slave on *ibaBM-DP* to which the master of the PROFIBUS line can send data directly.

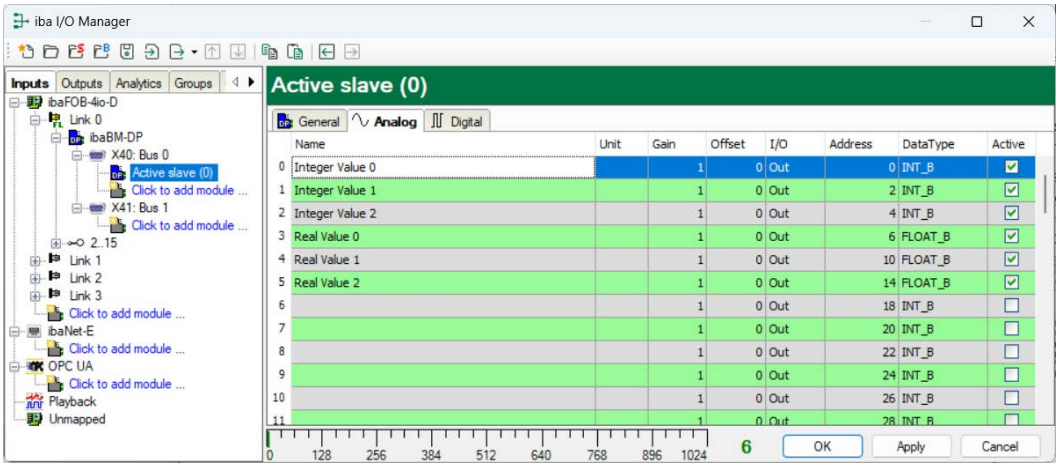
1. Enter the address of the slave (as parametrized in the configuration of the PLC) on the *General* tab under *Slave number*.
2. Under *Bus number* you can enter the PROFIBUS line (0: connector X40, 1: X41) on which the active slave is operated.



If you want to operate several active slaves, add more modules of the "Active slave" type.

For a detailed description of the "Active slave" module, please see chapter ↗ *Active slave module, page 86*.

3. On the *General* tab, enter the *No. analog signals* and the *No. digital signals* in the "Active slave“ module. The default setting is 64, a maximum of 512 analog and 512 digital signals can be assigned per module, a total over all modules of 1024 analog and 1024 digital signals. This value determines the length of the signal tables on the *Analog* and *Digital* tabs.
4. In the *Analog* tab, enter the signals you want to acquire in sequential order. Assign a name to each signal (*Name* column). In the *I/O*, *Address* and *Data type* column, define the information where the signal can be found in the interface of the slave.



Note

By clicking on the header of a column, all the settings in the rows below are filled in automatically.

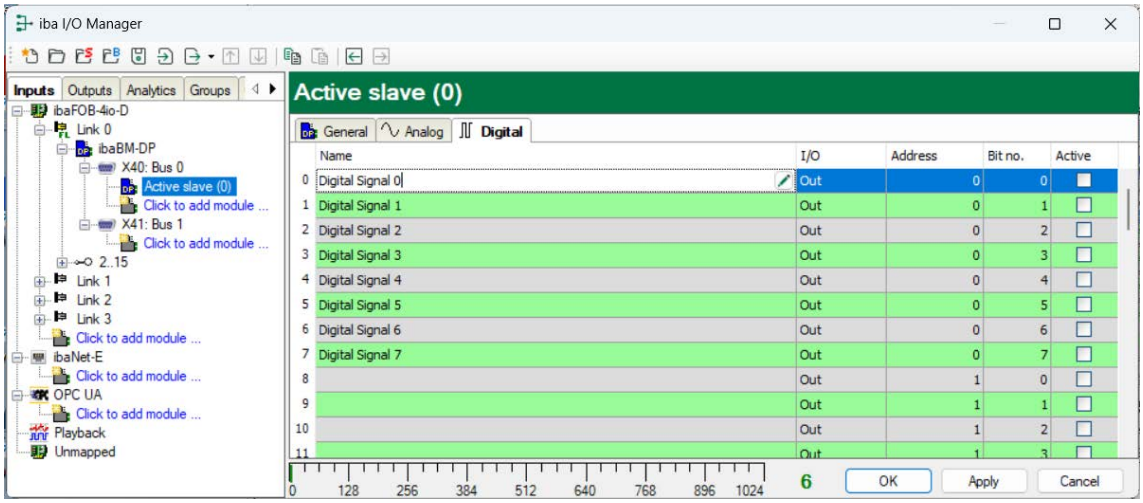
Examples:

- You want to set a different data type beginning with a certain row: Change the data type in the first concerned row, and click on the *Data type* header. The data type will be changed automatically in all lines below.
- If you want to have calculated the addresses automatically depending on the selected data type: Set the right address in the first row (usually 0) and then click on the *Address* header. Now, considering the selected data types, the addresses are filled in automatically in sequential order.

Similar functions are also available for the other columns.

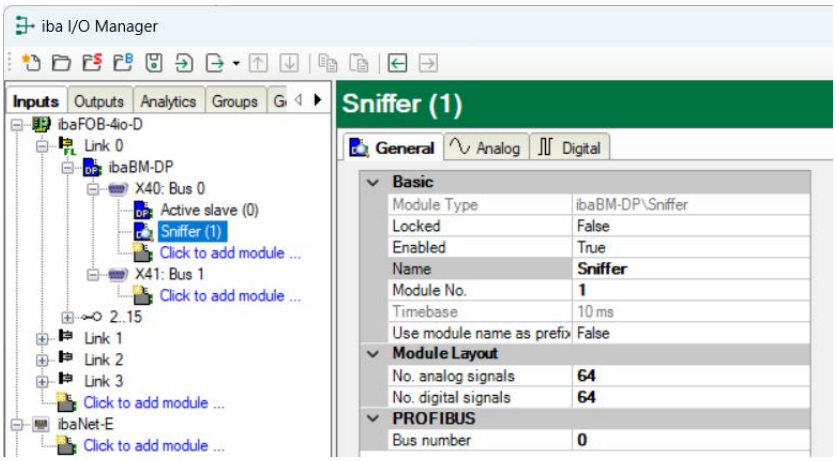
Thus, the project effort can be reduced.

5. If required, select a scaling value of the signals in the columns *Gain* and *Offset* for converting them into physical units.
6. For the digital signals on the *Digital* tab, proceed as described above. A data type is not defined. The address offset is given in 1-Byte-steps. The individual signals are addressed via the bit numbers 0 to 7.



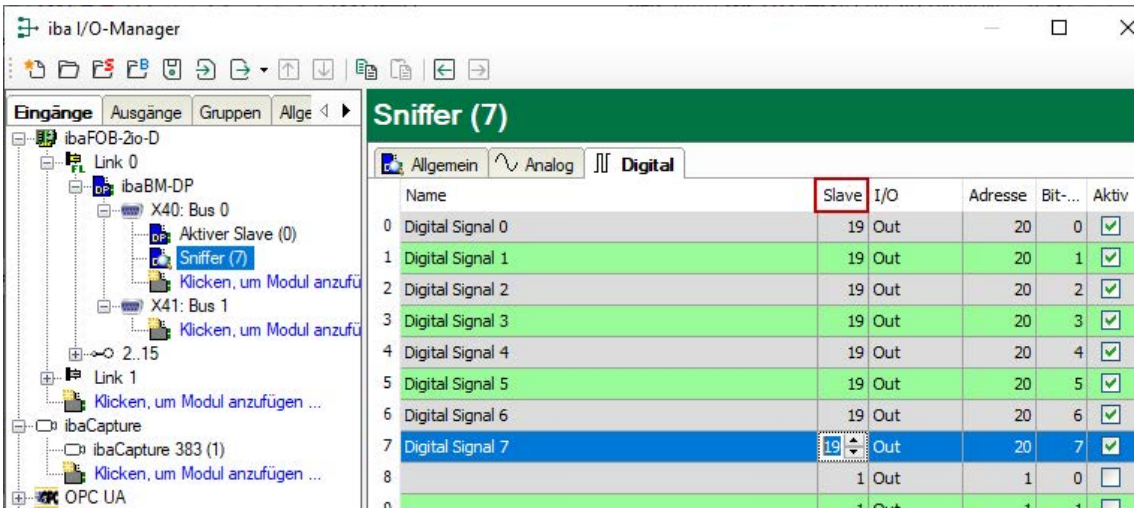
Sniffing on the PROFIBUS ("Sniffer" module)

With this module, you generate a sniffer on the bus that is able to record the existing telegram traffic between master and slaves within a PROFIBUS system.



For a detailed description of the "Sniffer" module, please see chapter ↗ *Sniffer module, page 81*.

1. Then enter the *No. analog signals* and the *No. digital signals* in the *General* tab. The default setting is 64, a maximum of 512 analog and 512 digital signals can be assigned per module, in total over all modules of 1024 analog and 1024 digital signals. This value determines the length of the signal tables on the *Analog* and *Digital* tabs.
2. The signals on the *Analog* and *Digital* tab are configured as for the "Active slave" module. In the *Slave* column, enter the slave number the data is to be captured from.



3. If required, select a scaling value of the signals in the columns *Gain* and *Offset* for converting them into physical units. For sniffing, in general a scaling is needed, as the data is transferred in a normalized way over the PROFIBUS to the slave.

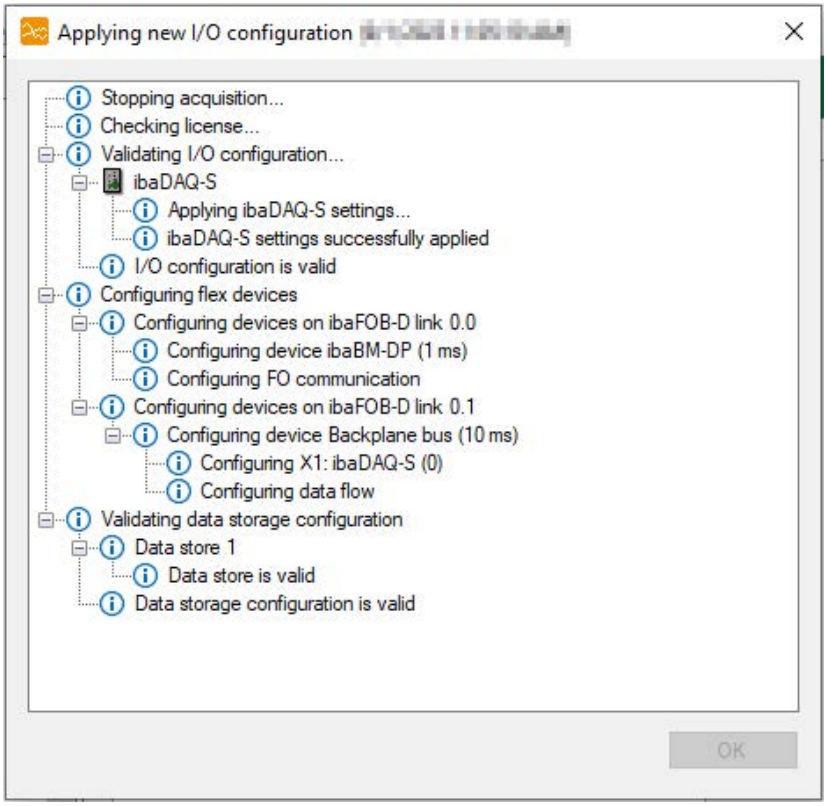
For example for a SIMATIC ET200 AO module, a +/- 10 V signal is transferred with the value range -27648 … 27648 (equals -10 V … +10 V). You find the physical meaning in the control program.

4. If a larger amount of digital signals has to be acquired, (e. g. status/control words of a large number of drives) the modules "Sniffer decoder" and "Active slave decoders" are a good solution. For a detailed description, please see chapters ↗ *Sniffer decoder module, page 90* and ↗ *Active slave decoder module, page 92*.

Complete and validate configuration

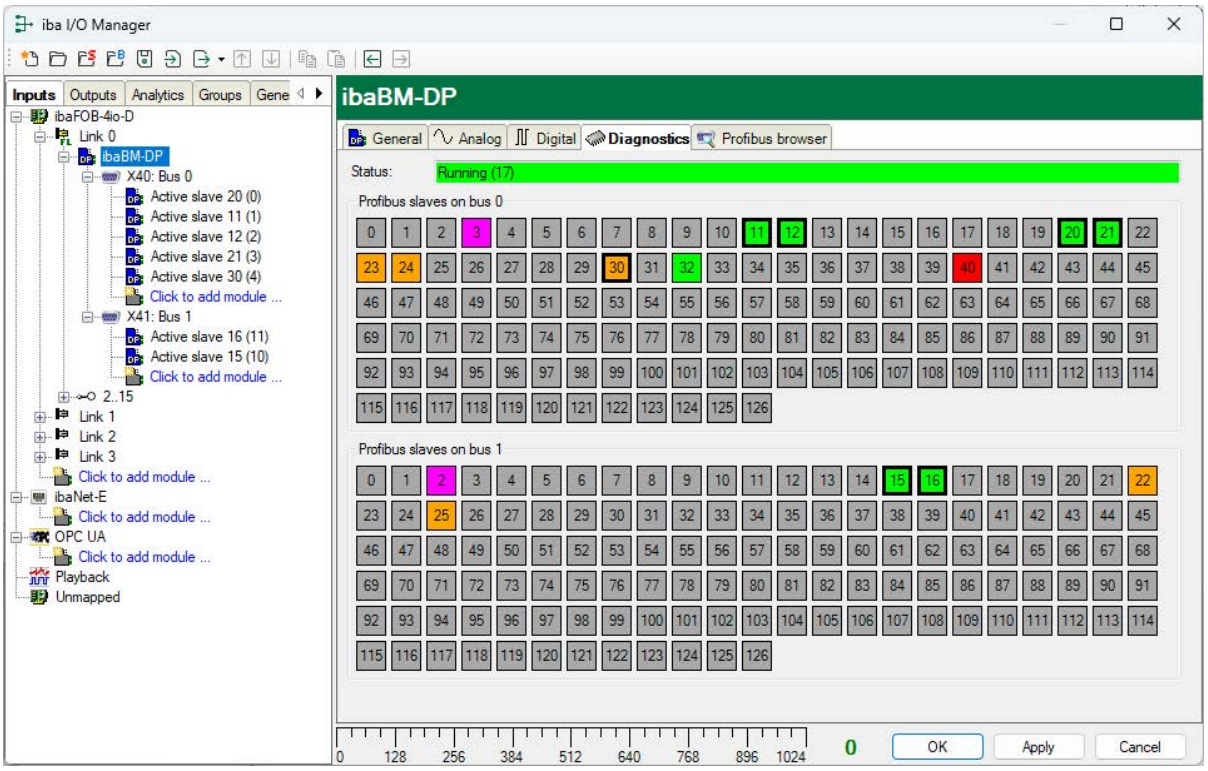
1. When all signals have been configured, activate the configuration by clicking on <OK> or <Apply>.

→ In course of the following validation, the configuration is transferred to *ibaBM-DP*. <OK> closes the I/O Manager, provided that no warning or error messages have appeared during the validation process.

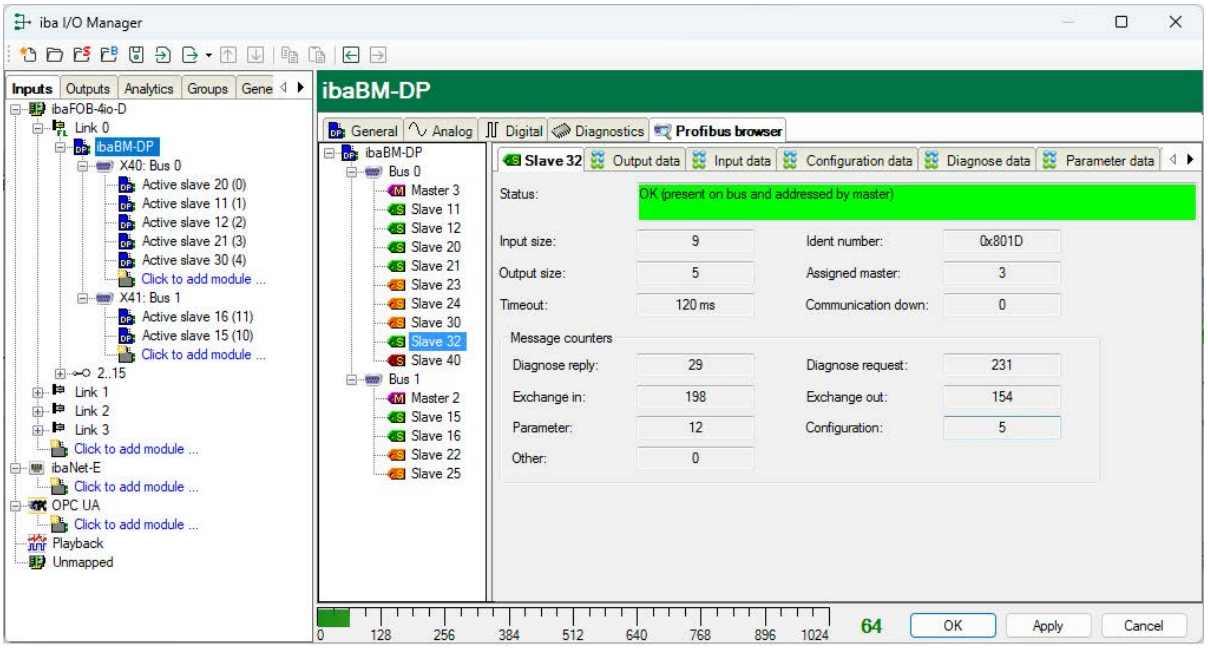


Of course, you can do the configuration step by step and hence check the validity of the current configuration.

2. *ibaBM-DP* provides a wide variety of diagnostic features for PROFIBUS systems. The *Diagnostics* tab in the device module is very helpful. On this tab, the identified masters and slaves and their status are shown for both PROFIBUS systems.



The *Profibus browser* tab shows detailed information about both PROFIBUS systems (e. g. bus cycle time) and about the input and output areas of each slave.



For detailed information on the diagnostic functions, see chapter ↗ *Slave diagnostics module, page 94*.

10.2 Notes on the compatibility mode 32Mbit

10.2.1 Compatibility mode 32Mbit with ibaBM-DPM-S device module

When compatibility mode 32Mbit is selected, the device can be used with an “ibaBM-DPM-S” device module in the *ibaPDA* configuration (I/O Manager). This is the case, if you have to replace *ibaBM-DPM-S* devices with new *ibaBM-DP* devices in an existing *ibaPDA* system.

This is why the commissioning procedure is different from the procedure described in chapter ↗ *First steps for the configuration in ibaPDA, page 61*.

In this case, you can replace the old *ibaBM-DPM-S* devices 1:1 with new *ibaBM-DP* devices. You do not have to make any changes in the I/O configuration of *ibaPDA*.

The following prerequisites have to be met:

- The version of *ibaPDA* must be v6.20.2 or higher
- The rotary switches on the device have to be set to S1 = 1 and S2 = 0.

  See chapter ↗ *Device setting compatibility mode 32Mbit*, page 25.

All cables have to be replugged 1:1 from the old device to the new device:

- Fiber optics cable TX-X10 to TX-X10
- Ethernet network from X22 bottom to X22 on the front side
- PROFIBUS X40 top to PROFIBUS X40 left
- PROFIBUS X41 bottom to PROFIBUS X41 right
- If the buses for *ibaBM-DPM-S* should have been connected by S6 = ON, both PROFIBUS lines for *ibaBM-DP* have to be connected by a cable bridge.
- If you should have done the bus termination for *ibaBM-DPM-S* by means of the device switch S4/S5, you have to do the termination for *ibaBM-DP* with switches on the PROFIBUS connectors.

Check the following settings in *ibaPDA*:

- If the device names (format dpms_nnnn) have been used for the settings of the *IP address* in the I/O configuration, you need to enter the device name of the new *ibaBM-DP* replacement devices. A suitable IP address has to be set in *ibaBM-DP*.
- If the IP addresses have been used when setting the *IP address*, you have to proceed as follows:

  a) Set the old IP addresses 1:1 in the new *ibaBM-DP* devices.

  See the description of the web interface in chapter ↗ *Network*, page 48.

  b) Set other IP addresses for the new *ibaBM-DP* devices, which must then of course be adjusted accordingly in the I/O configuration.

Note

As the device is always identified as *ibaBM-DP*, you should not do an automatic device detection on the FO link in the I/O Manager for this application.

10.2.2 Compatibility mode 32Mbit with ibaBM-DP device module

In compatibility mode 32Mbit, the device can be used with an “ibaBM-DP” device module in the *ibaPDA* configuration (I/O Manager). This mode is necessary when you want to connect an *ibaBM-DP* device to an *ibaPDA* system but cannot establish a bidirectional FO cable connection. One reason might be e. g. that you have only *ibaFOB-D* cards with inputs and outputs cannot be added anymore due to a lack of space.

This is why the commissioning procedure is different from the procedure described in chapter ↗ *First steps for the configuration in ibaPDA, page 61*.

The following prerequisites have to be met:

- The version of *ibaPDA* must be V6.32.0 or higher
- The rotary switches on the device have to be set to S1 = 1 and S2 = 0.

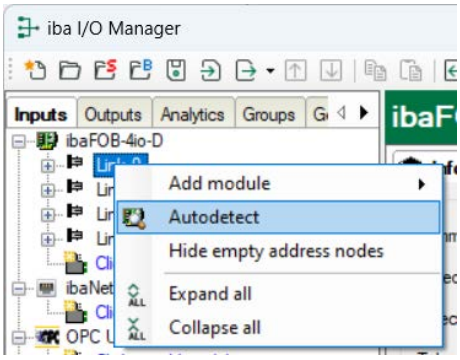
  See chapter ↗ *Device setting compatibility mode 32Mbit*, page 25.

The following connections have to be established:

- Unidirectional fiber optics connection between the transmission output TX-X10 of *ibaBM-DP* and a free input of an *ibaFOB-D* card in the *ibaPDA* computer.
- For this application, *ibaBM-DP* has to be connected via X22 to the Ethernet network. For this purpose, you have to set an appropriate IP address.
- Connection to the PROFIBUS network via X40 and/or X41.

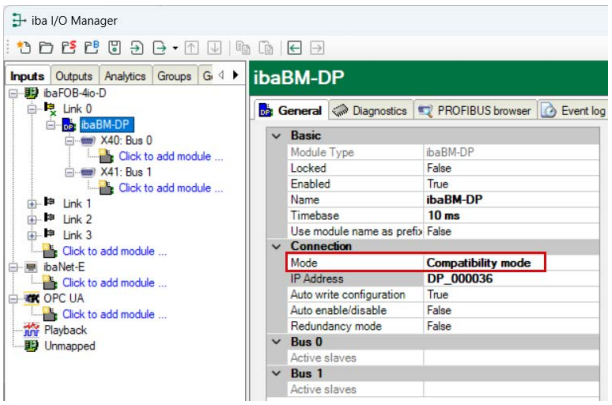
Notes on the configuration in the ibaPDA I/O Manager:

1. Choose the right *ibaFOB-D* card and mark the link, *ibaBM-DP* is connected to.



2. Click with the right mouse button on the link and select *Autodetect*.

→ The device is identified automatically and displayed in the module tree.



In compatibility mode 32Mbit, only one device can be operated on one link. The compatibility mode 32Mbit you have set by means of S1 = 1 and S2 = 0 is detected automatically and the device is displayed with the respective configuration.

3. Proceed as described in the chapter ↗ *First steps for the configuration in ibaPDA, page 61*.

10.2.3 Replacing the ibaBM-DPM-S device module with ibaBM-DP

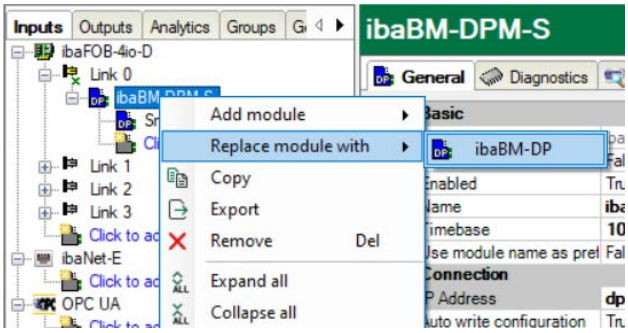
If an *ibaBM-DPM-S* device is replaced by an *ibaBM-DP* device, it may be an advantage that the “ibaBM-DPM-S” device module is no longer used in the I/O Manager but is replaced by an “ibaBM-DP” device module.

The advantage of the “ibaBM-DP” device module is that separate nodes are available for bus0 and bus1. There are separate modules for each bus, such as sniffer, active slave, Dig512 sniffer. This way, configuring the signals is easier to manage.

Furthermore, functions such as the display of bus voltages and the event log can only be used with the “ibaBM-DP” device module.

Notes on the configuration in the ibaPDA I/O Manager:

Right-click on the existing “ibaBM-DPM-S” device module and select *Replace module with ibaBM-DP*.



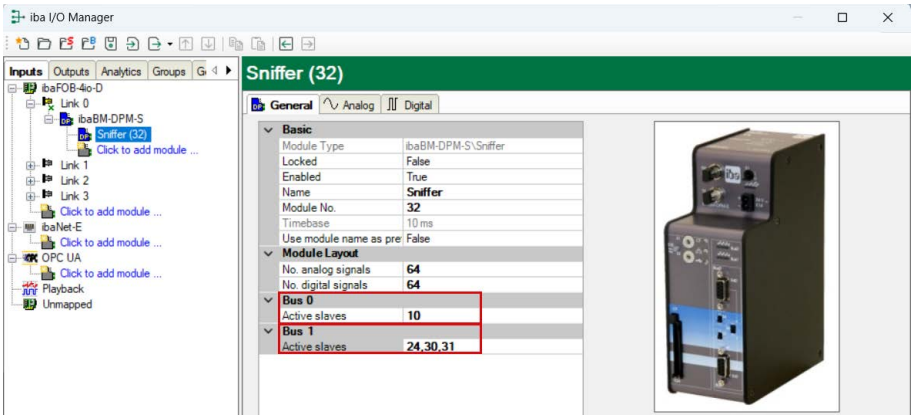
A “ibaBM-DP” device module is automatically generated in the module tree. Existing modules under the “ibaBM-DPM-S” device module are automatically assigned to the correct bus node bus 0/bus 1. Modules containing signals from both buses are automatically split. For example, two sniffer modules for bus 0 and bus 1 are created if signals are present on both busses. The same applies to Dig512 sniffer modules. For each active slave configured in the *ibaBM-DPM-S* device, a separate “Active slave" module is created under the corresponding bus node.

After replacing, check whether the correct mode is set in the “ibaBM-DP” device module for your application. For a *FOB-io* card (bidirectional), the Flex mode is set in the device module. For a *FOB-i* card (unidirectional) the compatibility mode 32Mbit is set.

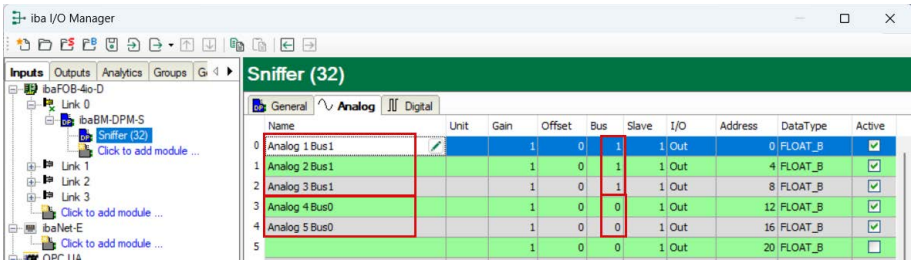
Example: Previous configuration in ibaBM-DPM-S

A sniffer module is configured under the “ibaBM-DPM-S” module. Active slaves are configured on bus 0 and bus 1 in the *General* tab. The tabs *Analog* and *Digital* contain signals on bus 0 and bus 1.

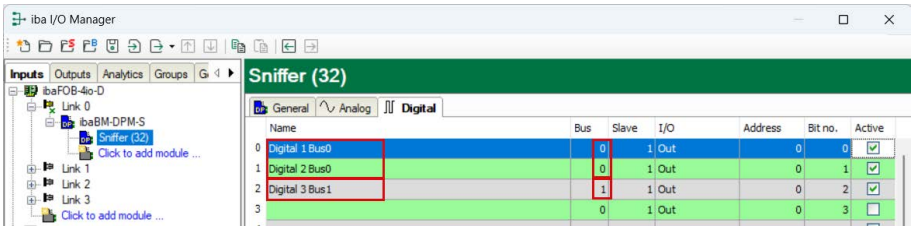
Configured active slaves in the *ibaBM-DPM-S* "Sniffer" module



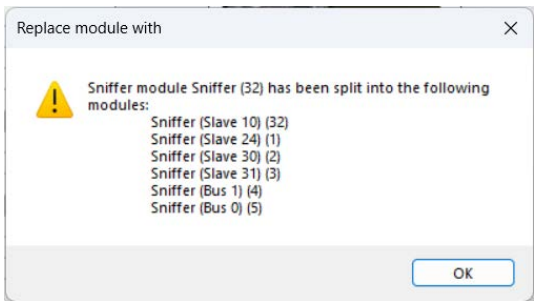
Analog signals in the *ibaBM-DPM-S* "Sniffer" module



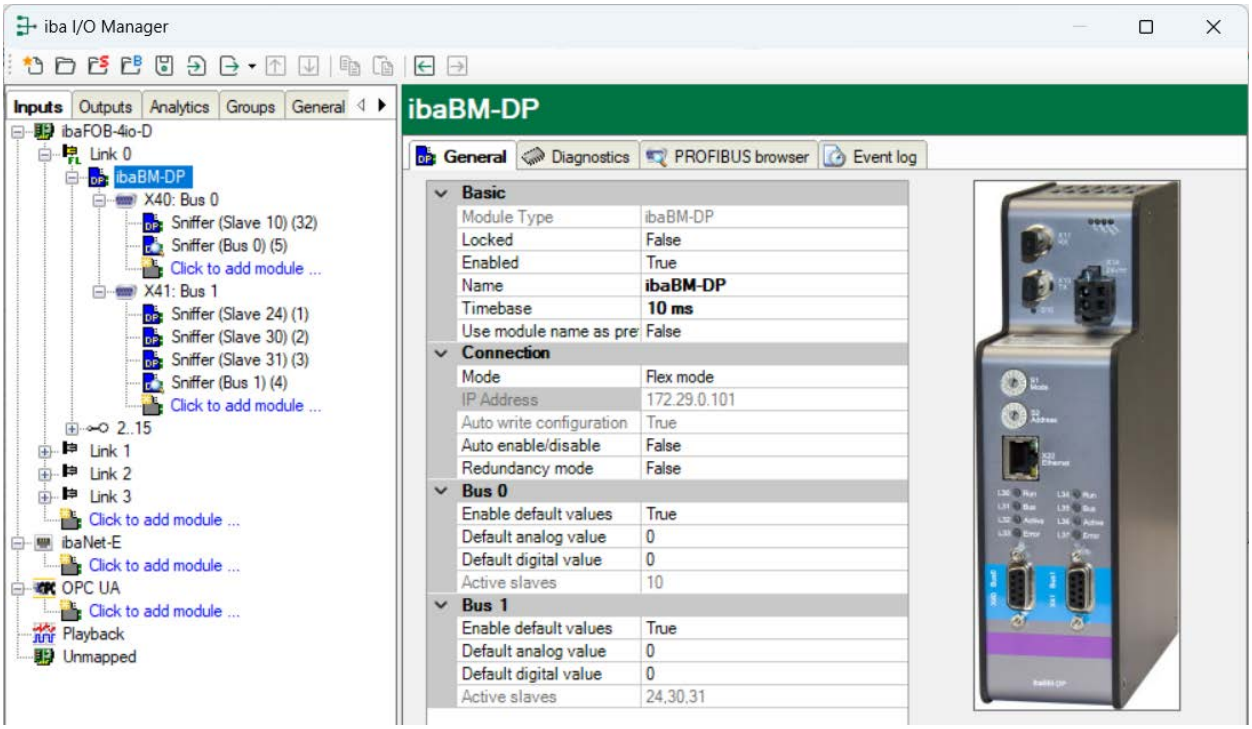
Digital signals in the *ibaBM-DPM-S* "Sniffer" module



After selecting the *Replace module with ibaBM-DP* function, a message appears telling you which modules have been created.



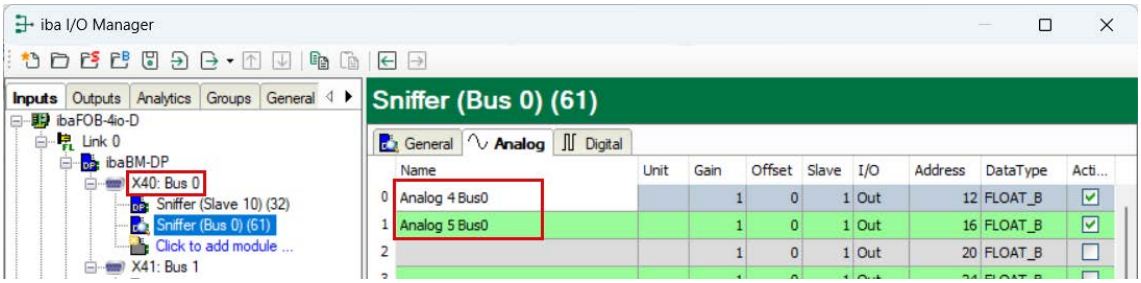
New configuration with ibaBM-DP module



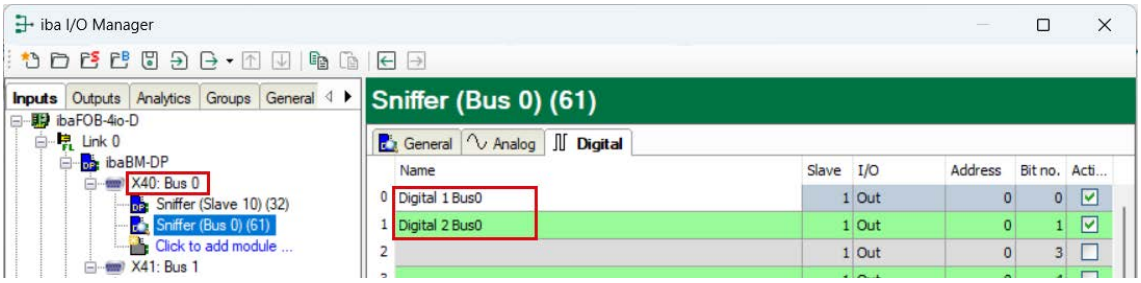
Under each bus, modules for the active slaves ( ) are created, one module under the respective bus node for each active slave. The name of the module "Sniffer..." is taken from the old configuration, because the active slaves were configured in the module "Sniffer". The name can be changed subsequently.

Under each bus, a sniffer module ( ) is created. The previously configured signals are transferred to the *Analog* and *Digital* registers.

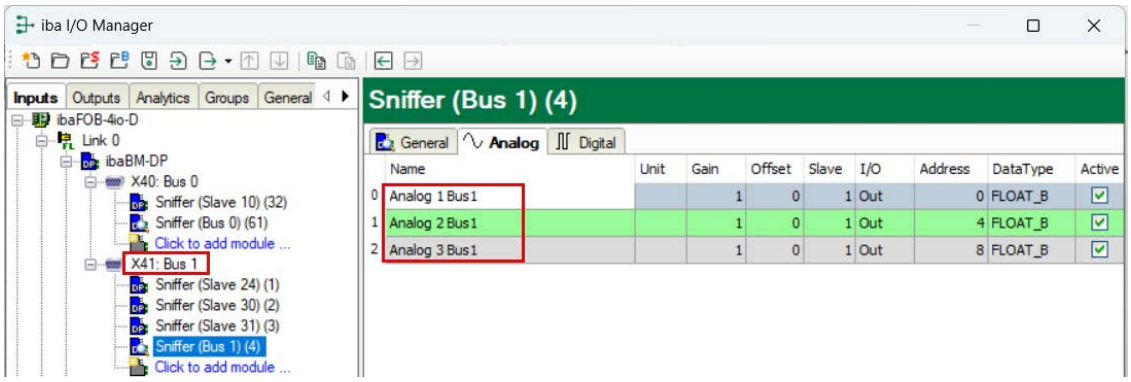
Analog signals on Bus0



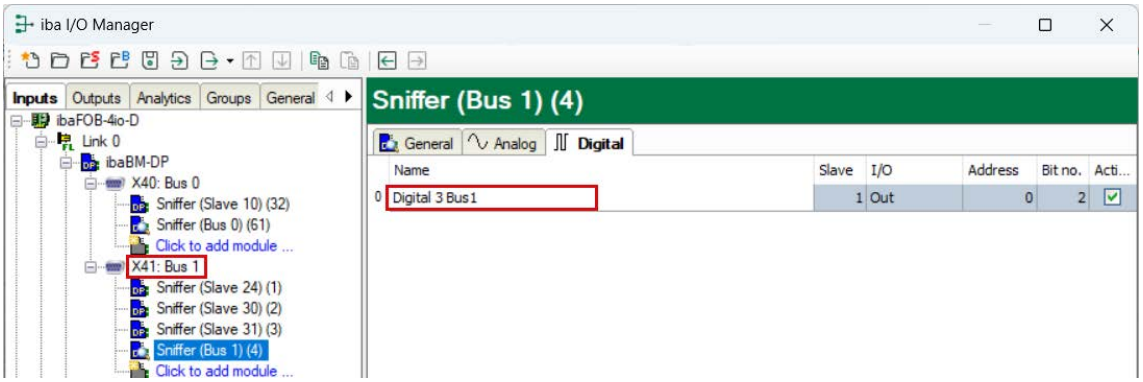
Digital signals on Bus0



Analog signals on Bus1



Digital signals on Bus1



10.3 Modules in the I/O Manager

If you want to use *ibaBM-DP* with *ibaPDA*, you have to configure the device in the *ibaPDA* I/O Manager. Follow the step-by-step procedure described in chapter ↗ *First steps for the configuration in ibaPDA, page 61*. If necessary, consider the notes on the compatibility mode 32Mbit in chapter ↗ *Notes on the compatibility mode 32Mbit, page 70*.

In the following chapters, the "ibaBM-DP" device module as well as the modules "Active slave", "Sniffer", "Active slave decoder", "Sniffer decoder", “Slave diagnostics” and “Bus diagnostics” are described.

Note

In the following chapters, the modules are described the way they are used on the input side of *ibaPDA* (data acquisition). Information on how to output data from *ibaPDA* to the PROFIBUS via *ibaBM-DP* can be found in chapter ↗ *Configuring outputs, page 117*.

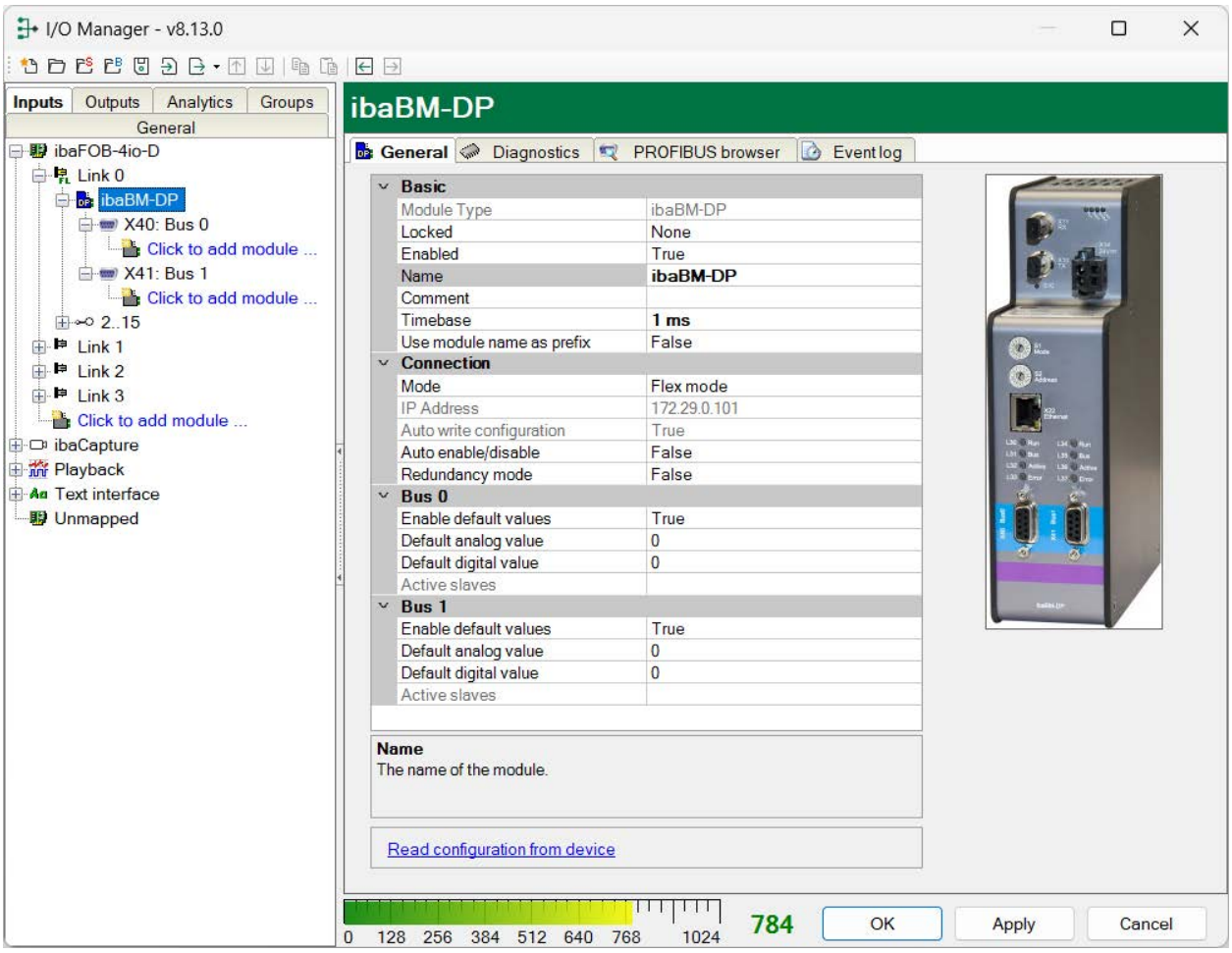
10.3.1 ibaBM-DP device module

The "ibaBM-DP" device module has 6 different tabs:

- The *General*, *Diagnostics*, *Profibus browser* and *Event log* tabs are always available.
- The *Analog* and the *Digital* tab contain dynamic online views of the analog and digital signals acquired by the device. This is why these two tabs are only visible after modules have been added and the configuration has been transferred to the device.

10.3.1.1 ibaBM-DP – General tab

In the *General* tab, make the basic settings, advanced settings and connection settings for the "ibaBM-DP" device module.



Basic settings

Module Type (information only)
Indicates the type of the current module.

Locked
A locked module can only be modified by authorized users.

Enabled
The data acquisition for this module is either enabled or disabled.

Name
Name of the module

Comment
You can enter a comment or description of the module here. This will be displayed as a tooltip in the signal tree.

Timebase
Timebase for the data acquisition which is used for this device in ms. With 32Mbit Flex cycles of up to 0.5 ms are possible (depending on the number of signals). In compatibility mode 32Mbit, the smallest timebase is 1 ms.

Use module name as prefix
If TRUE is selected, the module name is placed in front of the signal name as prefix.

Connection

Mode
Choose between Flex mode (the 32Mbit Flex protocol is used on the FO connection) and compatibility mode (the fixed 32Mbit protocol is used). In Flex mode, you can measure more signals and send output data.

This value has to equal the settings of the switches S1 and S2 on the device:

- S1 = 1 and S2 = 0: Compatibility mode 32Mbit
- S1 = 1 and S2 = 1 … F: Flex mode

IP Address
IP address of the device.

- In Flex mode, the IP address cannot be changed. For notes on the structure of the automatically generated IP address, please see chapter ↗ *Accessing the web interface*, page 44.
- In compatibility mode 32Mbit, you can enter here the device name or the IP address. In course of the automatic detection, the device name of the connected device is displayed.

Auto write configuration
At every start of *ibaPDA*, the configuration is transferred to the device. In Flex mode, this setting is always TRUE and cannot be changed. In compatibility mode 32Mbit, this option can be set to FALSE, if there is no continuous online connection to *ibaBM-DP* and the configuration does not always have to be transferred.

Auto enable/disable
If the value is TRUE, the data acquisition is started even though the device is missing. The missing device is temporarily disabled in the configuration. During the measurement process, *ibaPDA* tries to re-establish the connection to the missing device. If this is successful, the measurement is restarted automatically including the device that has been missing.

If the value is FALSE, the measurement will not be started, in case *ibaPDA* cannot establish a connection to the device.

Redundancy mode
Here, the redundancy mode is enabled. Then, the device treats both PROFIBUS lines as a redundant PROFIBUS line. For detailed information on operating the *ibaBM-DP* on the redundant PROFIBUS, please see chapter ↗ *Redundancy mode, page 128*.

Bus 0/1

Enable default values
If TRUE, for a slave which is not supplied with data (e. g. broken PROFIBUS cable or Master in STOP), the default values (see below) are sent by the device.

If FALSE, in this case the last received data is repeated.

Default analog value
If the default values are enabled (see option mentioned above), all analog signals of a disconnected slave are set to this default analog value.

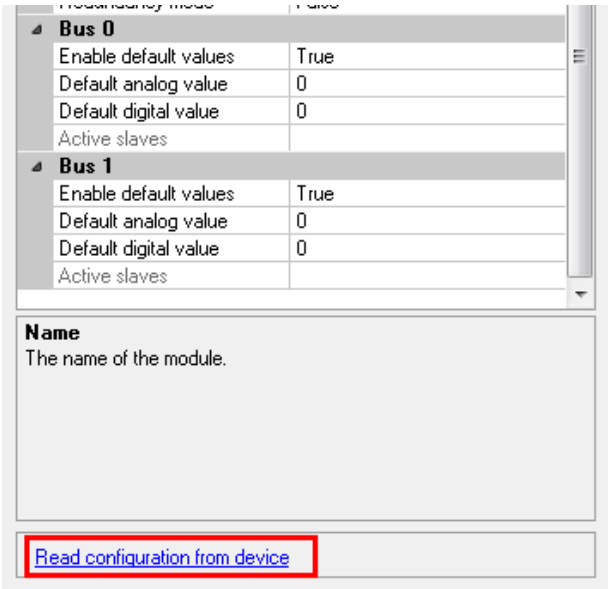
Default digital value
If the default values are enabled (see option mentioned above), all digital signals of a disconnected slave are set to this default digital value.

Note

In case analog and digital signals should access the same addresses simultaneously, the default analog value is overwritten by the default digital value.

Active slaves (only display)
Numbers of the active slaves configured on the bus.

Command for reading the configuration
Read configuration from device: This command can be used to read a configuration saved in the *ibaBM-DP* directly from the device.

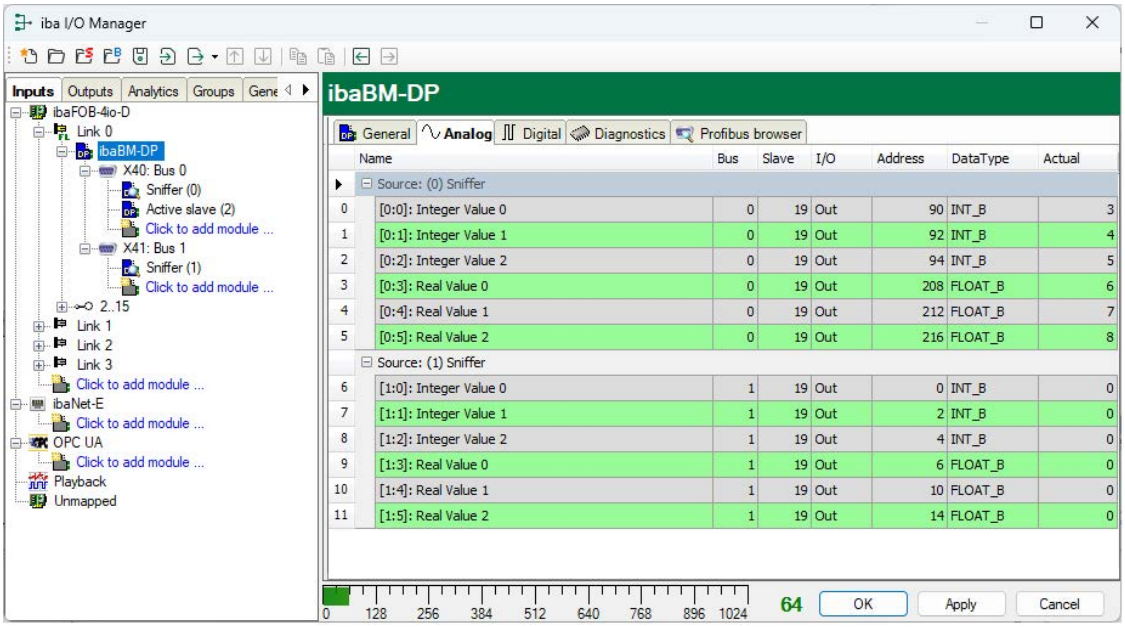


Note

The configuration can only be read in “Flex mode”. Using the command, the configuration of a single device can be read also while the acquisition is running. Please use the *Autodetect* command in the context menu of the FO link, for detecting all the devices that are connected to a FO link along with reading out their saved configurations.

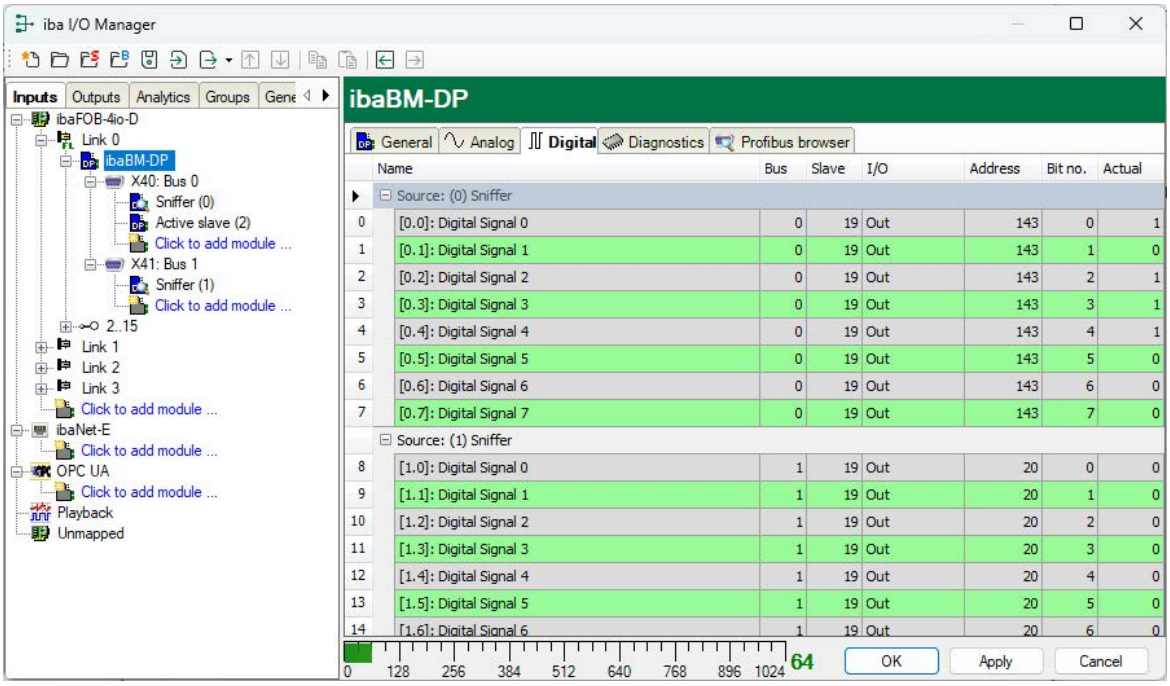
10.3.1.2 ibaBM-DP – Analog tab

If analog signals have been configured in the modules and the configuration has been transferred to *ibaBM-DP*, you will see here an overview of all acquired analog signals with an online overview of the currently acquired values.



10.3.1.3 ibaBM-DP – Digital tab

If digital signals have been configured in the modules and the configuration has been transferred to *ibaBM-DP*, you will see here an overview of all acquired digital signals with an online overview of the currently acquired values.



10.3.1.4 ibaBM-DP – Diagnostics tab

On this tab, the identified masters and slaves and their status are shown for both PROFIBUS systems.

For a description of the diagnostic functions, please see chapter ↗ *Diagnostic functions, page 99*.

10.3.1.5 ibaBM-DP – Profibus browser tab

The *Profibus browser* tab belongs to the diagnostic functions and displays detailed information about both PROFIBUS systems (e. g. bus cycle time) and about the available input and output ranges of the individual slaves.

For a description of the diagnostic functions, please see chapter ↗ *Diagnostic functions, page 99*.

10.3.1.6 ibaBM-DP – Bus node X40: Bus 0 / X41: Bus 1

The "ibaBM-DP" device module shows two bus nodes "X40: Bus 0" and "X41: Bus 1", which represent the two bus connections available on the device, see chapter ↗ *PROFIBUS DP connections X40 (Bus0) and X41 (Bus1)*, page 28.

Modules that are configured on "X40: Bus0" or "X41: Bus 1" physically refer to the respective bus connection.

If you mark a bus node, all status and diagnostic information as well as the measured bus voltages for the connected PROFIBUS line are shown.

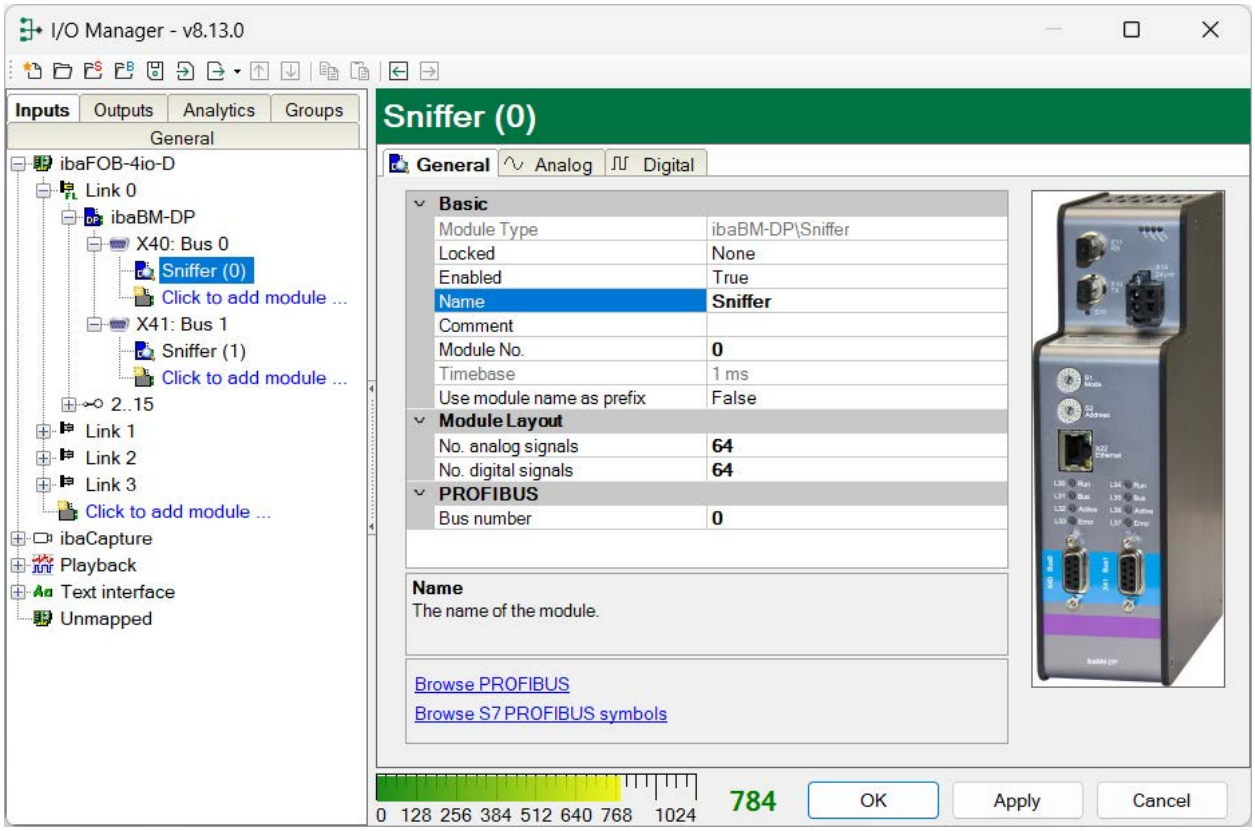
For a detailed description, please see chapter ↗ *Diagnostic functions, page 99*.

10.3.2 Sniffer module

The "Sniffer" module can be added to an “ibaBM-DP” device module. You can use it, if you want to "listen to" signals from an existing Master/Slave communication.

10.3.2.1 Sniffer – General tab

In the *General* tab, you make the basic settings, settings for the module layout and for PROFIBUS for the *Sniffer* device module.



Basic settings

Locked, Enabled, Name, Timebase, Use module name as prefix
see chapter ↗ *ibaBM-DP – General tab, page 76*.

Module No.
Logic module number for clear referencing of signals e. g. in expressions in virtual modules or *ibaAnalyzer*.

Module Layout

No. analog signals
Defining the number of analog signals for this module (min. 0, max. 512).

No. digital signals
Defining the number of digital signals for this module (min. 0, max. 512).

PROFIBUS

Bus number
The bus number corresponds to the PROFIBUS connection in the module tree. You can change the bus number. In this case, the Sniffer module is displayed under the respective PROFIBUS connection.

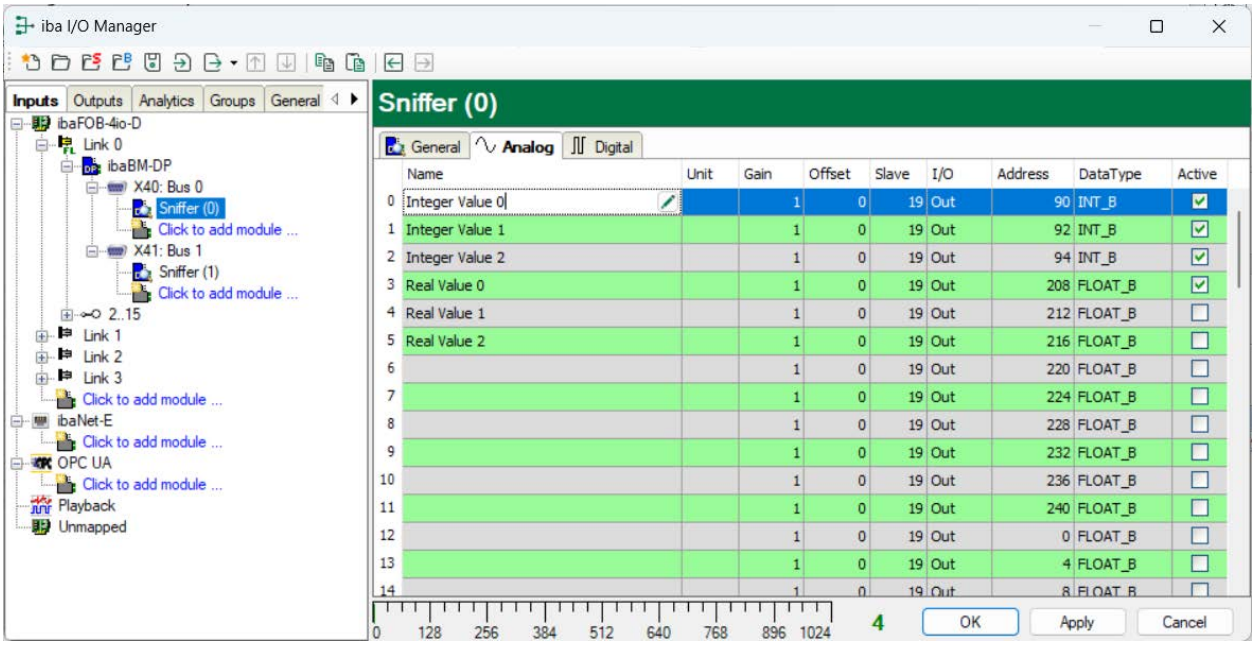
Command for browsing the PROFIBUS

Browse profibus
This command opens the Profibus browser, which can be used to interactively add signals from the input and output data area of the slaves to the analog and digital signals. For further information on Profibus browser see chapter ↗ *Signal selection in the Profibus browser, page 109*.

Browse S7 PROFIBUS symbols
With this command, you can open the Sniffer symbol browser. For a detailed description, see chapter ↗ *Selecting signals via sniffer symbol browser, page 112*. With this browser, you can use the PROFIBUS symbols available in a Step 7 project for adding signals in an interactive manner.

10.3.2.2 Sniffer – Analog tab

In the *Analog* tab, enter the digital signals to be acquired for the "Sniffer" module one after the other.



The individual columns in the signal list have the following meanings:

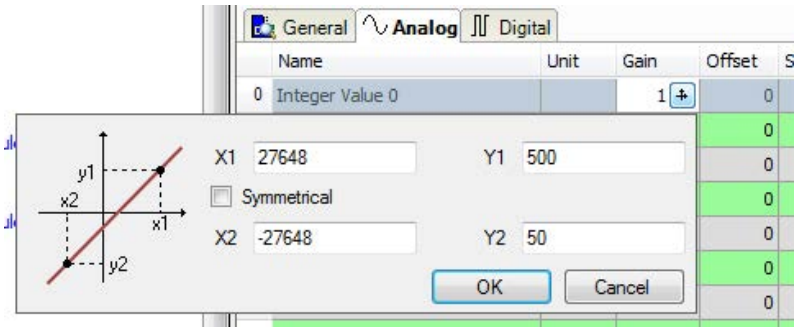
Name
Here, you can enter a signal name and additionally two comments when clicking the  symbol in the *Name* field.

Unit
Here, you can enter the physical unit of the analog value.

Gain / Offset
Gradient (Gain) and y axis intercept (Offset) of a linear equation. You can convert a standardized and unitless transmitted value into a physical value.

Example: For a SIMATIC ET200 AI/AO module, a +/-10 V signal with a value range of -27648 … 27648 (equals -10 V … +10 V) is transferred. Within the control program, the transferred value has a physical meaning (e. g. temperature 50°C … 500°C). You can choose by *Gain*/*Offset* a conversion of the value. The value which has been acquired without a unit is then recorded with the physical unit.

For making the calculation of Gain/Offset easier, an auxiliary dialog appears when clicking on the co-ordinate cross icon in the *Gain* or *Offset* field. In this dialog, you only enter two points in the line equation. *Gain* and *Offset* are then calculated automatically.



Slave
Enter the slave address that is assigned to the signal. Here, you can enter third party slaves that are present on the bus line as well as own active slaves on the device.

I/O
Select the I/O type of the signal:

- In: Input signal from the master´s perspective
- Out: Output signal from the master´s perspective
- Service: Only for service purposes in support cases

Address
The byte address of the signal within the input or output data range of the slave. The address range always begins with the address 0.

Data type
Data type of the signal. Available data types:

Data type		Description	Value range
Big Endian	Little Endian		
BYTE	BYTE	8 bit without plus/minus sign	0 to 255
INT_B	INT	16 bit with plus minus sign	-32768 to 32767
WORD_B	WORD	16 bit without plus/minus sign	0 to 65535

Data type		Description	Value range
DINT_B	DINT	32 bit with plus minus sign	-2147483647 to 2147483647
DWORD_B	DWORD	32 bit without plus/minus sign	0 to 4294967295
FLOAT_B	FLOAT	IEEE754; Single Precision; 32 bit floating point	±3,402823 E+38 ... ±1,175495 E-38
S5_FLOAT_B	S5_FLOAT	Simatic S5 Float Format, 32 bit	±0,1701412 E+39 ... ±0,1469368 E-38

Tip

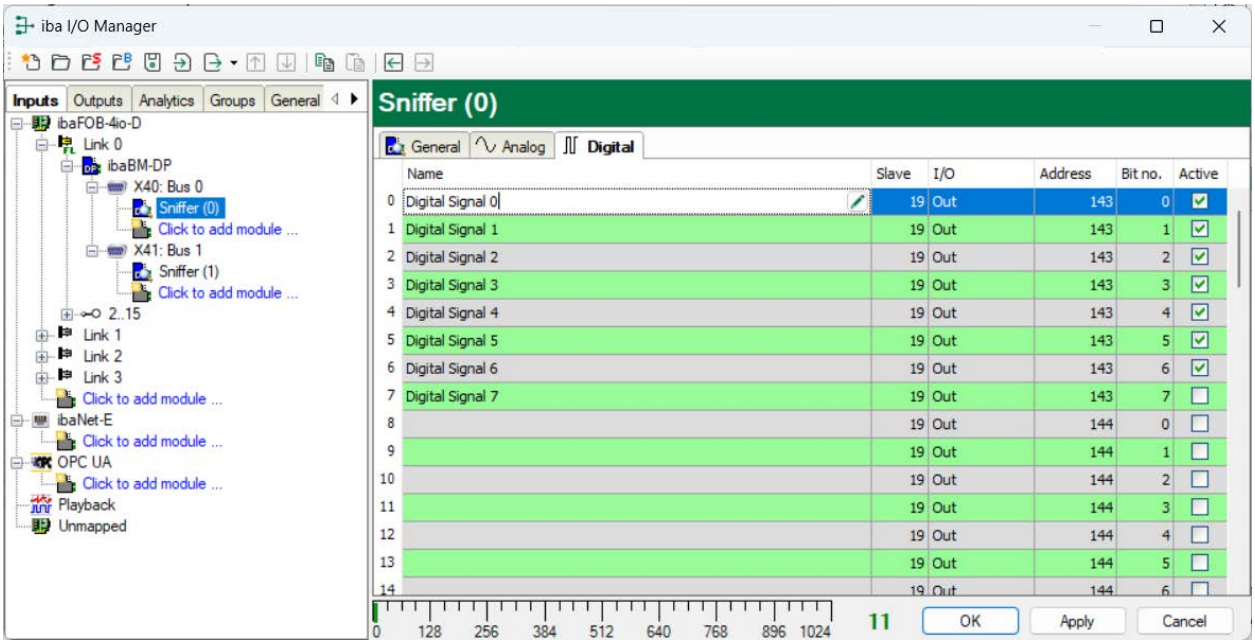
When entering the signals of a slave in sequential order, only the data types have to be selected for all signals. The byte addresses of the signals are then calculated automatically. For this purpose, please enter only for the first signal of the desired slave the correct byte address into the address column and then click on the column header. Starting with the first address (where the cursor is positioned) and considering all data types, the addresses of the other signals of this slave are filled in automatically.

Active
Only when this option is selected, the signal is acquired and considered when checking the number of licensed signals.

More columns can be displayed or hidden, using the context menu (right mouse-click on the header).

10.3.2.3 Sniffer – Digital tab

In the *Digital* tab, enter the digital signals to be acquired for the "Sniffer" module one after the other.



The individual columns in the signal list have the following meanings:

Name
Here, you can enter a signal name and additionally two comments when clicking the  symbol in the *Name* field.

Slave
Enter the slave address that is assigned to the signal. Here, you can enter third party slaves that are present on the bus line as well as own active slaves on the device.

I/O
Select the I/O type of the signal:

- In: Input signal from the master´s perspective
- Out: Output signal from the master´s perspective
- Status: Displays the status of the slave defined as "Slave":
  - True: Slave is OK
  - False: Slave is not OK
- Active bus: Only relevant in redundancy mode, see chapter ↗ *Redundancy mode, page 128*
- Service: Only for service purposes in support cases

Address
The byte address of the signal within the input or output data range of the slave. The address range always begins with the address 0.

Bit No.
Enter the bit no within the byte defined as “Address“.

Active
Only when this option is selected, the signal is acquired and considered when checking the number of licensed signals.

More columns can be displayed or hidden, using the context menu (right mouse-click on the header).

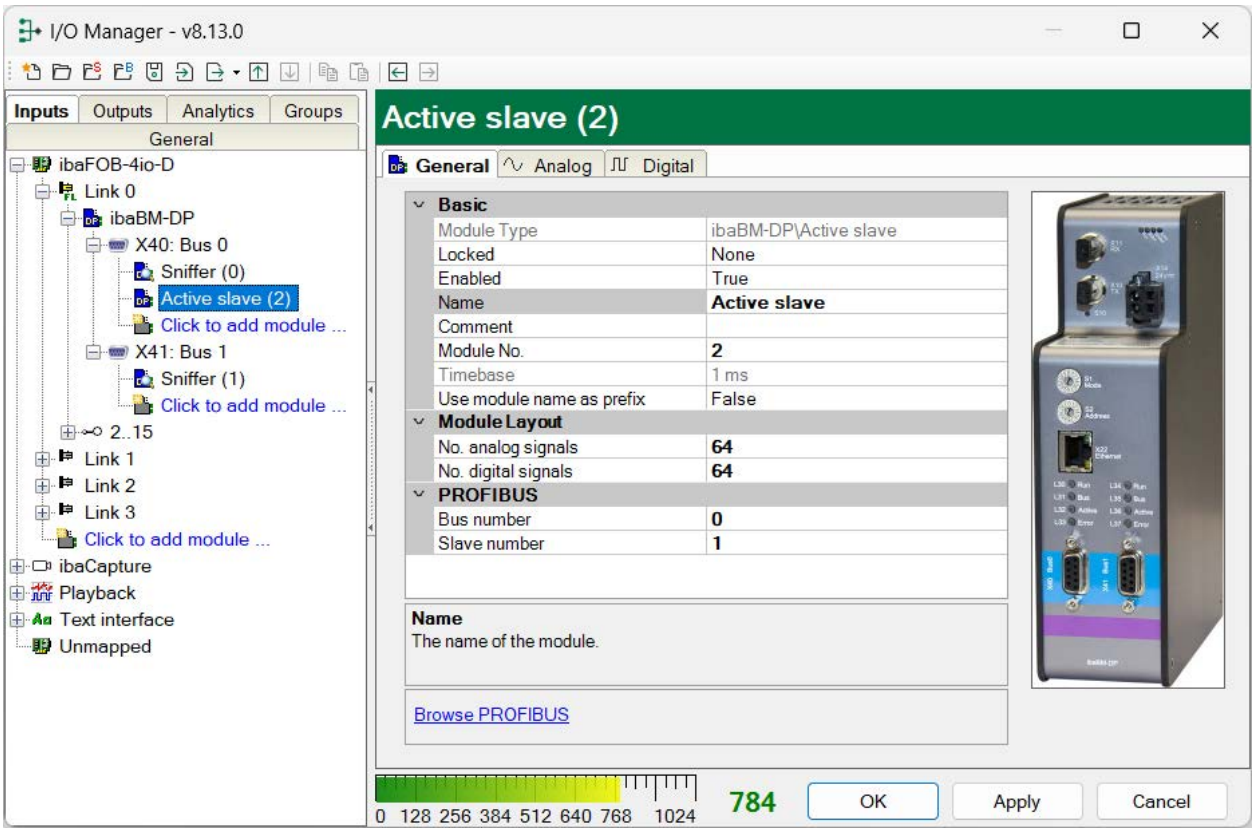
10.3.3 Active slave module

The “Active slave“ module can be added to an *ibaBM-DP* device module. With the “Active Slave“ module, you generate a single slave on *ibaBM-DP*. A master can send data for recording directly to this slave.

Information on step-by-step configuration can be found in chapter ↗ *First steps for the configuration in ibaPDA, page 61*.

10.3.3.1 Active slave – General tab

In the *General* tab, make the basic settings, advanced settings and PROFIBUS settings for the *Active slave* device module.



Basic settings

Locked, Enabled, Name, Modul No., Timebase (only display), Use name as prefix
see chapter ↗ *ibaBM-DP – General tab, page 76*.

Module Layout

No. analog signals
Defining the number of analog signals for this module (min. 0, max. 512).

No. digital signals
Defining the number of digital signals for this module (min. 0, max. 512).

PROFIBUS

Bus number
Define here, on which bus system (Bus0: X40, Bus1: X41) you want the active slave to be generated.

Slave number
Please define here the address of the active *ibaBM-DP* slave.

Command for browsing the PROFIBUS

Browse profibus
This command opens the Profibus browser, which can be used to interactively add signals from the input and output data area of the slaves to the analog and digital signals. See also chapter ↗ *Signal selection in the Profibus browser, page 109*.

Caution!

Connecting the PROFIBUS cable

A conflict between several slaves with the same number can lead to a complete failure of communication on the PROFIBUS and even to a system shutdown.

To ensure that there are no duplicate slave numbers, do not connect the PROFIBUS cable until the configuration of the active slaves has been correctly carried out in *ibaPDA*.

Note

By adding more modules of the "Active slave" type, you can generate more slaves on *ibaBM-DP*.

By default the max. number of active slaves is eight. If you define more active slaves, an error message will appear. If you need more than eight active slaves, please do not hesitate to contact the iba support. You can increase the number of active slaves to 16 with an additional license.

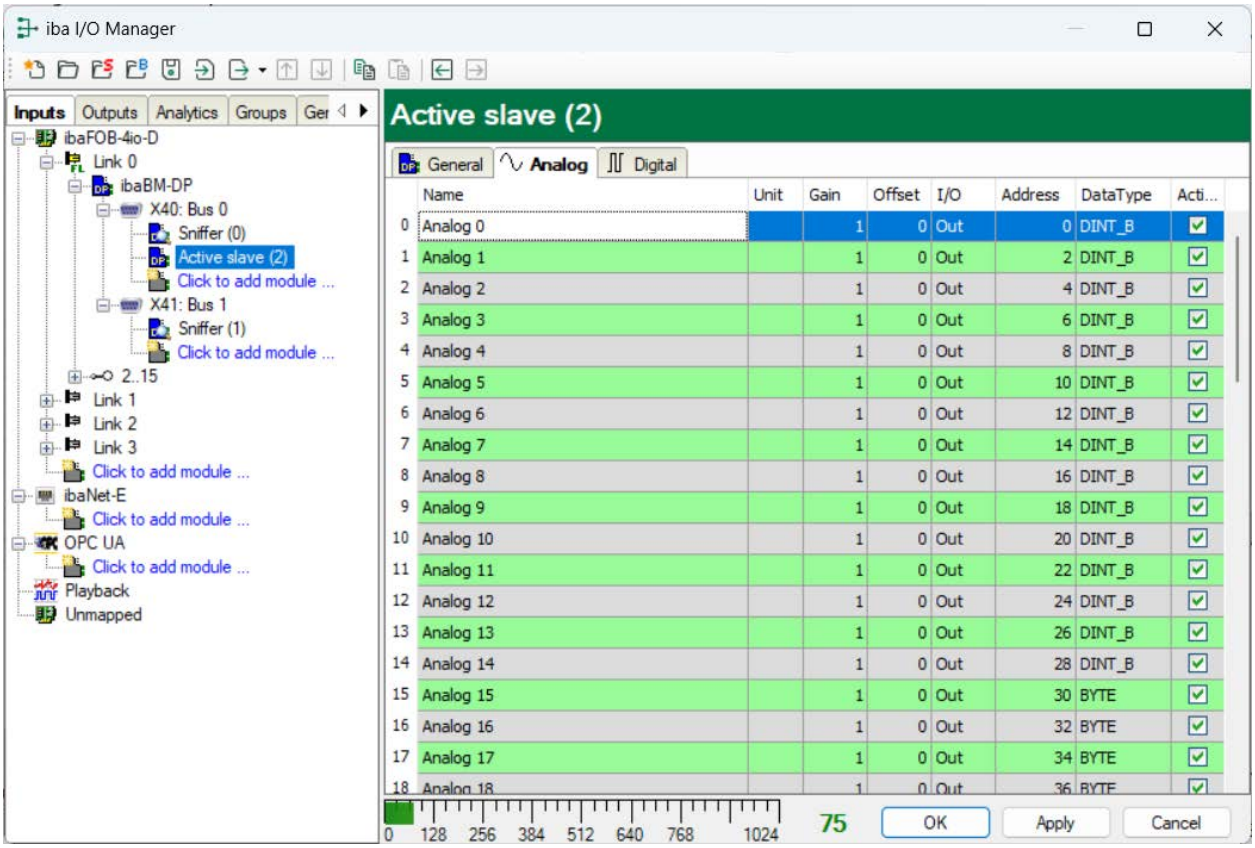
Note

Only define slave numbers for the device that are not yet existing in the PROFIBUS line. Select exactly these addresses that you have defined in your control configuration (e. g. SIMATIC® Step 7 Hardware Configuration) for the active slaves.

Before *ibaBM-DP* activates its own active slaves, the device first checks whether there are already slaves with the same number on the bus. If a slave with the same number already exists, your own slave is not activated.

10.3.3.2 Active Slave – Analog tab

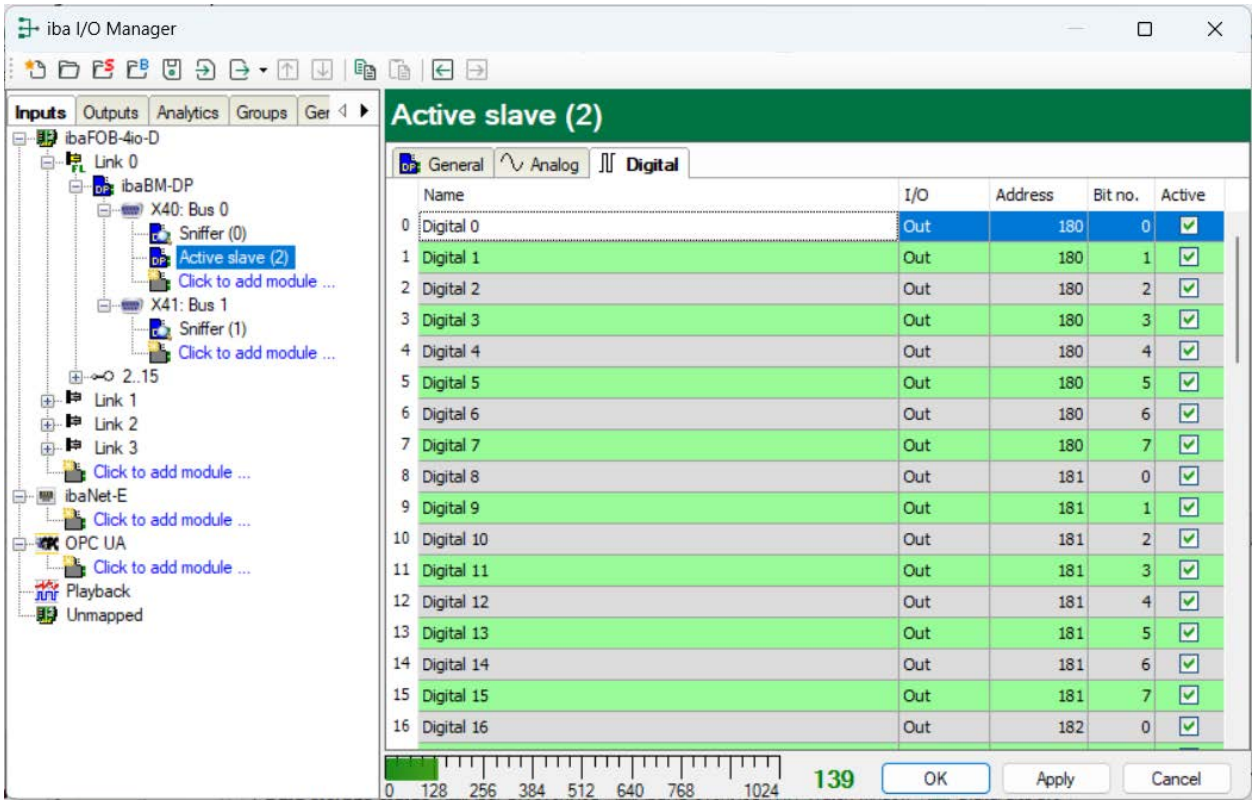
In the *Analog* tab, enter the analog signals to be acquired for the "Active slave" module one after the other.



Make the settings as for the “Sniffer“ module, see chapter ↗ *Sniffer – Analog tab, page 82*. You cannot define a slave number here as this is already done on the *General* tab. This means that all defined signals refer to the active slave of this module.

10.3.3.3 Active Slave – Digital tab

In the *Digital* tab, enter the digital signals to be acquired for the "Active slave" module one after the other.



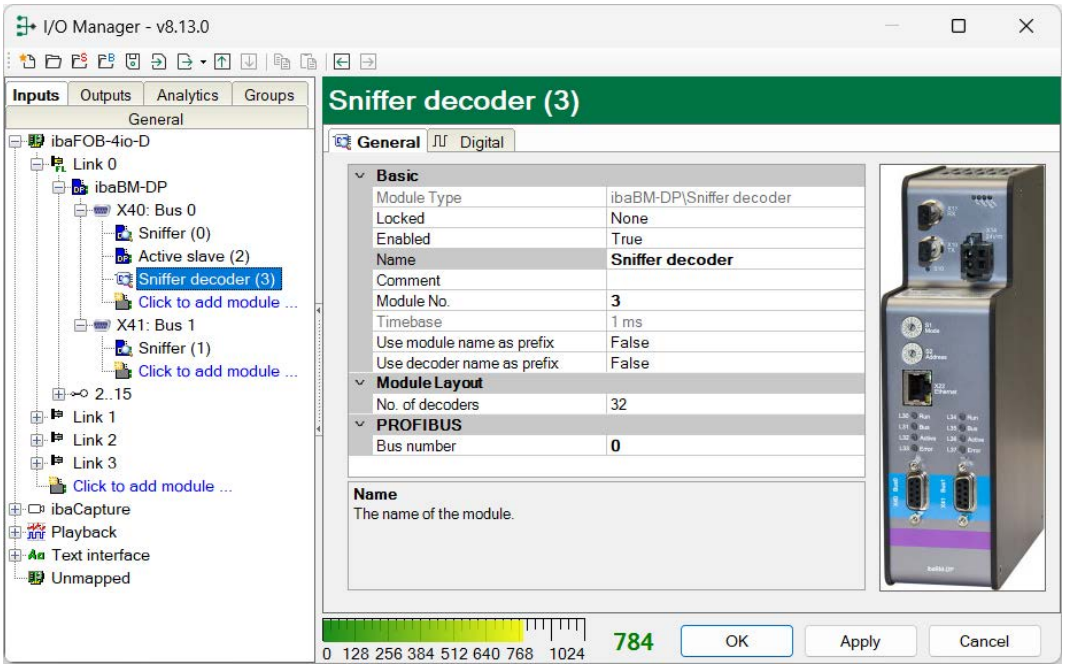
Make the settings as for the “Sniffer“ module, see chapter ↗ *Sniffer – Digital tab, page 84*.
You cannot define a slave number here as this is already done on the *General* tab. This means that all defined signals refer to the active slave of this module.

10.3.4 Sniffer decoder module

The "Sniffer decoder" module is especially suited for acquiring large amounts of digital signals, which are present on the PROFIBUS as words (e. g. status words of drives).

10.3.4.1 Sniffer decoder – General tab

In the *General* tab, make the basic settings, advanced settings and settings for module layout and PROFIBUS for the *Sniffer decoder* module.



Basic settings

Locked, Enabled, Name, Comment, Modul No., Timebase (only display)
see chapter ↗ *ibaBM-DP – General tab, page 76*.

Use module name as prefix
This option puts the module name in front of the signal names.

Use decoder name as prefix
This option puts the related decoder name in front of the signal names.

Module layout

No. of decoders
Definition of the number of decoder modules (words) for this module, max. 512.

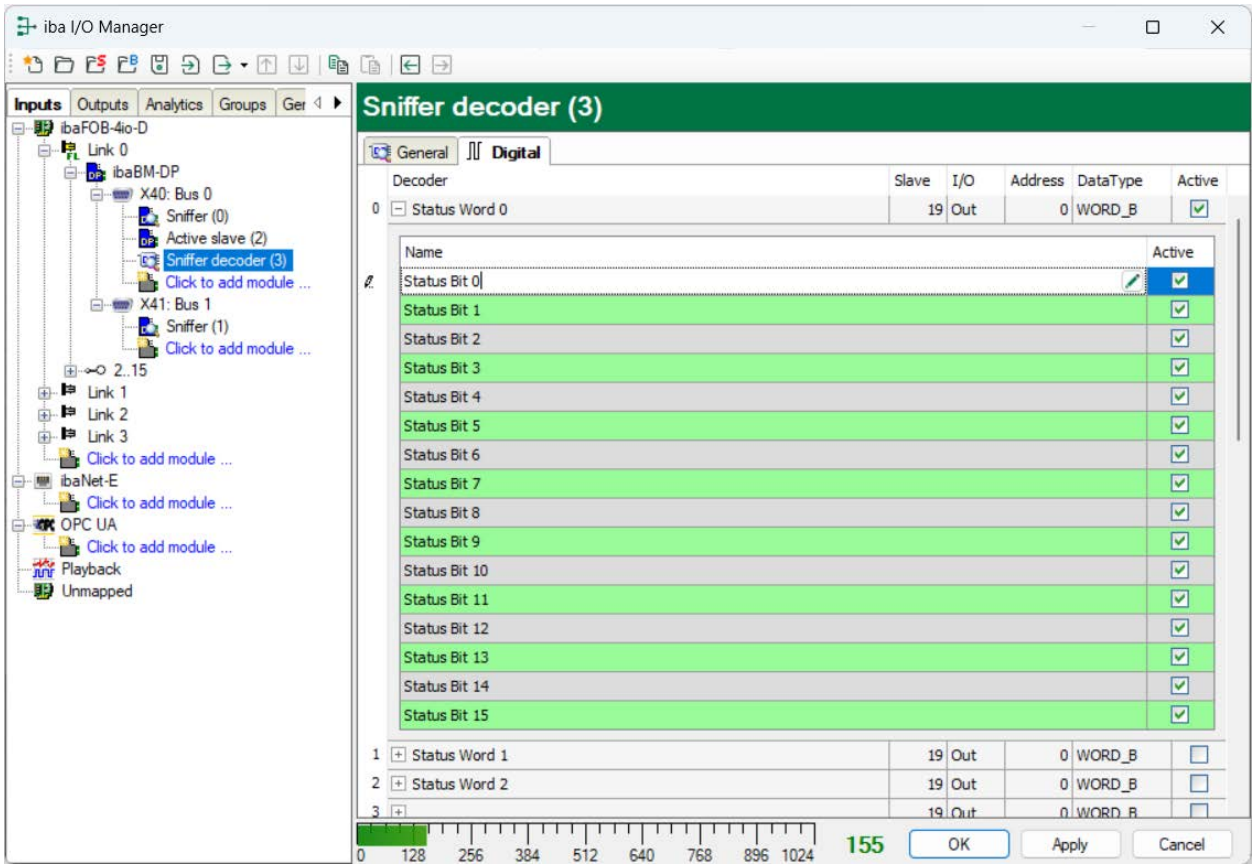
PROFIBUS

Bus number
The bus number corresponds to the PROFIBUS connection in the module tree. You can change the bus number; the decoder module is then displayed under the corresponding PROFIBUS connection.

10.3.4.2 Sniffer decoder – Digital tab

In the *Digital* tab, enter the digital signals to be acquired for the "Sniffer decoder" module one after the other.

The signals are declared in two steps. First, the words you want to acquire as source for the digital signals have to be defined in sequential order.



The individual columns in the signal list have the following meanings:

Connector
Assign a meaningful name to the source word.

Slave
Enter the slave address that is assigned to the signal.

I/O
Select the I/O type of the signal:

- In: Input signal from the master´s perspective
- Out: Output signal from the master´s perspective

Address
The byte address of the signal within the input or output data range of the slave. The address range always begins with the address 0.

Data type
Data type of the signal. Here, you can only select the types WORD and WORD_B.

Active
With this option enabled, the source signal is acquired with its 16 digital signals and considered when checking the number of licensed signals. Individual digital signals can be disabled.

For every source word, the corresponding list of 16 digital signals can be opened by clicking on the plus sign. Here, the single bits of the source word are defined.

Name
Enter a meaningful name to the individual digital signals.

Active
Only when this option is selected, the signal is acquired and also considered when checking the number of licensed signals.

Note

Only the activated digital signals are considered when counting the number of licensed signals, hence no additional signal for the source word.

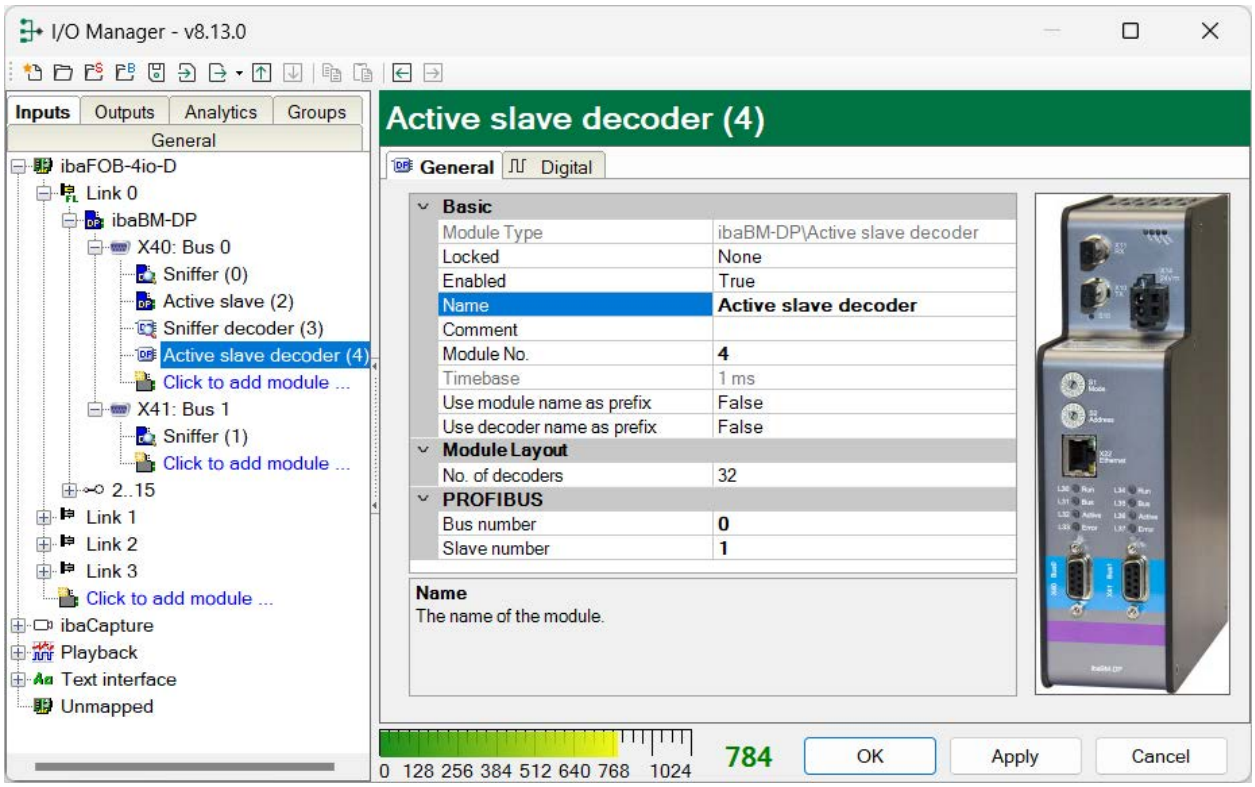
ibaBM-DP only acquires one analog value, which is then decoded by *ibaPDA*. Thus, the range of analog values is used in *ibaBM-DP* for acquiring large amounts of digital signals.

10.3.5 Active slave decoder module

The "Active slave decoder" module is perfectly suited for acquiring large amounts of digital signals of an active slave. The signals are sent as words from a master to a slave.

10.3.5.1 Active slave decoder – General tab

In the *General* tab, make the basic settings, advanced settings and settings for module layout and PROFIBUS for the *Active slave decoder* module.



Basic settings

Locked, Enabled, Name, Modul No., Timebase (only display), Use name as prefix
see chapter ↗ *ibaBM-DP – General tab, page 76*.

Module Layout

No. of decoders
Definition of the number of decoder modules (words) for this module, max. 122, (corresponds to the maximum size of a PROFIBUS slave of 244 Bytes).

PROFIBUS

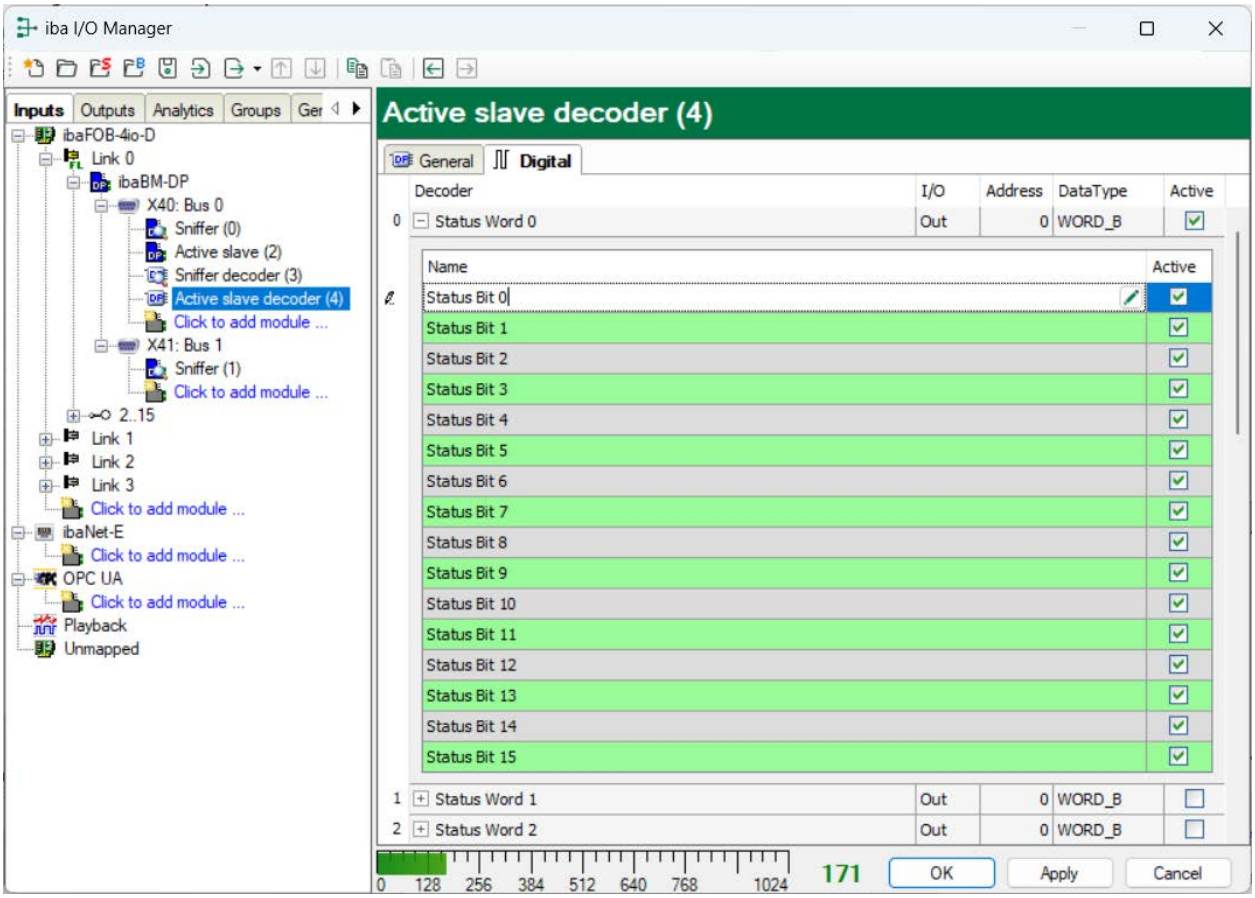
Bus number
The bus number corresponds to the PROFIBUS connection in the module tree. You can change the bus number. The decoder module is then displayed under the relevant PROFIBUS connection.

Slave number
Define the slave number, the active slave generated with the module, should have.

10.3.5.2 Active slave decoder – Digital tab

The declaration of the digital signals for the “Active slave decoder” module is done in the same way as for the module "Sniffer decoder", see chapter ↗ *Sniffer decoder – Digital tab, page 91*.

The *Slave* column is not available here, as the number of the associated slave has been defined on the *General* tab.



10.3.6 Slave diagnostics module

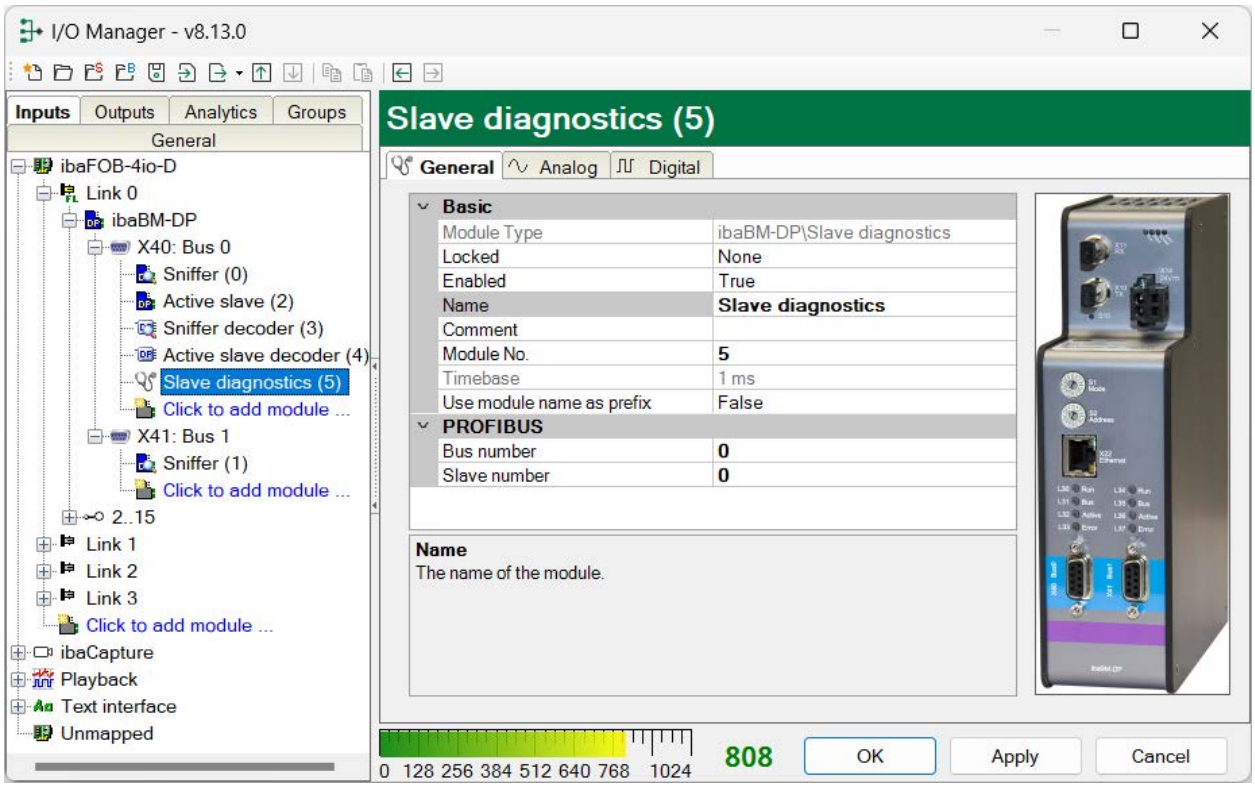
With the “Slave diagnostics” module, you can acquire predefined diagnostic signals for a certain slave in *ibaPDA*.

Note

The “Slave diagnostics” module requires Firmware v01.04.001 or more recent and *ibaPDA* v6.37.0 or higher. You can use the module only in 32Mbit Flex mode. In compatibility mode 32Mbit, the module remains disabled in the I/O Manager.

10.3.6.1 Slave diagnostics – General tab

In the *General* tab, make the basic settings and PROFIBUS settings for the *Slave diagnostics* module.



Basic settings

Locked, Enabled, Name, Modul No., Timebase (only display), Use name as prefix
see chapter ↗ *ibaBM-DP – General tab, page 76*.

PROFIBUS

Bus number
The bus on the *ibaBM-DP* which is connected to the PROFIBUS slave being monitored with this module.

Slave number
Number of the slave which is being monitored with this module.

10.3.6.2 Slave diagnostics – Analog tab

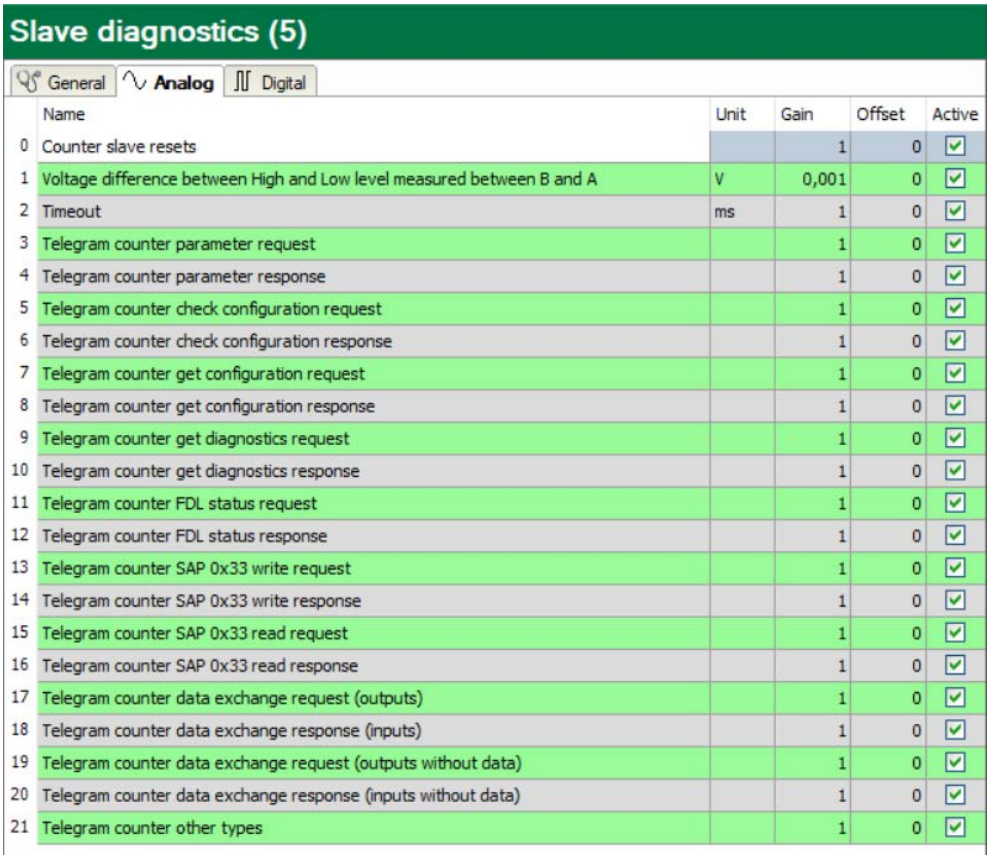
The *Analog* tab contains a series of predefined diagnostic values for the "Slave diagnostics" module:

Counter slave resets
Shows how often the connection between the master and the monitored slave has been terminated and reestablished.

Voltage difference between High and Low level measured between B and A
In the device, there is a transducer, that allows you to measure the voltage difference between line B and line A for the slave which is being monitored. For detailed information about measuring the voltage, see chapter ↗ *Display of bus voltages in the I/O Manager, page 102*.

Timeout
Timeout parameter which has been detected for the slave that is being monitored.

Various telegram counters
There are counters for the different telegram types.



	Name	Unit	Gain	Offset	Active
0	Counter slave resets		1	0	☑
1	Voltage difference between High and Low level measured between B and A	V	0,001	0	☑
2	Timeout	ms	1	0	☑
3	Telegram counter parameter request		1	0	☑
4	Telegram counter parameter response		1	0	☑
5	Telegram counter check configuration request		1	0	☑
6	Telegram counter check configuration response		1	0	☑
7	Telegram counter get configuration request		1	0	☑
8	Telegram counter get configuration response		1	0	☑
9	Telegram counter get diagnostics request		1	0	☑
10	Telegram counter get diagnostics response		1	0	☑
11	Telegram counter FDL status request		1	0	☑
12	Telegram counter FDL status response		1	0	☑
13	Telegram counter SAP 0x33 write request		1	0	☑
14	Telegram counter SAP 0x33 write response		1	0	☑
15	Telegram counter SAP 0x33 read request		1	0	☑
16	Telegram counter SAP 0x33 read response		1	0	☑
17	Telegram counter data exchange request (outputs)		1	0	☑
18	Telegram counter data exchange response (inputs)		1	0	☑
19	Telegram counter data exchange request (outputs without data)		1	0	☑
20	Telegram counter data exchange response (inputs without data)		1	0	☑
21	Telegram counter other types		1	0	☑

Note

All counters are Byte values revolving between 0 – 255.

10.3.6.3 Slave diagnostics – Digital tab

The *Digital* tab contains a series of predefined diagnostic values for the "Slave diagnostics" module:

	Name	Active
0	Slave is in exchange mode	☑
1	Currently active bus (for redundant slaves)	☑

Slave is in exchange mode
Shows that a slave is in exchange mode, thus sends and receives Data Exchange Telegrams. This is the normal state.

Currently active bus (for redundant slaves)
If redundancy mode is activated, the bus currently active for the diagnosed slave is displayed here (0: bus 0, 1: bus 1). For further information on the redundancy mode, see chapter ↗ *Redundancy mode, page 128*.

10.3.7 Bus diagnostics module

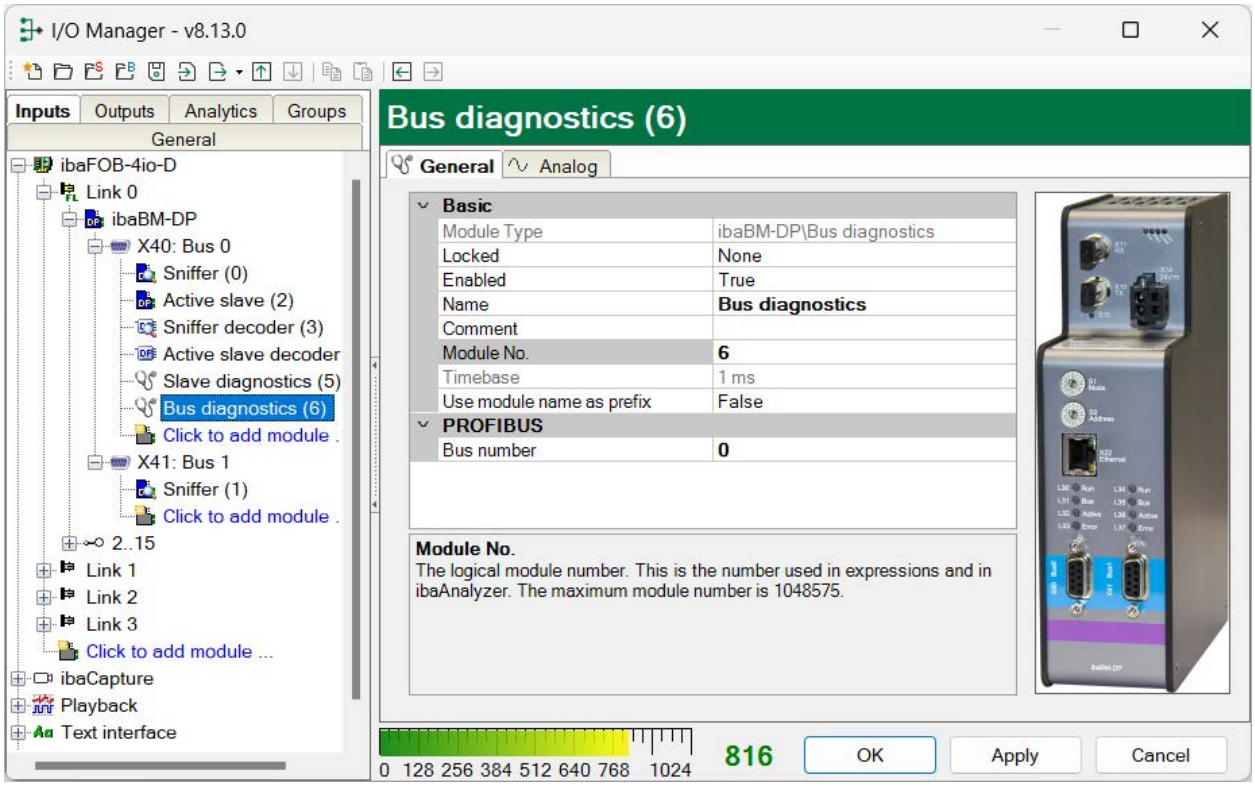
With the "Bus diagnostics" module, you can acquire predefined diagnostic signals for both busses 0/1 of *ibaBM-DP* in *ibaPDA*.

Note

The "Bus diagnostics" module requires firmware v01.04.001 or more recent and *ibaPDA* v6.37.0 or higher. You can use the module only in 32Mbit Flex mode. In compatibility mode 32Mbit, the module remains disabled in the I/O Manager.

10.3.7.1 Bus diagnostics – General tab

In the *General* tab, make the basic settings and PROFIBUS settings for the *Bus diagnostics* module.



Basic settings

Locked, Enabled, Name, Modul No., Timebase (only display), Use name as prefix
see chapter ↗ *ibaBM-DP – General tab, page 76*.

PROFIBUS

Bus number
The bus on *ibaBM-DP* which is being monitored with this module.

10.3.7.2 Bus diagnostics – Analog tab

The *Analog* tab contains a series of predefined diagnostic values for the "Bus diagnostics" module:

Counter corrupt frame
Shows the number of the detected, incomplete telegrams. The counter is a Byte value revolving between 0 - 255.

Transmission rate
Detected transmission rate of the PROFIBUS in Mbit/s.

Bus cycle time
Measured bus cycle time in ms.

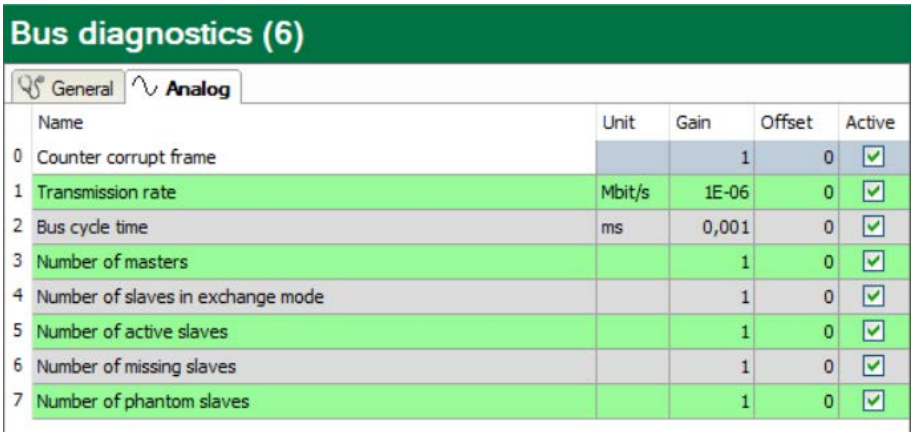
Number of masters
Number of the master stations detected on the PROFIBUS.

Number of slaves in exchange mode
Number of the slaves detected on the PROFIBUS which are exchanging data (Exchange Mode)

Number of active slaves
Number of slaves enabled on the device.

Number of missing slaves
Number of slaves which are configured on the PROFIBUS but are missing.

Number of phantom slaves
Number of phantom slaves



	Name	Unit	Gain	Offset	Active
0	Counter corrupt frame		1	0	☑
1	Transmission rate	Mbit/s	1E-06	0	☑
2	Bus cycle time	ms	0,001	0	☑
3	Number of masters		1	0	☑
4	Number of slaves in exchange mode		1	0	☑
5	Number of active slaves		1	0	☑
6	Number of missing slaves		1	0	☑
7	Number of phantom slaves		1	0	☑

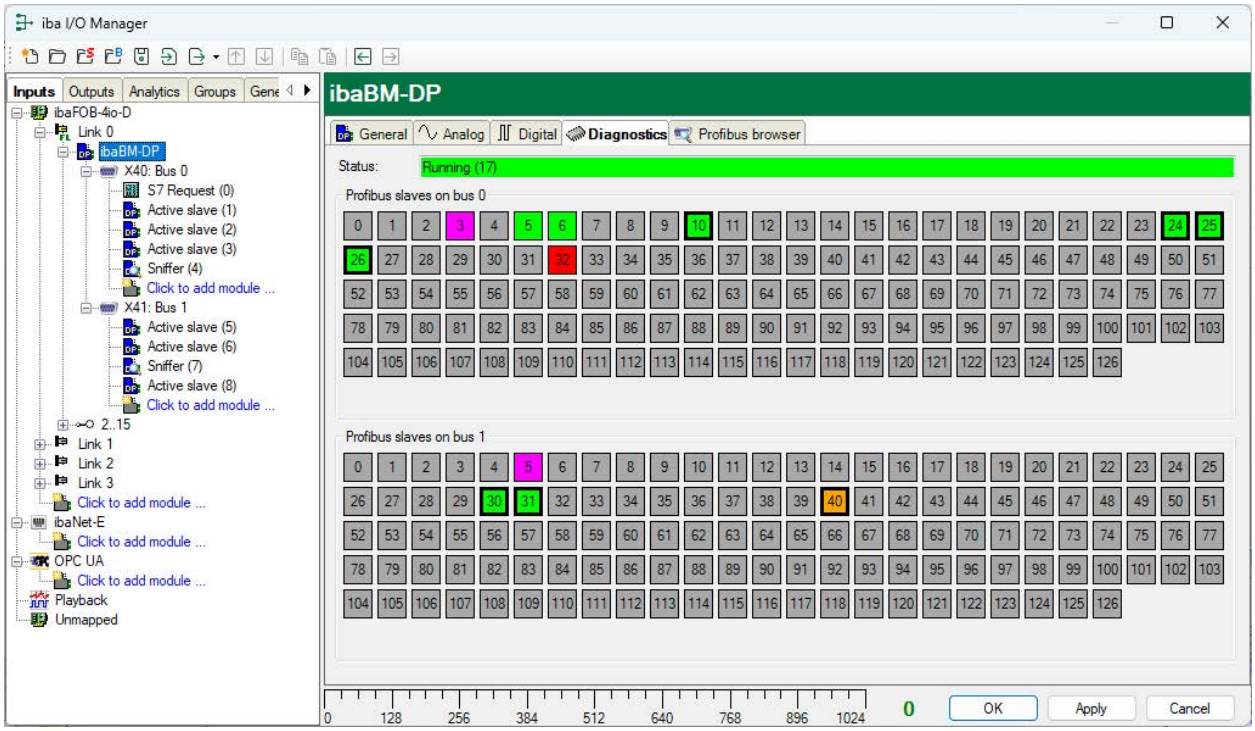
10.4 Diagnostic functions

The *ibaBM-DP* device provides numerous diagnostic functions which can be used to analyze the state of the connected PROFIBUS system.

Firmware v01.04.001 and *ibaPDA* v6.37.0 are prerequisites for the use of the event log, the bus voltage display, and the diagnostic modules.

10.4.1 Diagnostics in the I/O Manager

On the *Diagnostics* tab of *ibaBM-DP* in the *ibaPDA* I/O Manager, the operating state for bus 0/1 and all available participants are displayed.



The different statuses of the slaves are shown in different colors:

Color		State	Remark
Green	5	OK	The slave is available on the bus and is addressed by a master.
Red	32	Missing	The slave is configured for a master but is not present on the bus. This status leads to a bus error in the associated master.
Orange	40	Phantom	The slave is available on the bus, but not configured on a master.
Gray	10	Not active	
Magenta	5	Master	This is a master
Bold margin	26		Active slave on an ibaBM-DP device

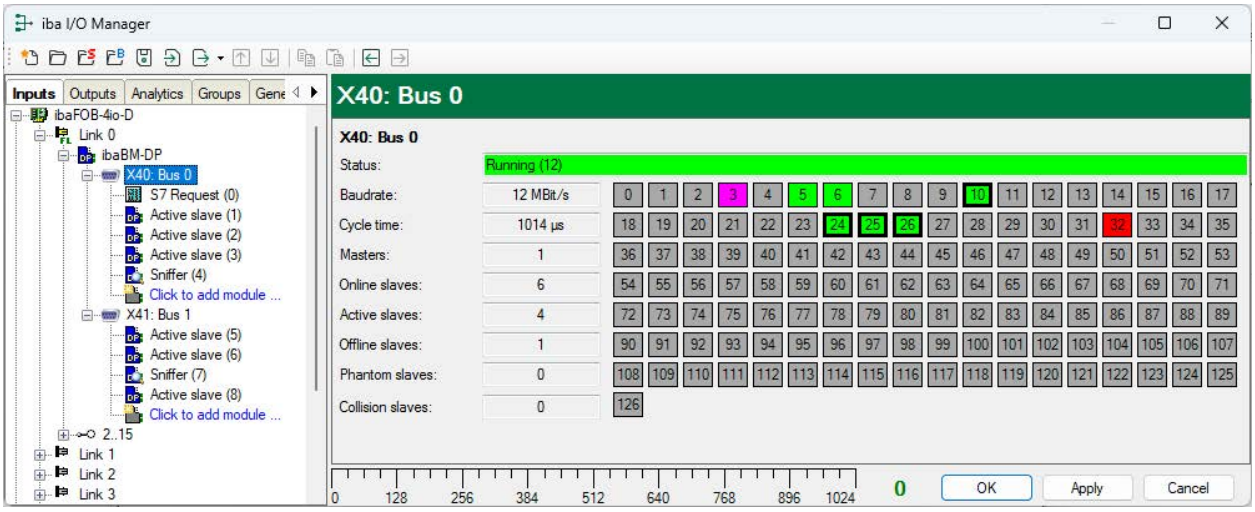
The device also supports a collision detection. Before *ibaBM-DP* activates its own active slaves, the device first checks whether there are already slaves with the same number on the bus. If a slave with the same number already exists, your own slave is not activated.

Note

A slave with the risk of colliding is flashing in the bus overview. When validating the I/O configuration after having clicked on <OK> or <Apply>, an error message is shown for the identified collision.

The status of a slave is shown in the tooltip text when you position the cursor on a slave symbol. By clicking on the slave symbol, you get directly to the detailed view of the slave in the PROFIBUS browser, see chapter ↗ *PROFIBUS browser, page 106*.

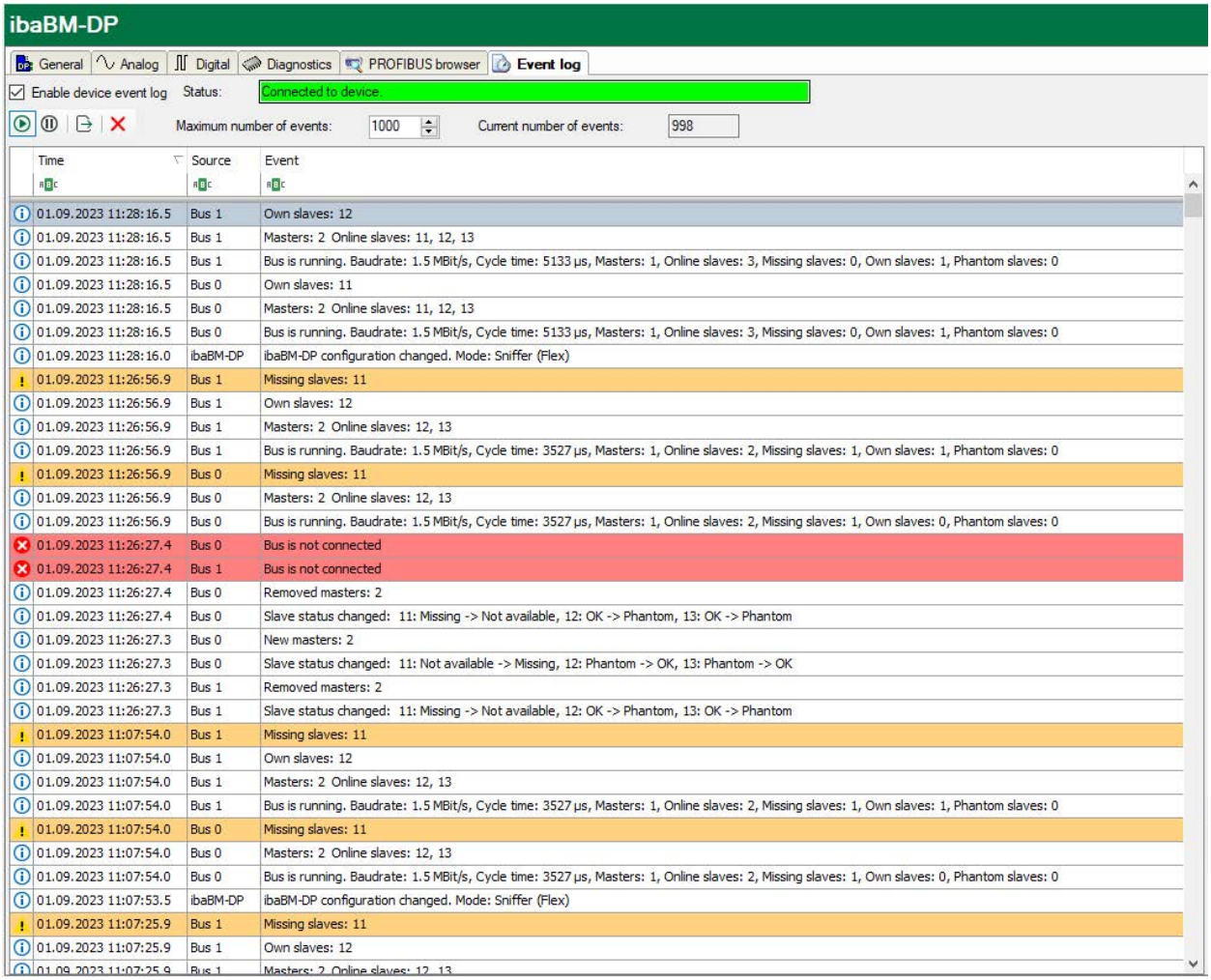
You will see a detailed diagnostics view of a bus line, when marking the bus connection "X40: Bus0" or "X41: Bus 1". Here, additionally the detected transfer rate, cycle time and the number of masters and the different slave types are displayed.



10.4.2 Event log in the I/O Manager

You can use the event log in 32Mbit Flex mode as well as in compatibility mode 32Mbit. In 32Mbit Flex mode, the events are transmitted via the Ethernet communication which is running via the FO connection simultaneously to the measurement data acquisition. In compatibility mode 32Mbit, the Ethernet interface is used.

In the event log, the status changes on the PROFIBUS detected by *ibaBM-DP* are documented in a list. You find the event log in the I/O Manager: Mark the *ibaBM-DP* device in the interface tree. Now, you can see the “Event log” tab on the right.



The following settings and operation modes are available:

Enable device event log
Here, you enable the event log for the device. The event log must be enabled individually for each device.

Status
Here, the status of the connection between *ibaPDA* and *ibaBM-DP* for reading the events is displayed.

Update

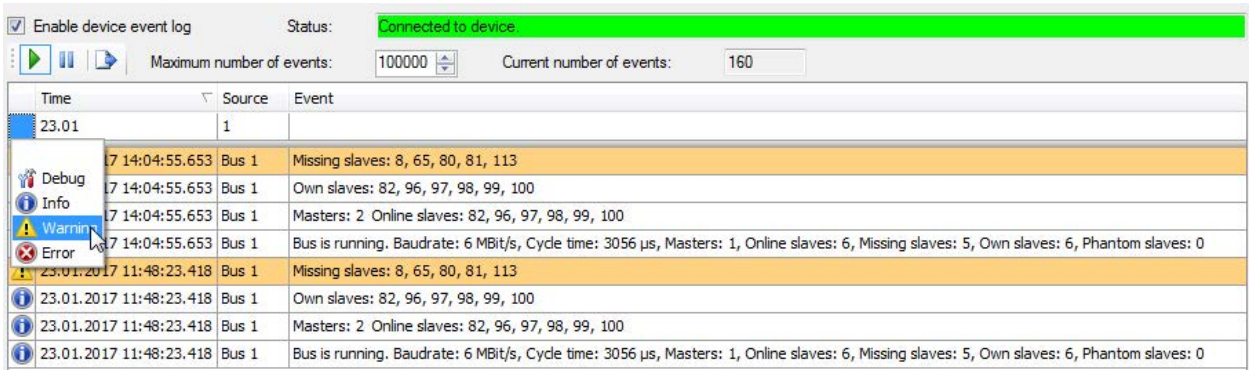
- When pressing the button, the list of the events will be continuously updated automatically.
- When pressing the button, the automatic update is stopped.

Export
With the button, you can export the events as *.tsv (tabulator separated values) file.

Maximum number of events
Here, you configure the maximum number of saved events (100 - 100,000).

Current number of events
The currently saved number of events.

Filter results
The list of events can be filtered in a customized way. For this purpose, enter the filter text you are searching for in the upper line in the desired field. All events containing the entered search text, will be displayed. The symbol in the first column shows the type of the event. If you want to filter the events according to a type, just select the desired symbol in the filter row.



Note

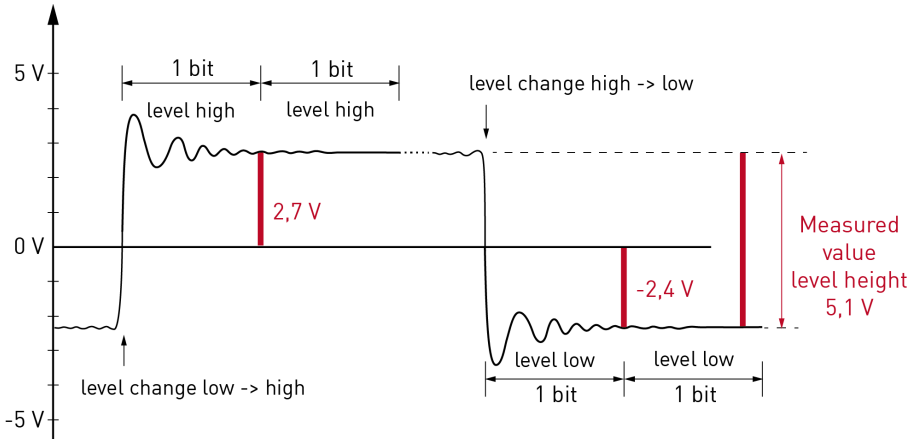
The status of the PROFIBUS system and thus the events, are generated by numerous asynchronous monitorings of various PROFIBUS telegrams in *ibaBM-DP*.

Thus, the correct time sequence of the reported events cannot be guaranteed. Events, that have been generated within a short continuous time period, always have to be analyzed in common.

10.4.3 Display of bus voltages in the I/O Manager

ibaBM-DP has a measuring transducer (8 Bit, sampling rate 10 ns) that enables you to measure the bus voltages. The measured voltages are displayed as bar diagram in the I/O Manager. The bus voltages can also be acquired as signals. For this purpose, use the "Slave diagnostics" module, see chapter ↗ *Slave diagnostics module, page 94* and ↗ *Diagnostic modules, page 105*.

Measuring principle for determining the bus voltages



For determining the voltage difference between high and low level, one voltage value will be determined in the high and low status each. The difference is the measured value for the level height.

The measurement in the high status is done in situations, where the level is at high for at least two consecutive bits after the level has changed from low to high. The values are measured at the end of the first bit. Thus, a nearly steady state of the level at the time of the measurement can be assumed.

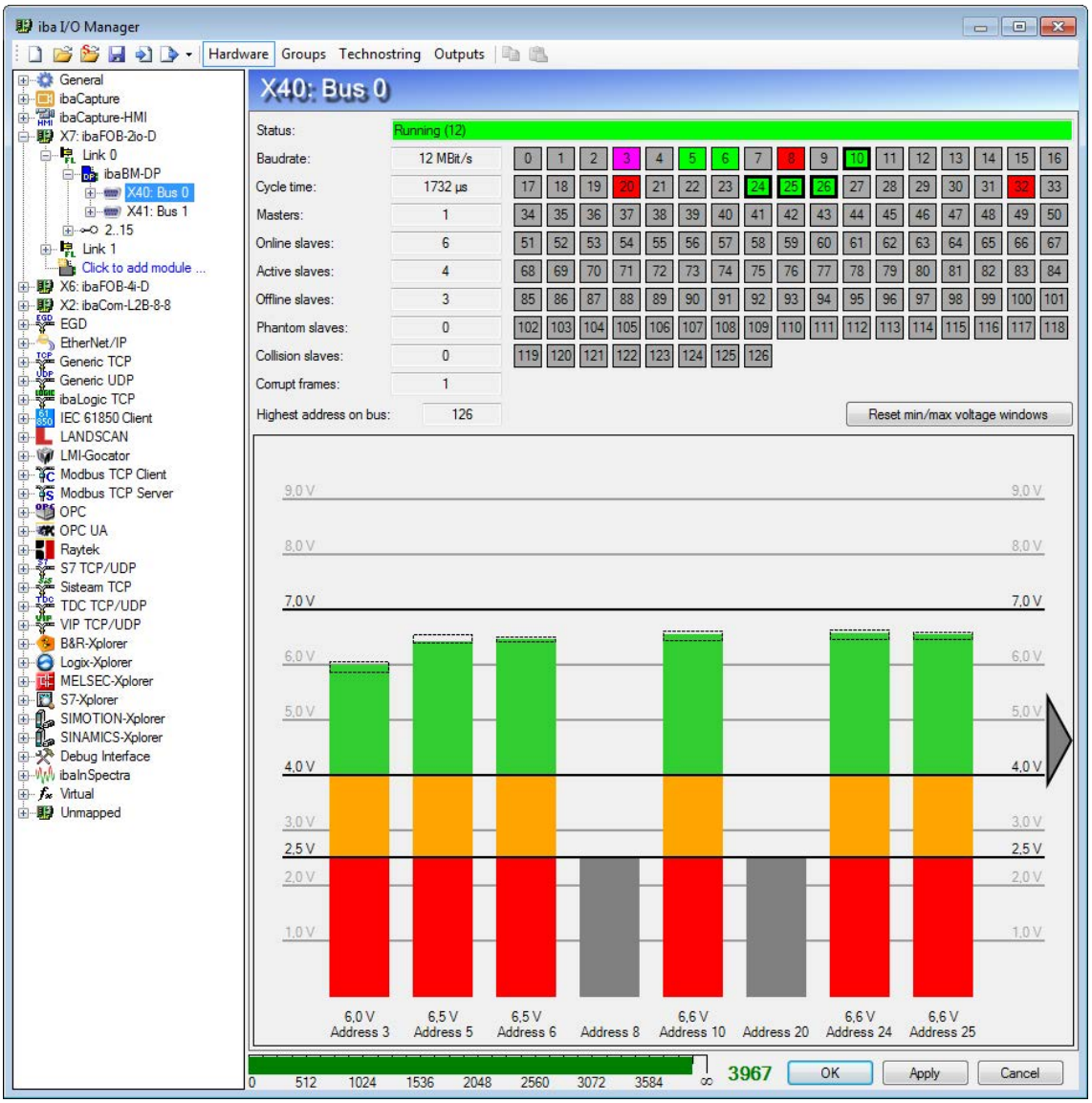
The measurement in the low status is done according to the same principle, i. e. in situations where the level is at low for at least two consecutive bits after the level has changed from high to low.

With an increasing transfer rate, the number of available measurement values decreases as the time period of one bit is getting shorter and shorter. Moreover, the time of measurement within one bit has a Jitter. With an increasing transfer rate, this Jitter becomes more and more relevant as the voltage does not reach a steady state anymore. Thus, the precision of the measurement gets lower at high transfer rates.

The measurement is only done for status telegrams which are exchanged between master and slaves. Depending on the bus cycle (depending on the transfer rate and the number of participants), the update rate of the bus voltages can be in the seconds range. The *ibaBM-DP* hardware does not allow for a more frequent measurement. The focus of the voltage measurement in the *ibaBM-DP* lies on the statistic evaluation of the voltage ratio on the bus and the long-term acquisition of the voltages. The measurement of the bus voltages in *ibaBM-DP* is not suited for acquiring and analyzing fast processes on the bus voltage.

Bar chart for the bus voltages

The bar chart of the bus voltages becomes visible when you select the bus node “X40: Bus 0” or “X41: Bus 1” of an *ibaBM-DP* in the I/O Manager.



The currently measured bus voltage is displayed as a bar for each device on the bus. The following areas are differentiated by color:

- Green: Participants with a voltage in the range between 4.0 V and 7.0 V are generally called “okay”.
- Orange: Participants with a voltage in the range between 2.5 V and 4.0 V may be okay. Line losses due to a long length of the conductor between *ibaBM-DP* as point of measurement and the participant, may result in a lower voltage. Also, a problem with the participant itself may result in a lower voltage.
- Red: Participants with a voltage lower than 2.5 V are generally designated as “not okay”.
- Gray: Slaves that do not exist but are configured are displayed as gray bars at the corresponding position. In the overview of the bus participants above, these slaves correspond to the red marked slave symbols.

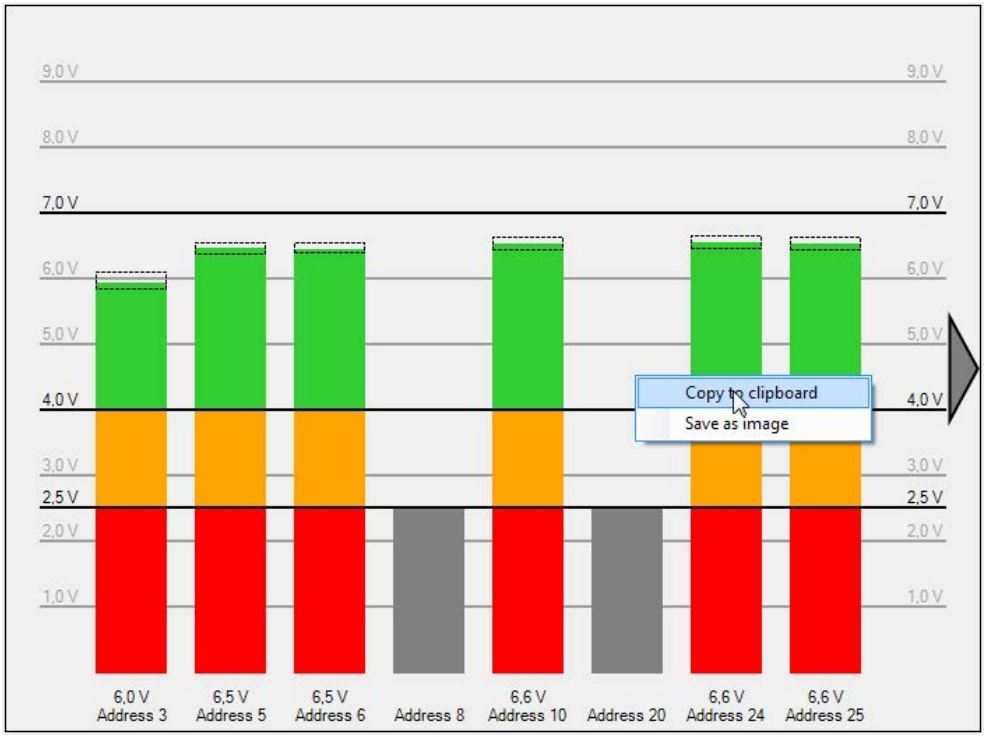
The dotted rectangles show the range between the minimum and maximum value of the bus voltage. Minimum and maximum value are only determined as long as the bar diagram is visible

in the I/O Manager. When you leave the bar diagram view, the values will be reset. The values can also be reset manually with a click on <Reset min/max voltage windows>.

Clicking on the grey triangle displays additional participants.

Save bar chart as image

For further use, the bar diagram can be saved as image or copied to the clipboard. Open the context menu with a right mouse click in the bar diagram and select *Copy to clipboard* or *Save as image*. The image formats PNG, GIF, JPG, TIF, BMP are supported.



10.4.4 Diagnostic modules

If you want to examine sporadic errors in the PROFIBUS system in detail, you can acquire slave- and bus-specific diagnostic values as signals in *ibaPDA* using the diagnostic modules "Slave diagnostics" and "Bus diagnostics". The data are analyzed, just as for all other acquired signals, online via *ibaPDA* client or offline with the DAT file in *ibaAnalyzer*.

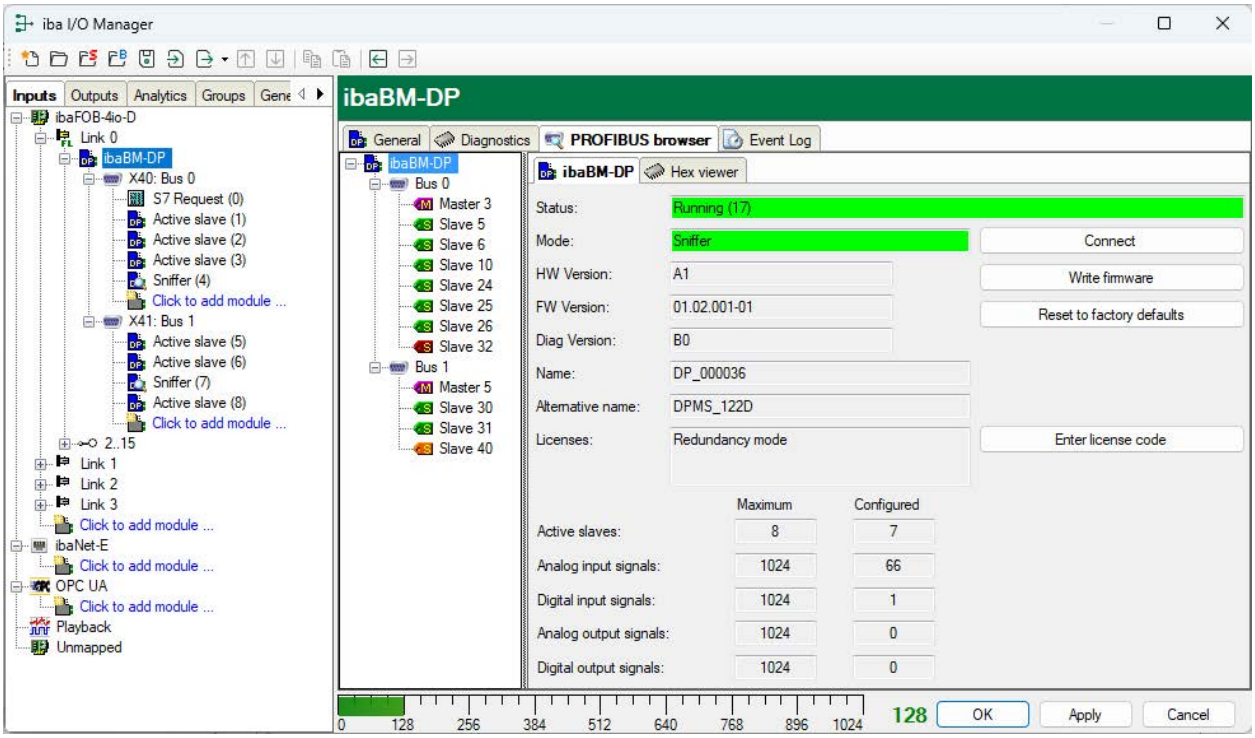
Information on the two diagnostic modules and the values they contain can be found in the chapters ↗ *Slave diagnostics module, page 94* und ↗ *Bus diagnostics module, page 97*.

Note

You can use the “Slave diagnostics” and “Bus diagnostics” modules only in 32Mbit Flex mode. In compatibility mode 32Mbit, the modules remain disabled in the I/O Manager.

10.4.5 PROFIBUS browser

The PROFIBUS browser supplies you with detailed information about the PROFIBUS which is connected to *ibaBM-DP*. If you mark the main node in the tree structure of the browser, you get information about the device, like hardware and firmware versions, device names, license options and the max. number of the possible and configured slaves and signals.



Moreover, you can install new firmware, reset the device to factory settings or enter license codes for additional functions.

Note

You can only install new firmware and reset the device to factory settings in 32Mbit Flex mode.

In compatibility mode 32Mbit, please use the web interface for installing firmware updates. In this case, the reset to factory settings can be done using the S10 pushbutton (see chapter ↗ *Push button S10*, page 23).

Write firmware

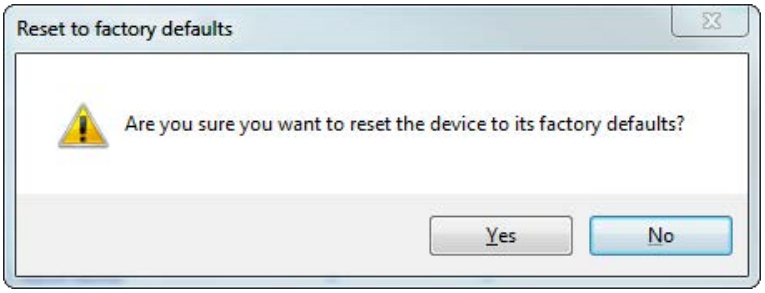
With the <Write firmware> button, you can install firmware updates. Please select the update file `dp_v[xx.yy.zzz].iba` in the browser and start the update with <OK>.

Note

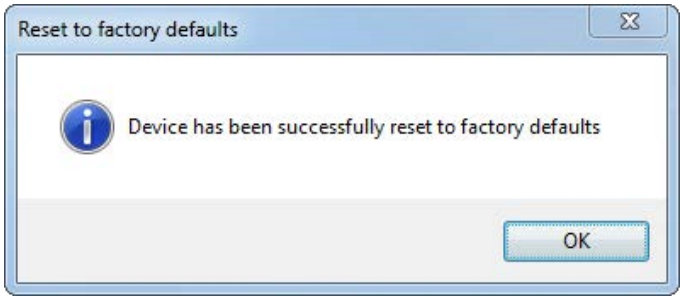
This procedure might take some minutes and must not be interrupted. As soon as the process has been finished, the device restarts automatically.

Reset to factory defaults

Having opened the following dialog by clicking on the button <Reset to factory defaults>, all settings are reset to factory settings by confirming with <Yes>.

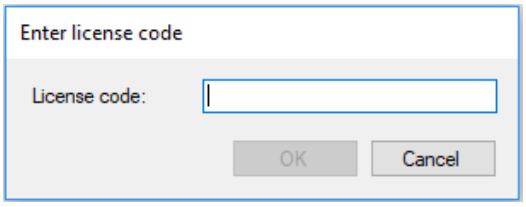


The following message is shown:



Enter license code

Click the button <Enter license code> to open the dialog *Enter license code*.



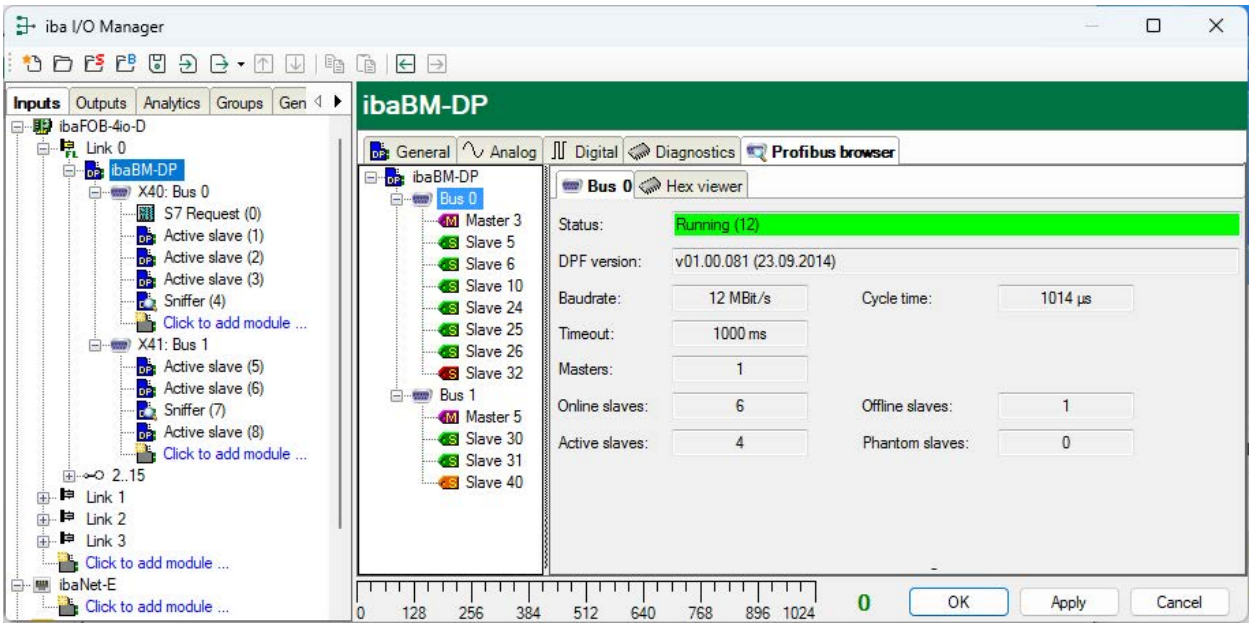
If you have purchased an additional license from iba (redundancy, mirror, simulation or mapping mode or the extension to 16 active slaves), enter the key that you have received from iba in the "License code" field. With a click on <OK> the device automatically detects which license(s) will be activated.

Tip

In addition to the diagnostic functions described above, the PROFIBUS browser can be used to select signals in the “Sniffer” and “Active slave” modules. For further information see chapter ↗ *Signal selection in the Profibus browser, page 109*.

Bus information in the Profibus browser

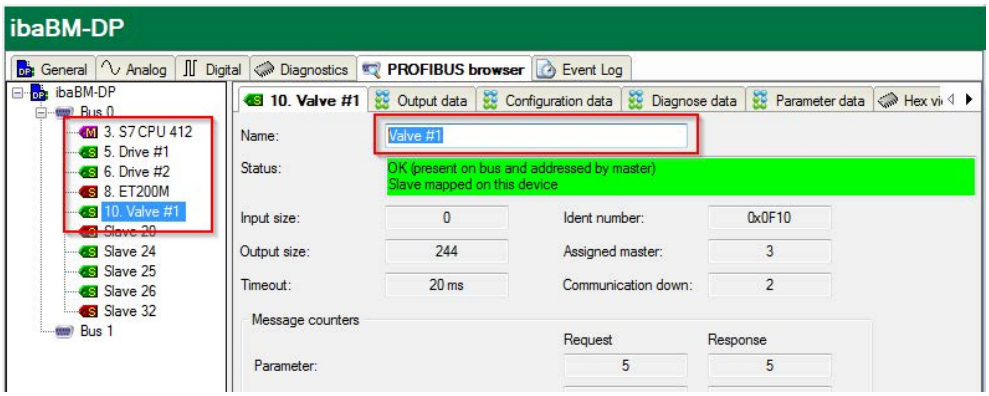
If a bus node is marked in the browser, the information about the respective PROFIBUS line, like transfer rate, cycle time and number of slaves is displayed.



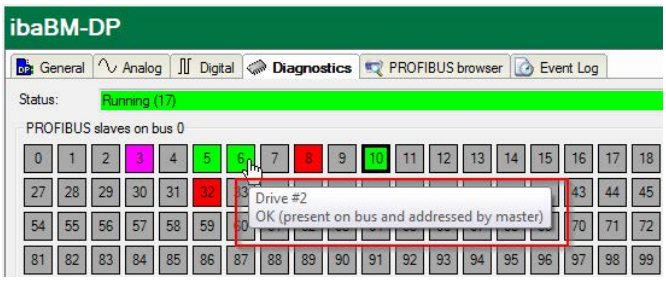
Slave information in the Profibus browser

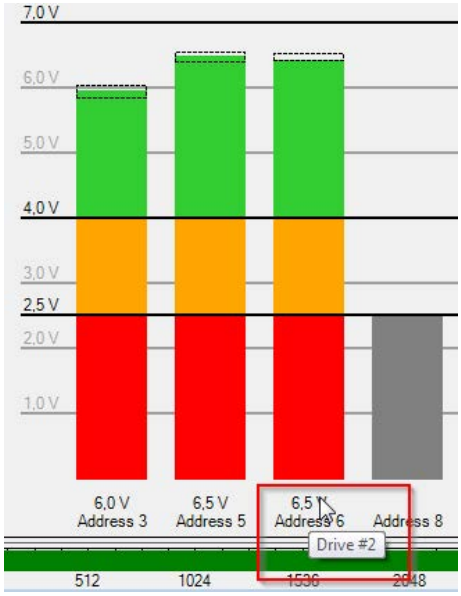
If the node of a bus participant (slave or master) is marked, you get information about the participant, like length of the input and output range, the assigned master and counters for different telegram types.

In the field *Name* you can assign a symbolic name to the slave. This improves clarity and assignment.

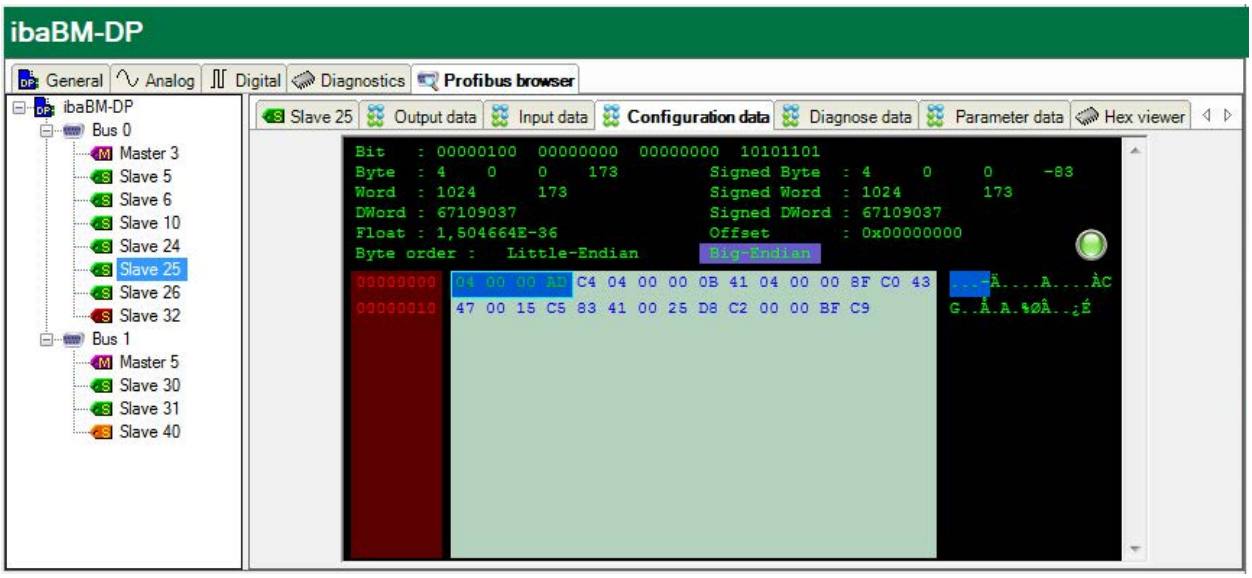


The assigned names are also displayed as tooltips in the diagnostics overview and in the bar diagram of the bus voltages.





On the additional tabs *Output data*, *Input data*, *Configuration data*, *Diagnose data* and *Parameter data*, the current contents of the individual telegram types are shown. This information might be helpful in case you need support.

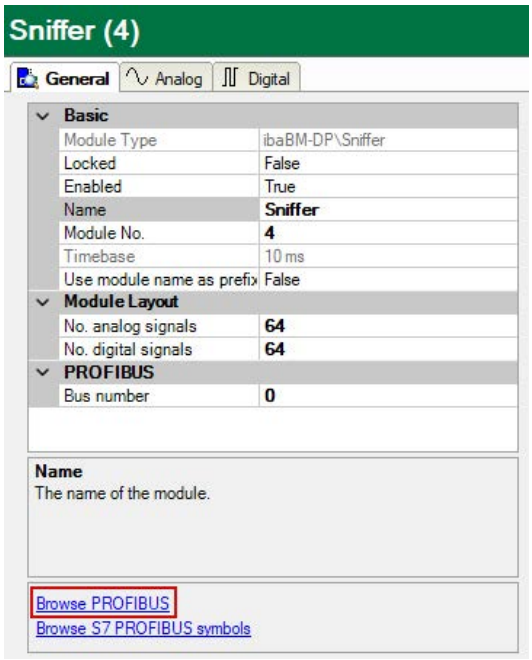


10.5 Signal selection in the Profibus browser

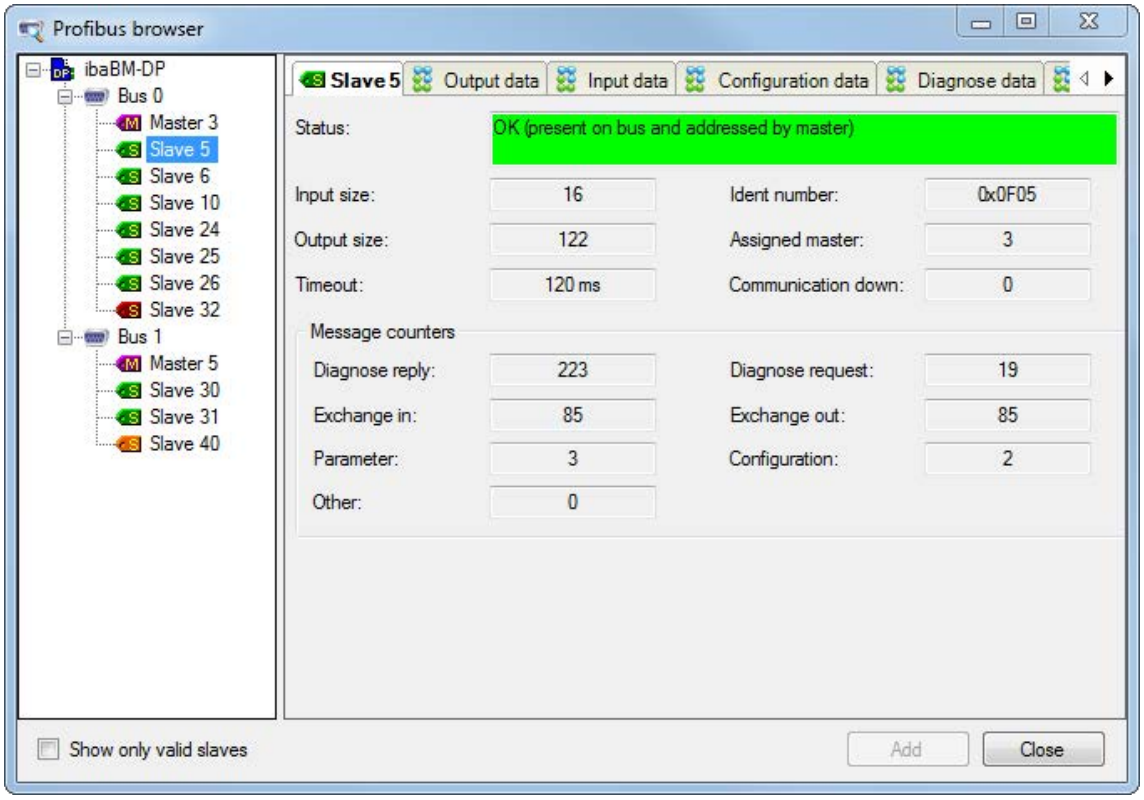
You can use the Profibus Browser for choosing analog and digital signals for a “Sniffer“ or “Active slave“ module.

1. Open the *Profibus browser* on the *General* tab of the “Sniffer“ or “Active Slave“ module.

   See also chapters ↗ *Sniffer – General tab, page 81* and ↗ *Active slave – General tab, page 86*.



2. Then, mark the node of the participant (slave).

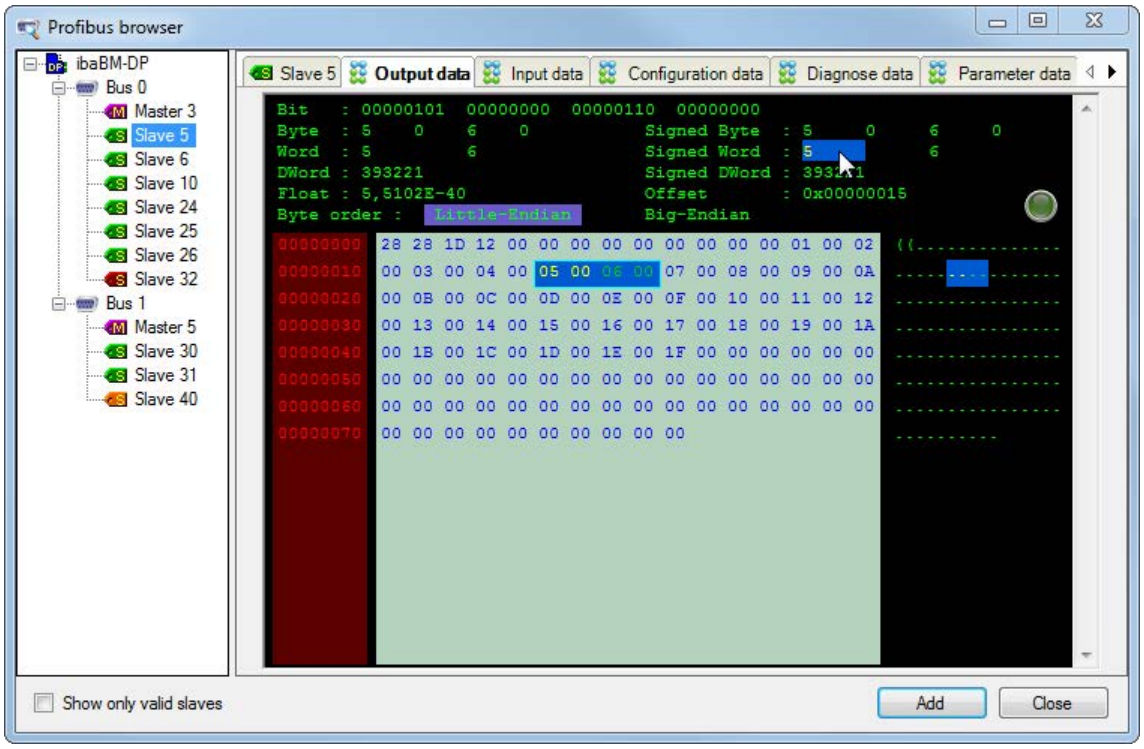


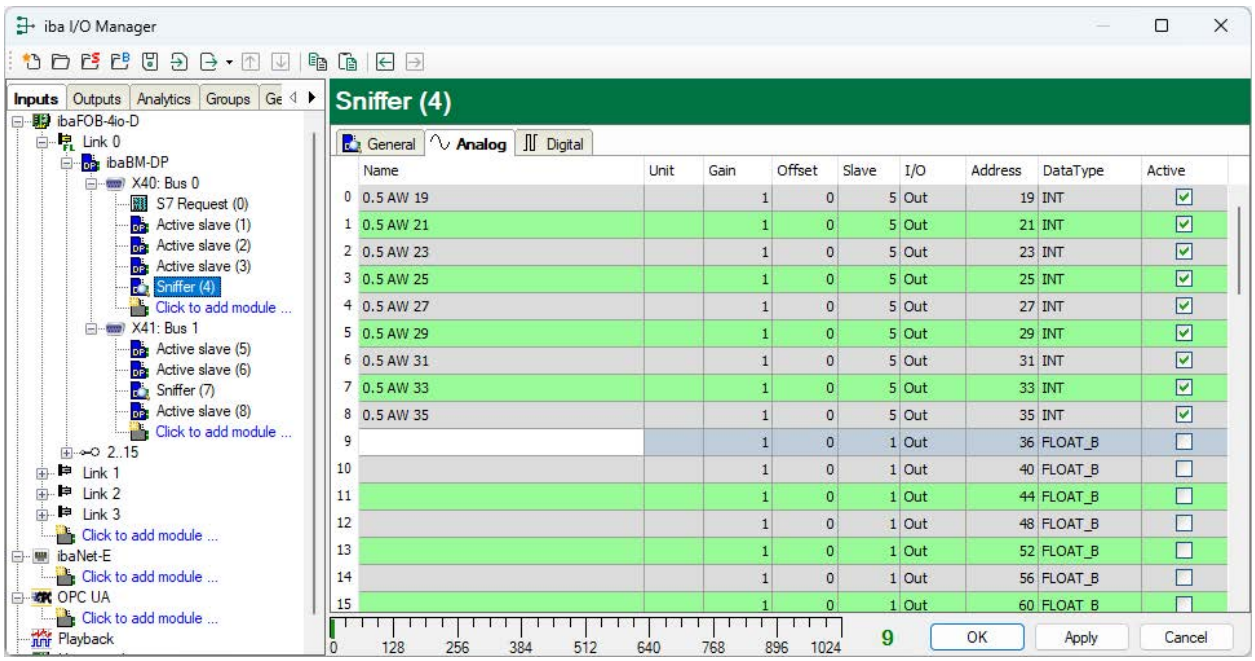
→ If a slave has input and/or output data, (e. g. ET200 station with input and/or output signals), the data are shown on two tabs, the *Output data* and the *Input data* tab. You can interpret the binary data by means of the Hex viewer.

In the figures above, slave no. 5 has input data and output data.

In the upper part of the tab (here, e. g. the *Output data* tab), the value of a chosen byte sequence is shown – interpreted for different data types – in the bottom part. You can switch be-

tween "Big Endian" and "Little Endian". If you have identified the chosen byte sequence as signal value, and want to apply it as measurement signal, mark the correct value in the upper part of the dialog. Then, you can add the signal by clicking on the <Add> button to the signal table in the Sniffer (or “Active slave“) module. Bus number, slave number, I/O, offset and data type are entered automatically. After you have added the signal, the marked choice automatically jumps to the next value of the same data type. You can also transfer a signal to the signal table by double clicking on the correct value.



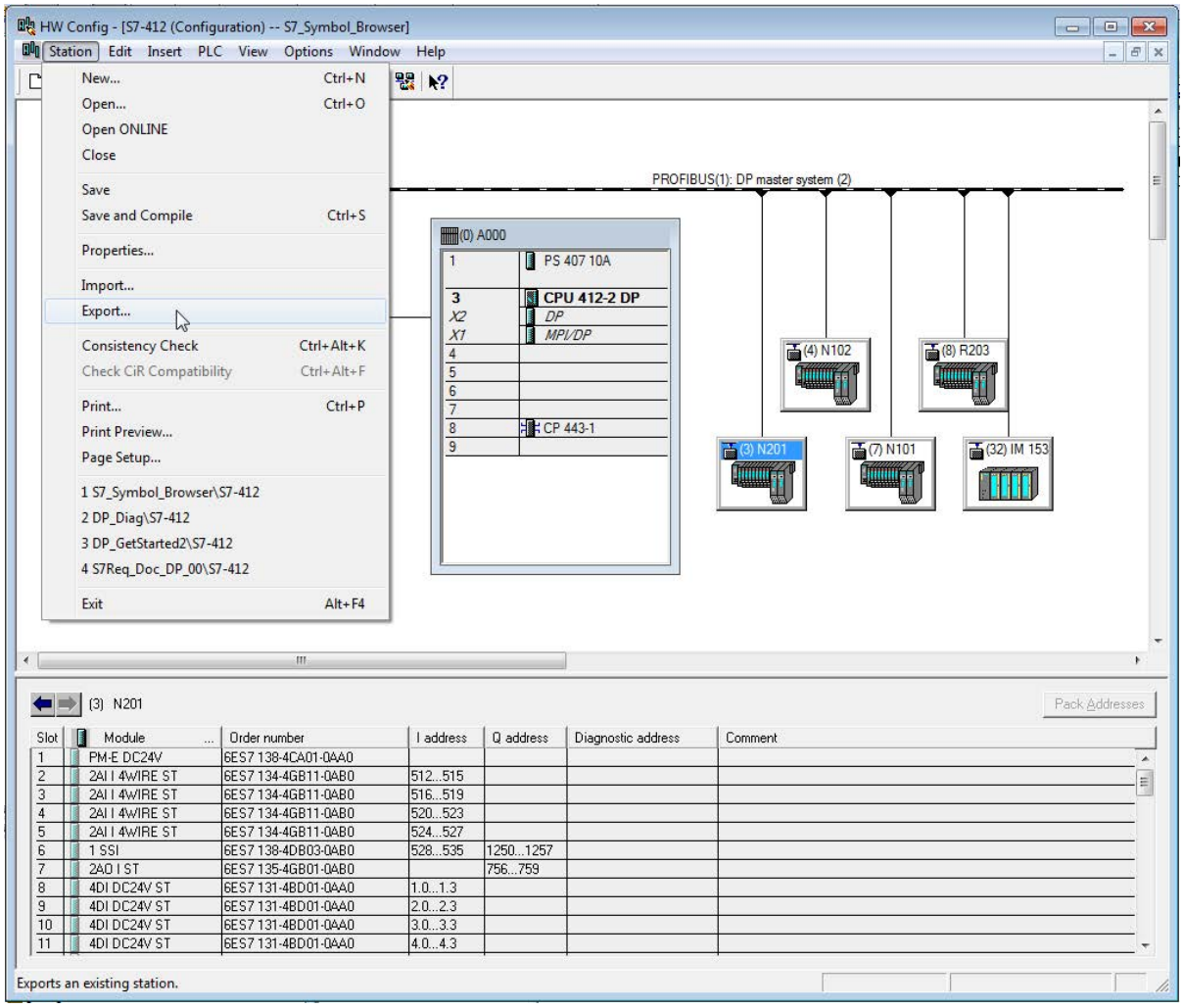


10.6 Selecting signals via sniffer symbol browser

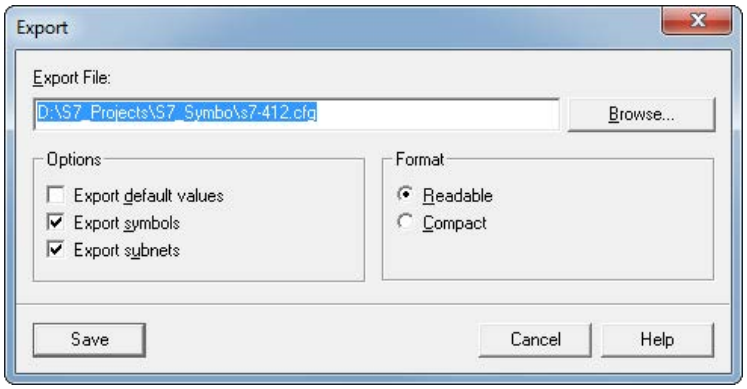
You can perform "symbolic browsing" with “sniffer” modules for PROFIBUS configurations of S7-CPUs, which have been configured under Step 7 V5.x and contain the symbols of the PROFIBUS peripherals in the symbol table. This function cannot be used for TIA Portal projects.

An export file *.cfg of the hardware configuration from Step 7 has to be available when creating the address book.

1. For generating such an export file, open the hardware configuration of your S7-CPU in Step 7.
2. Under the menu item *Station* - *Export...*, you can generate an export of the configuration:



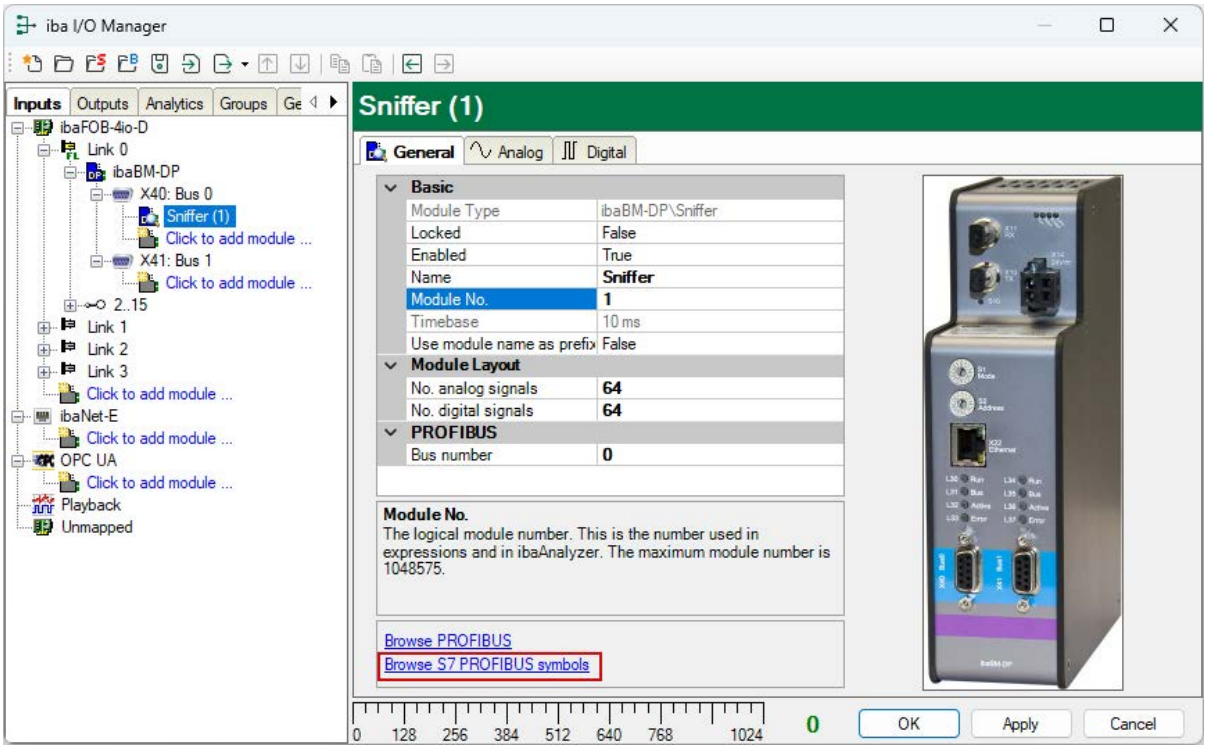
3. Please select the following settings for *Options* and *Format*:



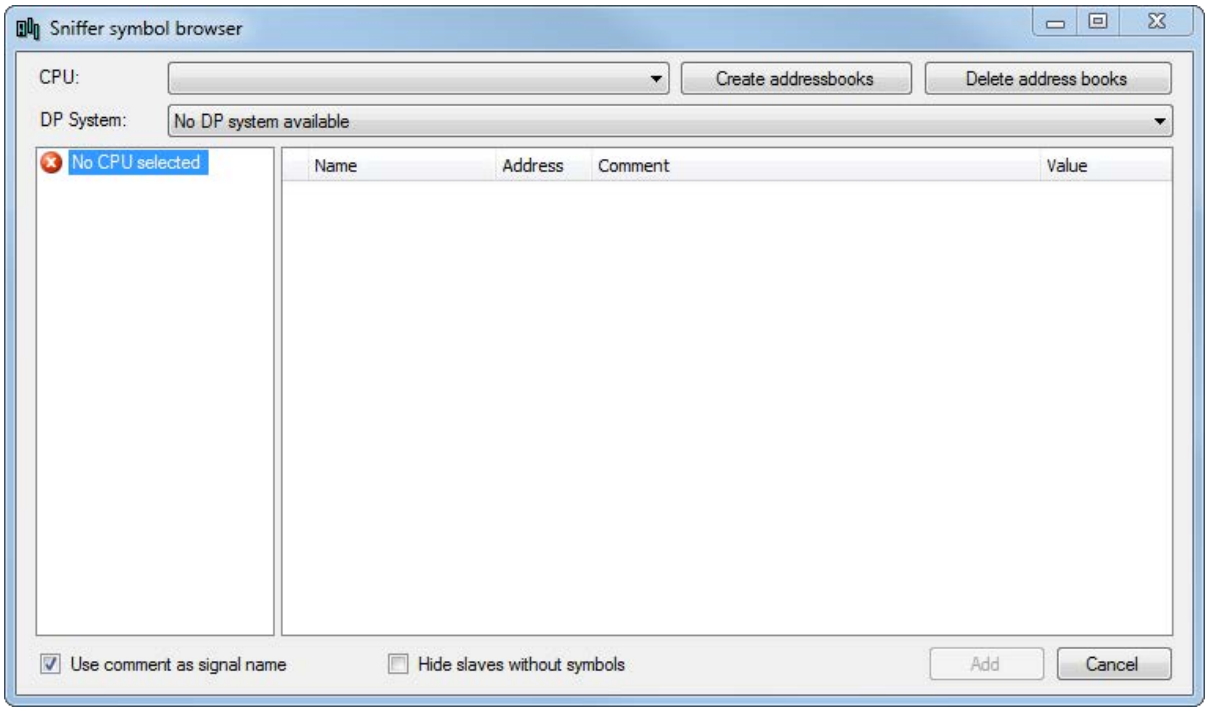
   Any path can be defined for the export file.

4. Close the dialog with <Save> and switch over to *ibaPDA*.

5. For creating the address book in *ibaPDA*, select the *General* tab of a sniffer module and click on the blue link "Browse S7 PROFIBUS symbols".

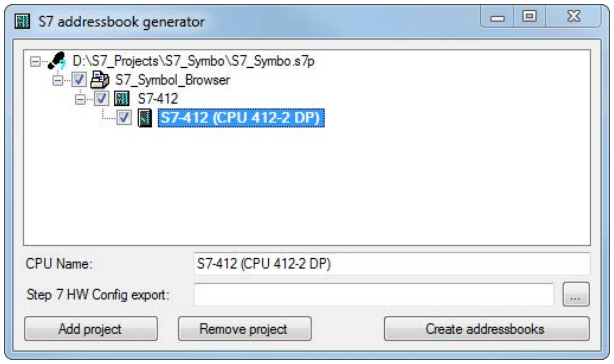


→ The sniffer symbol browser is opened. Currently, no CPU and no DP system are available.



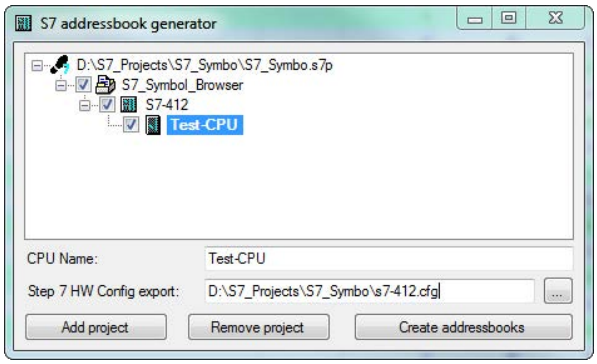
6. To open the S7 address book generator, tap the <Create addressbooks> button.
7. Add your Step 7 project by clicking on the <Add project> button and selecting the *.s7p file of your Step 7 project in the file browser. In the example below the Step 7 project is stored under the path `D:\S7_Projects\S7_Symbo\` and the *.s7p-file is named `S7_Symbo.s7p`.

→ The available S7-CPUs are displayed automatically.



8. Enter now the path to the exported hardware configuration file in the field "Step 7 HW Config export".

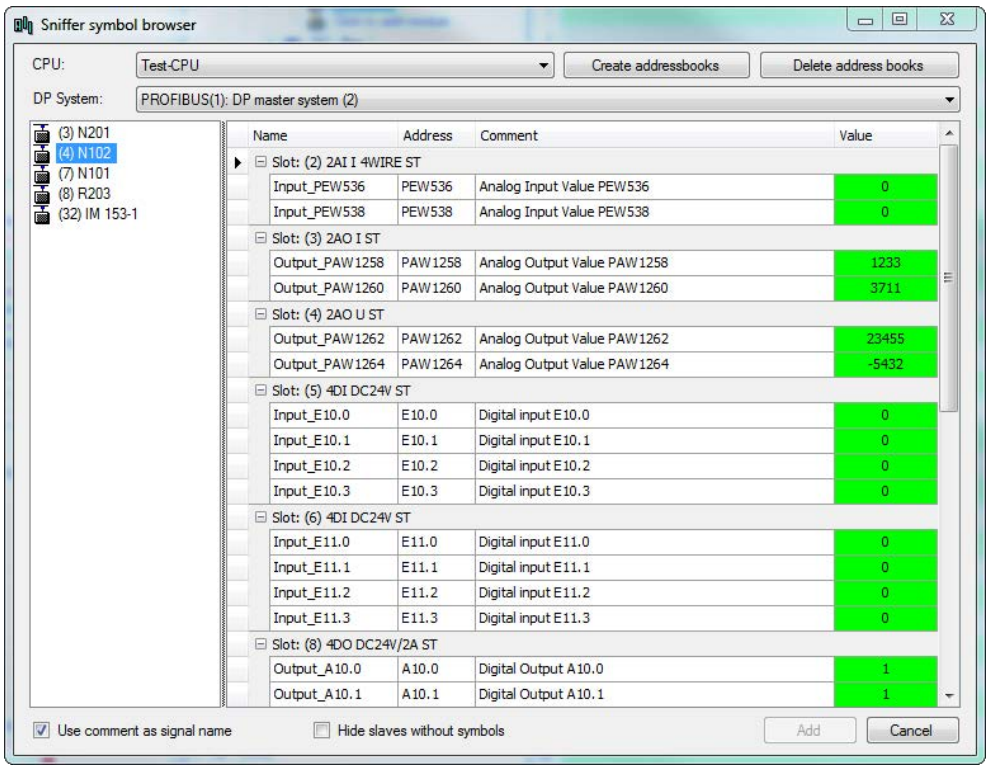
   In the *CPU Name*, you can enter a meaningful name for the CPU. The default setting is the original name which is used in the Step 7 project.



9. Then, click on the button <Create addressbooks>.

→ Now, an addressbook including the PROFIBUS symbols is generated.

10. Now, you can choose a CPU and a DP system in the sniffer symbol browser.



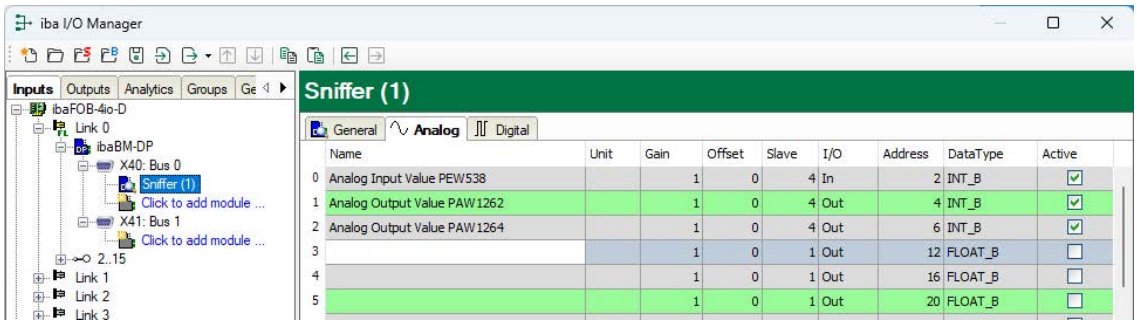
→ On the left-hand side, the PROFIBUS slaves available in the DP system are displayed. On the right-hand side, you see the structure of the marked slaves with the individual I/O signals. If *ibaBM-DP* is connected, you see a preview of the current value in the *Value* column.

11. To use the signal comment from the Step7 symbol table as the signal name in the "Sniffer" module, activate the *Use comment as signal name* option.

12. To hide slaves for which no symbols have been defined in Step7, activate the option *Hide slaves without symbols* to hide slaves.

13. If you want to add signals for recording to the sniffer module, mark the signals on the right and click on <Add>.

→ Now the marked signals are inserted with the correct data for slave, I/O, address and data type in the sniffer module.



Tip

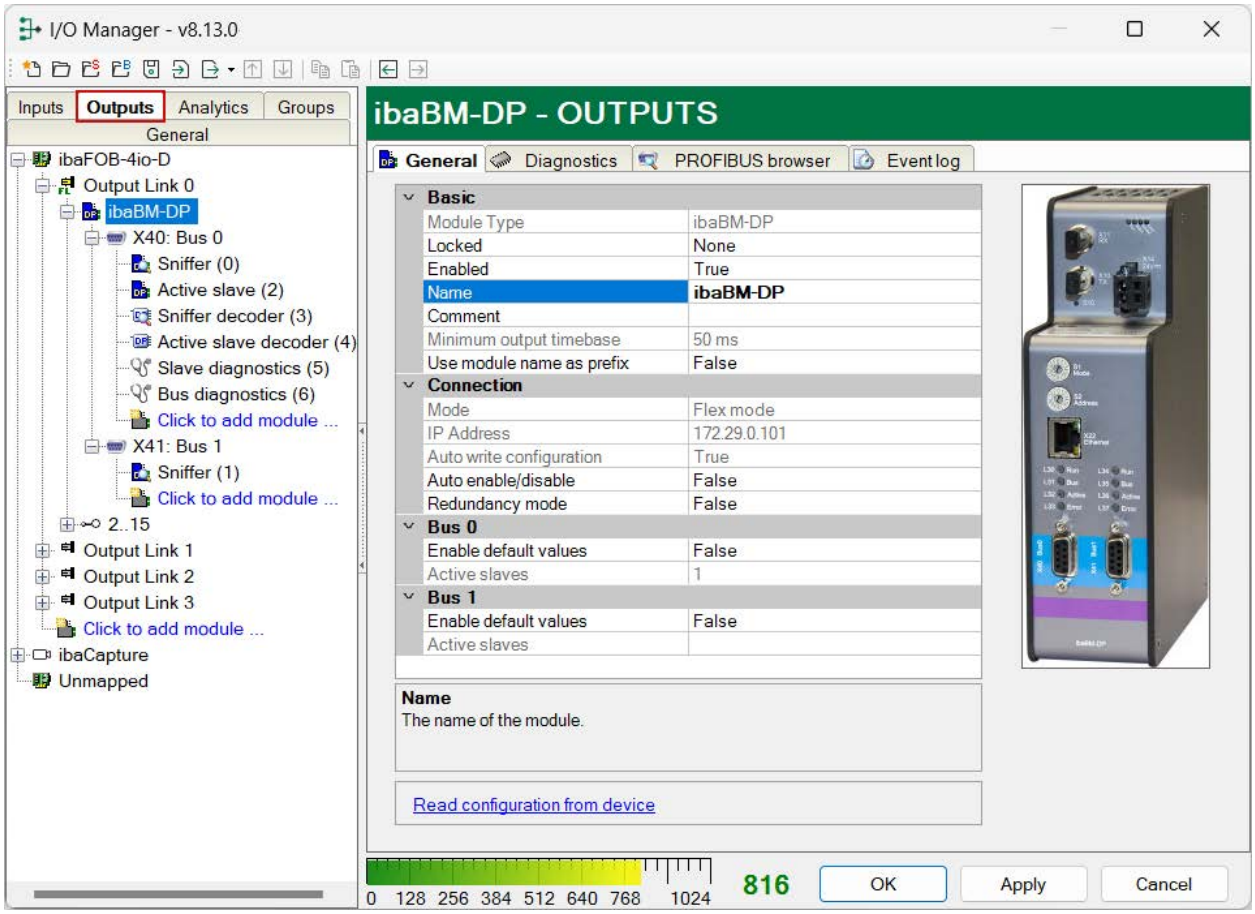
If you keep the <Ctrl> key pressed in the sniffer symbol browser, you can mark and add several signals at once.

10.7 Configuring outputs

With 32Mbit Flex, output signals can be sent via an active slave configured on the device from *ibaPDA* to the DP master.

The slave has to be configured e. g. under Step7 with an appropriate input range, for the master can read the data from the slave. See also the example in chapter ↗ *Operation as active slave, page 125*.

For configuring the outputs, select the *Outputs* tab in the I/O Manager. Modules which have been configured on the input side (*Inputs* tab) are displayed here.



Note

ibaPDA processes output signals with lower priority compared to the acquisition of input signals with a cycle not faster than 50 ms depending on the I/O configuration.

10.7.1 Outputs for device module ibaBM-DP

The following settings in the *General* tab relate exclusively to the outputs. For all other settings, see the description in chapter ↗ *ibaBM-DP device module, page 76*.

Calculation timebase
Timebase (in ms) used for the calculation of the output values. The calculation timebase is not the same as the output timebase with which the values are output!

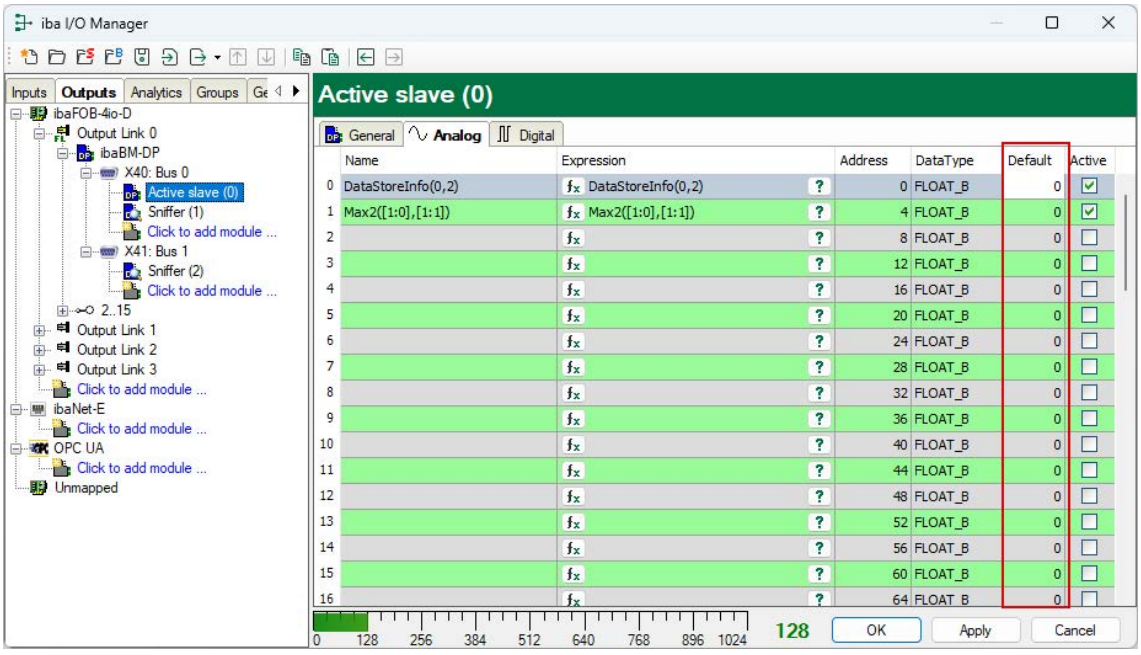
Minimum output timebase
Timebase with which the outputs can be updated as quickly as possible. The value is acquired automatically by the system based on the current I/O configuration and is only displayed here. The output timebase results from the smallest common multiple of all module timebases or is at least 50 ms.

Bus 0/1

Enable default values
If the value is TRUE, for a slave which is not supplied with data, (e. g. broken FO cable, stop of data acquisition in *ibaPDA*) the default values are sent by the device.

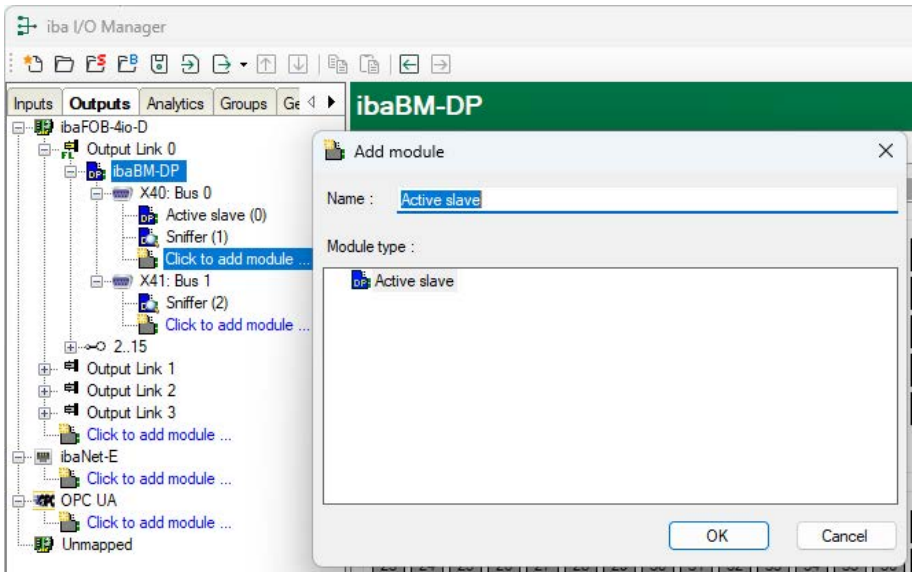
If the value is FALSE, the signal values which have been received last, will be repeated.

The default values can be individually set for the outputs for each signal. If the value is TRUE, an additional column *Default* is displayed for the analog and digital signals.



When selecting the *Output* menu, the modules which have been configured under *Input* are displayed. Outputs can be used only for modules of the type "Active slave".

You can configure a new module of the "Active slave" type by clicking on the blue "Click to add module..." command. In the dialog box, only the "Active slave" type module is available. Add the module by clicking on <OK>.



10.7.2 Outputs for Active slave module

Information on the settings in the *General* tab can be found in chapter ↗ *Active slave module, page 86*.

Output of analog values

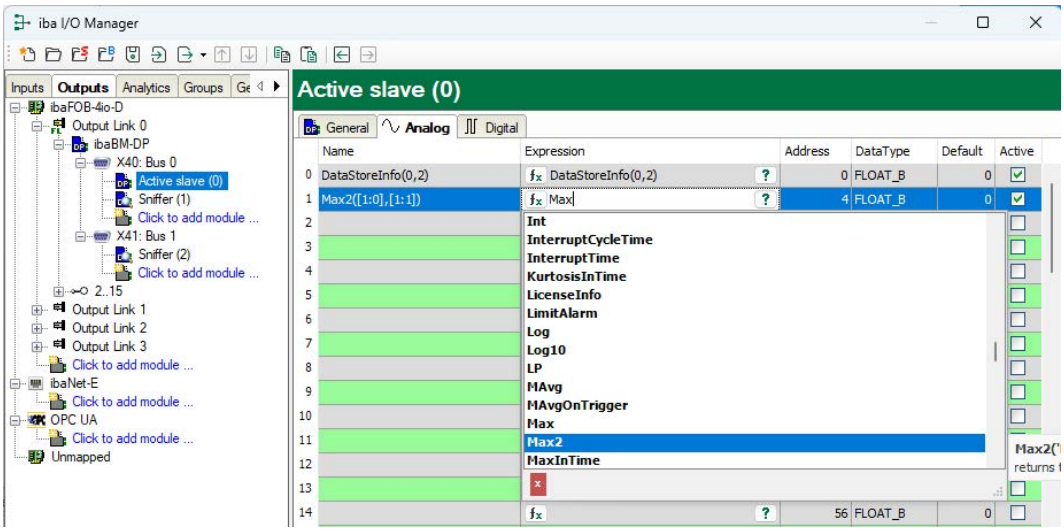
Define the analog values you want to output in the *Analog* tab.

Name

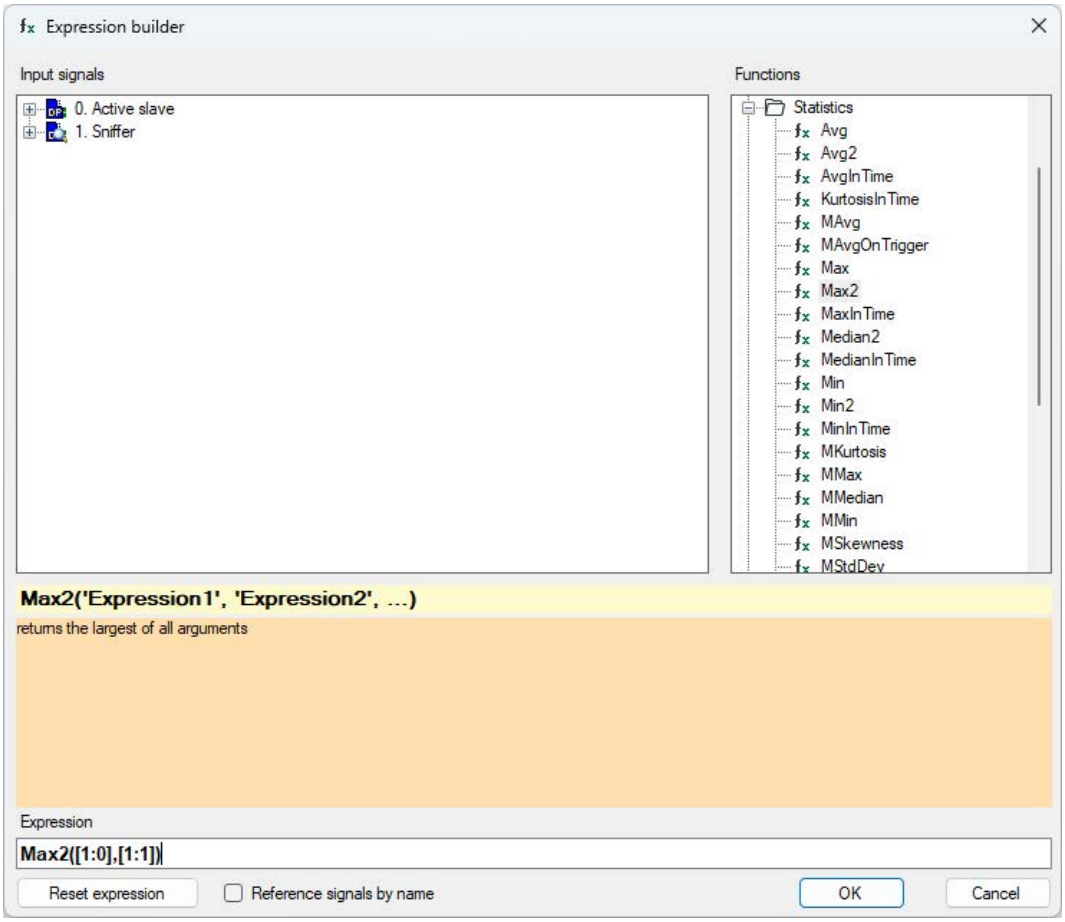
Here, you can enter a signal name and additionally two comments when clicking the symbol in the *Name* field.

Expression

Enter here an expression which defines the output signal. The Intellisense function supplies you with automatic support for creating an expression.



Alternatively, you can also open the printout editor by tapping the symbol to create the desired printout.



Other documentation

For more information about the function of the expression builder and the available functions, please refer to the *ibaPDA* manual.

Address
The byte address of the signal within the input data range of the slave. The address range always begins with the address 0.

Data type
Data type of the signal, see table in chapter ↗ *Sniffer – Analog tab, page 82*.

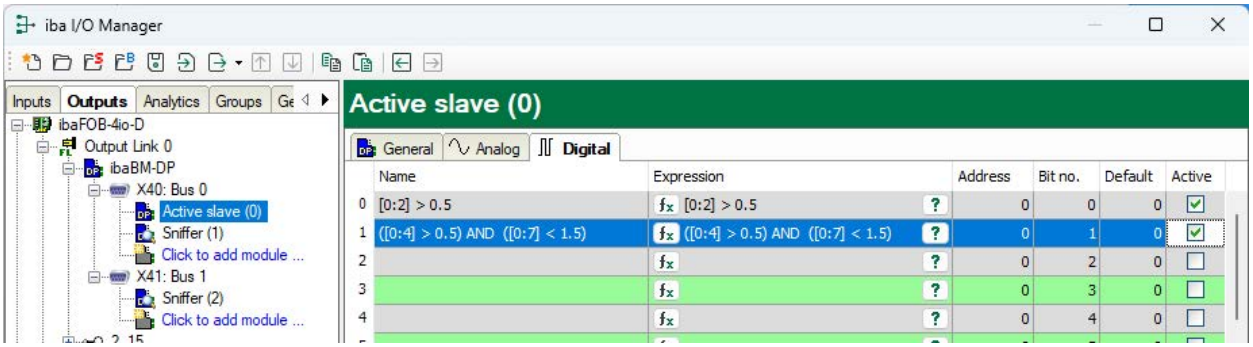
Default
Here, you can enter the default value. This column is only visible for enabled default values, see chapter ↗ *Outputs for device module ibaBM-DP, page 118*.

Active
Activate the signal, which is to be output.

Output of digital values

Define the digital values you want to output on the *Digital* tab.

The procedure is identical to the procedure for the analog values. Additionally to the *Address* column, there is the *Bit no.* column where the bit address of the output signal is defined within the address byte.



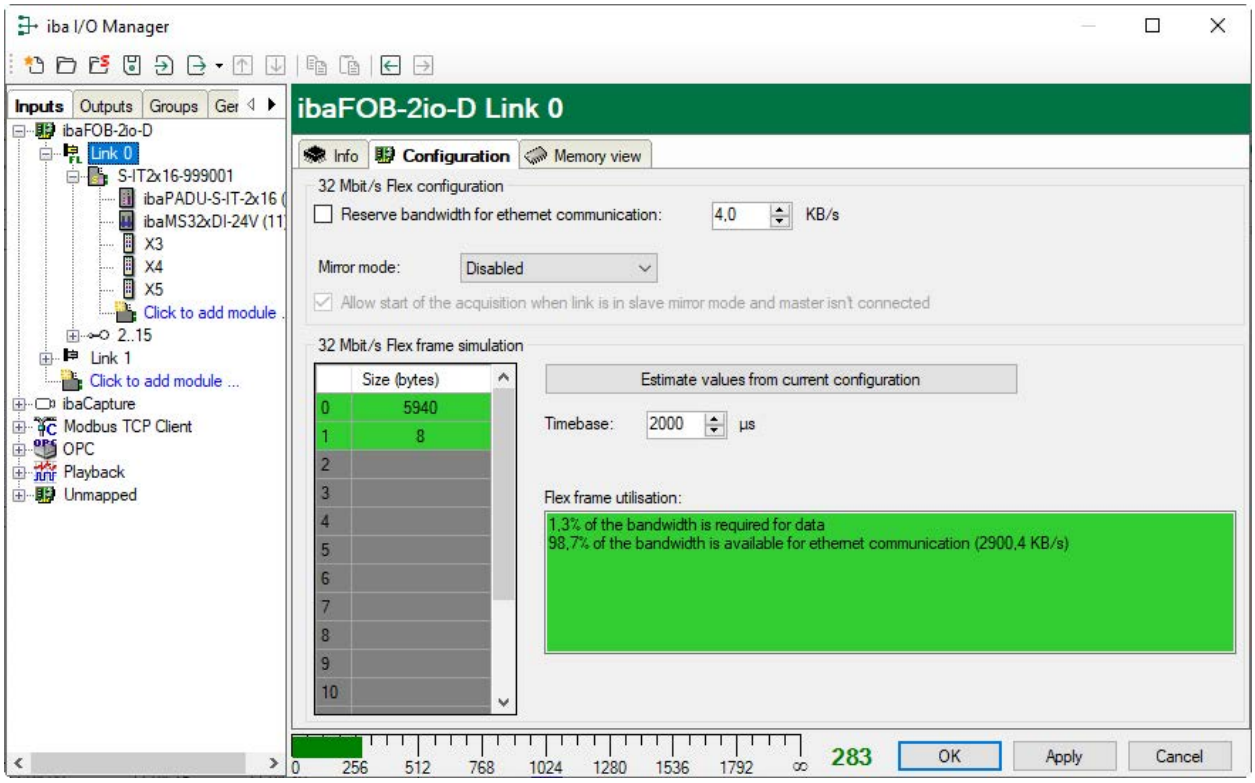
Note

In case different analog signals and/or digital signals of a slave are configured on the same address, an error message will be issued when the I/O configuration is validated.

10.8 Calculation of the telegram size with 32Mbit Flex

In a flex ring with several participants, the data volume per participant is distributed dynamically and calculated by *ibaPDA*. The data size is calculated by *ibaPDA* and it depends on the configured number of analog and digital signals and the smallest configured time base in the ring.

Beginning with version 6.33.1, *ibaPDA* provides a simulator which calculates the data size that can be transmitted via fiber optics with 32Mbit Flex protocol. The simulator is available in the *Configuration* tab.



The data sizes in bytes of each device on the link and the timebase of the data acquisition on the link (in µs) is needed for the calculation.

The values can be manually entered or taken automatically from the current configuration, either with a click on the button <Estimate values from current configuration> or when the respective link of the *ibaFOB* card is marked in the module tree.

The devices in the Flex ring and the corresponding data sizes are listed in the grid on the left. Address 0 corresponds to the Ethernet channel and is not editable.

The section *Flex frame utilization* indicates how much of the bandwidth is still available. The color of the section changes with the utilization rate:

- Green: OK
- Orange: bandwidth for the Ethernet channel < 3 kB/s
- Red: too much data configured.

The values taken automatically are estimated first. After the configuration has been applied with a click on <OK> or <Apply>, the actual data values are displayed on the *Info* tab.

When too much data is configured, you may either decrease the number of signals to be measured or increase the timebase.

Simulation of the load

Even if no devices have been connected and configured, the calculation of the telegram size can be used for calculating the expected data load in advance. However, an *ibaFOB-D* or *ibaFOB-io-ExpressCard* card should be available in the computer.

Open the I/O Manager in *ibaPDA*, click on the link of the card and select the *Configuration* tab.

Set the smallest planned sampling time in the *Timebase* field. Now, you can enter manually the planned or expected data amount (in Bytes) in the table rows 1 to 15. With every new entry, the result values in the *Flex frame utilization* field are recalculated.

In this way, you can estimate if the planned number of signals can be processed on one Flex link or if you should use an additional Flex link.

Due to the large data amounts that are usually captured with *ibaBM-DP*, it makes sense in most cases to operate just one device on a 32Mbit Flex link.

Reserved bandwidth for Ethernet communication

The Ethernet channel (address 0) is used to transmit configuration data, to communicate with the web interface and especially with *ibaBM-DP* for the display of the PROFIBUS diagnosis. If many devices are configured with a lot of signals, it may happen, that only the minimum size of 1 kB/s is reserved for Ethernet communication. This is not sufficient in many cases and may cause, that the PROFIBUS diagnosis cannot be displayed or the communication with the web interface is very slow.

It is now possible to reserve a fixed bandwidth for the Ethernet channel with the option *Reserve bandwidth for ethernet communication*. The default value of 4 kB/s is usually sufficient for configuration data and PROFIBUS diagnosis.


Info
Configuration
Memory view
32 Mbit/s Flex configuration
Reserve bandwidth for ethernet communication:
4,0
kB/s

11 PROFIBUS configuration

11.1 Sniffer operation

No GSD file and no special configuration (for example in the SIMATIC Manager) are required for the device.

The telegrams on the PROFIBUS must be known if you want to enter the data to be measured in the configuration files of the device or in *ibaPDA*. The following signal information must be known:

- The slave on which it is to be acquired (bus no. and slave no.).
- If it is a signal that is sent from the DP master to the slave (OUTPUT) or from the slave to the master (INPUT).
- Where the signal is located in the telegram or where the range of values for several signals starts (byte offset) and what data type is involved. The byte offset is the offset within the payload data.

Tip

If you use Step7 and S7-CPUs, you can generate a symbolic address book for the data you want to measure. See chapter ↗ *Selecting signals via sniffer symbol browser*, page 112.

As a prerequisite, the IO signals have to be defined in the symbol table.

Note

PROFIsafe

PROFIsafe is a certified profile for PROFIBUS and PROFINET which overlays the PROFIBUS and PROFINET standard protocol to transmit safe input and output data. The transmitted data does not only include the pure user data but also an area for the transmission of the data securing information.

User data from PROFIsafe connections can be acquired using the same functions as from PROFIBUS and PROFINET standard connections.

The definition of the transmitted data can be found in the respective device manual of the IO-module. In most cases, the user data is located from byte offset 0 on.

11.2 Operation as active slave

For operation as active slave, one or several slave addresses (max. total of 8) must be assigned to the device. These slave addresses must be parametrized in the PROFIBUS configuration (e. g. in the SIMATIC manager) as well as in the configuration of the device (e. g. by using „Active slave“ modules in *ibaPDA*).

Caution!

Connecting the PROFIBUS cable

A conflict between several slaves with the same number can lead to a complete failure of communication on the PROFIBUS and even to a system shutdown.

To ensure that there are no duplicate slave numbers, do not connect the PROFIBUS cable until the configuration of the active slaves has been correctly carried out in *ibaPDA*.

It makes sense to configure active slaves, if data have to be acquired with the device that are not sent on the PROFIBUS anyway.

For configuring the slaves on the PROFIBUS, you need the `ibaDPMSi.gsd` GSD file. You find this file on the data medium “iba Software & Manuals” included in delivery in the directory

`02_iba_Hardware\ibaBM-DP\02_GSD_Files\01_General\`

Import the GSD file in the “HW Config“ tool under Step 7. In the catalog of the available modules, you now find the “ibaBM-DPM-S/DP-Monitor“ device under *PROFIBUS DP – Additional Field Devices – General*.

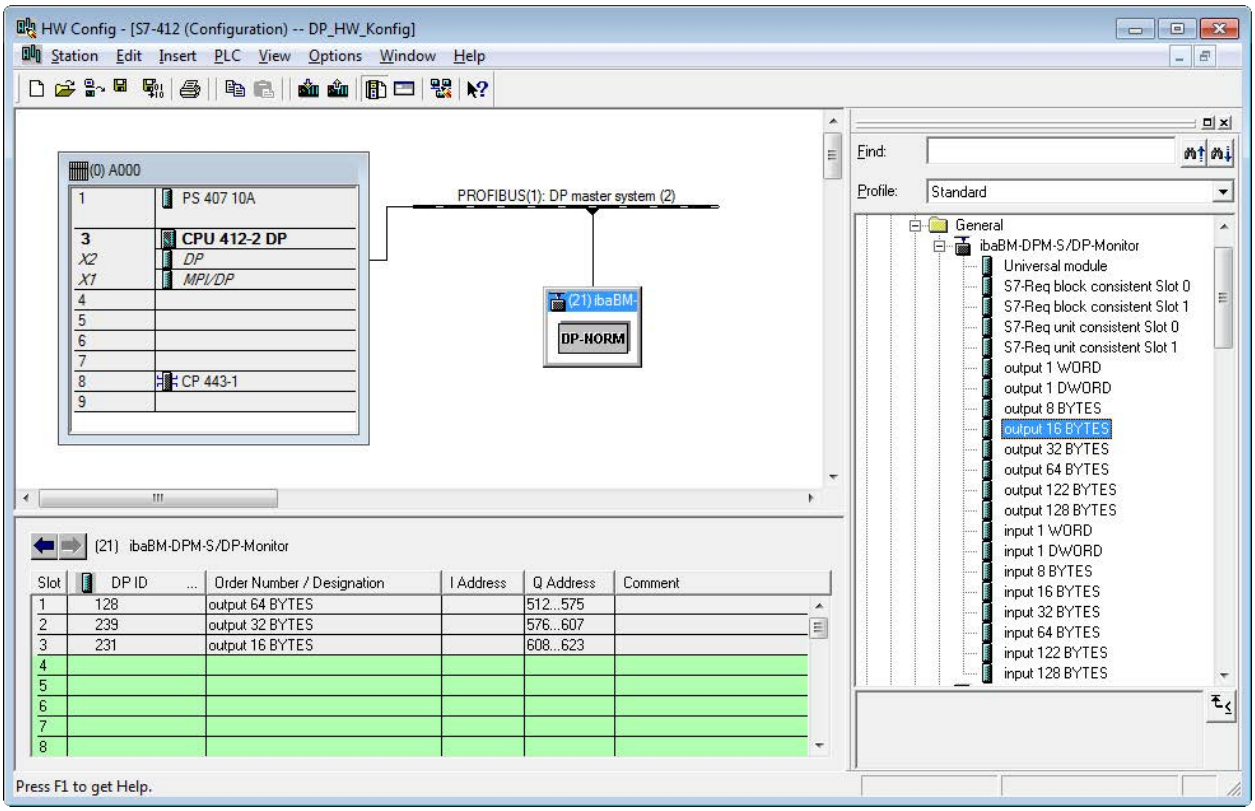
With this GSD file, the slaves can be freely defined concerning offsets and data types. The file contains some predefined slot modules for configuring certain signal groups. "Output" represents the output signal group (from the master´s perspective). “Input“ is an input signal group.

The prepared slot modules in the figure below appear in the tree structure in the right-hand window. Apart from the slot module sets for input and output signals, several prepared modules for using the ibaPDA-Request-S7 option are available.

Other documentation

See the separate manual "ibaPDA-Request-S7".

In the example in the figure below, we have assigned 112 bytes of source data (from master to slave) to the *ibaBM-DP* device. These source data are combined by three slot modules (64 bytes, 32 bytes and 16 bytes).



Note

The following S7-CPUs are considered to be “older”: S7-400 CPUs with firmware < V3.0 and S7-300 CPUs with firmware < 2.0 or CPUs, where no firmware version is indicated in the hardware configuration.

In general, S7-CPU of the older type do not support long slots with the setting “Consistent over total length”. When configuring those slots, **no** error message is generated in Step 7.

In this case, use the universal module with the setting “Consistent over unit” for the ibaBM-DP configuration.

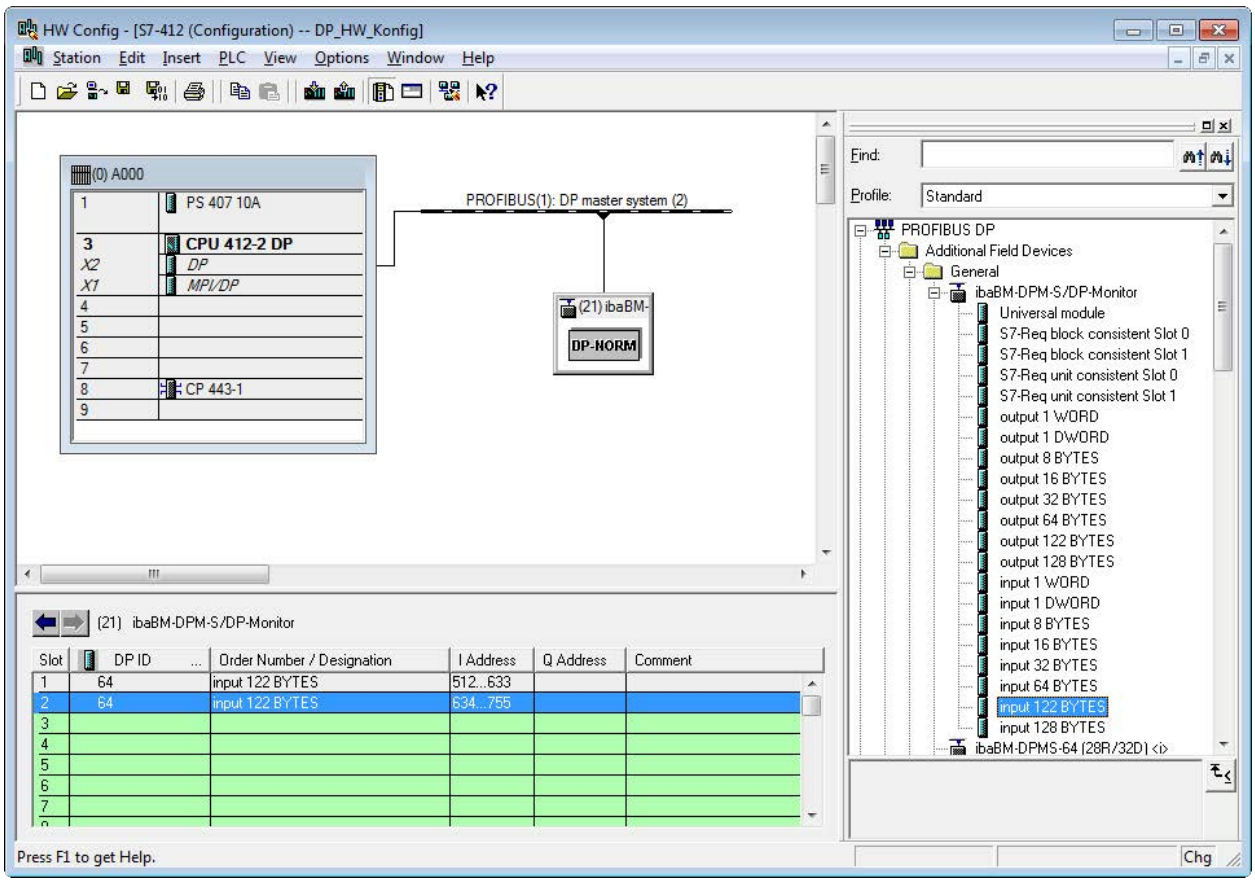
When using CP443-5, there are also restrictions regarding the max. slot length when “Consistent over total length” is set. For more information, please see the according module manuals.

When using S7-CPUs of the older type, the max. slave address length may also lead to restrictions. Some models support only a maximum slave length of 122 bytes. Usually, an error message occurs when the device is being configured.

11.3 Operation with outputs

If you want to use outputs in *ibaPDA*, the PROFIBUS configuration of the master needs to have an appropriate range of input data. Use the slot modules available in the GSD file for inputs.

In the following example, a total of 244 bytes of input data have been configured with 2 slot modules with a length of 122 bytes each for slave 21.



Exactly as for the outputs, the maximum length of the input range is also 244 bytes.

Configurations with both inputs and outputs can also be used and can be addressed in *ibaPDA* under "Hardware" for reading data as well as under "Outputs" for signal output.

Note

In the PROFIBUS configuration, there are limitations for the maximum length to be configured for the inputs and outputs. Under Step 7, for example, the sum of the configured inputs and outputs of a slave may not exceed a maximum length of 256 bytes.

For more information on the operation with outputs, see chapter ↗ *Configuring outputs*, page 117.

12 Redundancy mode

Note

The following description provides you with general information about the operation of the *ibaBM-DP* device in redundancy mode. You will find detailed information about differences and special features in comparison to operation on the normal PROFIBUS.

For understanding the following description, we suppose that you have basic knowledge in using the *ibaBM-DP* device.

The redundancy mode of *ibaBM-DP* and *ibaPDA* is required if you want to capture data of redundant PROFIBUS systems of a SIMATIC S7-400H control.

Basically, data can also be captured without redundancy mode. The disadvantage is that data have to be captured on each of the both PROFIBUS systems. When analyzing data, the user has to decide which of the two data sets is valid.

In redundancy mode, *ibaBM-DP* decides automatically and dynamically, which PROFIBUS system sends the valid data sets. Only valid data is sent to *ibaPDA* for recording.

ibaBM-DP recognizes situations like the switching of a S7-400H CPU to STOP, the failure of a slave connection (e. g. IM153-2 for a redundant ET200) or a broken cable. It then changes dynamically the bus system used for data capturing.

In case, valid data is recognized on both bus systems, the bus system 0 (connected to the X40 plug) is preferred.

In redundancy mode, "sniffing" an existing master/slave communication can be done. You can also use active slaves in *ibaBM-DP* for sending internal data of the PLC directly to *ibaPDA*. The active slaves can also have an input data range. Then the signals can be passed from *ibaPDA* via *ibaBM-DP* to the master.

Caution

When using active slaves on *ibaBM-DP*, you have to take measures in the S7-400H CPU program for preventing an eventual downtime of an active slave (e. g. over OB85) for there will be no negative consequences for the rest of the program.

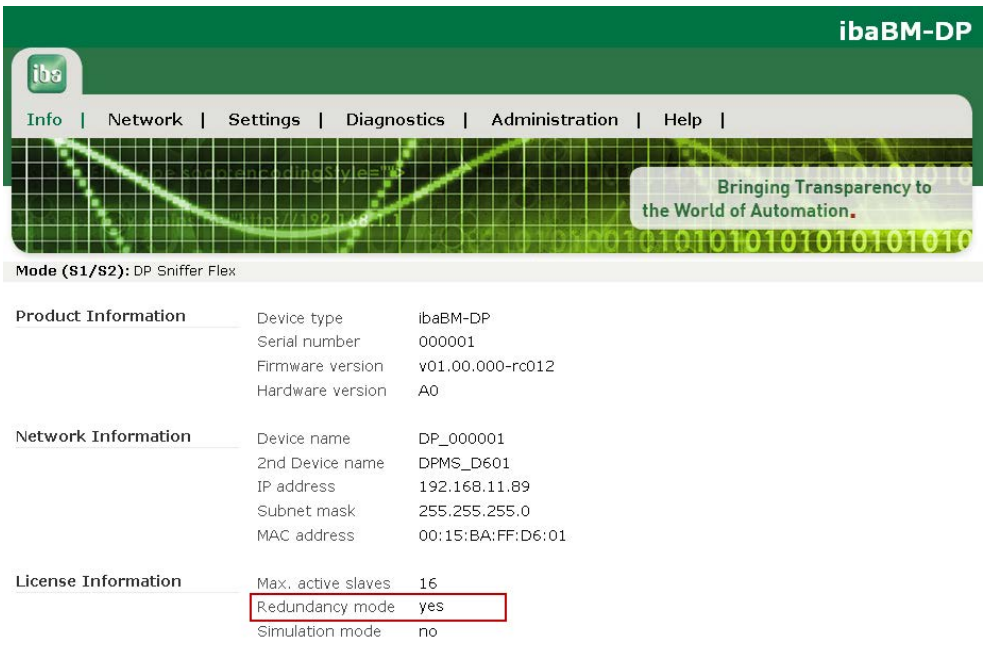
Note

Due to the system, for some cycles zero values or „frozen“ values might be recorded when changing the active bus system (e. g. a S7-400H CPU switches to STOP status).

For using redundancy mode, you need an additional license. For detailed information on the order data see chapter ↗ *Order data*, page 13. The license can be activated as follows:

- Via the administrator functions in the *ibaBM-DP* web dialog, see chapter ↗ *Administration*, page 58
- Via the I/O manager in *ibaPDA* in the *Profibus browser* dialog, see chapter ↗ *PROFIBUS browser*, page 106

After having activated the license in the web dialog, the *Info* page shows that redundancy mode is available.



Note

ibaBM-DP can either be operated in normal mode or in redundancy mode. A combination of these modes is not possible.

12.1 Configuration of the redundancy mode with ibaPDA

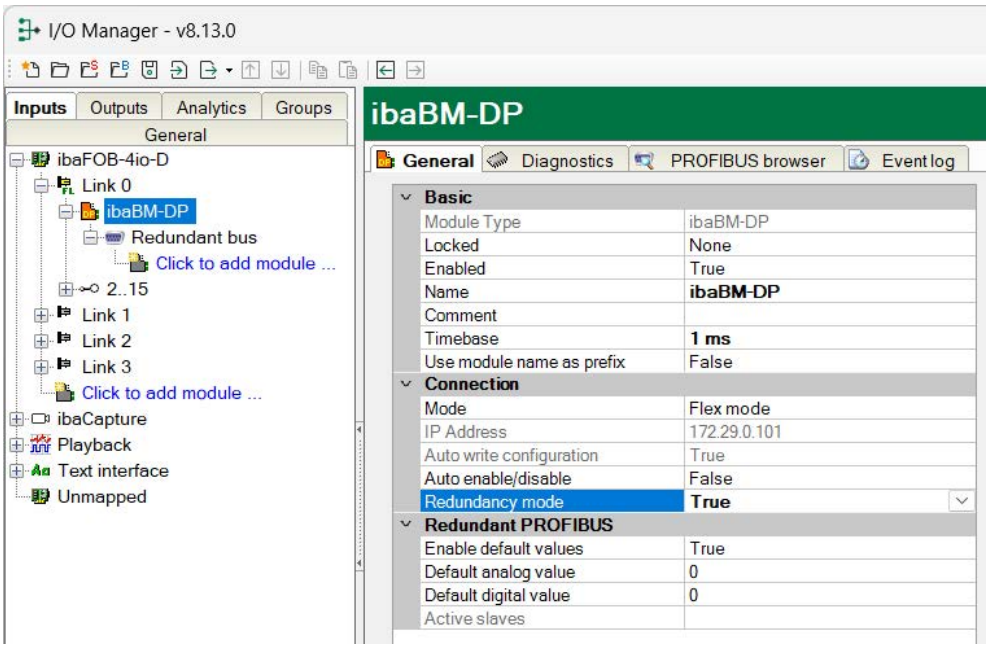
Note

The following description refers to the use of *ibaBM-DP* in 32Mbit Flex mode. The redundancy mode can also be used in compatibility mode 32Mbit (with *ibaBM-DPM-S* and with the *ibaBM-DP* device module).

Please consider the general notes about compatibility mode 32Mbit in chapter ↗ *Notes on the compatibility mode 32Mbit*, page 70.

1. Connect the *ibaBM-DP* device to a free link of an *ibaFOB-D* input card.
2. In the I/O Manager, add a device module "ibaBM-DP".
3. In the *General* tab, set the *Redundancy mode* to TRUE.

→ The activated redundancy mode is indicated by an orange symbol on the device module.



→ As the two bus systems 0 and 1 are operated in parallel with the redundant PROFIBUS, there are only settings for the "Redundant PROFIBUS" in the *General* tab.

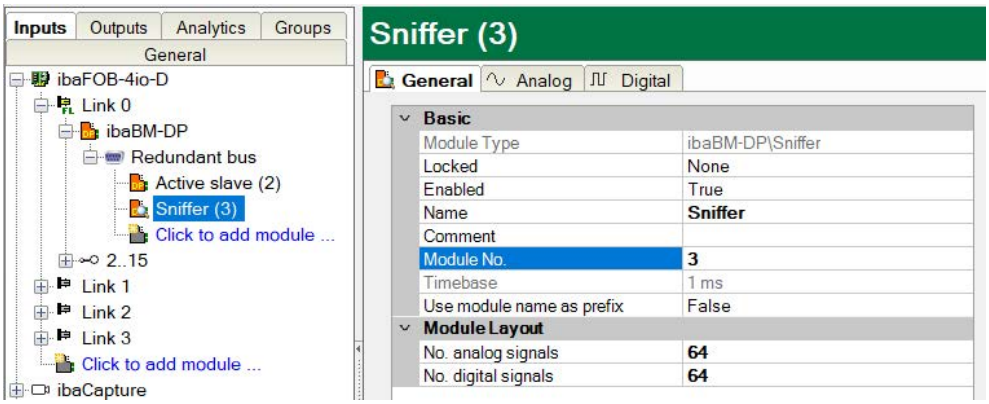
→ On the left-hand side in the module tree, only a common redundant bus is displayed.

Note

Several Request modules are not available in redundancy mode: the modules "FM458 Request", "TDC Request", "Bachmann M1 Request" and the ibaCom-L2B compatible modules "S7 Request" and "S7 Request Dig512" are disabled automatically in redundancy mode.

12.1.1 Notes on the Sniffer module

In redundancy mode, there is no "Profibus" group for setting bus 0/1 for the *Sniffer* module on the *General* tab. There is only a common redundant bus. The *Sniffer* module is assigned to this PROFIBUS.

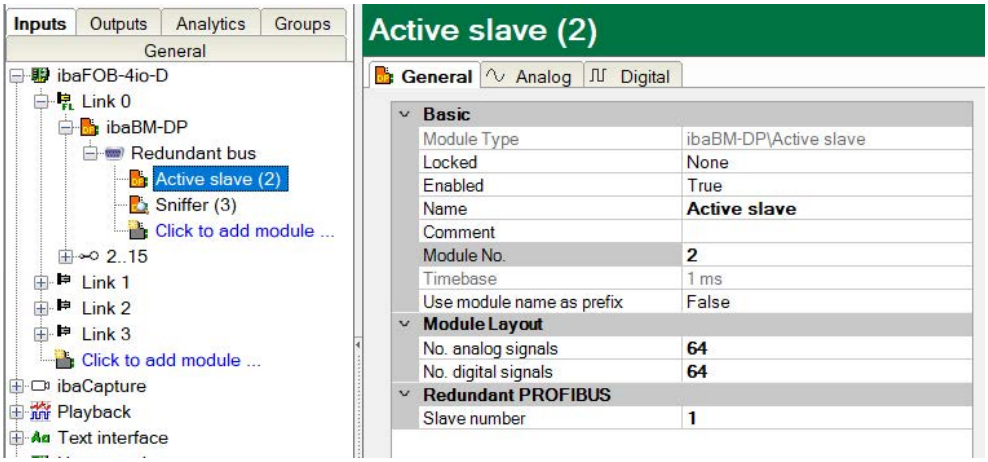


Configured signals therefore always refer to the redundant bus. As usual, you define the signals to be recorded in the *Analog* and *Digital* tabs.

12.1.2 Notes on the Active slave module

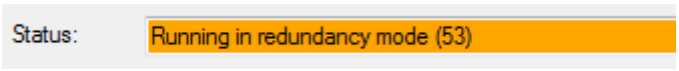
In redundancy mode, there is only one group "Redundant Profibus" on the *General* tab where you can set the slave numbers. There is no entry any more for selecting the bus number, as the active slave in redundancy mode is always generated on both buses simultaneously.

Each of the two S7-400H CPUs sends data to the slave on its own PROFIBUS system. This is why an active slave always has to be available on both PROFIBUS systems.

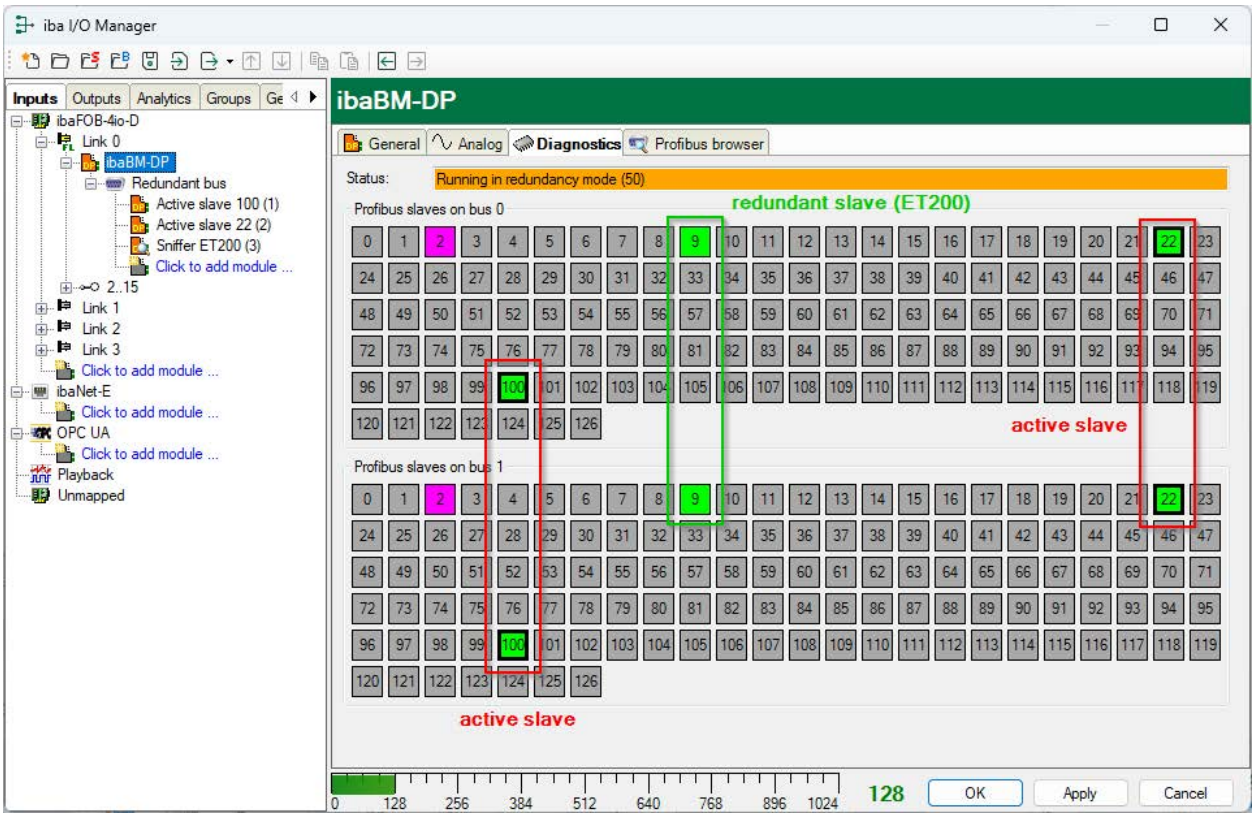


12.1.3 Notes on Diagnostics

In the *Diagnostics* tab, you see that *ibaBM-DP* runs in redundancy mode. In the top row *Status* on the *Diagnostics* tab, the current operating status of the device is displayed. In redundancy mode, you will see the following message:



In the example below, by means of two modules of the "Active slave" type, slaves with the addresses 22 and 100 have been generated. If you take a look at the diagnostics you see that both slaves were generated on both bus systems (bold margin shows that this slave is assigned to the chosen *ibaBM-DP* device). Moreover, you can see an "external" slave, in this case an ET200 station with the address 9. The master with the address 2 (each a S7-400H CPU) is displayed on both bus systems in magenta.

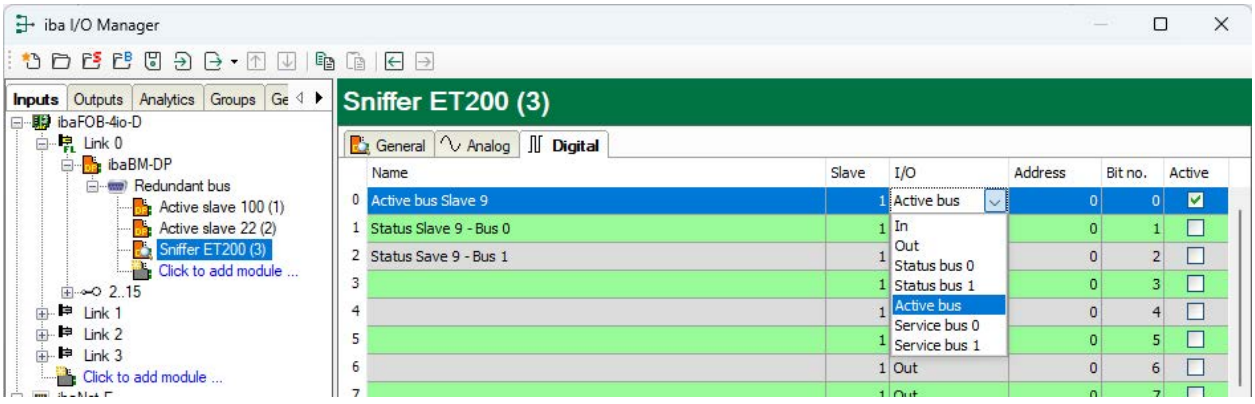


12.1.4 Special features of I/O types

Active bus

In redundancy mode, *ibaBM-DP* decides individually for each slave, on which bus the relevant information is sent.

The additional I/O type "Active bus" for the digital signals provides you with information about the bus via which the signals of a specific slave are currently being recorded by *ibaBM-DP*.



Further information on the I/O type "Active bus" can be found in chapterc ↗ *Sniffer – Digital tab*, page 84.

In the *Slave* column, you can define the slave for which you want to get information about the currently valid bus.

Status bus 0/1

Due to the way *ibaBM-DP* works, you do not need to select a bus system for the analog and digital signals in redundancy mode.

There is only one exception: the signal with the I/O type "status". In this case, the user needs to have the opportunity to address bus 0 or 1 for requesting the status.

As in redundancy mode there is no column for the bus system, here the I/O types "Status bus 0" and "Status bus 1" are being displayed.

Tip

Define for each slave in the PROFIBUS system digital signals of the I/O type "Status" and "Active bus". Thus, you can evaluate the status of the slaves when analyzing the data later.

12.2 PROFIBUS configuration for redundancy mode

12.2.1 Sniffer operation in redundancy mode

In redundancy mode the same notes are applicable as for sniffing on the regular PROFIBUS (see chapter ↗ *Sniffer operation*, page 124).

When using the sniffer symbol browser, the symbolic names are always assigned to the CPU in Rack 0, as the common symbol table is only maintained in this CPU.

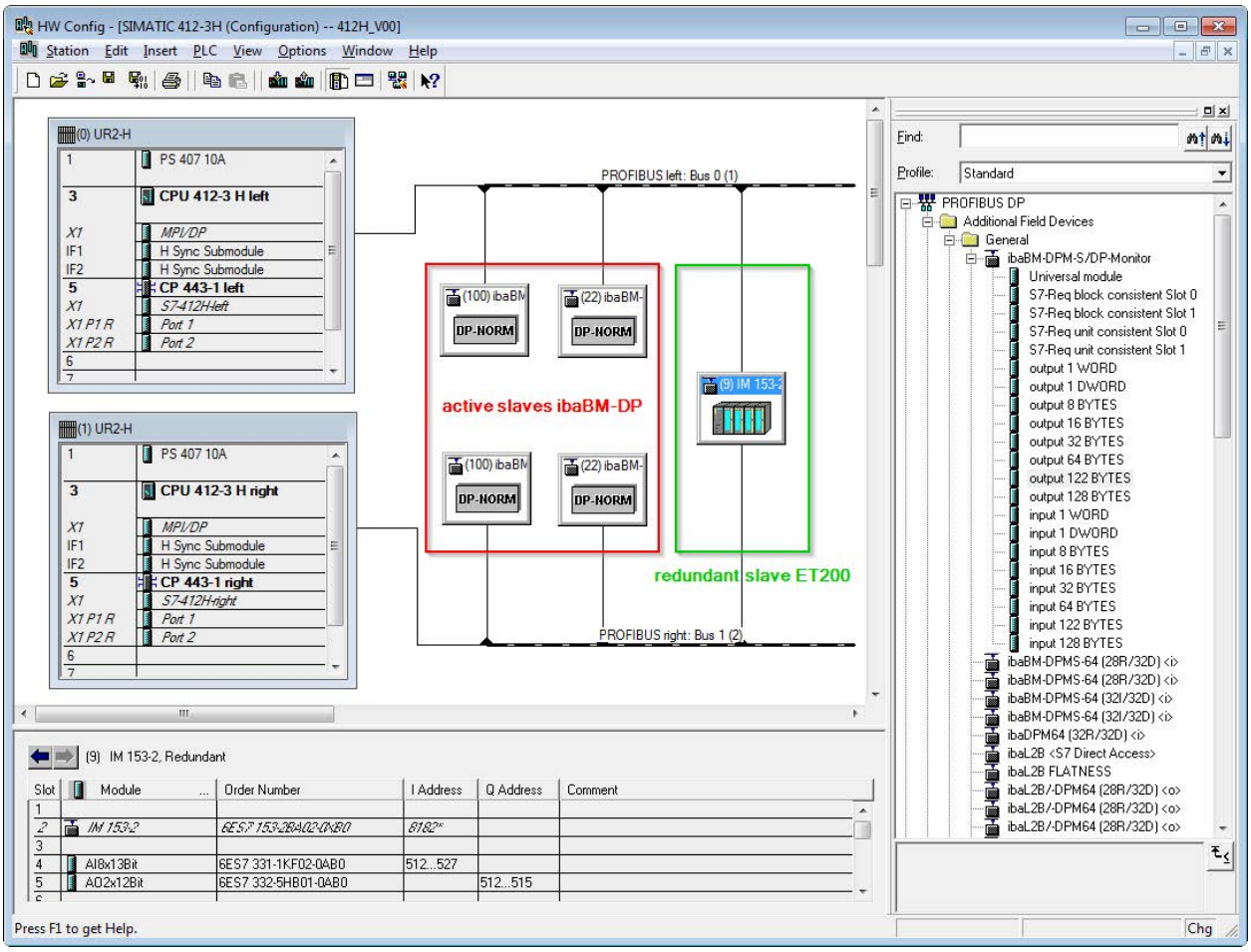
12.2.2 Operation as active slave in redundancy mode

If you want to send internal data from the S7-400H to an *ibaBM-DP* active slave, you need to configure the active slaves in the S7-400H hardware configuration under SIMATIC Step 7.

For this purpose, you need the `ibaDPMSi.gsd` GSD file. You find this file on the data medium "iba Software & Manuals" included in delivery in the directory

`02_iba_Hardware\ibaBM-DP\02_GSD_Files\01_General\`

Import the GSD file in the “HW Config“ tool under Step 7. In the catalog of the available modules, you now find the “ibaBM-DPM-S/DP-Monitor“ device under *PROFIBUS DP – Additional Field Devices – General*.



A normal redundant slave (e. g. ET200) is shown with two connections in the hardware configuration that are connected to both PROFIBUS systems. This redundant slave has a single I/O address range (see figure above).

In contrast to that, an active slave of the *ibaBM-DP* has to be configured **on both bus systems**. In both bus systems, the slave has to get the **same PROFIBUS address**.

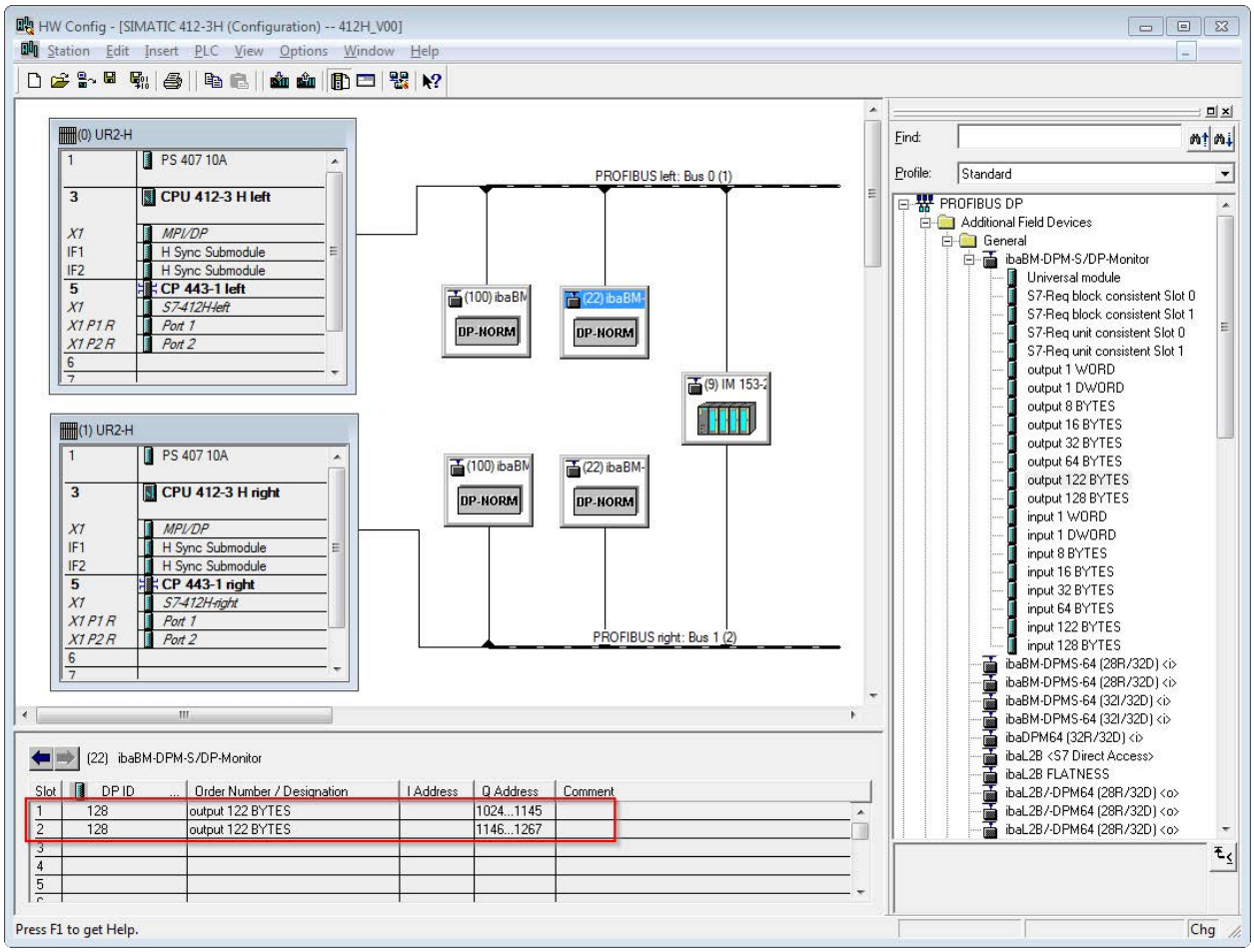
This way, the configured slaves each have their own I/O address range. You can combine the address range for each slave from the modules in the hardware catalog. A PROFIBUS slave can have a maximum payload data length of 244 bytes. This is why you should use two modules of the “output 122 BYTES“ type.

Example Step7 Hardware configuration

In the figure above, two active slaves have been configured (addresses 22 and 100). The following address ranges have been assigned to:

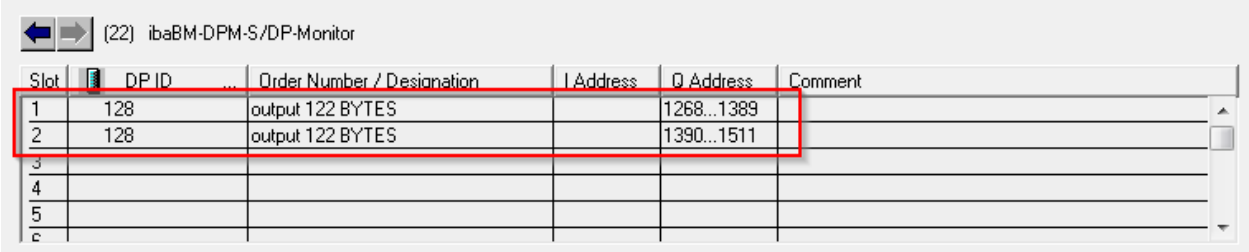
Slave 22 – Bus 0

- output 122 BYTES: 1024…1145
- output 122 BYTES: 1146…1267



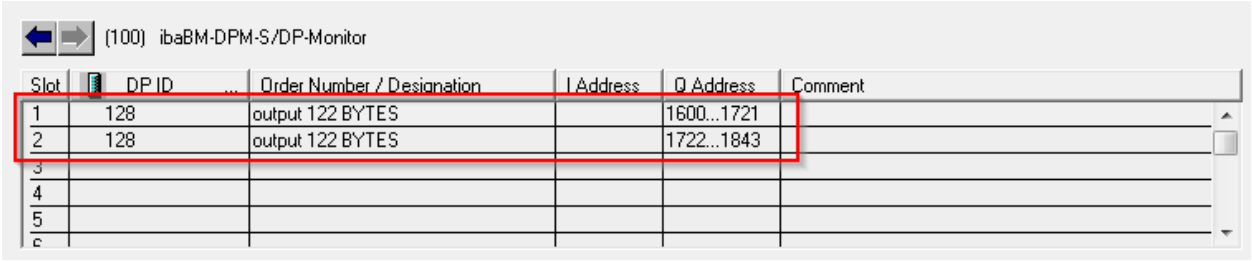
Slave 22 – Bus 1

- output 122 BYTES: 1268…1389
- output 122 BYTES: 1390…1511



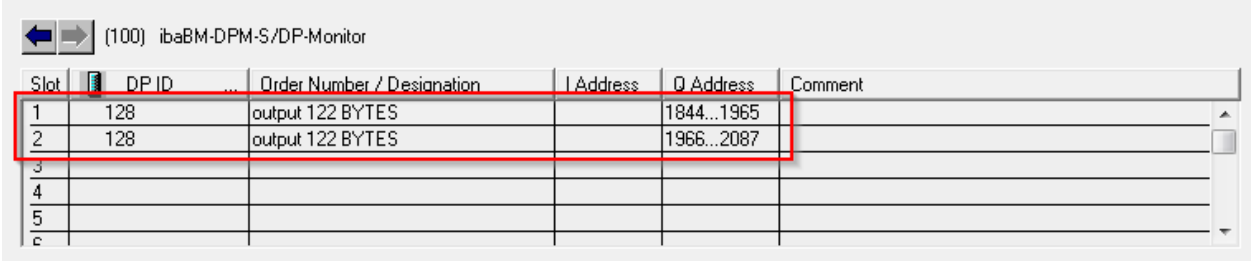
Slave 100 – Bus 0

- output 122 BYTES: 1600…1721
- output 122 BYTES: 1722…1843



Slave 100 – Bus 1

- output 122 BYTES: 1844…1965
- output 122 BYTES: 1966…2087



12.2.3 Operation with outputs in redundancy mode

In 32Mbit Flex mode, outputs in *ibaPDA* can also be used in redundancy mode.

The description for using outputs in chapter ↗ *Configuring outputs*, page 117 is applicable here as well as the description about active slaves in redundancy mode in chapter ↗ *Operation as active slave in redundancy mode, page 133*.

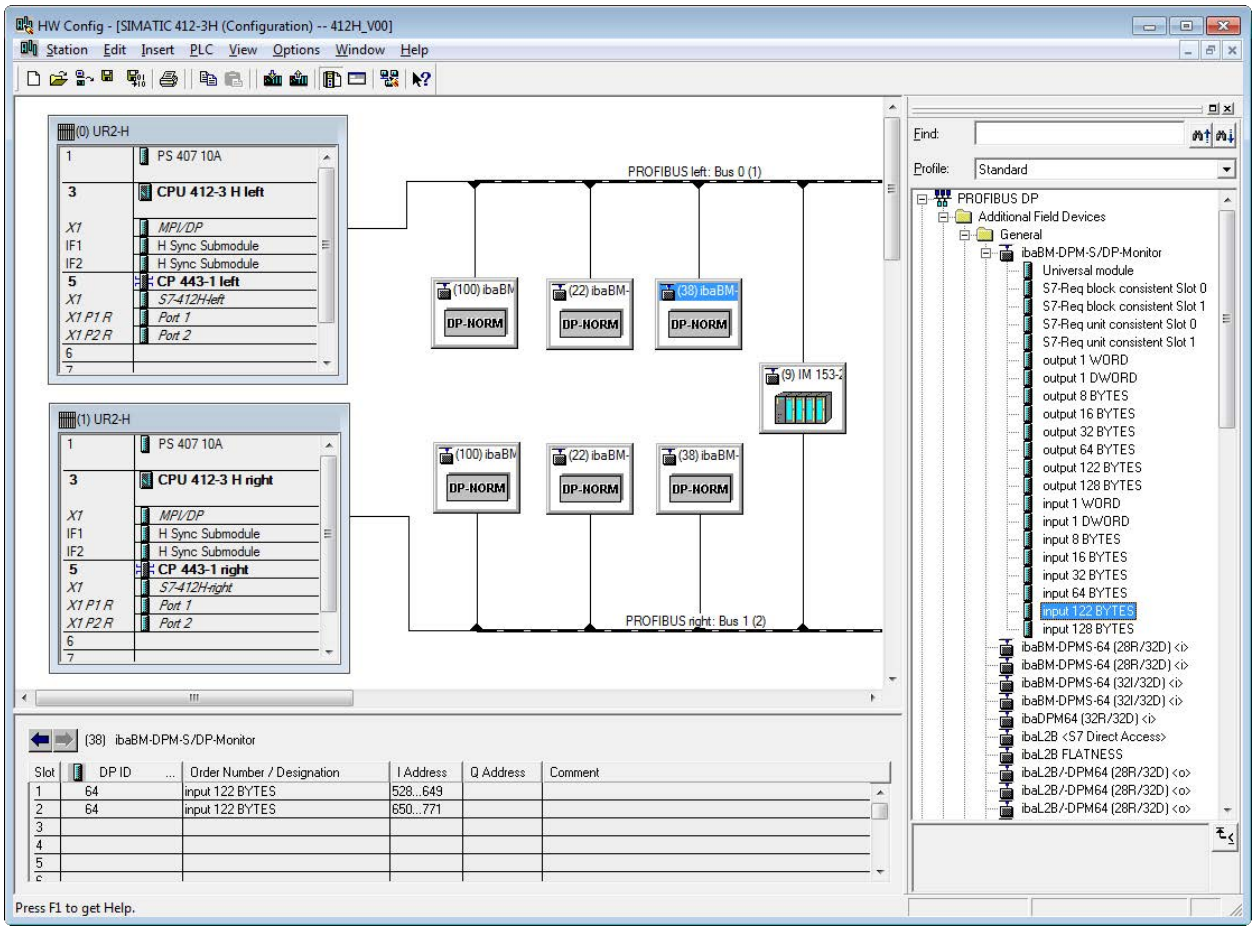
Just like the output data range, the input data range has to be configured on the two slaves belonging together. The PLC has access to the values sent by *ibaPDA* in two address ranges as inputs.

Example Step7 Hardware configuration

Hereafter, an active slave 38 has been configured with a total of 244 bytes input data. For this purpose, two modules of the "input 122 BYTES" type were used.

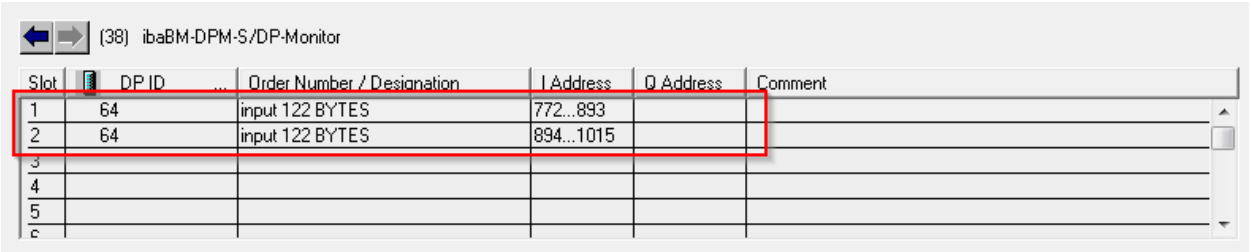
Slave 38 – Bus 0

- input 122 BYTES: 528…649
- input 122 BYTES: 650…771



Slave 38 – Bus 1

- input 122 BYTES: 772…893
- input 122 BYTES: 894…1015

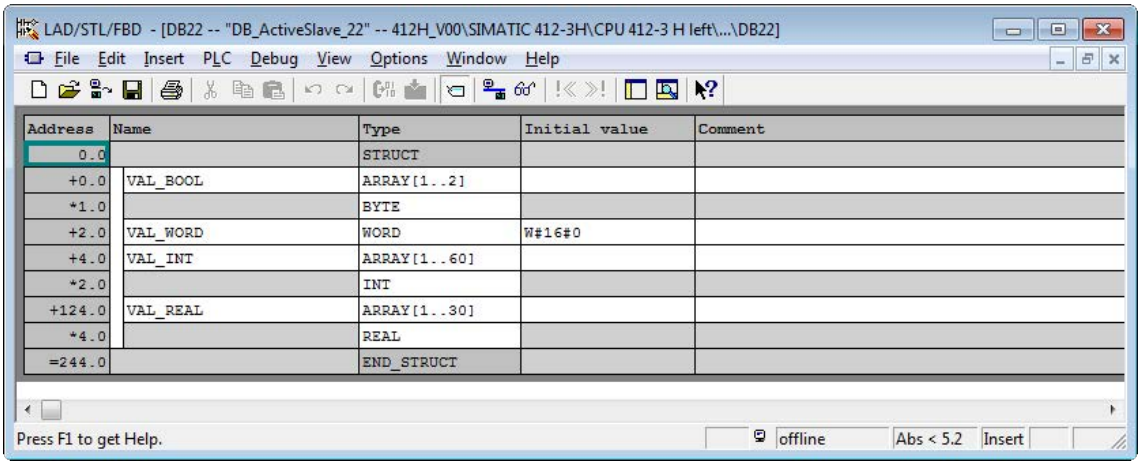


12.3 Transferring data to active slaves

In the PLC program of the S7-400H, you need to output the data you want to record with the active slave always to the two slaves belonging together. Hereafter, we give an example of how data can be written on the slaves on bus 0 and 1 in the S7-400H in the exemplary PROFIBUS configuration in chapter ↗ *Operation as active slave in redundancy mode, page 133*.

For this purpose, you generate in your PLC a data block (DB) for each active slave. In this block, you cyclically write the data you want to record. You can customize the structure of the DB. The length of the DB has to equal the length of the output data range of the active slave (i.e. again a max. of 244 Bytes).

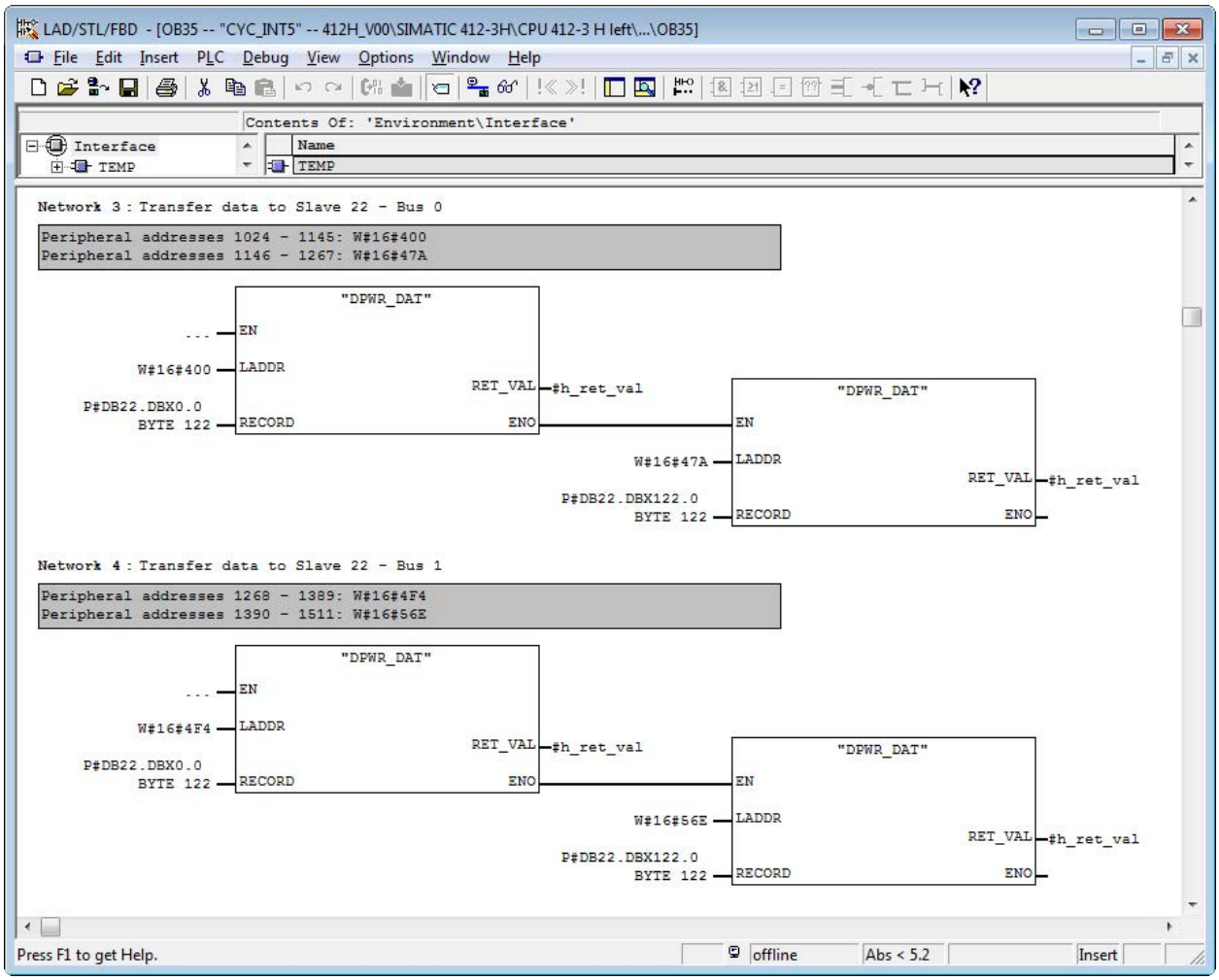
In our example, the interface DB (DB22) looks as follows:



The data is output by calling up SFC15 (DPWR_DAT) several times. When calling up the SFC15 twice in network 3 (figure below), all 244 bytes of the interface DBs DB22 for slave 22 – bus 0 are written. In network 4, with two more SFC15 call ups the same data is put out on slave 22 – bus 1.

Several SFC15 calls are needed as the transferred address range must not overlap the address range of the single modules of the slave in the hardware configuration. The maximum length of a module is 128 Bytes.

For more information about to use of SFC15, please see the SIMATIC Step7 manuals.



Note

Data should be exclusively given out to the active slave by SFC15 (DPWR_DAT). Data output by load/transfer commands leads to a much higher cyclic load in the CPU.

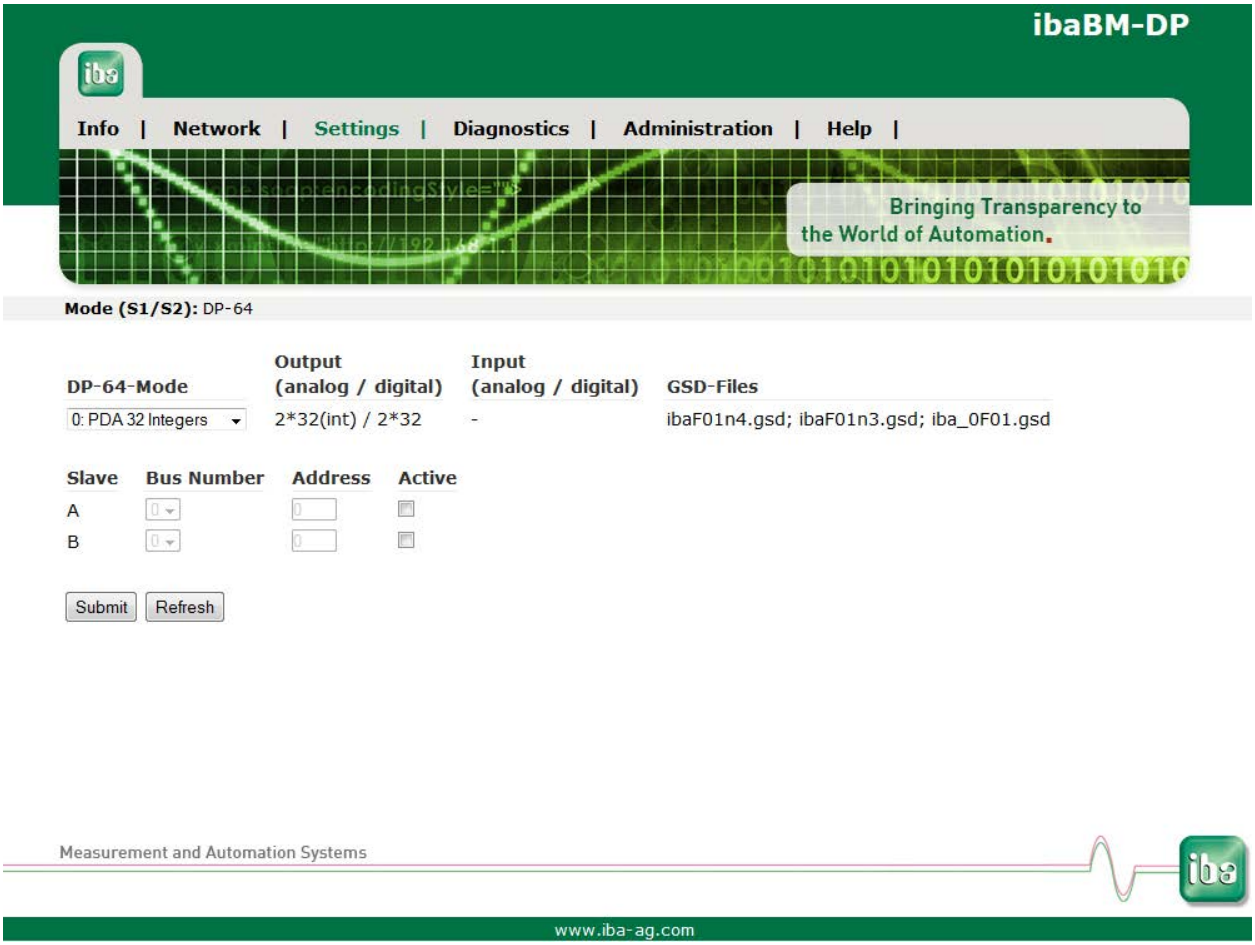
Caution

When using active slaves on *ibaBM-DP*, you have to take measures in the S7-400H CPU program for preventing an eventual downtime of an active slave (e. g. over OB85) for there will be no negative consequences for the rest of the program.

13 Compatibility mode 3Mbit (DP-64 mode)

13.1 Configuration via web interface

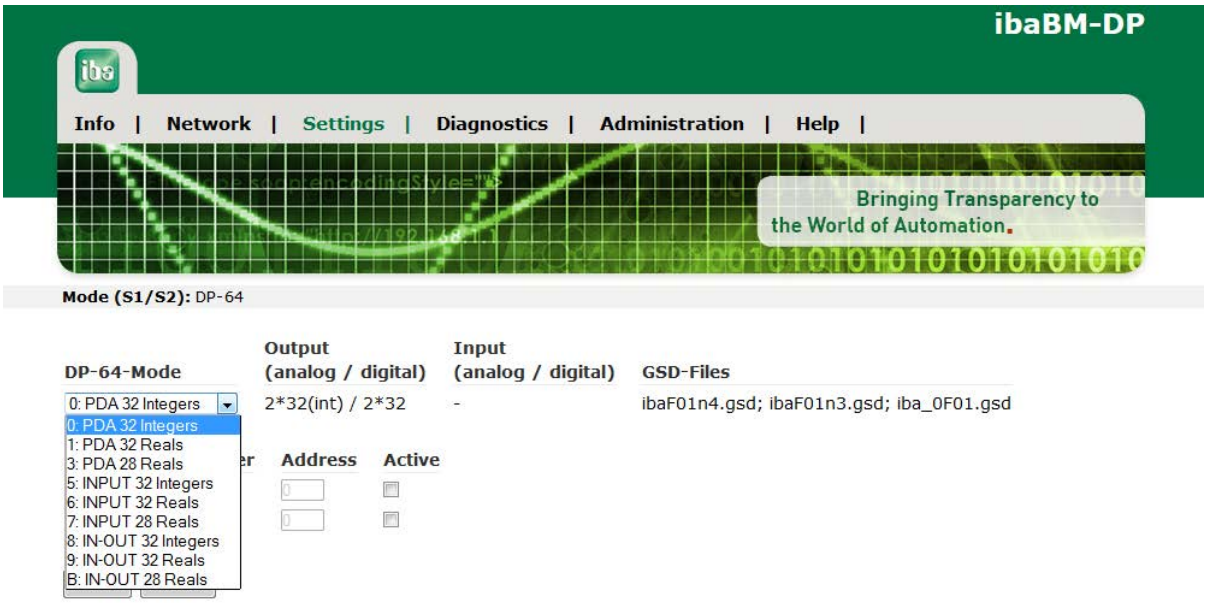
The figure shows the *Settings* page, when the device is set to compatibility mode 3Mbit (DP-64 mode).



In this mode, the device has to be configured via the web interface. The settings are made on the *Settings* page.

1. The operating mode can be selected in the combo box *DP-64-Mode*.

   To open the selection list, click on the arrow in the box. The mode names correspond to those described in chapter ↗ *Operating modes overview, page 143*.

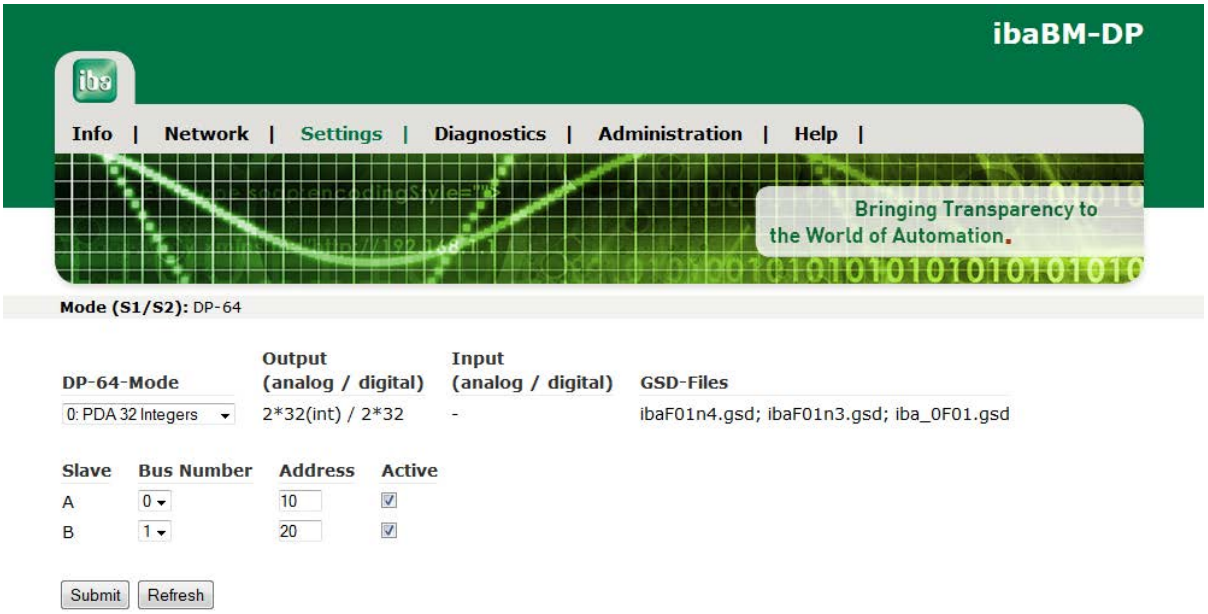


2. Make sure that the two slaves are assigned to the correct bus line (bus 0 – connector X40, bus 1 – connector X41).
3. Enter the slave address for each slave, as they are given in DP project engineering.

   The allowed address range reaches from 0 to 126.

Note

You can deactivate the slave with the checkbox *Active*.



4. Use the <Submit> button to save the settings in the device.
5. Use the <Refresh> button to refresh the settings display.

13.2 Operating modes and data types

The data to be measured from the PROFIBUS is defined using the GSD data files which is used in the PROFIBUS configuration. The data types for both slaves on the device are furthermore selected over the web interface by choosing the operating mode. GSD file and operating mode must match.

In general, the following data types may be processed:

- 2 * (32 * 16 bit integer + 32 binary) in modes 0, 5, 8
- 2 * (32 bit floats + 32 binary) in modes 1, 6, 9
- 2 * (28 SIMATIC S7 Floats + 32 binaries) in modes 3, 7, B

Depending on whether data is to be read (master output) or written (master input) or read and written on the PROFIBUS, the corresponding mode must be selected in the operating mode setting in the web interface.

For further information, please see chapter ↗ *Settings*, page 50.

The transmission of data is usually managed by telegram block transmission.

Each DP slave uses one block for data transmission in each direction, i.e. an *ibaBM-DP* uses 2 blocks per direction (slave 1 and 2).

The data structure of these blocks for reception (outputs) and transmission (inputs) is shown in the following for each of the different operating modes.

Please note that the examples apply to one slave and apply accordingly to the second slave.

Note

For SIMATIC S5, the connection to *ibaBM-DP* (in DP-64 mode) via a PROFIBUS interface (e. g. IM308C) is not possible without further ado, as the REAL data format for S5 does not correspond to the IEEE standard. Corresponding changes must first be made in the S5 project planning!

In compatibility mode 32Mbit or in 32Mbit Flex mode, the data type “S5 FLOAT” is available.

13.2.1 Operating modes overview

The following table gives an overview of the operating modes which are available on the device. For each mode you'll find the appropriate GSD files in the corresponding row. Details information can be found in the following chapters.

Mode	Name	Outputs	Inputs	GSD-file	Application
0	PDA 32 Integers	2 * 32 analog (int) 2 * 32 digital	-	ibaF01n4.gsd ibaF01n3.gsd iba_0F01.gsd	*ibaPDA*, *ibaLogic*, SIMATIC S7 System coupling
1*	PDA 32 Reals	2 * 32 analog (Real) 2 * 32 digital	-	iba_0F02.gsd	*ibaPDA*, *ibaLogic*, System coupling **No S7*, SD**
2	n/a	-	-	-	-
3	PDA 28 Reals	2 * 28 analog (Real) 2 * 32 digital	-	ibaF04n4.gsd ibaF04n3.gsd iba_0F04.gsd	*ibaPDA*, *ibaLogic*, System coupling
4	n/a	-	-	-	-
5	INPUT 32 Integers	(4 byte reserved)	2 * 32 analog (int) 2 * 32 digital	ibaF00n4.gsd ibaF00n3.gsd	*ibaLogic*, S7 System coupling
6*	INPUT 32 Reals	(4 byte reserved)	2 * 32 analog (Real) 2 * 32 digital	iba_0F06.gsd	*ibaLogic*, System coupling **no S7*, SD**
7	INPUT 28 Reals	(4 byte reserved)	2 * 28 analog (Real) 2 * 32 digital	ibaF07n4.gsd ibaF07n3.gsd	*ibaLogic*, S7 System coupling
8	IN-OUT 32 Integers	2 * 32 analog (int) 2 * 32 digital	2 * 32 analog (int) 2 * 32 digital	ibaF08n4.gsd ibaF08n3.gsd iba_0F08.gsd	*ibaLogic*, S7 System coupling
9*	IN-OUT 32 Reals	2 * 32 analog (Real) 2 * 32 digital	2 * 32 analog (Real) 2 * 32 digital	iba_0F09.gsd	*ibaLogic*, System coupling **no S7*, SD**
A	n/a	-	-	-	-
B	IN-OUT 28 Reals	2 * 28 analog (Real) 2 * 32 digital	2 * 28 analog (Real) 2 * 32 digital	ibaF0Bn4.gsd ibaF0Bn3.gsd	*ibaLogic* S7 System coupling

* not applicable to former CPUs SIMATIC S7 (firmware <2.0 for S7-300, firmware < 3.0 for S7400) or SIMADYN D

Note

Note the meaning of the terms "output" and "input". These refer to the PROFIBUS master device. For example, "Output" means that data is sent from the PROFIBUS master device (e. g. SIMATIC S7) to the *ibaBM-DP* device. Both slaves in the *ibaBM-DP* are always used in the same mode.

The file names of the GSD files which come with our PROFIBUS products had been renamed for standardization purposes (eff. 10/2005).

If you still use the old files, please refer to the following table for reference:

New GSD file name	Old GSD file name
ibaF01n4.gsd	DPM32IO.GSD
ibaF01n3.gsd	DPL32IO.GSD
iba_0F01.gsd	L2B_32I.GSD
iba_0F02.gsd	L2B_32R.GSD
ibaF04n4.gsd	DPM28RO.GSD
ibaF04n3.gsd	DPL28RO.GSD
iba_0F04.gsd	L2B_28R4.GSD
ibaF00n4.gsd	DPM32II.GSD
ibaF00n3.gsd	DPL32II.GSD
iba_0F06.gsd	L2B32RI.GSD
ibaF07n4.gsd	DPM28RI.GSD
ibaF07n3.gsd	DPL28RI.GSD
ibaF08n4.gsd	DPM32IOI.GSD
ibaF08n3.gsd	DPL32IOI.GSD
iba_0F08.gsd	L2B32IOI.GSD
iba_0F09.gsd	L2B32ROI.GSD
ibaF0Bn4.gsd	DPM28ROI.GSD
ibaF0Bn3.gsd	DPL28ROI.GSD

Note

The GSD files required for the DP-64 mode can be found on the "iba Software & Manuals" data carrier in the directory `02_iba_Hardware\ibaBM-DP\02_GSD_Files\02_DP64_Mode\`

13.2.2 Mode 0 – PDA 32 Integers

This mode is used to read up to 32 integer values and 32 digital signals from the PROFIBUS (OUT 72 bytes).

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	Status	not used
2	1	Status	not used
3	2	Status	not used
4	3	Status	not used
5	4	7 6 5 4 3 2 1 0	Dig. outputs channel 0...7
6	5	15 14 13 12 11 10 9 8	Dig. outputs channel 8...15
7	6	23 22 21 20 19 18 17 16	Dig. outputs channel 16...23
8	7	31 30 29 28 27 26 25 24	Dig. outputs channel 24...31
9	8	MSB	Analog output channel 0
10		LSB	Integer (2 byte), Big Endian Motorola
11	10	MSB	Analog output channel 1
12		LSB	Integer (2 byte), Big Endian Motorola
	12		Analog outputs in total: 32 Words (16-bit integer), Big Endian Motorola
71	70	MSB	Analog output channel 31
72		LSB	Integer (2 byte), Big Endian Motorola

Slave data space

Input data

No inputs

GSD-file

GSD file name	Remark
ibaF01n4.gsd	Transfer in one block with SFC (S7-400)
ibaF01n3.gsd	Transfer in three blocks with SFC (S7-300)
iba_0F01.gsd	Transfer as word (S7-300/400)

Applications

- *ibaPDA*
- *ibaLogic*
- System coupling SIMATIC S7
- SIMATIC TDC
- SIMADYN D

13.2.3 Mode 1 – PDA 32 Reals

This mode is used to read up to 32 real values and 32 digital signals from the PROFIBUS (OUT 136 bytes).

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	Status	not used
2	1	Status	not used
3	2	Status	not used
4	3	Status	not used
5	4	7 6 5 4 3 2 1 0	Dig. outputs channel 0...7
6	5	15 14 13 12 11 10 9 8	Dig. outputs channel 8...15
7	6	23 22 21 20 19 18 17 16	Dig. outputs channel 16...23
8	7	31 30 29 28 27 26 25 24	Dig. outputs channel 24...31
9	8	MSB	Analog output channel 0 Real (4 byte), Big Endian Motorola
10			
11			
12		LSB	
13	12	MSB	Analog output channel 1 Real (4 byte), Big Endian Motorola
14			
15			
16		LSB	
	16		Analog outputs in total: 32 Longs (Real), Big Endian Motorola
133	132	MSB	Analog output channel 31 Real (4 byte), Big Endian Motorola
134			
135			
136		LSB	

Slave data space

Input data

No inputs

GSD-file

GSD file name	Remark
iba_0F02.gsd	-

Applications

- *ibaPDA*
- *ibaLogic*
- System coupling
- SIMATIC TDC
- No SIMATIC S7 (FW < 2.0 for S7-300, FW < 3.0 for S7-400), SIMADYN D

13.2.4 Mode 3 – PDA 28 Reals

This mode is used to read up to 28 real values and 32 digital signals from the PROFIBUS (OUT 120 bytes) from a SIMATIC S7 as PROFIBUS master. Due to limitations of the S7 real data type only 28 values can be used.

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	Status	not used
2	1	Status	not used
3	2	Status	not used
4	3	Status	not used
5	4	7 6 5 4 3 2 1 0	Dig. outputs channel 0...7
6	5	15 14 13 12 11 10 9 8	Dig. outputs channel 8...15
7	6	23 22 21 20 19 18 17 16	Dig. outputs channel 16...23
8	7	31 30 29 28 27 26 25 24	Dig. outputs channel 24...31
9	8	MSB	Analog output channel 0 Real (4 byte), Big Endian Motorola
10			
11			
12		LSB	
13	12	MSB	Analog output channel 1 Real (4 byte), Big Endian Motorola
14			
15			
16		LSB	
	16		Analog outputs in total: 28 Longs (Real), Big Endian Motorola
117	116	MSB	Analog output channel 27 Real (4 byte), Big Endian Motorola
118			
119			
120		LSB	

Slave data space

Input data

No inputs

GSD-file

GSD file name	Remark
ibaF04n4.gsd	Transfer in one block with SFC (S7-400)
ibaF04n3.gsd	Transfer in four blocks with SFC (S7-300)
iba_0F04.gsd	Transfer as double word (S7-300/400)

Applications

- *ibaPDA*
- *ibaLogic*
- System coupling
- SIMATIC S7
- SIMATIC TDC
- SIMADYN D

13.2.5 Mode 5 – INPUT 32 Integers

This mode is used to write up to 32 integer values and 32 digital signals to the PROFIBUS (IN 72 bytes/OUT 4 bytes).

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	Status	not used
2	1	Status	not used
3	2	Status	not used
4	3	Status	not used

Input data

INPUT DATA										
Byte no.	Offset	Contents								Remark
1	0	FO message counter-A								incremented by each new FO message
2	1	FO reception status								Bit 7:FO reception OK; Bit 3: 0 = integer, 1 = real
3	2	7	6	5	4	3	2	1	0	Dig. inputs channel 0...7
4	3	15	14	13	12	11	10	9	8	Dig. inputs channel 8...15
5	4	23	22	21	20	19	18	17	16	Dig. inputs channel 16...23
6	5	31	30	29	28	27	26	25	24	Dig. inputs channel 24...31
7	6								MSB	Analog input channel 0
8									LSB	Integer (2 byte), Big Endian Motorola
9	8								MSB	Analog input channel 1
10									LSB	Integer (2 byte), Big Endian Motorola
	12									Analog inputs in total: 32 Words (16-bit integer), Big Endian Motorola
69	68								MSB	Analog input channel 31
70									LSB	Integer (2 byte), Big Endian Motorola
71	70	Device-ID of FO transmitter								see list of iba device-IDs
72	71	FO message counter-B								incremented by each new FO message

Slave data space

GSD-file

GSD file name	Remark
ibaF00n4.gsd	Transfer in one block with SFC (S7-400)
ibaF00n3.gsd	Transfer in three blocks with SFC (S7-300)

Applications

- *ibaLogic*
- System coupling
- SIMATIC S7
- SIMATIC TDC
- SIMADYN D

13.2.6 Mode 6 – INPUT 32 Reals

This mode is used to write up to 32 real values and 32 digital signals to the PROFIBUS (IN 136 bytes/OUT 4 bytes).

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	Status	not used
2	1	Status	not used
3	2	Status	not used
4	3	Status	not used

Input data

INPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	FO message counter-A	incremented by each new FO message
2	1	FO reception status	Bit 7:FO reception OK; Bit 3: 0 = integer, 1 = real
3	2	7 6 5 4 3 2 1 0	Dig. inputs channel 0...7
4	3	15 14 13 12 11 10 9 8	Dig. inputs channel 8...15
5	4	23 22 21 20 19 18 17 16	Dig. inputs channel 16...23
6	5	31 30 29 28 27 26 25 24	Dig. inputs channel 24...31
7	6	MSB	Analog input channel 0 Real (4 byte), Big Endian Motorola
8			
9			
10		LSB	
11	10	MSB	Analog input channel 1 Real (4 byte), Big Endian Motorola
12			
13			
14		LSB	
	14		Analog inputs in total: 32 Longs (Real), Big Endian Motorola
131	130	MSB	Analog input channel 31 Real (4 byte), Big Endian Motorola
		LSB	
135	134	Device-ID of FO transmitter	see list of iba device-IDs
136	135	FO message counter-B	incremented by each new FO message

Slave data space

GSD-file

GSD file name	Remark
iba_0F06.gsd	-

Applications

- *ibaLogic*
- System coupling
- SIMATIC TDC
- No SIMATIC S7 (FW < 2.0 for S7-300, FW < 3.0 for S7-400), SIMADYN D

13.2.7 Mode 7 – INPUT 28 Reals

This mode is used to write up to 28 real values and 32 digital signals to a SIMATIC S7 (resp. TDC, SD) as PROFIBUS master. Due to limitations of the SIMATIC real data type only 28 values can be used (IN 122 bytes/OUT 4 bytes).

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	Status	not used
2	1	Status	not used
3	2	Status	not used
4	3	Status	not used

Input data

INPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	FO message counter-A	incremented by each new FO message
2	1	FO reception status	Bit 7:FO reception OK; Bit 3: 0 = integer, 1 = real
3	2	reserved	
4		reserved	
5	4	7 6 5 4 3 2 1 0	Dig. inputs channel 0...7
6	5	15 14 13 12 11 10 9 8	Dig. inputs channel 8...15
7	6	23 22 21 20 19 18 17 16	Dig. inputs channel 16...23
8	7	31 30 29 28 27 26 25 24	Dig. inputs channel 24...31
9	8	MSB	Analog input channel 0 Real (4 byte), Big Endian Motorola
10			
11			
12		LSB	
13	12	MSB	Analog input channel 1 Real (4 byte), Big Endian Motorola
14			
15			
16		LSB	
	16		Analog inputs in total: 28 Longs (Real), Big Endian Motorola
117	116	MSB	Analog input channel 27 Real (4 byte), Big Endian Motorola
		LSB	
121	120	Device-ID of FO transmitter	see list of iba device-IDs
122	121	FO message counter-B	incremented by each new FO message

Slave data space

GSD-file

GSD file name	Remark
ibaF07n4.gsd	Transfer in one block with SFC (S7-400)
ibaF07n3.gsd	Transfer in three blocks with SFC (S7-300)

Applications

- *ibaLogic*
- System coupling
- SIMATIC S7

- SIMATIC TDC
- SIMADYN D

13.2.8 Mode 8 – IN-OUT 32 Integers

This mode is used to read / write up to 32 integer values and 32 digital signals from / to a PROFIBUS master (IN 72 bytes / OUT 72 bytes).

Output data

OUTPUT DATA										
Byte no.	Offset	Contents								Remark
1	0	Status								not used, fill with zero
2	1	Status								not used, fill with zero
3	2	7	6	5	4	3	2	1	0	Dig. outputs channel 0...7
4	3	15	14	13	12	11	10	9	8	Dig. outputs channel 8...15
5	4	23	22	21	20	19	18	17	16	Dig. outputs channel 16...23
6	5	31	30	29	28	27	26	25	24	Dig. outputs channel 24...31
7	6								MSB	Analog output channel 0
8									LSB	Integer (2 byte), Big Endian Motorola
9	8								MSB	Analog output channel 1
10									LSB	Integer (2 byte), Big Endian Motorola
	10									Analog outputs in total: 32 Words (16-bit integer), Big Endian Motorola
69	68								MSB	Analog output channel 31
70									LSB	Integer (2 byte), Big Endian Motorola
71	70	Status								customized functions possible (e.g. status, watchdog etc.)
72		Status								

Slave data space

Input data

INPUT DATA										
Byte no.	Offset	Contents								Remark
1	0	FO message counter-A								incremented by each new FO message
2	1	FO reception status								Bit 7:FO reception OK; Bit 3: 0 = integer, 1 = real
3	2	7	6	5	4	3	2	1	0	Dig. inputs channel 0...7
4	3	15	14	13	12	11	10	9	8	Dig. inputs channel 8...15
5	4	23	22	21	20	19	18	17	16	Dig. inputs channel 16...23
6	5	31	30	29	28	27	26	25	24	Dig. inputs channel 24...31
7	6								MSB	Analog input channel 0
8									LSB	Integer (2 byte), Big Endian Motorola
9	8								MSB	Analog input channel 1
10									LSB	Integer (2 byte), Big Endian Motorola
	12									Analog inputs in total: 32 Words (16-bit integer), Big Endian Motorola
69	68								MSB	Analog input channel 31
70									LSB	Integer (2 byte), Big Endian Motorola
71	70	Device-ID of FO transmitter								see list of iba device-IDs
72	71	FO message counter-B								incremented by each new FO message

Slave data space

GSD-file

GSD file name	Remark
ibaF08n4.gsd	Transfer in one block with SFC (S7-400)
ibaF08n3.gsd	Transfer in three blocks with SFC (S7-300)
iba_0F08.gsd	Transfer as word (S7-300/400)

Applications

- *ibaLogic*
- System coupling
- SIMATIC S7
- SIMATIC TDC
- SIMADYN D

13.2.9 Mode 9 – IN-OUT 32 Reals

This mode is used to read / write up to 32 real values and 32 digital signals from/to a PROFIBUS master (IN 136 bytes/OUT 136 bytes).

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	not used	
2		not used	
3	2	7 6 5 4 3 2 1 0	Dig. outputs channel 0...7
4	3	15 14 13 12 11 10 9 8	Dig. outputs channel 8...15
5	4	23 22 21 20 19 18 17 16	Dig. outputs channel 16...23
6	5	31 30 29 28 27 26 25 24	Dig. outputs channel 24...31
7	6	MSB	Analog output channel 0 Real (4 byte), Big Endian Motorola
8			
9			
10		LSB	
11	10	MSB	Analog output channel 1 Real (4 byte), Big Endian Motorola
12			
13			
14		LSB	
	14		Analog outputs in total: 32 Longs (Real), Big Endian Motorola
131	130	MSB	Analog output channel 31 Real (4 byte), Big Endian Motorola
		LSB	
135	134	not used	customized functions possible (e.g. status, watchdog etc.)
136	135	not used	

Slave data space

Input data

INPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	FO message counter-A	incremented by each new FO message
2	1	FO reception status	Bit 7:FO reception OK; Bit 3: 0 = integer, 1 = real
3	2	7 6 5 4 3 2 1 0	Dig. inputs channel 0...7
4	3	15 14 13 12 11 10 9 8	Dig. inputs channel 8...15
5	4	23 22 21 20 19 18 17 16	Dig. inputs channel 16...23
6	5	31 30 29 28 27 26 25 24	Dig. inputs channel 24...31
7	6	MSB	Analog input channel 0 Real (4 byte), Big Endian Motorola
8			
9			
10		LSB	
11	10	MSB	Analog input channel 1 Real (4 byte), Big Endian Motorola
12			
13			
14		LSB	
	14		Analog inputs in total: 32 Longs (Real), Big Endian Motorola
131	130	MSB	Analog input channel 31 Real (4 byte), Big Endian Motorola
		LSB	
135	134	Device-ID of FO transmitter	see list of iba device-IDs
136	135	FO message counter-B	incremented by each new FO message

Slave data space

GSD-file

GSD file name	Remark
iba_0F09.gsd	-

Applications

- *ibaLogic*
- System coupling
- SIMATIC TDC
- No SIMATIC S7 (FW < 2.0 for S7-300, FW < 3.0 for S7-400), SIMADYN D

13.2.10 Mode B – IN-OUT 28 Reals

This mode is used to read / write up to 28 real values and 32 digital signals from / to a SIMATIC S7 (resp. TDC, SD) as PROFIBUS master. Due to limitations of the SIMATIC real data type only 28 values can be used (IN 122 bytes/OUT 122 bytes).

Output data

OUTPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	not used	
2	1	not used	
3	2	not used	
4	3	not used	
5	4	7 6 5 4 3 2 1 0	Dig. outputs channel 0...7
6	5	15 14 13 12 11 10 9 8	Dig. outputs channel 8...15
7	6	23 22 21 20 19 18 17 16	Dig. outputs channel 16...23
8	7	31 30 29 28 27 26 25 24	Dig. outputs channel 24...31
9	8	MSB	Analog output channel 0 Real (4 byte), Big Endian Motorola
10			
11			
12		LSB	
	12		Analog outputs in total: 28 Longs (Real), Big Endian Motorola
117	116	MSB	Analog output channel 27 Real (4 byte), Big Endian Motorola
118			
119			
120		LSB	
121	120	not used	customized functions possible (e.g. status, watchdog etc.)
122	121	not used	

Slave data space

Input data

INPUT DATA			
Byte no.	Offset	Contents	Remark
1	0	FO message counter-A	incremented by each new FO message
2	1	FO reception status	Bit 7:FO reception OK; Bit 3: 0 = integer, 1 = real
3	2	reserved	
4		reserved	
5	4	7 6 5 4 3 2 1 0	Dig. inputs channel 0...7
6	5	15 14 13 12 11 10 9 8	Dig. inputs channel 8...15
7	6	23 22 21 20 19 18 17 16	Dig. inputs channel 16...23
8	7	31 30 29 28 27 26 25 24	Dig. inputs channel 24...31
9	8	MSB	Analog input channel 0 Real (4 byte), Big Endian Motorola
10			
11			
12		LSB	
	12		Analog inputs in total: 28 Longs (Real), Big Endian Motorola
117	116	MSB	Analog input channel 27 Real (4 byte), Big Endian Motorola
		LSB	
121	120	Device-ID of FO transmitter	see list of iba device-IDs
122	121	FO message counter-B	incremented by each new FO message

Slave data space

GSD-file

GSD file name	Remark
ibaF0Bn4.gsd	Transfer in one block with SFC (S7-400)
ibaF0Bn3.gsd	Transfer in four blocks with SFC (S7-300)

Applications

- *ibaLogic*
- System coupling
- SIMATIC S7
- SIMATIC TDC
- SIMADYN D

13.3 Application notes

1. Install or copy the appropriate GSD file(s) on the PROFIBUS master. The choice of GSD file depends on the mode to be used.

   For more information on the operation modes see chapter ↗ *Configuration via web interface, page 140*.

2. Register the GSD files using the master configuration program in order to assign them to the DP slaves of *ibaBM-DP*.
3. Connect the *ibaBM-DP* device physically with the DP line.

Caution!

Connecting the PROFIBUS cable

A conflict between several slaves with the same number can lead to a complete failure of communication on the PROFIBUS and even to a system shutdown.

To ensure that there are no duplicate slave numbers, do not connect the PROFIBUS cable until the configuration of the active slaves has been correctly carried out in *ibaPDA*.

4. Activate application-specific transfer programs in the master (PLC).
5. Connect the fiber optical links of *ibaBM-DP* with another iba sytem, e. g. *ibaPDA*, *ibaLogic* etc.

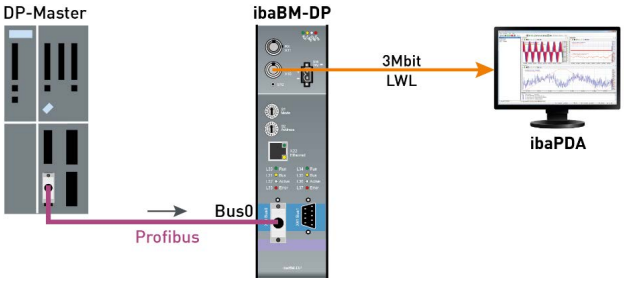
13.4 Applications with SIMATIC S7

In the following sections you will find a description of 2 very simple applications for unidirectional and bidirectional communication with *ibaBM-DP* in compatibility mode 3Mbit which show the principles in configuration and engineering. The following explanations generally refer to SIMATIC S7 applications. However, these also apply analogously to SIMATIC TDC and SIMADYN D.

13.4.1 The 1st Test

13.4.1.1 SIMATIC S7 application unidirectional (S7-300)

An analog value (e. g. a temperature scaled with FC105 from S7 standard library) is to be transferred as a REAL variable from S7-PLC to *ibaBM-DP* and acquired with *ibaPDA*.



Step 1: FO connecting and cabling

As *ibaPDA* is a passive application and thus only reads data from the PROFIBUS, the modes 0, 1 and 3 are available.

1. Connect the FO output (TX) on the *ibaBM-DP* with a FO input on the *ibaFOB* card in the *ibaPDA* computer.
2. Start the *ibaPDA* software and define a module “ibaBM-DP-64” in the I/O Manager of *ibaPDA*.
3. In the *ibaPDA* I/O Manager, mark the corresponding link under the *ibaFOB* card in the signal tree.

→ Even if the *ibaBM-DP* device is not yet connected to the PROFIBUS, valid telegrams are already sent to *ibaPDA* via fiber optic cables. Using the diagnostics function of *ibaPDA* you should be able to watch the telegram counter running.

→ As soon as the connection between the DP master and both slaves of *ibaBM-DP* has been established the “Bus” LED should light yellow and the “Active” LED white.

Step 2: GSD file installation and hardware configuration

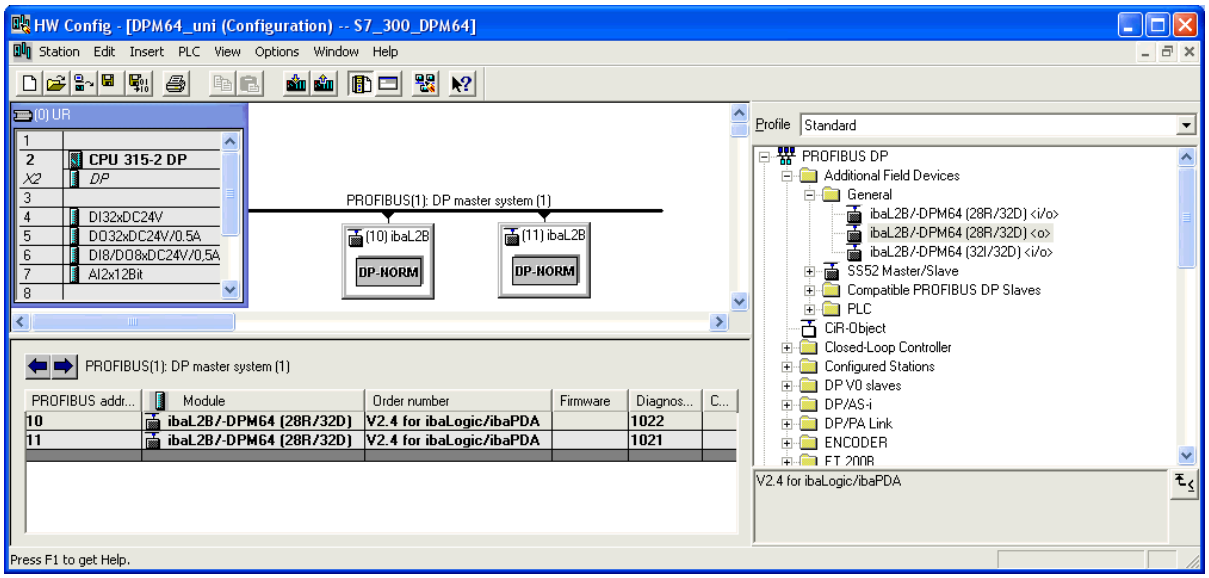
1. Start the “HW Config” tool in the current S7 project and install the GSD file with name ibaF04n3.gsd
2. In the web interface of the *ibaBM-DP*, set the operating mode to mode 3 (PDA 28 Reals).
3. Open the “PROFIBUS DP” folder in the hardware catalog of "HW Config".
4. Connect an “ibaDPM64” module with the PROFIBUS line per drag & drop and set an DP ad-

dress (in the example 10) for this module.

Note

The same address has to be set in the web interface of *ibaBM-DP*!

5. If you want to use both slaves on *ibaBM-DP* connect another module with the PROFIBUS line and assign in “HW Config” the other DP address set in the web interface.



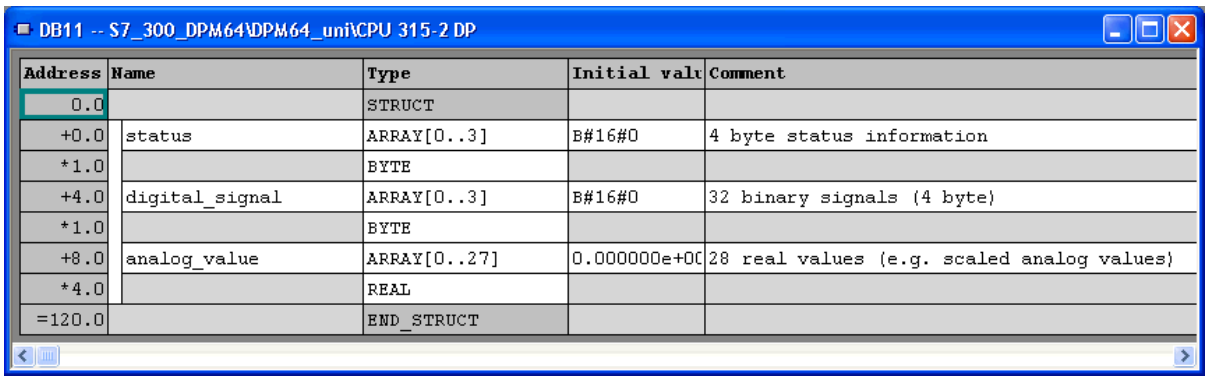
Step 3: Establishing a connection to the DP

1. Connect the left DP interface on *ibaBM-DP* with the DP interface of your S7-PLC.
2. If ibaBM-DP is the last device on the DP line, then also activate the terminating resistor in the PROFIBUS connector.
3. Download the system data to the S7-PLC with HW Config and start the PLC.

   As soon as the connection between the DP master and the *ibaBM-DP* slaves has been established the “Bus“ LED should light yellow and the “Active” LED white.

Step 4: S7 test program

1. Generate a DB11 (or any free DB number) in your S7 project.



Address	Name	Type	Initial valu	Comment
0.0		STRUCT		
+0.0	status	ARRAY[0..3]	B#16#0	4 byte status information
*1.0		BYTE		
+4.0	digital_signal	ARRAY[0..3]	B#16#0	32 binary signals (4 byte)
*1.0		BYTE		
+8.0	analog_value	ARRAY[0..27]	0.000000e+0(	28 real values (e.g. scaled analog values)
*4.0		REAL		
=120.0		END_STRUCT		

DB11 contains 120 byte data for *ibaBM-DP*.

2. Define the local variables and call FC105 and SFC15 (both blocks from the S7 standard library) in OB1.

   Other FCs are also possible.

   The scaled temperature (0.0 °C to 700.0 °C) is saved as a REAL value in DB11.DBD8 (in the 1st memory area for analog signals).

   Example for transfer of 32 bytes of consistent data from S7 PLC (DB11) to ibaBM-DP with SFC15:

```
OB1 :  "Main Program Sweep (Cycle)"
Network 1: static "0"- and static "1"- flag
          A     M      0.0
          R     M      0.0
          AN    M      0.1
          S     M      0.1


Network 2: reading in and scaling the temperature (from PIW 304)

          CALL  FC   105
           IN     :=PIW304                  //temperature (0-32767)
           HI_LIM :=7.000000e+002
           LO_LIM :=0.000000e+000
           BIPOLAR:=M0.0                    //static "0" -flag
           RET_VAL:=#error_code_fc105
           OUT    :=DB11.DBD8               //temperature (0-700 °C)


Network 3: DPM 64 connection (ibaPDA)
          CALL  SFC   15
           LADDR  :=W#16#200                //peripheral output- address (PQW) 512
           RECORD :=P#DB11.DBX0.0 BYTE 32   //starting address of data source length of data block (32 byte)
           RET_VAL:=#error_code_sfc15       //error code
          NOP   0
```

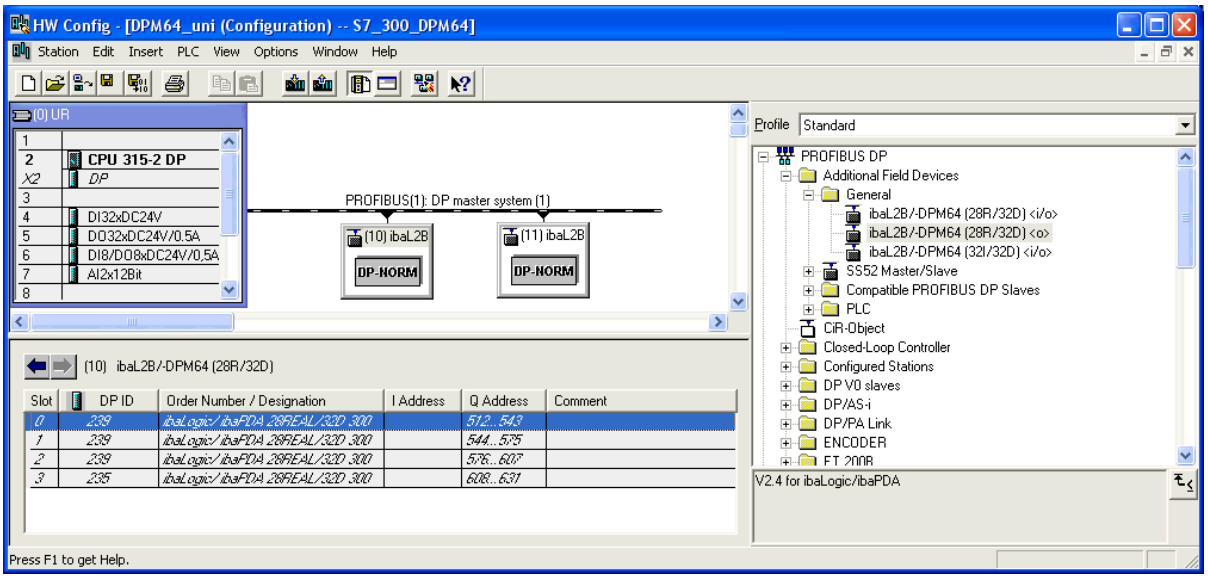
3. In your S7 program, you must set the peripheral output address in network 3 (LADDR parameter) to the DP output address in the hardware configuration (A address column).

Note

Do not forget to take into account the offset of the data set within the PROFIBUS telegram.

Example: To address the 1st analog value in mode "3", take into account an offset of 8 bytes/4 words.

For further information, see chapter ↗ *Output data, page 147*.



4. Now, download all modified blocks to PLC.

Step 5: ibaPDA setup and test

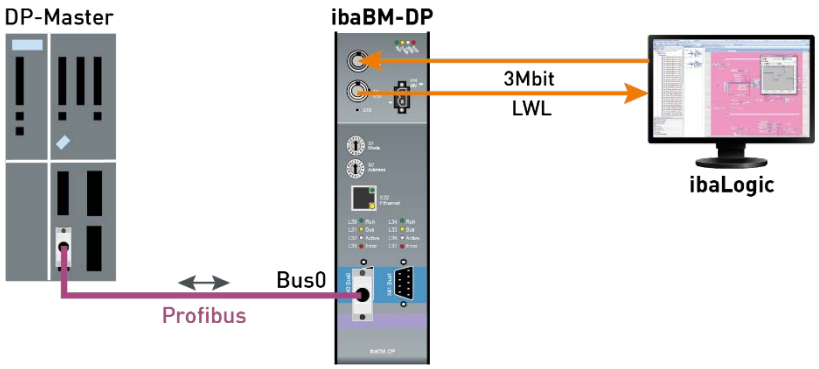
In step 1 you should have already defined one module *ibaBM-DP-64* in the I/O Manager of *ibaPDA*.

1. In the signal tables of the module in *ibaPDA*, activate (check) the analog and digital channels of the modules and enter signal names and comments if required.
2. Start measurement by clicking on <GO>.
3. Drag & drop the signals from the signal tree into the signal view.

→ If all connections are done and if the S7 PLC sends data via the PROFIBUS then signal curves should appear in the trend graphs of the *ibaPDA* client. If the measurement curves are not immediately visible, right-click in the signal strip and select the *Autoscale strip* command in the context menu.

13.4.1.2 Bidirectional application with S7 (S7-300) and ibaLogic

A temperature signal is to be transmitted from an S7 PLC to an *ibaLogic* system. A generator signal is to be sent from *ibaLogic* to the S7.



Step 1: FO connecting and cabling

Because the data are to be transmitted in two directions, the bidirectional modes 8, 9 and B are available.

1. Take a duplex fiber optic cable and connect the transmitting link (TX) on *ibaBM-DP* with a receiving link of der *ibaFOB-io* or *ibaFOB-4i* card of the *ibaLogic* system.
2. Use the 2nd wire to connect the input (receiver, RX) on *ibaBM-DP* to an output of the *ibaFOB-io* or *ibaFOB-4o* card.

Step 2: GSD installation and hardware configuration

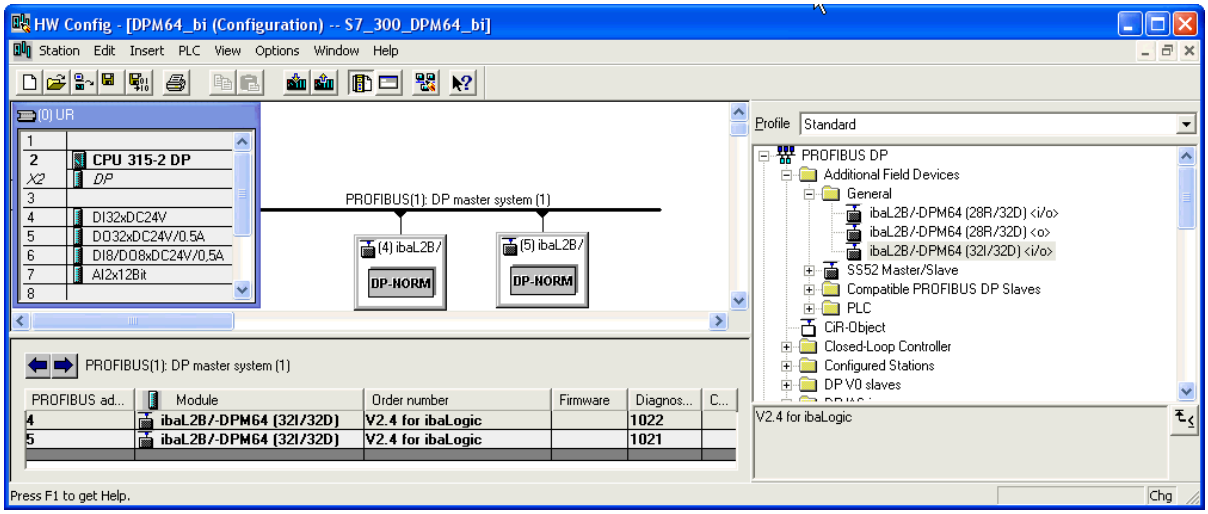
1. Start the “HW Config” tool in the current S7 project and install the GSD file with name ibaF08n3.gsd

   For further information, see chapter ↗ *Operating modes overview, page 143*.
2. In the web interface of *ibaBM-DP* set the operating mode to mode “8”.
3. Open the “PROFIBUS DP” folder in the hardware catalog of "HW Config".
4. Connect an DPM64 module with the PROFIBUS line by drag & drop and set a DP address for this module (in this example 4).

Note

The same address has to be set in the web interface on ibaBM-DP.

5. If you want to use both slaves on *ibaBM-DP* connect another module with the PROFIBUS line and assign in HW Config the other DP address set in the web interface.



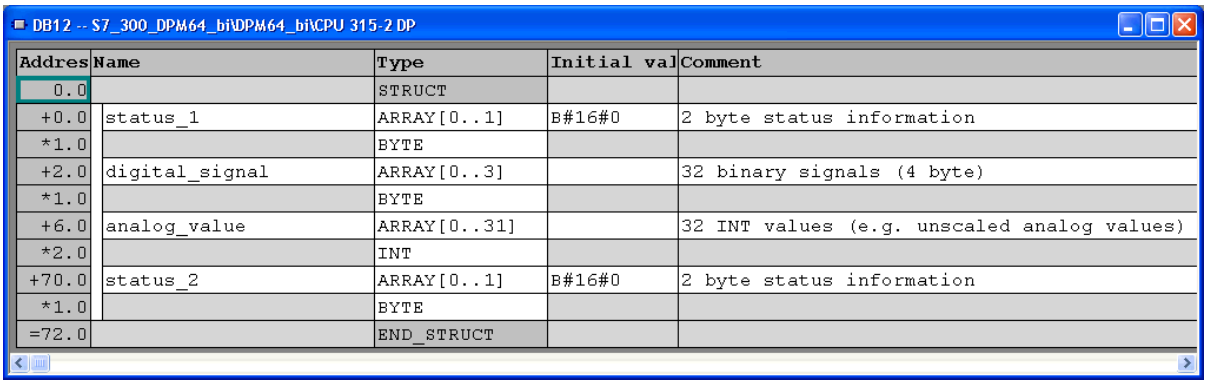
Step 3: Establishing a connection to the DP

1. Connect the left DP interface on *ibaBM-DP* with the DP interface of your S7-PLC.
2. If *ibaBM-DP* is the last device on the DP line, then also activate the terminating resistor in the PROFIBUS connector.
3. Download the system data to the S7-PLC with HW Config and start the PLC.

→ As soon as the connection between the DP master and the *ibaBM-DP* slaves has been established the “Bus“ LED should light yellow and the “Active” LED white.

Step 4: S7 test program

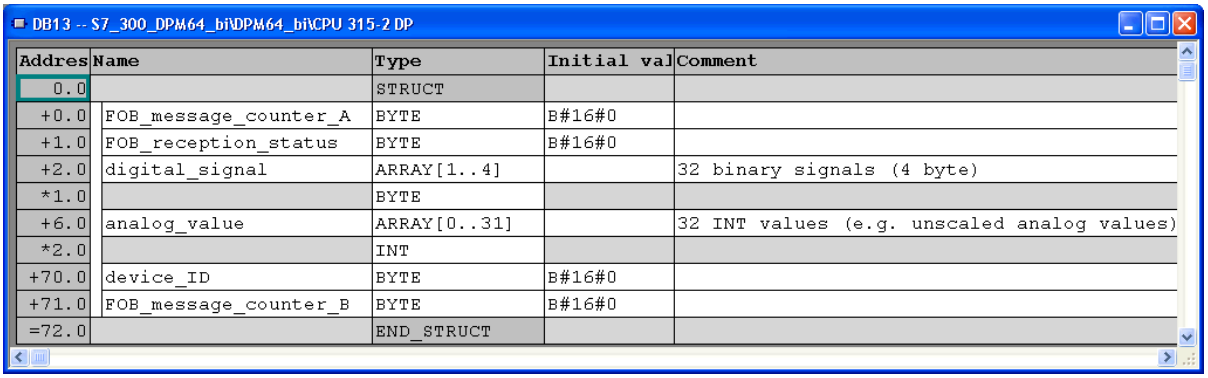
1. Generate a SEND-DB12 (or any free DB number) in your S7 project.



DB12 -- S7_300_DPM64_bi\DPM64_bi\CPU 315-2 DP

Address	Name	Type	Initial val	Comment
0.0		STRUCT		
+0.0	status_1	ARRAY[0..1]	B#16#0	2 byte status information
*1.0		BYTE		
+2.0	digital_signal	ARRAY[0..3]		32 binary signals (4 byte)
*1.0		BYTE		
+6.0	analog_value	ARRAY[0..31]		32 INT values (e.g. unscaled analog values)
*2.0		INT		
+70.0	status_2	ARRAY[0..1]	B#16#0	2 byte status information
*1.0		BYTE		
=72.0		END_STRUCT		

2. Generate a RECEIVE-DB13 (or any free DB number) in your S7 project.



DB13 -- S7_300_DPM64_bi\DPM64_bi\CPU 315-2 DP

Address	Name	Type	Initial val	Comment
0.0		STRUCT		
+0.0	FOB_message_counter_A	BYTE	B#16#0	
+1.0	FOB_reception_status	BYTE	B#16#0	
+2.0	digital_signal	ARRAY[1..4]		32 binary signals (4 byte)
*1.0		BYTE		
+6.0	analog_value	ARRAY[0..31]		32 INT values (e.g. unscaled analog values)
*2.0		INT		
+70.0	device_ID	BYTE	B#16#0	
+71.0	FOB_message_counter_B	BYTE	B#16#0	
=72.0		END_STRUCT		

3. Enter the content of OB1. Define the local variables and call SFC14 (DP receive) and SFC15 (DP send), both blocks from the S7 standard library, in OB1. Other FCs are also possible.

   The unscaled temperature (0 to 32767) is stored as an INT value in DB12.DBW6 (in the 1st memory area for analog signals) and is passed on from there to ibaLogic.

   Example for transfer of 32 bytes transmitting (DB12, SFC15) and receiving data (DB13, SFC14) in S7-PLC

```
OB1 :   "Main Program Sweep (Cycle)"
Network 1: static "0"- and static "1"- flag
          A     M      0.0
          R     M      0.0
          AN    M      0.1
          S     M      0.1


Network 2: copy send data to send- DB
          L     PIW  304                  //e.g. unscaled temperature value (0-32767)
          T     DB12.DBW    6            //save to send- DB (1. analog value in the OUTPUT block; DPM mode 8)

Network 3: DPM 64 SEND- connection (to ibaLogic)
          CALL  SFC   15
           LADDR  :=W#16#100              //peripheral output- address (PQW) 256
           RECORD :=P#DB12.DBX0.0 BYTE 32 //starting address of data source; length of data block 32 byte
           RET_VAL:=#error_code_sfc15     //error code
          NOP   0

Network 4: DPM 64 RECEIVE- connection (from ibaLogic)

          CALL  SFC   14
           LADDR  :=W#16#100              //peripheral input- address (PIW) 256
           RET_VAL:=#error_code_sfc14     //error code
           RECORD :=P#DB13.DBX0.0 BYTE 32 //starting address of data destination; length of data block 32 byte


Network 5: read out from receive- DB and process received data
          L     DB13.DBW    6            //load INT- variable from receive- DB (1. analog value in the INPUT block; DPM m
          L     2500                     //load a limit
          >I                             //compare greater than
          =     M     30.0               //assign the result to a flag
```

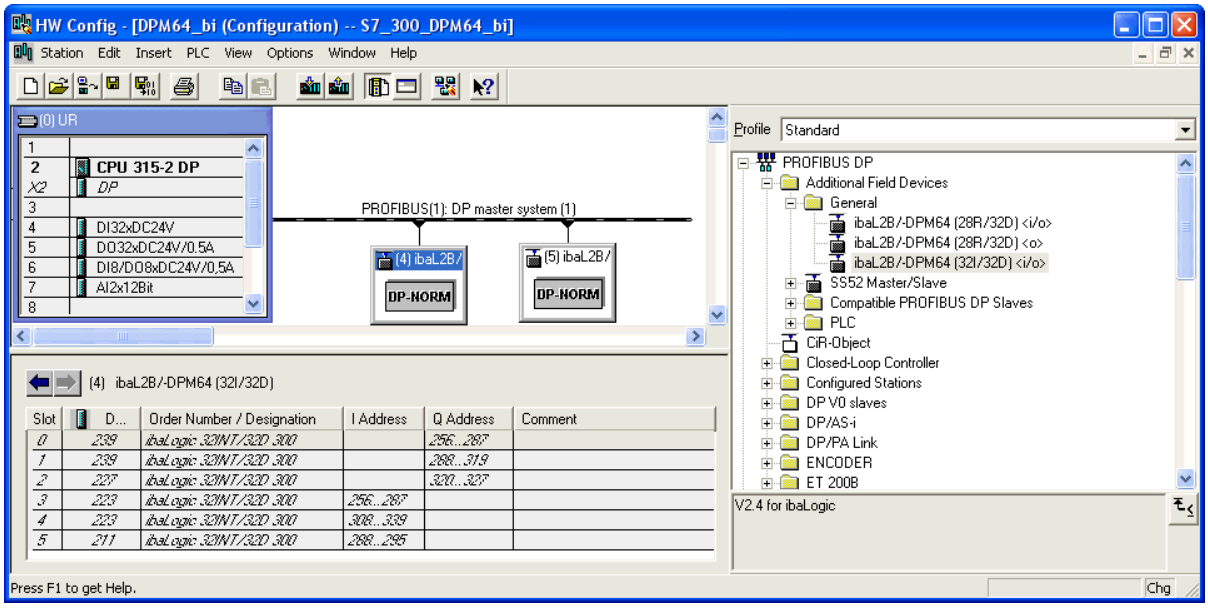
4. In your program you have to adjust the peripheral input/output address in network 3 and 4 (LADDR- parameter) with the DP input/output addresses in the HW-configuration (column I-/ Q- Address).

Note

Do not forget to take into account the offset of the data set within the PROFIBUS telegram.

Example: To address the first analog value in mode 8, please consider an offset of 6 Bytes / 3 Words.

For further information, see chapter ↗ *Operating modes overview, page 143*.



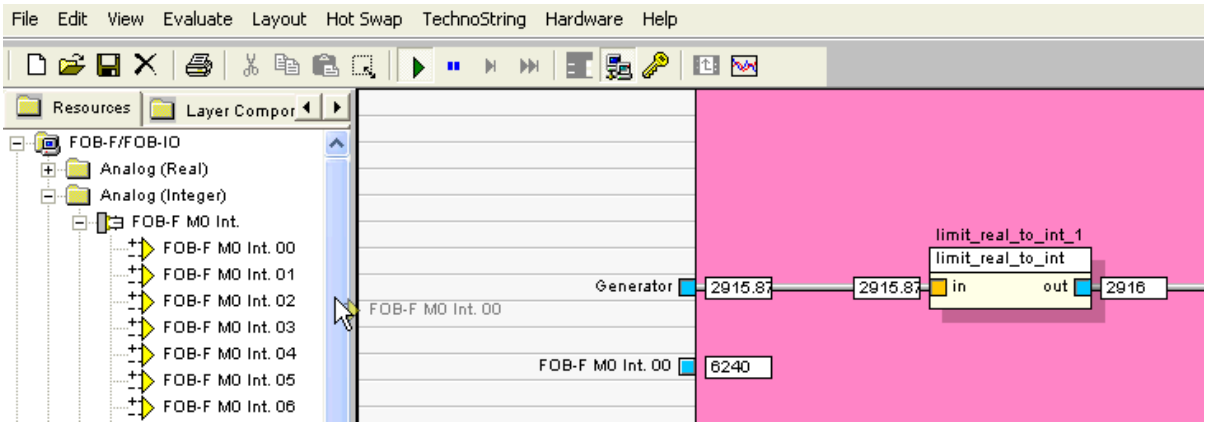
In this example the addresses PIW 256 and PQW 256 are displayed in HW Config. For S7-300, 3 ranges (2 with 32 bytes and 1 with 8 bytes) are automatically created per slave. The maximum size of transfer data with SFC14 and SFC15 to any DP device is limited to 32 bytes (only for S7-300). That means, if you want to transfer the complete block of 72 bytes, you have to call up the DP-SFCs three times in your S7 program.

5. Now, download all modified blocks to PLC.

Step 5: ibaLogic test program

1. Start *ibaLogic* and create a new test layout. Activate the *ibaFOB-i/o* or ibaFOB4i card in the system settings.
2. Data received from S7:

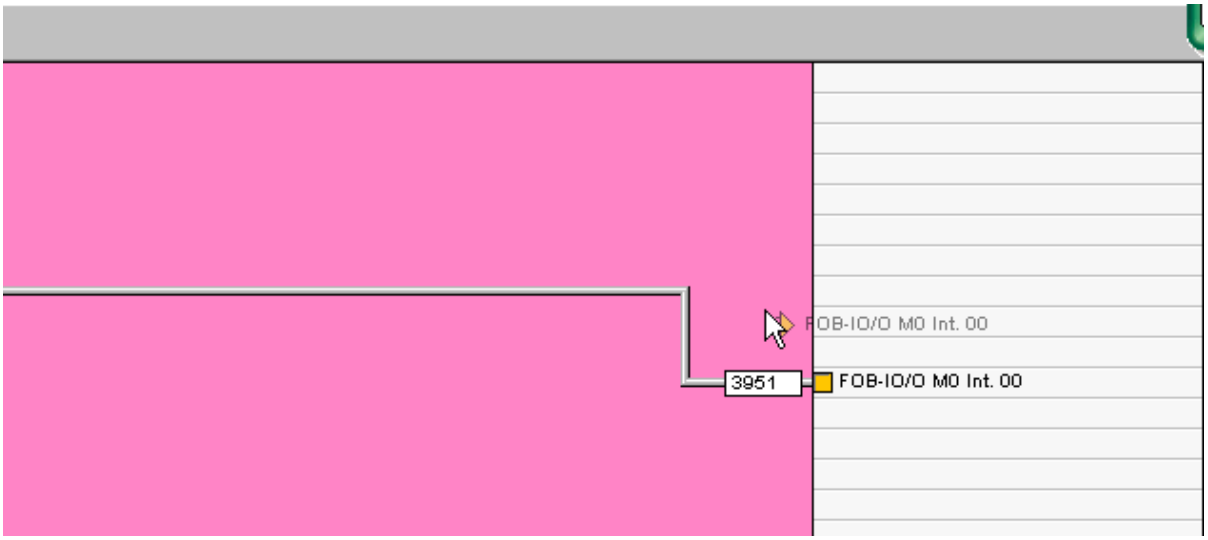
   o be able to display the received data (temperature values) from the S7, the 1st INT analog value from the FOB_F/FOB-IO input resources must be used.



3. Transmit data to S7:

   To create a signal in ibaLogic, you can use the generator (input resource).

   To transfer the data from the ibaLogic system to the S7, the 1st INT analog output must be used for the FOB-F/FOB-IO output resources.



4. Start the SIMATIC-Manager and enter a new variable table. Display the transmitted generator signal (DB13.DBW6) in INT format

13.4.2 Reloading S7 application data from/to DP master

When assigning the slaves in the master system several data blocks are defined in the peripheral address space at the same time. The block-wise reloading of data is used to reach a higher security and a better detection of short-term failures.

To reload the data from or to the periphery the use of SFC14 and SFC15 is recommended. When exchanging data with an

S7-300 more than one call of SFC14/SFC15 is required because the data block length is limited to 32 bytes. When working with the S7-400 family, 122 bytes are available per data block. This is the reason why you find different GSD files on the data medium.

13.4.3 Zero values for DP faults with S7 master

Please note that slave data can be overwritten with zeros in case of a DP slave failure.

Such failures can lead to zeros or no values in the data flow, even for a few milliseconds. In real time automation systems this effect may cause failures of the entire system which are hard to examine.

Concerning incoming data (master's view), there are some possibilities using the DP monitoring functions of the S7-system, such as alert function blocks.

When it comes to outgoing data the receiving systems, which are connected to the PROFIBUS via *ibaBM-DP* and interface boards like *ibaLink-VME* or *ibaLink-SM-64-io*, can only read 32 analog and 32 digital data per slave (= module in *ibaPDA*) from the iba interface cards.

On that end even the breakdown of the entire DP line cannot be detected. In case of a PROFIBUS failure the most recent signal values remain.

Note

There is a way to realize corresponding indications by using the data set. For example a digital channel of this data set can serve as a "hot wire". The master should hold this digital value always on TRUE (= 1) as long as the PROFIBUS works properly. In case of a short DP failure the master will write zero to all outgoing data for a short time, including the digital monitoring signal. When the receiving system reads a FALSE (= 0) on the digital channel it is clear that all other values are not valid and therefore should not be taken into account.

Other methods may be engineered as well by means of the data set. Particularly a dynamic life sign, i. e. a toggling digital signal, from the master is recommended.

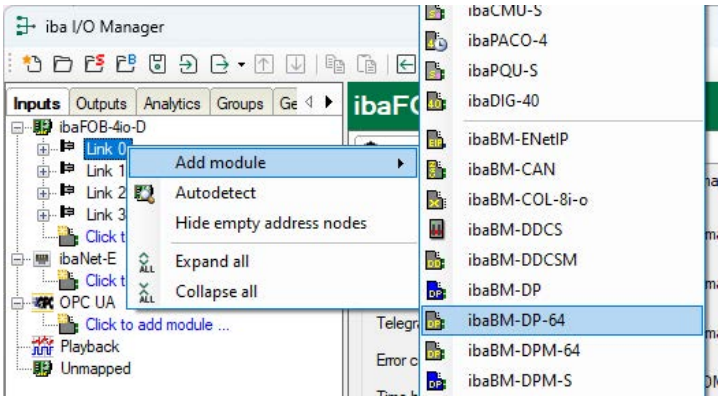
13.5 Configuration of the compatibility mode with ibaPDA

The following description refers to *ibaPDA* version 6.32.0 or higher. If older *ibaPDA* versions are use, please see chapter ↗ *Compatibility mode 3Mbit with older device modules, page 166*.

1. On the left-hand side in the I/O Manager, choose the desired *ibaFOB-D* card and mark the link, *ibaBM-DP* is connected to.
2. Click with the right mouse button on the link and select *Autodetect*.

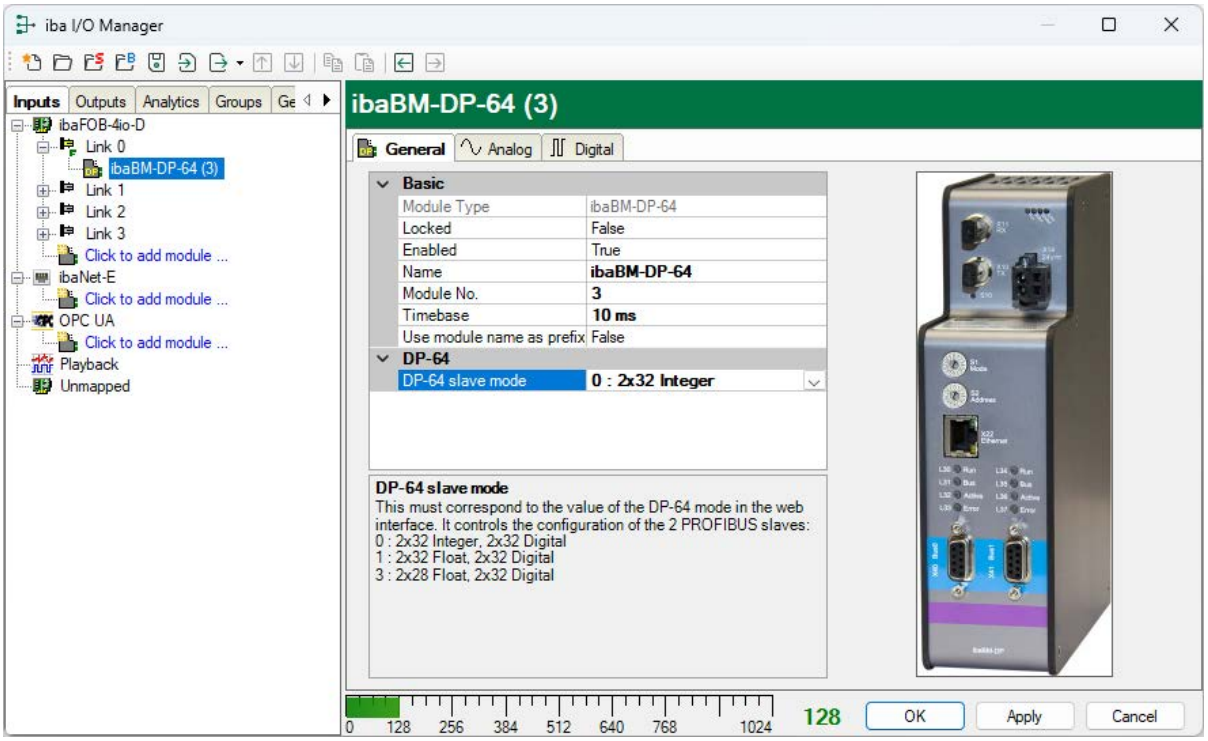
→ The device set to compatibility mode 3Mbit (rotary switch S1 = 0 and S2 = 0) is identified automatically and shown as “ibaBM-DP-64” in the signal tree.

3. Optionally, you can also add the device manually. In this case select *Add module – ibaBM-DP-64* in the context menu.



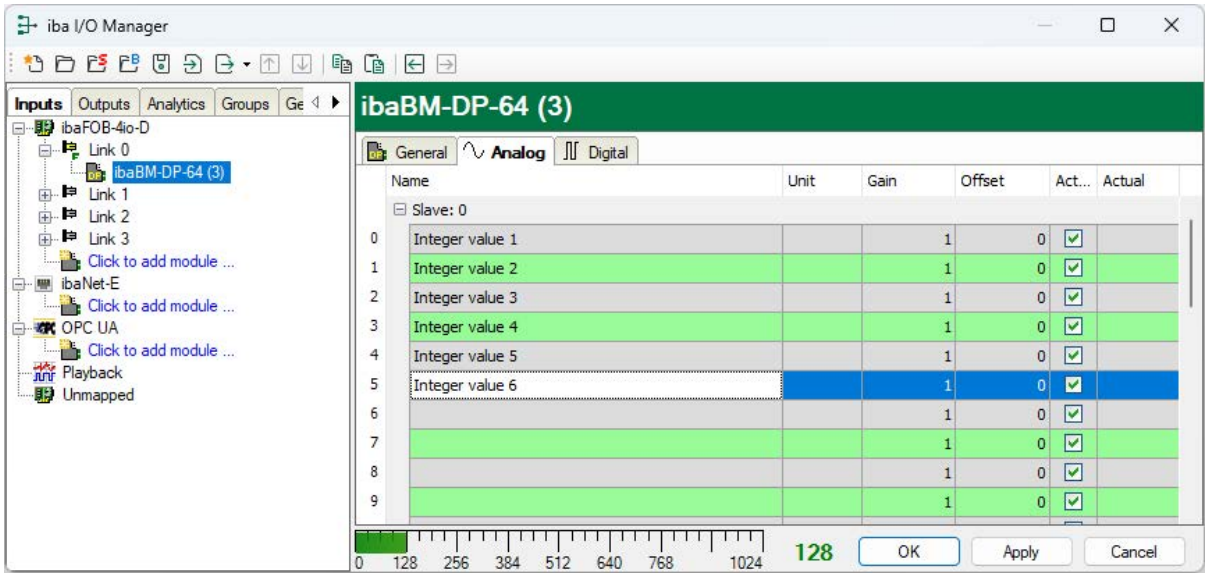
4. Select the operating mode in the *General* tab in the field *DP-64*.

   The mode must correspond with the mode in the web interface.



5. In the *Analog* tab, enter the signals you want to acquire in sequential order.

   Enter a name for each signal (column *Name*) and optionally the physical unit in the column *Unit*. If necessary, enter values in the columns *Gain* and *Offset* for all signals.



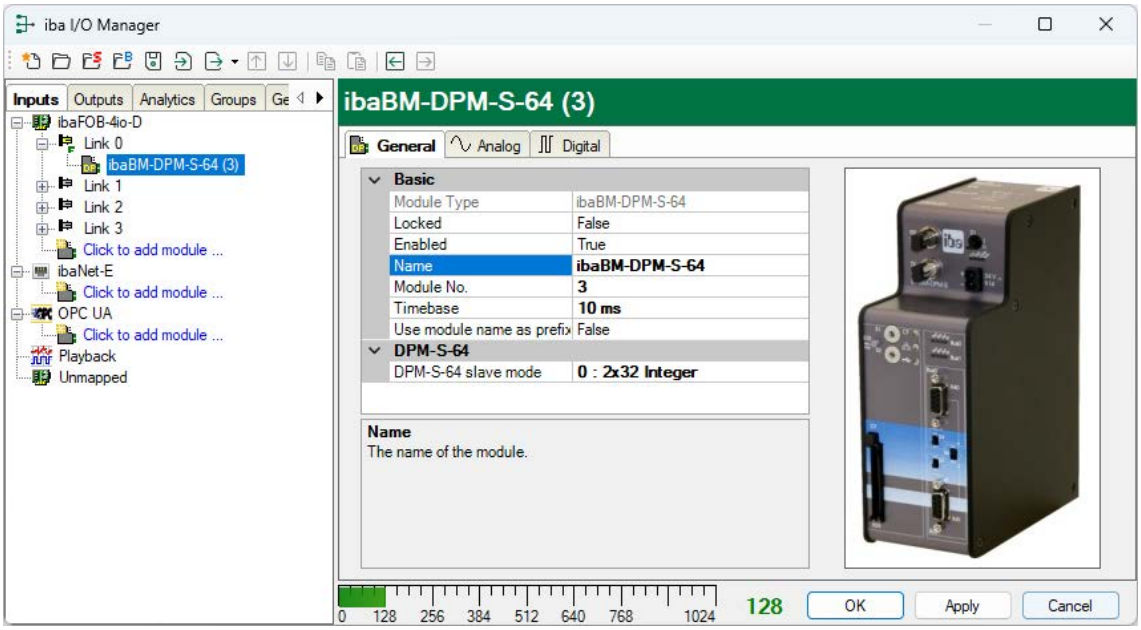
6. Proceed accordingly for the digital signals in the *Digital* tab. Here, only signal names have to be entered.

13.5.1 Compatibility mode 3Mbit with older device modules

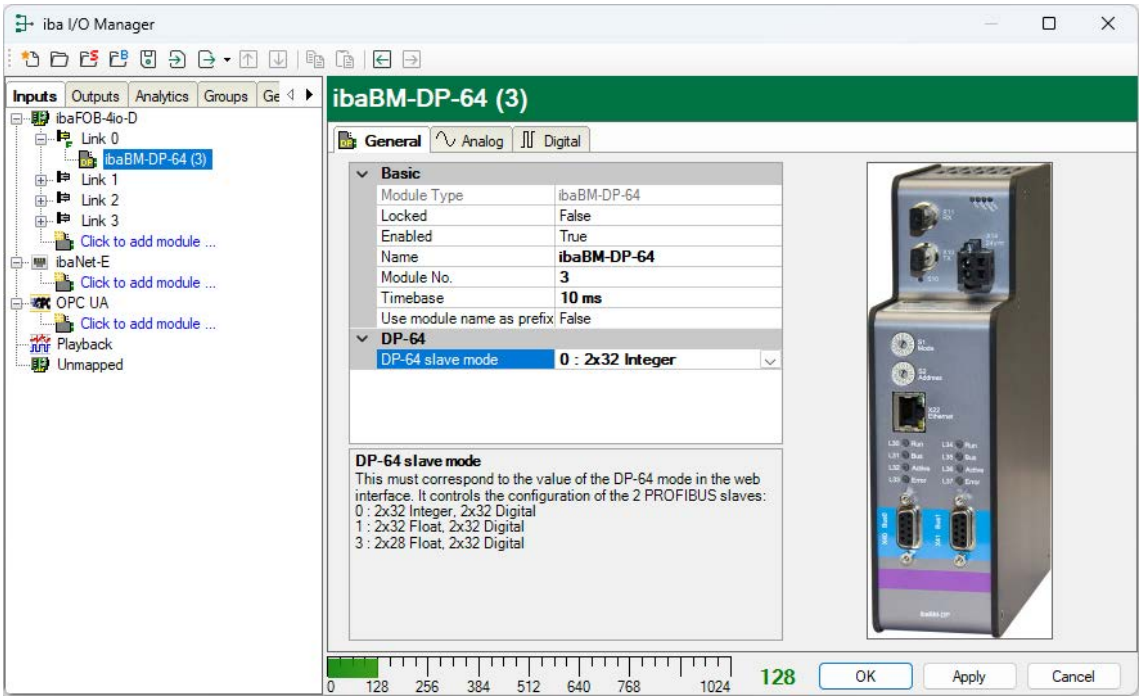
To record data in compatibility mode 3Mbit, the device modules *ibaBM-DPM-64* or *ibaBM-DPM-S-64* can also be used. If an *ibaPDA* version older than V6.32.0 is used, only these device modules are available.

Configuration proceeding is the same as with the *ibaBM-DP-64* module.

ibaBM-DPM-S-64 module



ibaBM-DPM-64 module

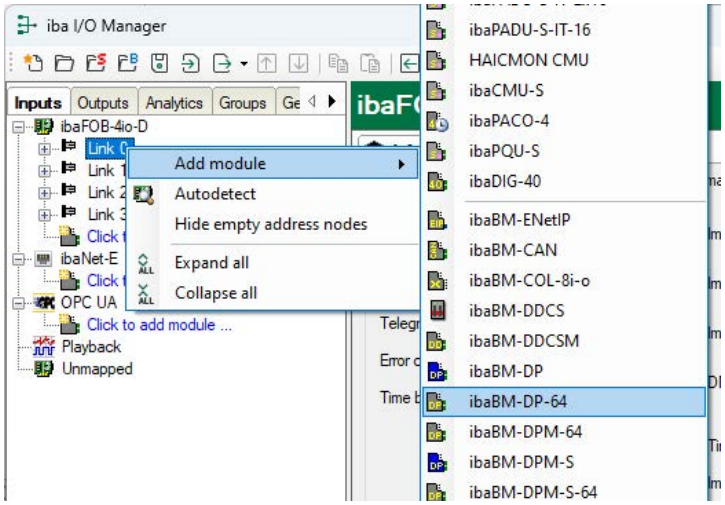


13.6 Outputs from ibaPDA to PROFIBUS master (bidirectional)

Depending on the analog value type to be processed. integer or real, mode 8, 9 or B has to be set on the *ibaBM-DP* device for bidirectional operation. The notes for configuration of outputs in *ibaPDA* (from step 4) apply also, if the modes 5, 6 or 7 are used to transfer data from *ibaPDA* to a master.

For further information, please see chapter ↗ *Settings*, page 50.

1. Configure an applicable GSD file in the PROFIBUS configuration of the master.
2. Add a module "ibaBM-DP-64" to the link of the corresponding *ibaFOB* card in *ibaPDA* I/O Manager.



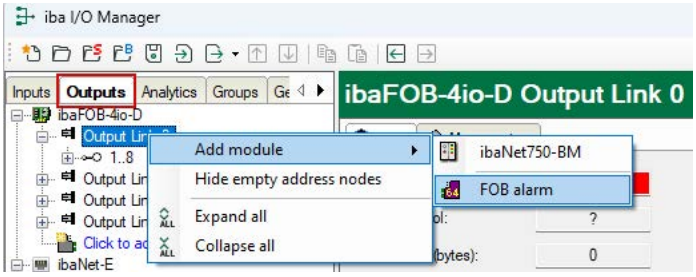
3. Set the “DP-64 slave mode” in the *General* tab.

Note

The mode set on the device via the web interface must match the mode set *ibaPDA*.

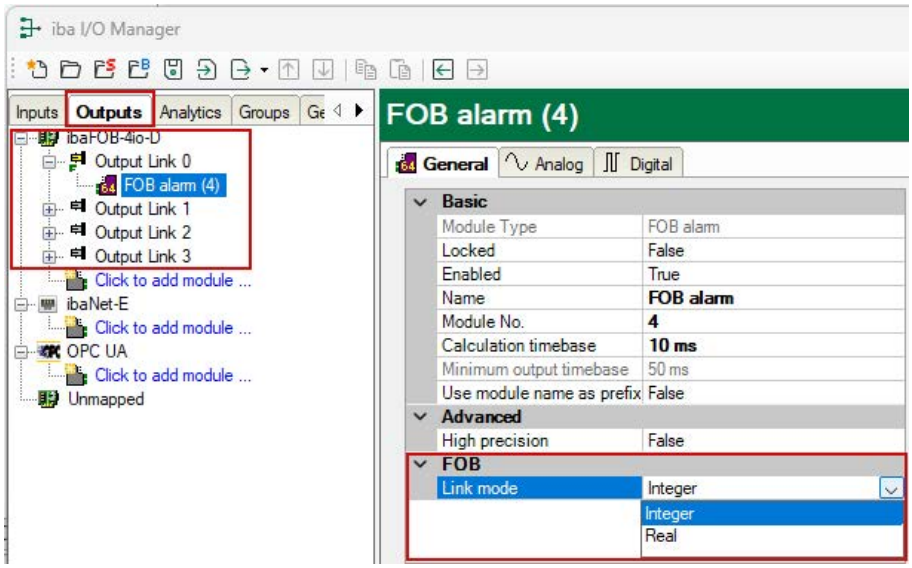
Device mode	DP-64 slave mode (ibaPDA I/O Manager)
8	0 (2 x 32 integer)
9	1 (2 x 32 float)
B	3 (2 x 28 float)

4. Add an "FOB alarm" module to the corresponding output link in the *Outputs* area of the I/O Manager.



5. In the *General* tab of this module, set the "Link mode" to the correct data format "Integer" or "Real".

Device mode	Link mode
8	Integer
9	Real
B	Real



6. Enter the data to be written in the *Analog* and *Digital* tables.

14 Simulation mode

For general information about system integration and activating the simulation mode, see chapters ↗ *Device setting simulation mode*, page 27 and ↗ *Simulation mode*, page 33.

If you want to use the simulation mode, you need an additional license, see chapter ↗ *Order data*, page 13.

Note

The simulation mode is approved for the use with PROFIBUS masters supplied by Siemens only.

14.1 Commissioning procedure

1. Configure the PROFIBUS master and start it, even when not all configured slaves have been connected.
2. Connect the *ibaBM-DP* device to the PROFIBUS. Both connections “X40: Bus 0” and "X41: can be used. This way, the slaves can be simulated by two different bus lines.
3. Switch on ibaBM-DP.

→ While booting, *ibaBM-DP* is searching for “missing” slaves. These are all slaves, which are requested by the PROFIBUS master, but do not respond, as they are not present on the bus. These physically missing slaves are simulated by ibaBM-DP.

Note

Only switch the device on, after you have connected the connections “X40: Bus0" or "X41: Bus1” to the PROFIBUS. Missing slaves are searched for and simulated only while *ibaBM-DP* is booting.

→ From now on, all displayed bus errors should disappear on the PROFIBUS master. Since *ibaBM-DP* simulates all missing slaves, the PROFIBUS master detects the configured slaves as being existent and valid.

4. Start the simulation program and establish a TCP/IP connection to *ibaBM-DP*.

   The following settings apply to the TCP/IP connection:

   - The simulation program is the “active” communication partner. Here, you have to enter the IP address (or device name) and the port number of *ibaBM-DP*. You find the IP address on the *Info* page in the web interface. The port number is “999”.
   - You can define a “send” and “receive” telegram for each slave to be simulated. The receive telegram contains the data, the master sends to the slave (outputs). Within the send telegram, you can simulate the data the slave sends to the master (inputs).

     For detailed information on the telegram layouts see chapter ↗ *Telegram layout, page 171*.

Note

A periphery module is only recognized if it contains no more than 19 signal modules. Periphery modules with 20 or more signal modules are no longer recognized.

14.2 Boundary conditions

- *ibaBM-DP* searches for missing slaves only when the device is booting. Subsequent changes of the configuration like adding or removing slaves are not detected by *ibaBM-DP*. A new search for missing slaves is not carried out until the device is restarted and switched off/on again.
- Any number of slaves can be simulated. The limitation of *ibaBM-DP* to 8 active slaves does not apply to the simulation mode.
- In simulation mode, you generally cannot acquire simultaneously data from the *ibaBM-DP* in *ibaPDA* via FO cable.
- If *ibaPDA* is available, you can use it for diagnostic purposes. The *ibaPDA* computer has to be equipped with an *ibaFOB-X* or i*baFOB-D* card.

  Additionally you need:

  - a network connection between the *ibaPDA* computer and *ibaBM-DP*
  - an unused link on the *ibaFOB-X* or *ibaFOB-D* card

  ibaBM-DP does not need to be connected via a FO cable to this unused link. The diagnostic can be used only by temporarily adding *ibaBM-DP* to the I/O configuration.

  Insert an *ibaBM-DP* device on the unused *ibaFOB* link, activate the compatibility mode 32Mbit in the "General" tab and parametrize the IP address or device name of *ibaBM-DP*. In the *PROFIBUS browser* tab you can now see the status of the simulated slaves and analyze the output and simulated input data.

14.3 TCP/IP protocol

14.3.1 Telegram data transfer

Slave data is transferred to *ibaBM-DP* via TCP/IP at port 999.

The telegrams sent to *ibaBM-DP*are referred to as **request** in this manual, the telegrams sent from *ibaBM-DP* as **response**.

The input data for a slave is transferred to *ibaBM-DP* with a request telegram. *ibaBM-DP* accepts the data and sends back the output data of the same slave with a response telegram.

The request telegrams are processed sequentially, i. e., it is not necessary to wait for a response after a request, before sending further requests.

The following options are available:

Procedure 1 (synchronous)

Request 1	→	
	←	Response 1
Request 2	→	
	←	Response 2
	:	
Request X	→	
	←	Response X

Procedure 2 (asynchronous)

Request 1	→	
Request 2	→	
Request 3	→	
	←	Response 1
	←	Response 2
Request 4	→	
	←	Response 3
	←	Response 4
	:	
Request X	→	
	←	Response (X-1)
	←	Response X

14.3.2 Telegram layout

The Exchange request and response telegrams are structured identically and are shown in the table below. All 2/4 Byte fields are formatted as Little Endian (“Intel”).

Offset	Bytes	Field	Values	Description
0	2	id		Can be set to any value in the request, the value is mirrored in the corresponding response
2	2	fc	7	Exchange telegram identifier
4	2	length	272	Telegram length
6	2	reserved	0	
8	4	success		**Response only:** error messages, see below
12	1	bus	0..1	Bus number, ibaBM-DP interface
13	1	slave	1..126	Slave number
14	1	dummy1	0	
15	1	dummy2	0	
16	**244**	**Data**	-	**Slave I/O data** **- Request: input data (from DP Master's view)** **- Response: output data (from DP Master's view)**
260	1	DataSize	0..244	**Response only:** actual user data length in the data field
261	3	Service1	0	Not used
264	1	MasterNr	-	**Response only**: Profibus address of the master which has written the output data to the slave
265	1	Service2	0	Not used
266	6	Timestamp	0	**Response only:** counter 48 Bits: 33 Ticks/1µs

"Success" field

Value	Description
1	Without error
-3	Bus number is wrong
-5	Slave number is wrong
-7	Simulation mode is not available

14.4 Sample project

On the data storage medium "iba Software & Manuals" you will find an example in which *ibaLogic* V5 is used as a simulation program and an S7-400 CPU with 5 configured slaves serves as PROFIBUS master. You find the example in the following directory:

`04_Libraries_and_Examples\31_ibaBM-DP\00_GENERAL\Simulation_Mode\`

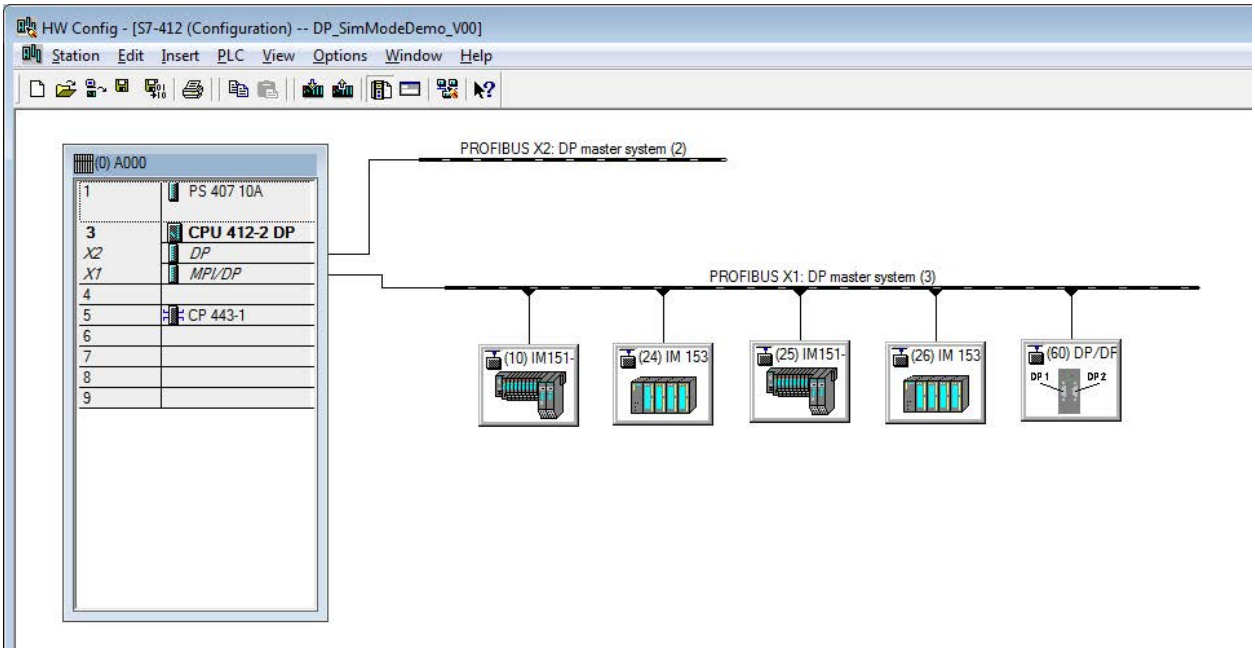
14.4.1 Step7 project "S7_DP_SimModeDemo_Vxy.zip"

The PROFIBUS configuration contains the following slaves:

Slave	Type	Inputs *	Outputs *	ibaLogic struct type
10	ET200S	8 byte	4 byte	Slave_10_in / Slave_10_out
24	ET200M	9 byte	5 byte	Slave_24_in / Slave_24_out
25	ET200S	8 byte	4 byte	Slave_25_in / Slave_25_out
26	ET200M	9 byte	5 byte	Slave_26_in / Slave_26_out
60	DP/DP coupler	32 byte	32 byte	Slave_60_in / Slave_60_out

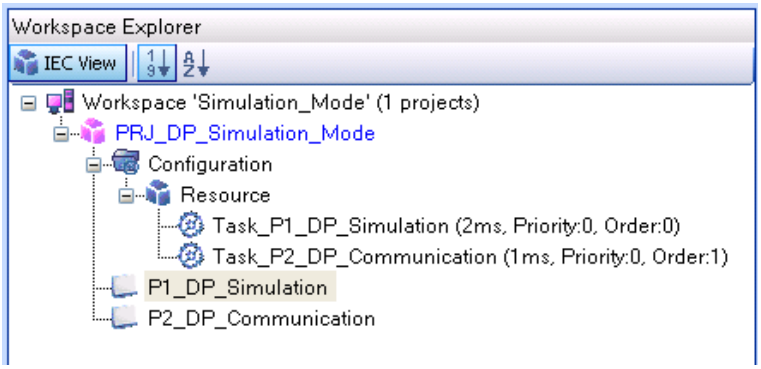
* Inputs/outputs from the view of the DP master

Example Step7 project



14.4.2 ibaLogic project „ibaLogic_DP_Simulation_Mode_Vxy.zip“

The *ibaLogic* project (*ibaLogic* V5) contains two programs:



- P1_DP_Simulation:

  The data is evaluated by the DP master and the response data to the DP master is generated. The data is exchanged with the P2_DP_Communication program as arrays with 244 bytes. The following tasks are carried out:

  - Definition of the slaves to be simulated
  - Converting the received data (arrays) into the slave-specific data structures (see table above).
  - Processing the received values and generating the data to be sent (simulation)
  - Collecting and converting the data structure to be sent into the 244 byte arrays for data transfer

- P2_DP_Communication:

  The TCP/IP communication with *ibaBM-DP* is handled here. The user data is sequentially processed, i.e., the headers are added and the data is sent consecutively to *ibaBM-DP* via TCP/IP. The following functiond are performed:

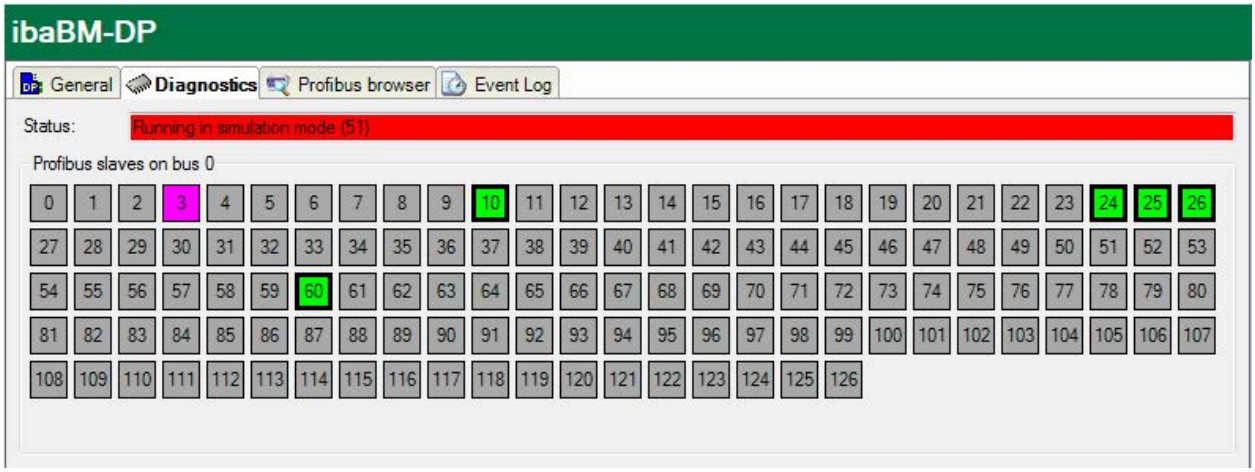
  - Process control of sending and receiving TCP/IP telegrams.
  - Selection of output data per slave
  - Calling the macro “transmit/receive”

    The macro adds the headers before sending, and evaluates and removes them after the reception.
  - The receive telegram is copied into the slave specific data array.

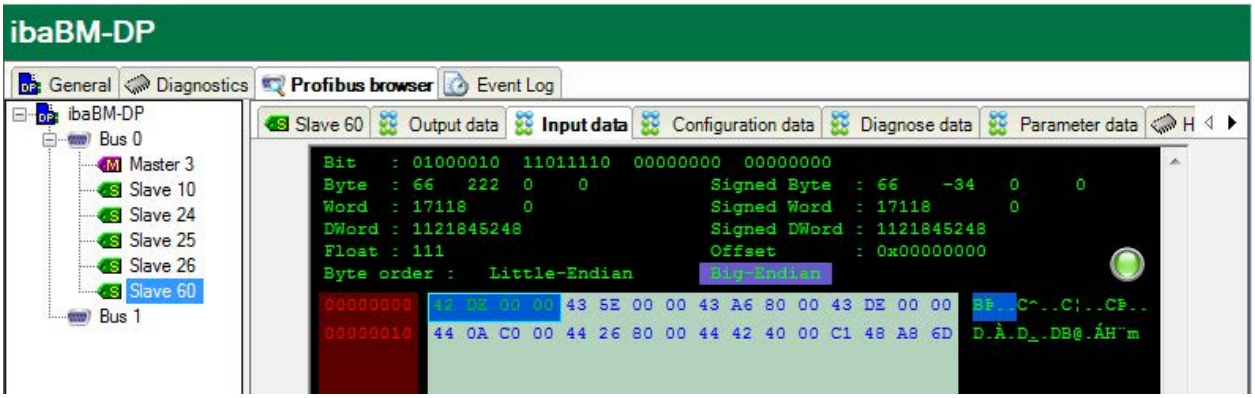
14.4.3 Diagnostics with ibaPDA

As described in chapter ↗ *Boundary conditions, page 170*, you can use the diagnostic functions in *ibaPDA* to check if all slaves are simulated and if the simulation program generates input data.

"ibaBM-DP” module, *Diagnostics* tab



"ibaBM-DP" module, *Profibus browser* tab - *Input data*



15 Mirror mode

In the following, we explain the mirror mode, using an example. You find the project data we have used (Step7 project and *ibaPDA* project) on the data medium “iba Software & Manuals“ in the directory `04_Libraries_and_Examples\31_ibaBM-DP\00_GENERAL\Mirror_Mode\`

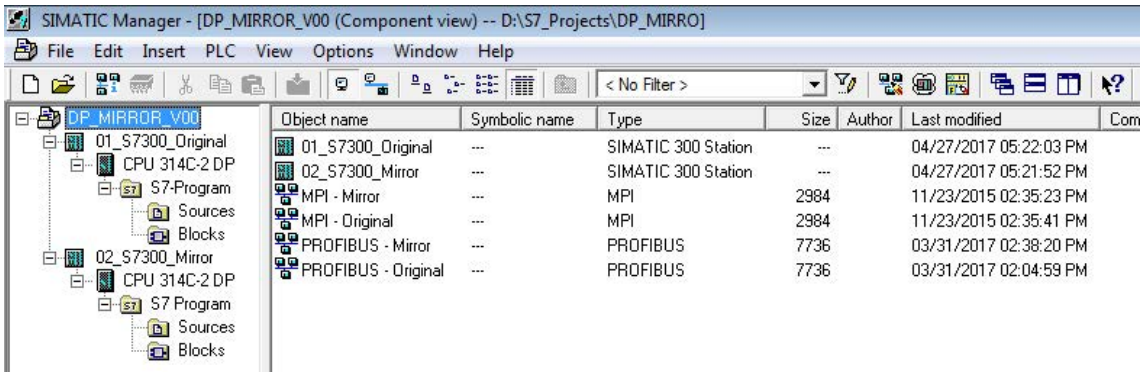
Note

A periphery module is only recognized if it contains no more than 19 signal modules. Periphery modules with 20 or more signal modules are no longer recognized.

The setup of the sample project basically corresponds to that one in chapter ↗ *Device setting mirror mode*, page 27:

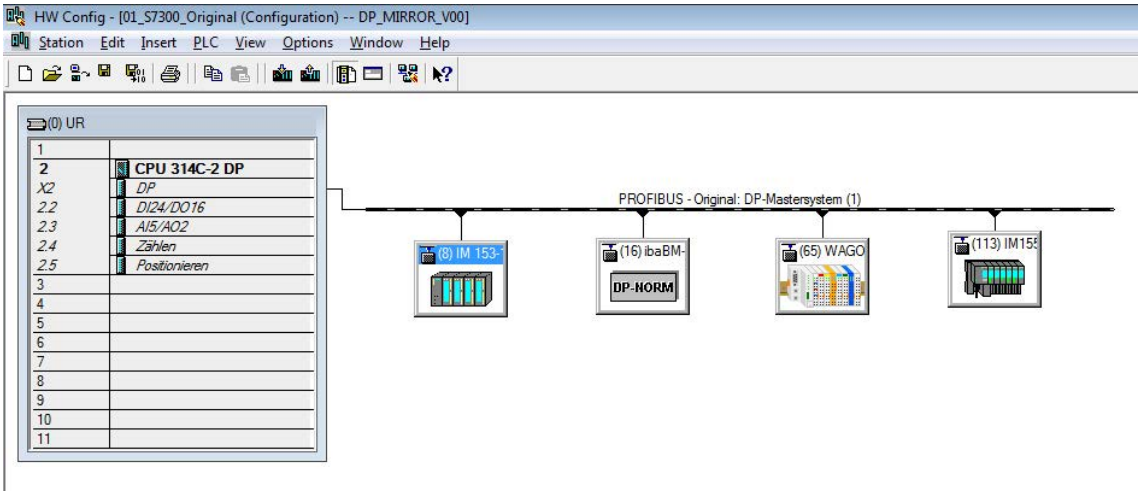
- As “PROFIBUS master old”, we use an S7-300, hereinafter referred to as “01_S7300_Original“.
- As “PROFIBUS master new”, we use an S7-300 CPU, hereinafter referred to as “02_S7300_Mirror“.

SIMATIC Manager, example mirror mode:



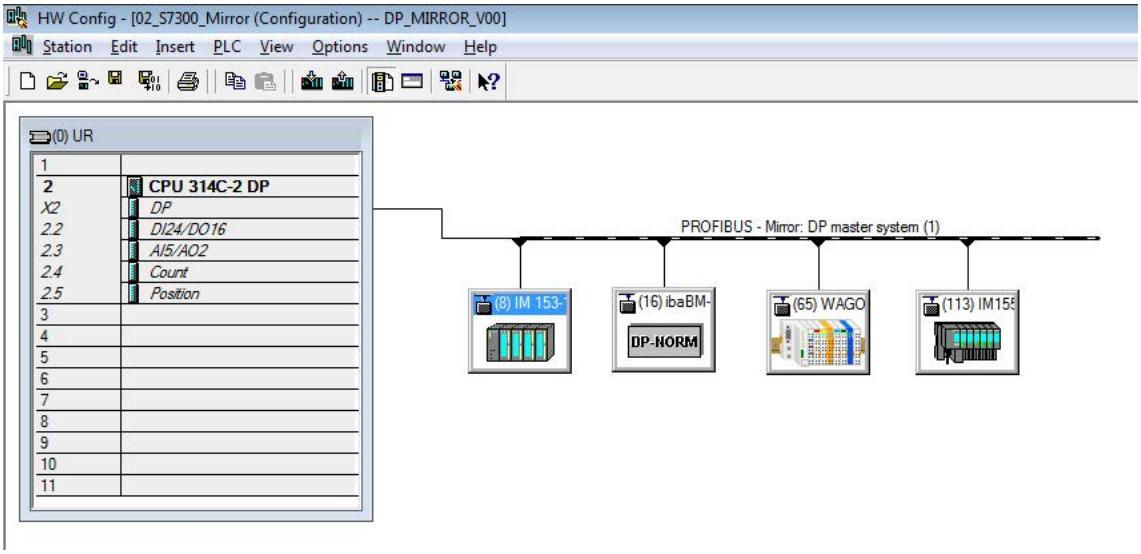
For the original system “01_S7300_Original“, we have configured 4 slaves, that really exist. The slaves are connected to the X2 PROFIBUS interface of the CPU. This PROFIBUS line is connected to the X40 (Bus0) of *ibaBM-DP*.

HW Config, original system:



In the mirror system “02_S7300_Mirror“, we have configured the same four slaves. The slaves do not physically exist. The PROFIBUS interface X2 of the CPU is connected to X41 (Bus1) of *ibaBM-DP*.

HW Config, mirror system:



Note

In mirror mode, the original system always has to be connected to X40 (Bus0). The mirror system always has to be connected to X41 (Bus1).

ibaBM-DP automatically detects the slaves on the original side (X40) and mirrors them to the mirror side (X41). In this process, the input data of all slaves are also mirrored. Thus, the controller “02_S7300_Mirror“ also can see the input data from the original system, although it is not physically present, there. The output data will not be duplicated.

In case of a modernization of the system, in our example, the controller “02_S7300_Mirror“ would be the new automation system. We can now test this system via the mirrored input data and in parallel to the running system.

In mirror mode, we can connect *ibaBM-DP* in parallel to an *ibaPDA* system. In sniffer mode, you can record the data from both PROFIBUS systems. Thus, you can compare the original system to the mirror system.

Note

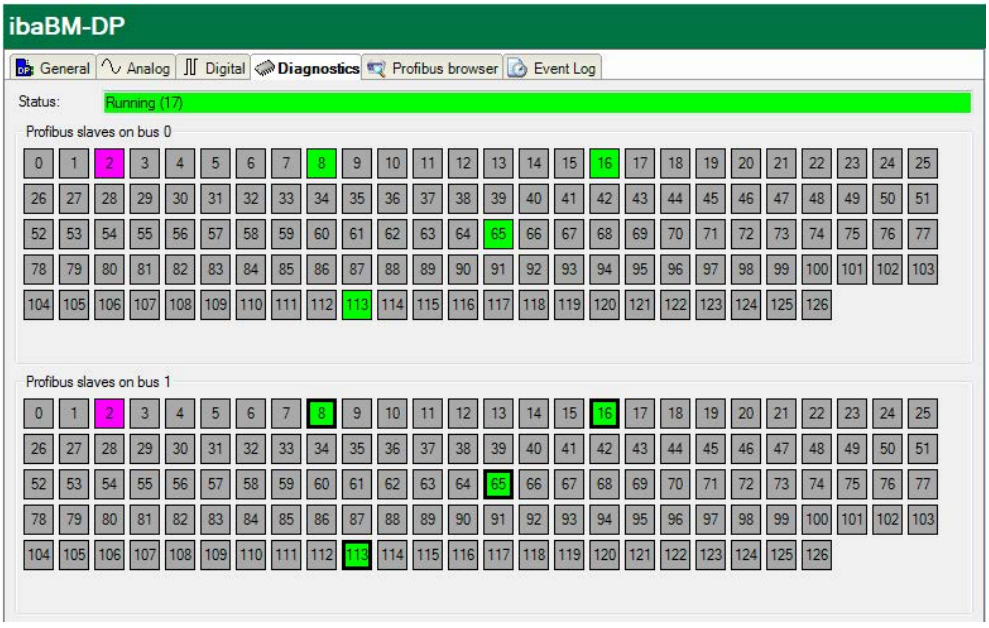
For acquiring data from both PROFIBUS systems, you can connect in mirror mode *ibaPDA* via FO cable to *ibaBM-DP*. Using *ibaPDA* is not compulsory. You can use the mirror mode also without *ibaPDA*.

In *ibaPDA*, sniffer modules can be used. Active slaves are not supported.

By means of the diagnostic functions in *ibaBM-DP*, slaves can be detected in the original as well as in the mirror system.

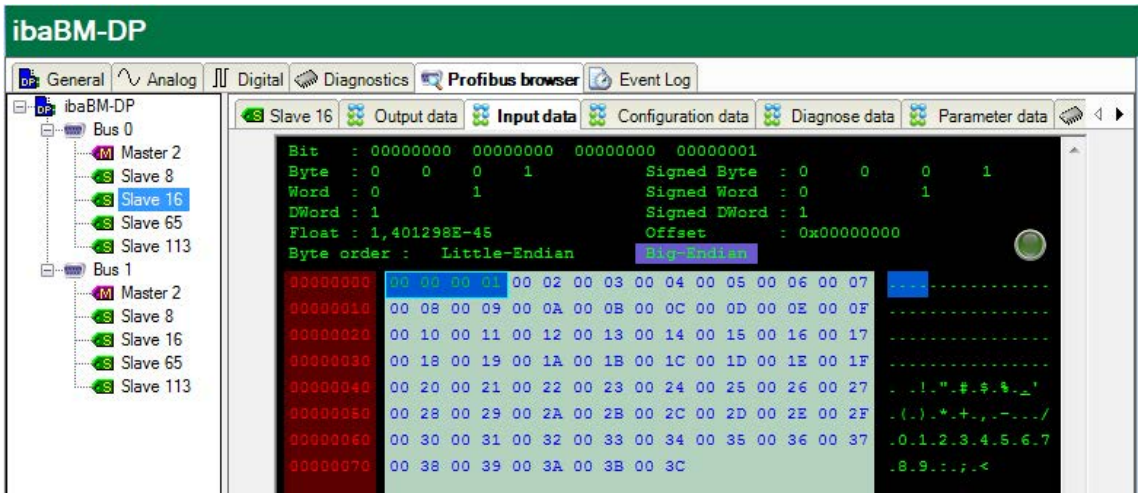
- On bus 0, you can see the slaves 8, 16, 65 and 113 of the CPU “01_S7300_Original“.
- On bus 1, the mirrored slaves are visible with the same addresses. In contrast to bus 0, the slaves have a thick black border, as they are not external slaves, but slaves created on the device, see chapter ↗ *Diagnostics in the I/O Manager*, page 99.

Comparison of both systems on the *Diagnostics* tab

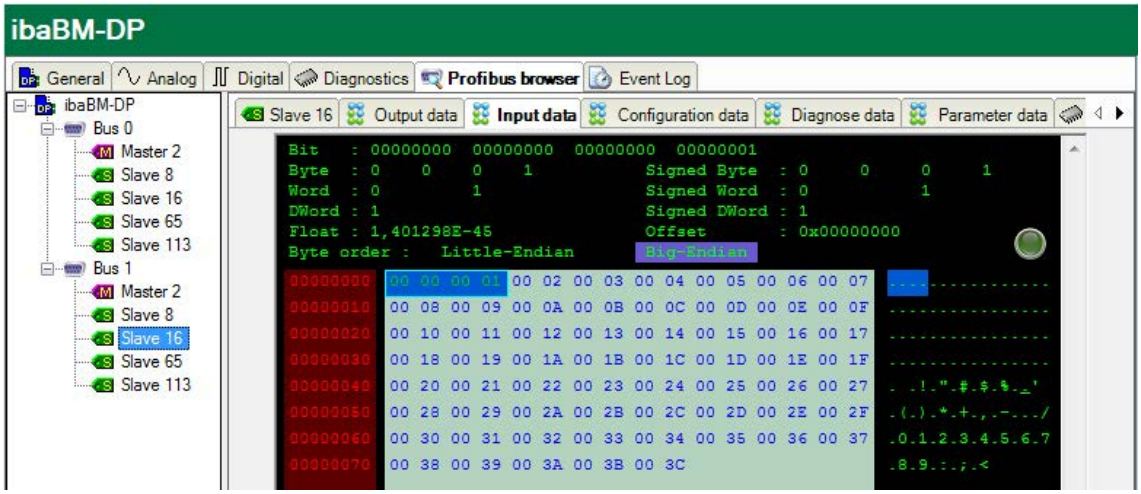


In the detailed view of the individual slaves, you can see the identical input data.

Input data original system:

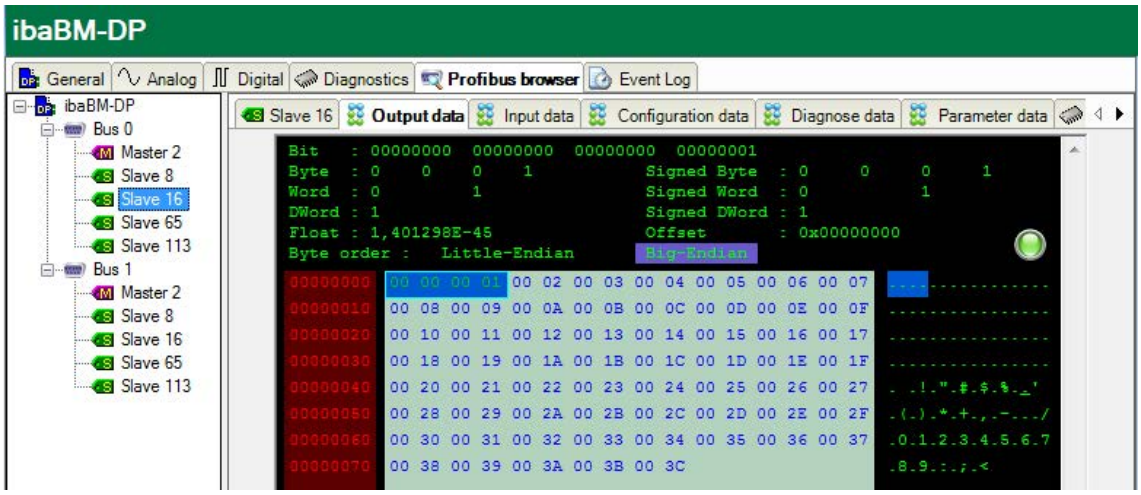


Input data mirror system:

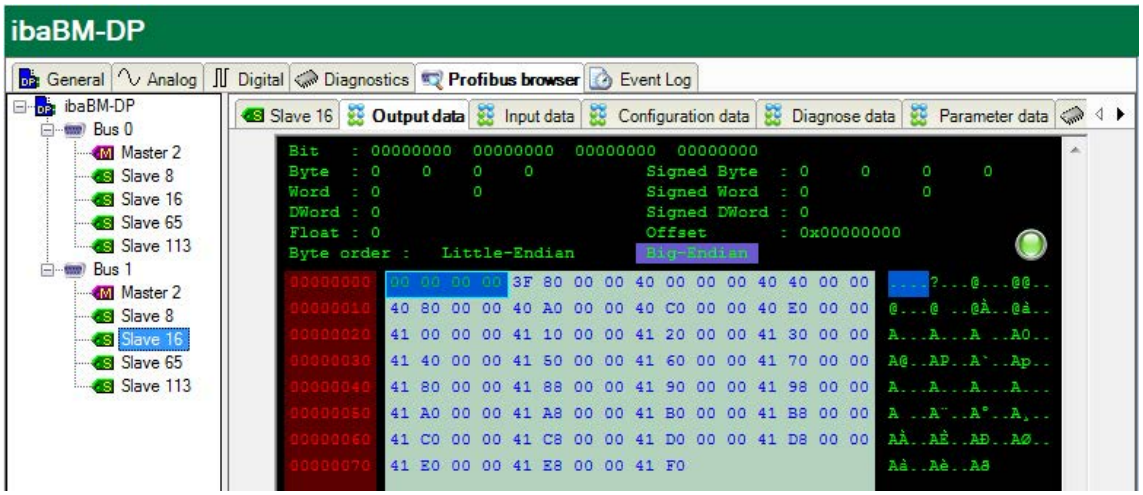


In contrast, the output data are differing.

Output data original system:



Output data mirror system:



16 Notes on the different PROFIBUS masters

16.1 Beckhoff master

The Beckhoff master (e. g. EL6731 master terminal) does not cyclically request the status of slaves.

This is why in this case no external (not activated on the device itself) Phantom slaves (see chapter ↗ *Diagnostics in the I/O Manager*, page 99) can be detected in the diagnosis.

Measurement of the bus voltages (see chapter ↗ *Display of bus voltages in the I/O Manager*, page 102) is also not possible due to the missing status telegrams.

16.2 Siemens IM308C Master

The master IM308C for Simatic S5 does not cyclically request the status of slaves.

This is why in this case no external (not activated on the device itself) Phantom slaves can be detected in the diagnosis, see chapter ↗ *Diagnostics in the I/O Manager*, page 99.

Measurement of the bus voltages is also not possible due to the missing status telegrams, see chapter ↗ *Display of bus voltages in the I/O Manager*, page 102.

17 Technical data

In the following you will find the technical data and dimensions for *ibaBM-DP*.

17.1 Main data

Refer to the following table for the technical data for *ibaBM-DP*.

Manufacturer	iba AG, Germany
Order number	13.121001
Description	PROFIBUS bus monitor

Operating and indicating elements

Power supply	24 V DC ±10 % not stabilized
Power consumption	Max. 500 mA
Connection type	2-pin Phoenix connector, can be screwed
Voltage switch	HW version A9 and lower: On/off switch for the whole device HW version B0 and higher: No on/off switch included
Rotary switch	Operation modes, address switch (in the cascade)
Indicators	4 LEDs for device status 4 LEDs for PROFIBUS status bus 0 4 LEDs for PROFIBUS status bus 1 2 LEDs for Ethernet interface

Operating and environmental conditions

Operating temperature range	-40 °F to 185 °F (0 °C to +50 °C)
Storage temperature range	-40 °F to 185 °F (-25 °C to +65 °C)
Transport temperature range	-40 °F to 185 °F (-25 °C to +65 °C)
Humidity class acc. to DIN 40040	F, no condensation
Protection class	IP20
Mounting	DIN-rail mounting
Mounting position	Vertical (typ.)
Cooling	Self-cooling
Norms and standards	CE, EMC (EN 61326-1:2006, class A) FCC part 15 class A
Mechanical stability	DIN IEC 68-2-6 (when mounted correctly)
MTBF[2)]	1,428,860 hours / 163 years

[2)] MTBF (mean time between failure) according to Telcordia 3 SR232 (Reliability Prediction Procedure of Electronic Equipment; Issue 3 Jan. 2011 and NPRD, Non-electronic Parts Reliability Data 2011

Dimensions and weight

Dimensions (Width x height x depth)	2.1 in x 7.5 in x 5.8 in (54 mm x 189 mm x 148 mm) incl. DIN-rail clip
Weight (incl. packaging and manual)	approx. 2.2 lb (ca. 1000 g)

17.2 Interface data

Refer to the following table for the interface data for *ibaBM- DP*.

PROFIBUS interfaces

DP connectors	2 x 9-pin D-Sub connector (Bus0, Bus1)
Data transmission rate	9.6 kbit/s to 12 Mbit/s
DP slaves (can be configured as active slaves in the device)	max. 8, can be distributed as required on both PROFIBUS lines (can be extended on request)
Address range of the slaves	1 to 126

ibaNet interface

ibaNet protocols	Sampling cycle	Number of signals
32Mbit Flex	selectable beginning with 0.5 ms (1540 bytes), data amount depending on cycle time	up to 1024 analog values (BYTE, INT, WORD, DINT, DWORD, FLOAT, Big/Little Endian) + up to 1024 digital signals (bits) a total max. of 4060 bytes at a cycle time of 1.4 ms
32Mbit (compatibility mode [3)])	1 ms	Up to 512 analog values (BYTE, INT, WORD, DINT, DWORD, FLOAT, Big/Little Endian; max. 1984 bytes) + up to 512 digital signals (bits)
3Mbit (compatibility mode[3])	1 ms	up to 64 analog values (INT or FLOAT) + up to 64 digital signals (bits)
Connection technology	2 ST connectors for RX and TX; iba recommends the use of FO with multimode fibers of type 50/125 µm or 62.5/125 µm; For information on cable length, see chap. ↗ *Example for FO budget calculation, page 186*.	

[3)] from ibaPDA v6.20.2

Transmitting interface (TX)		
Output power	50/125 µm FO cable	-19.8 dBm to -12.8 dBm
	62.5/125 µm FO cable	-16 dBm to -9 dBm
	100/140 µm FO cable	-12.5 dBm to -5.5 dBm
	200 µm FO cable	-8.5 dBm to -1.5 dBm
Temperature range	-40 °F to 185 °F (-40 °C to 85 °C)	
Light wavelength	850 nm	
Receiving interface (RX)		
Receiving sensibility[4)]	100/140 µm FO cable	-33.2 dBm to -26.7 dBm
Temperature range	-40 °F to 185 °F (-40 °C to 85 °C)	

Other interfaces

Ethernet	10/100 Mbit/s, RJ45 connector
Other interfaces	USB (only for service purposes) Grounding screw

17.3 Declaration of conformity

Supplier's Declaration of Conformity
47 CFR § 2.1077 Compliance Information

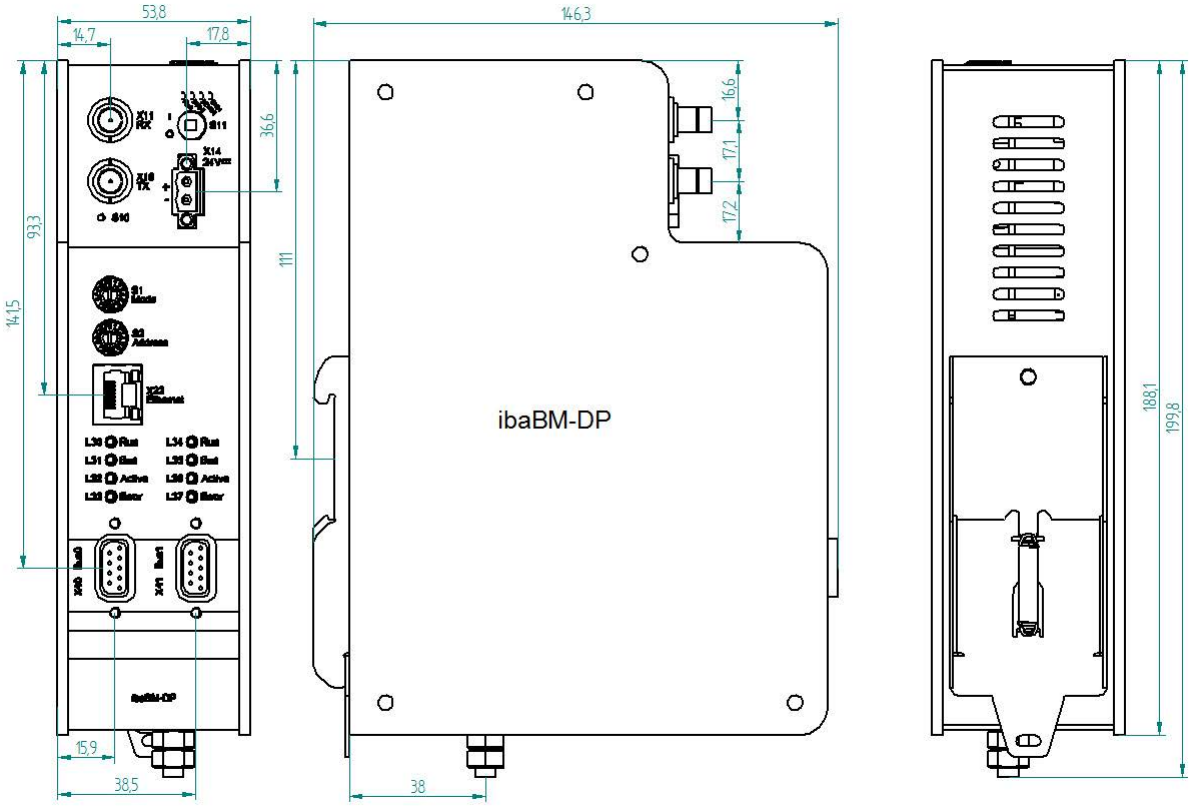
Unique Identifier: 13.121001, ibaBM-DP

Responsible Party - U.S. Contact Information
iba America, LLC
370 Winkler Drive, Suite C
Alpharetta, Georgia
30004
(770) 886-2318-102
www.iba-america.com

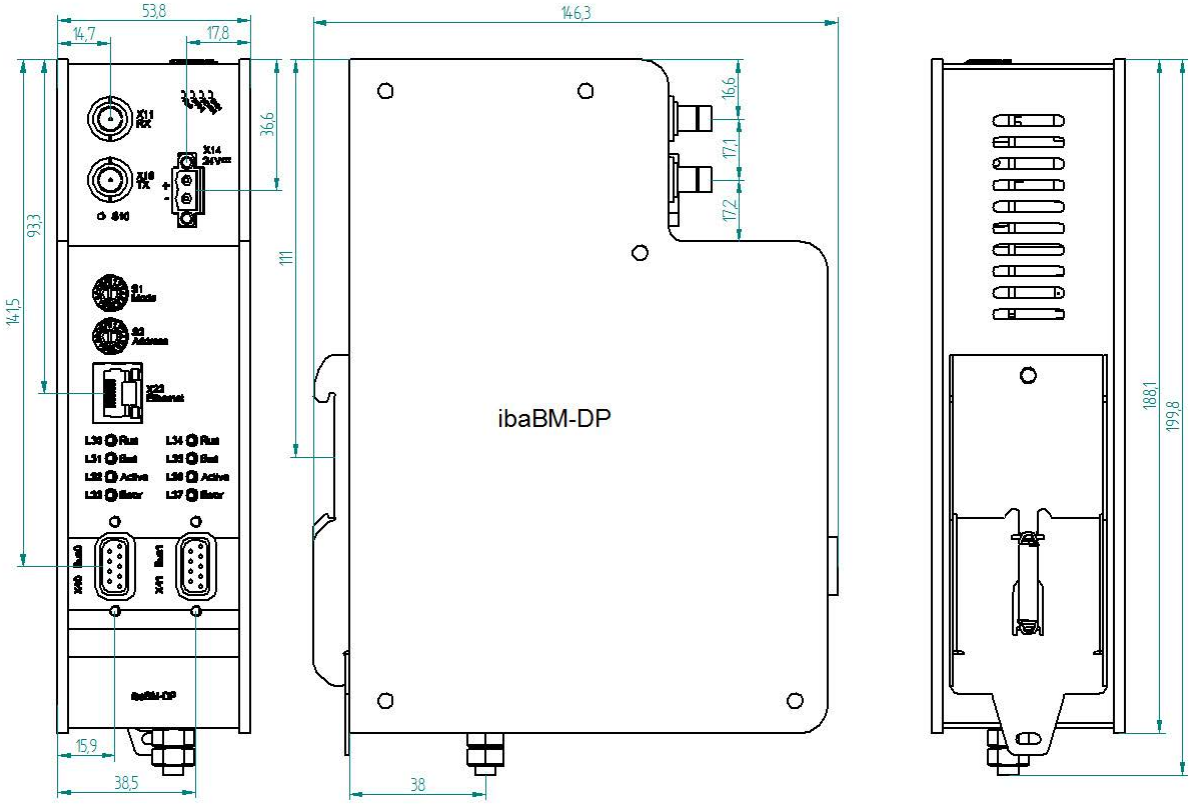
FCC Compliance Statement
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

[4)] Information on other fiber optic cable diameters not specified

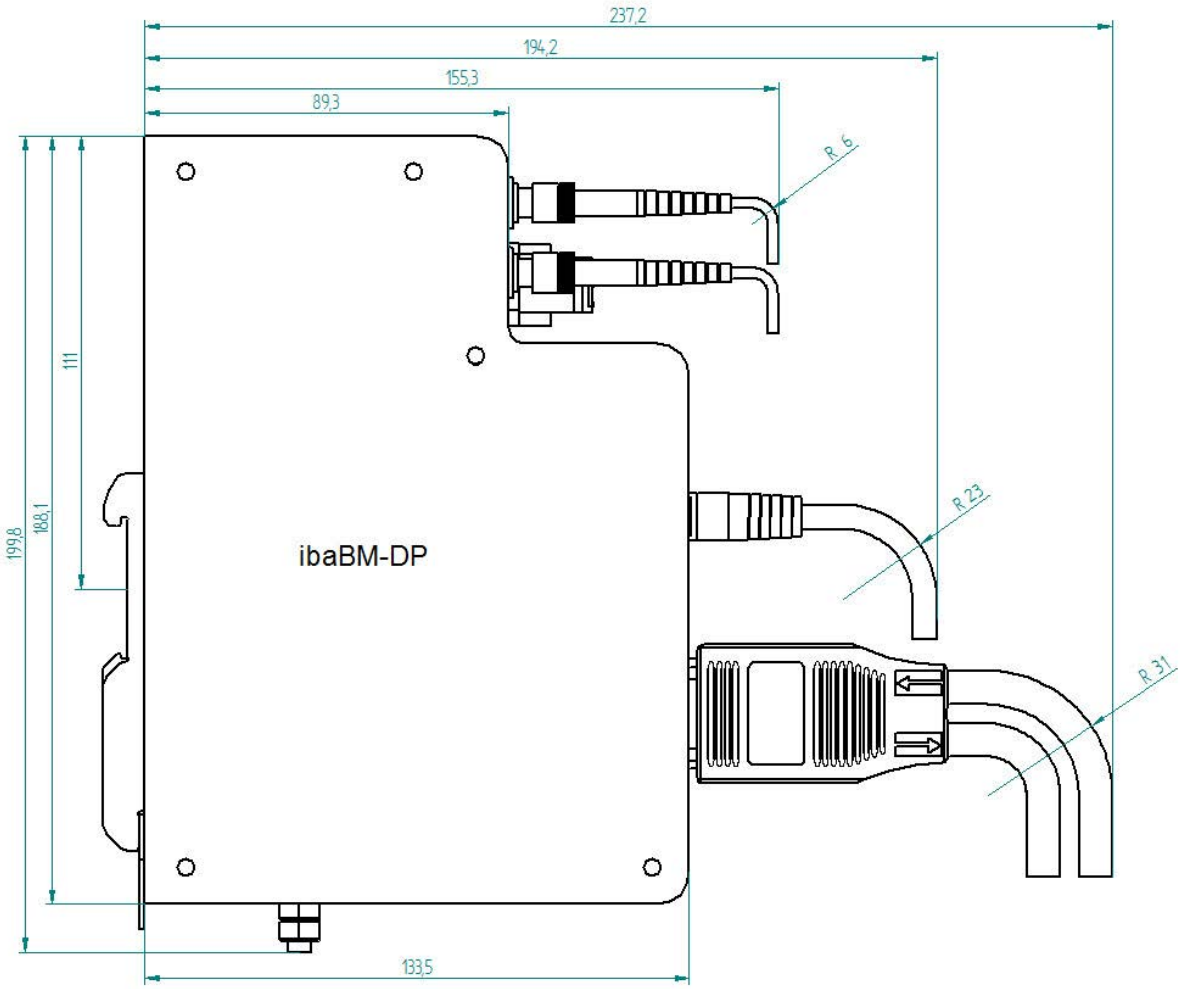
17.4 Dimensions



Dimensions *ibaBM-DP* HW version A9 and lower (dimensions in mm)



Dimensions *ibaBM-DP* HW version B0 and higher (dimensions in mm)

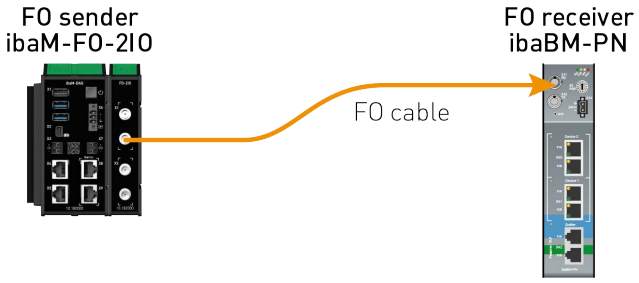


Dimensions *ibaBM-DP* with cable (dimensions in mm)

17.5 Example for FO budget calculation

A fiber optic link from an *ibaM-FO-2IO* module (FO transmitter) to an *ibaBM-PN* device (FO receiver) is used as an example.

The example only considers the transmission direction from the *ibaM-FO-2IO* module to the *ibaBM-PN* device. In actual operation, a connection from the *ibaBM-PN* device to the *ibaM-FO-2IO* module is also required.



The example refers to a P2P connection with an FO cable of type 62.5/125 µm. The light wavelength used is 850 nm.

The range of the minimum and maximum values of the output power or receiver sensitivity depends on the component and, among other things, on temperature and aging.

For the calculation, the specified output power of the transmitting device and, on the other side, the specified sensitivity of the receiving device must be used in each case. You will find the corresponding values in the relevant device manual in the chapter "Technical data" under "ibaNet interface".

ibaM-FO-2IO specification

Output power of FO transmitting interface		
FO cable in µm	Min.	Max.
62.5/125	-16 dBm	-9 dBm

ibaBM-PN specification

Sensitivity of FO receiving interface		
FO cable in µm	Min.	Max.
62.5/125	-30 dBm	

Specification FO cable

Refer to the data sheet for the fiber optic cable used:

FO cable	62.5/125 µm
Connector loss	0.5 dB connector
Cable attenuation at 850 nm wavelength	3.5 dB / km

Equation for calculating the FO budget (A_{Budget}):

$$A_{Budget} = |(P_{Receiver} - P_{Sender})|$$

$P_{Receiver}$ = sensitivity of FO receiving interface

P_{Sender} = output power of FO transmitting interface

Equation for calculating the fiber optic cable length (l_{Max}):

$$l_{Max} = \frac{A_{Budget} - (2 \cdot A_{Connector})}{A_{Fiberoptic}}$$

$A_{Connector}$ = connector loss

$A_{Fiberoptic}$ = cable attenuation

Calculation for the example ibaM-FO-2IO -> ibaBM-PN in the best case:

$$A_{Budget} = |(-30\ dBm - (-9\ dBm))| = 21dB$$

$$l_{Max} = \frac{21dB - (2 \cdot 0.5dB)}{3.5\ \frac{dB}{km}} = 5.71\text{km}$$

Calculation for the example ibaM-FO-2IO -> ibaBM-PN in the worst case:

$$A_{Budget} = |-30\ dBm - (-16\ dBm)| = 14dB$$

$$l_{Max} = \frac{14dB - (2 \cdot 0.5dB)}{3.5\ \frac{dB}{km}} = 3.71\text{km}$$

Note

When connecting several devices as a daisy chain or as a ring (e.g., *ibaPADU-S-CM* with 32Mbit Flex), the maximum distance applies to the section between two devices. The FO signals are re-amplified in each device.

Note

When using fiber optics of the 50/125 µm type, a reduced distance (by approx. 30–40%) must be expected.

Note

In addition to conventional multimode cable types OM1 (62.5/125 µm) and OM2 (50/125 µm), the other cable types OM3, OM4 and OM5 of the 50/125 µm fiber can also be used.

18 Support and contact

Support

Phone: +49 911 97282-14

Email: support@iba-ag.com

Note

If you need support for software products, please state the number of the license container. For hardware products, please have the serial number of the device ready.

Contact

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