ibaDAQ

Central unit for stand-alone data acqusition

Manual

Issue2.1

Measurement Systems for Industry and Energy

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Issue	Date	Revision	Author	Version HW/FW
2.1	11-2025	Discontinuation ibaMS16xDO-2A module	ms, st	02.15.005

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.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Contents

1 About this documentation

This documentation describes the layout, application and operation of the *ibaDAQ* device. *ibaDAQ* can be used as a central unit in the iba modular system.

Other documentation

For a general description of the iba modular system and additional information about layout, application and operation of the modules, please refer to the dedicated documentations.

The documentation of the iba modular system is part of the data medium "iba Software & Manuals" included in the delivery.

The documentation of the iba modular system comprises the following documentations:

- **Central units**

  The documentations of the central units contain information about:

  - Scope of delivery
  - System requirements
  - Device description
  - Mounting/dismounting
  - Start-up
  - Configuration
  - Technical data
  - Accessories

- **Modules**

  The documentations of the single modules contain specific information on the individual module. For example:

  - Short description
  - Scope of delivery
  - Product characteristics
  - Configuration
  - Description of the functions
  - Technical data
  - Connection diagram

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 *ibaDAQ* 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

ibaDAQ can be used as a stand-alone device to acquire and record data. For this purpose, *ibaDAQ* has an integrated, complete *ibaPDA* system and an internal SSD (solid state disk) with sufficient storage space.

The range of applications includes:

- Mobile measurement acquisition
- Start-up
- Troubleshooting
- Test stands
- Calculation of process parameters

Modular concept

The central unit is the heart of the iba modular system. It can be complemented by up to 4 I/O modules. *ibaDAQ* is the smart central unit in the iba modular system that enables data acquisition with *ibaPDA* functionality independent of an external computer. All channels are sampled synchronously with a rate of up to 40 kHz.

Configuration

Equipped with connections for a monitor, mouse and keyboard, *ibaDAQ* is as convenient to operate as an *ibaPDA* system running on a computer. Moreover, it can be operated with an *ibaPDA* client connected via the network.

The *ibaPDA* version in *ibaDAQ* provides the full functional scope of *ibaPDA* and a license for 64 signals in the standard version.

Monitoring and alarm

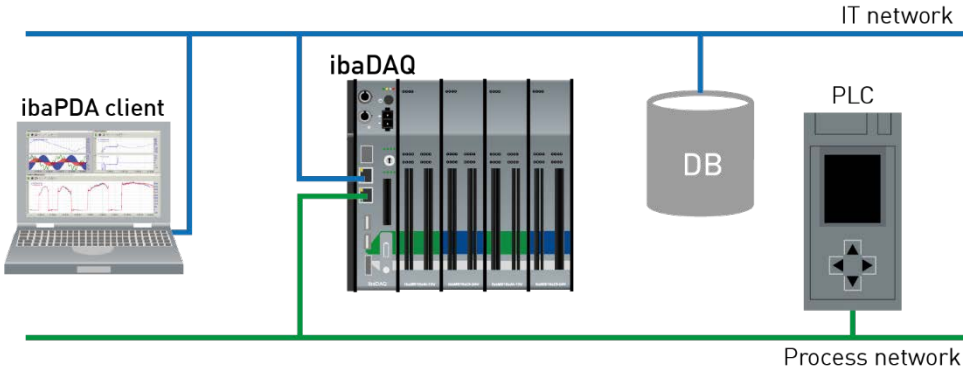
2 digital inputs and 2 digital outputs are available and can be configured for special functions. One output can serve as an alarm output if the watchdog function is activated in *ibaPDA*. In addition, the device can be shut down and powered off safely if a trigger signal signals the interruption of the power supply at a digital input.

Connection via ibaNet

The FO input and output provides the function of an *ibaFOB-io* card supporting the *ibaNet* protocols 32Mbit Flex, 32Mbit, 5Mbit, 3Mbit, and 2Mbit. It allows additional iba devices to be connected such as the *ibaPADU* family, iba bus monitors, or system interface connections.

Connection to several networks

With the two independent 1Gbit/s Ethernet interfaces, *ibaDAQ* can operate in two networks and thus enable the separation of IT and process networks. This separation allows, for example, databases and storage systems to be connected to *ibaDAQ*, which are located in the IT network.


IT network
ibaPDA client
ibaDAQ
DB
PLC
Process network

3 Scope of delivery

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

The scope of delivery includes:

- Device *ibaDAQ*
- Covering caps for FO cables, USB and Ethernet
- 8-pin terminal block with spring terminals (digital inputs and outputs)
- 2-pin terminal block with spring terminals (power supply)
- Data medium "iba Software & Manuals"

4 Safety instructions

Observe the following safety instructions for *ibaDAQ*.

4.1 Intended use

The device is an electrical apparatus. It is only allowed to use the device for the following applications:

- Measurement data acquisition
- Applications with iba products (*ibaPDA*, etc.)

The device must only be used as described in chapter ↗ *Main data*, page 66 .

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.

Warning!

Modules and CPU must never be inserted or removed to/from the module rack under voltage!

Switch off *ibaDAQ* and disconnect the power supply before inserting or removing modules.

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!

Make sure that the cooling fins have sufficient ventilation!

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

Do not switch off the device in an uncontrolled manner, e.g. by disconnecting the power supply. This can lead to data loss. Always shut down the device correctly.

Note

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

5 System requirements

Observe the following requirements for using the *ibaDAQ* device.

Hardware

For operation

- Power supply24 V DC ± 10%, 3 A (fully equipped)
- Installation of the central unit and optionally up to 4 I/O modules in
  - a backplane panel, e. g. *ibaPADU-B4S*
  - or in the mobile measuring system *ibaMBox*

    The selection of I/O modules to be used in *ibaMBox* is limited, see chapter ↗ *Supported I/O modules*, page 69.

For device parameterization and operation

- Monitor (connection to DisplayPort), mouse and keyboard (connection to USB ports)

  or

- *ibaPDA* client via network link

Note

The *ibaDAQ* central unit runs *ibaPDA* by default. The license for 64 signals is included in the delivery. The number of signals can be extended up to 1024 with additional license.

Note

The *ibaFOB-io*-USB adapter cannot be used with devices of the *ibaDAQ* family (ibaDAQ/-C/-S).

Software

ibaPDA version 8.1.1 or higher for device configuration and for measuring and recording the data

Firmware

ibaDAQ version 02.15.005 or higher

6 Mounting and dismounting

Caution!

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

6.1 Mounting

Proceed as follows to mount *ibaDAQ* on a module rack.

1. Mount the backplane panel on an appropriate construction.
2. Connect the grounding.

   You can find a description of how to attach the grounding for the different mounting systems here:

   - Mounting with backplane panel, see ↗ *Backplane panels*, page 75
   - Mounting systems for central unit only, see ↗ *Mounting system for central unit*, page 80
   - Mounting systems for *ibaPADU-S-B4S*, see ↗ *Mounting systems for ibaPADU-S-B4S*, page 82
3. Plug the device into the left slot.

   Make sure that the guide bolts on the rear side of the device are inserted into the corresponding holes on the backplane.
4. Press the device firmly against the backplane and secure it with the fixing screws.

Note

Always screw the device and the modules tightly. Plugging or unplugging the connectors for the inputs/outputs can otherwise cause damage.

Note

The *ibaMBox* mobile measurement system is based on the iba modular system that is integrated in a compact, rugged aluminum case. The central unit and the I/O modules are already installed in *ibaMBox* according to the order. *ibaMBox* is delivered preconfigured.

6.2 Dismounting

Proceed as follows to mount *ibaDAQ* on a module rack.

1. Switch off the device.
2. Remove all cables.
3. Hold the device and remove the upper and lower fixing screw.
4. Pull the device off the module rack.

7 Initial start-up

You can set up *ibaDAQ* via the network or with a monitor, keyboard and mouse.

7.1 Setup via network

In the factory setting of the network interface, DHCP is active (position of rotary switch S1 = 1). Thus, an IP address is automatically assigned to *ibaDAQ*, as soon as the device is connected to a network with a DHCP server. If the IP configuration is successful, *ibaDAQ* can be accessed via the host name daq-<serial number>, e. g. daq000002.

If the network does not have a DHCP server, *ibaDAQ* can be set to fixed IP addresses via the rotary switch S1 position = 2:

Network interface X21: 192.168.1.1

Network interface X22: 192.168.1.2

See also ↗ *Rotary switch S1*, page 23.

Note

The first configuration with a fixed assigned IP address (S 1 = 2) should only be carried out by means of a point-to-point connection, in order to avoid IP address conflicts.

Note

In administrated network environments, it may occur that the device does not receive an IP address even if a DHCP server is available. This is usually due to the fact that unknown network devices are not allowed in the network for reasons of safety. In this case, please contact your IT department to obtain network approval for the device.

7.1.1 Instaling ibaPDA client

If not already installed, install *ibaPDA* on the system you have selected for the configuration of *ibaDAQ*. The installation file can be found on the storage medium "iba Software & Manuals" in the directory `01_iba_Software\ibaPDA`.

1. Start the *ibaPDA* client.
2. Click on the icon  to open the *Select ibaPDA server* dialog.
3. Enter the name or the IP address of the *ibaDAQ* device in the *Address* field. By default, the port number is "9170". If *ibaDAQ* is already in the list of servers, you can also select the device there.
4. Exit the dialog with <OK>.

→ Provided that the *ibaPDA* versions match, *ibaPDA* directly connects to the *ibaDAQ* system. If the *ibaPDA* versions do not match, you will be requested to install the suitable *ibaPDA* version.

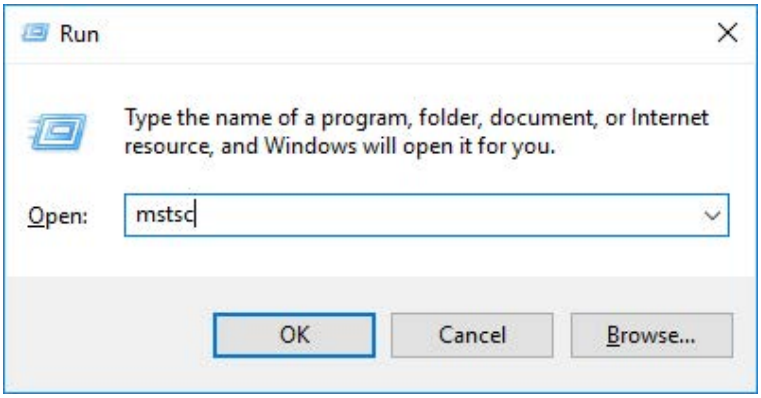
For further configuration of the system, see ↗ *Configuration in ibaPDA*, page 38.

7.1.2 Remote Desktop

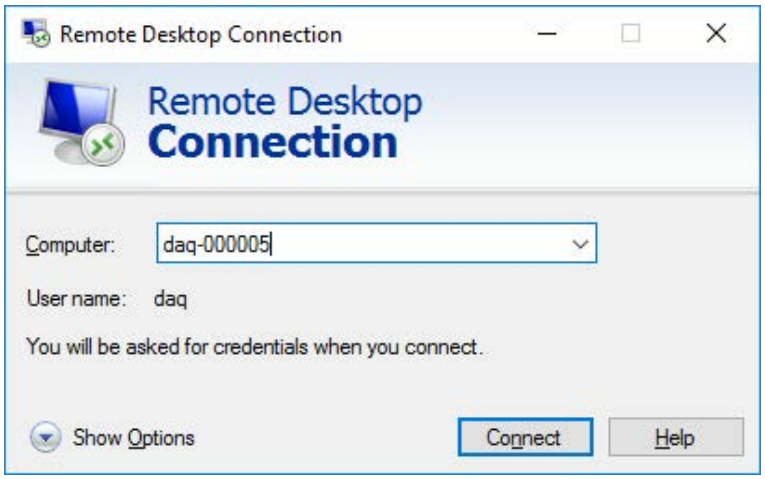
1. Open the Remote Desktop Connection on the system used to configure *ibaDAQ*.

   You can find this in the Windows task bar under *Accessories*.

   Press the keys <Windows>+<R> and enter "mstsc" in the field.



2. Enter the host name or the IP address of the *ibaDAQ* system in the field *Computer*.



3. If you are asked to do so, enter the login information, see ↗ *Sample applications*, page 36.
4. Start the *ibaPDA* client from the Windows Start menu.

For further configuration of the system, see ↗ *Configuration in ibaPDA*, page 38.

7.2 Set up via monitor, keyboard and mouse

1. Connect a monitor to the DisplayPort connection of *ibaDAQ*. If necessary, use an adapter.
2. Connect a keyboard and a mouse to the USB ports of *ibaDAQ*.
3. If required, log in to the system.

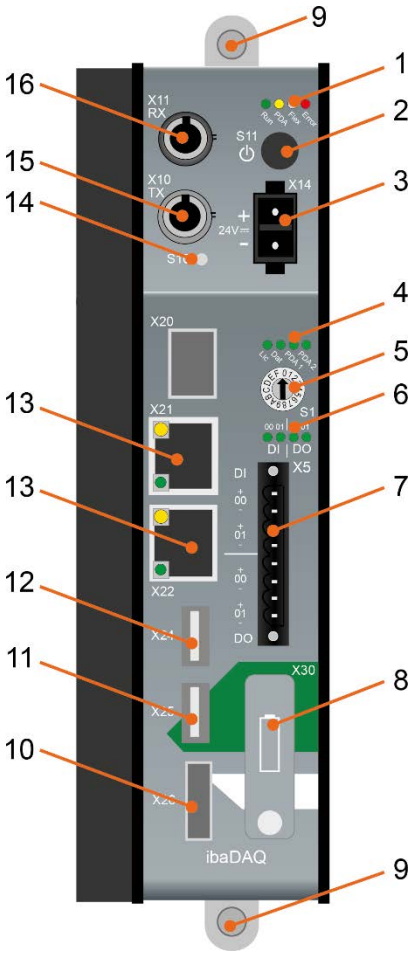
   For further information see chapter ↗ *Default settings*, page 32.
4. Start the *ibaPDA* client from the Windows Start menu.

For further configuration of the system, see ↗ *Configuration in ibaPDA*, page 38.

8 Device description

Here you will find views and descriptions of the device *ibaDAQ*.

8.1 Views



1	Operating state indicator	10	Monitor connection X26
2	ON/OFF switch S11	11	USB 2.0 port X25
3	Connection power supply 24 V X14	12	USB 3.0 port X24
4	Indicator (operating status, user-defined)	13	Network interfaces X22 and X21
5	Rotary switch S1	14	System function push button S10
6	Indicator of digital inputs and outputs	15	Connection FO output (TX) X10
7	Connection of digital inputs and outputs X5	16	Connection FO input (RX) X11
8	Battery compartment X30		
9	Fixing screws		X20, SFP port for future functions

8.2 Indicating elements

8.2.1 Operating state

Colored LEDs on the device indicate the operating status of the device.

LED	Color	State	Description
Run	green	off	out of operation, no power supply hardware error, controller stopped
		flashing	ready for operation
		on	device shuts down
PDA	yellow	flashing	updating
		on	*ibaPDA* server running
Flex	white	flashing	FO input ready
		on	FO input ready and configured
Error	red	off	no error
		flashing	error, internal applications do not run
		on	hardware error

Note

If an error is displayed on the "Error" LED, contact iba support.

8.2.2 Operating state and user-defined displays

Multi-colored LEDs (Lic and Dat) indicate the status of the license and of data recording. It is possible to assign signals to 2 multi-colored LEDs in *ibaPDA* to display user-defined states.

LED	Color	State	Description
Lic	yellow		demo licenses released on dongle
	green		dongle OK
	red		o dongle or no license
Dat	off		no data recording configured
	yellow		waiting for start trigger
	green		data recording
	red		data recording interrupted/stopped
PDA1	yellow		
	green		user-defined display
	red		
	off		

LED	Color	State	Description
PDA2	yellow		
	green		user-defined display
	red		
	off		

8.2.3 Status of digital inputs

The green LEDs indicate whether a digital input is on or off.

LED	State	Description
DI 00, DI 01	off	no signal, logical 0
	on	signal ok, logical 1

8.2.4 Status of digital outputs

If an output is deactivated via *ibaPDA*, the corresponding channel LED remains off.

LED per channel	State	Description
DO 00, DO 01	off	no signal, logical 0
	on	signal ok, logical 1

8.3 Operating elements

8.3.1 ON/OFF switch S11

By switching the device off and on again, the power voltage is disconnected and reconnected and the device is rebooted. There are different ways to shut down or switch off the running device:

- Press briefly: System shuts down
- Long press (> 5 s): Switching off (without controlled shutdown)

8.3.2 Rotary switch S1

The S1 rotary switch is used to specify IP address settings of the network interfaces:

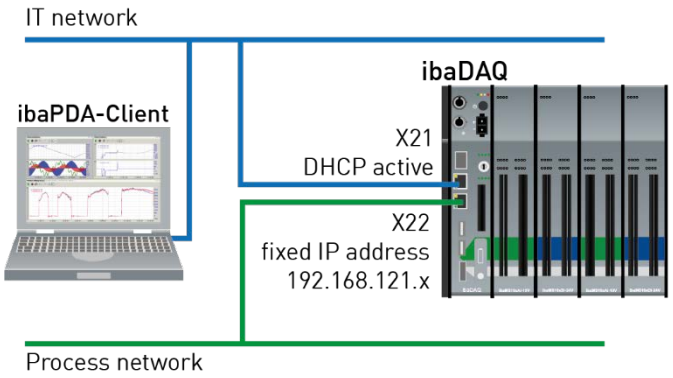
Position	Description
0	User-defined IP addresses are used for the interfaces X21 and X22. The IP addresses can be configured in *ibaPDA* or in the system settings.
1	DHCP active for X21 and X22 (factory setting)

Position	Description
2	fixed IP addresses: X21: 192.168.1.1 X22: 192.168.1.2
3…F	not allowed

It is also possible to select different address assignment methods for the two interfaces X21 and X22.

Example:

- X21 = Interface for the IT network, DHCP is active
- X22 = Interface for the process network with fixed IP address (192.168.121.2)



Procedure:

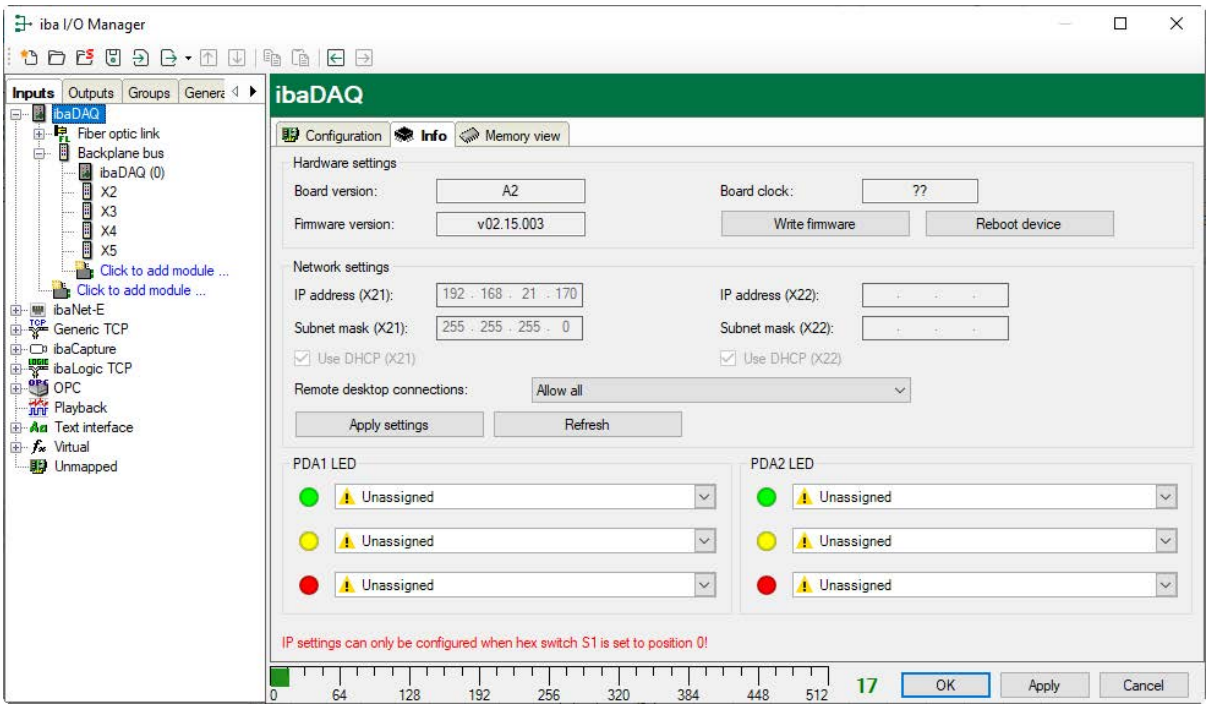
1. First, set switch S1 to position 1 and establish a connection between the *ibaPDA* client and *ibaDAQ*.

   To do so, start the *ibaPDA* client on your PC and follow the steps in chapter ↗ *Connection with an external ibaPDA client*, page 38.

2. Set switch S1 to position 0.
3. Open the I/O manager in *ibaPDA*.
4. Select the first node *ibaDAQ* and switch to the *Info* tab.
5. Assign the appropriate settings for the network interfaces.

   For the above example, select the *Use DHCP* option for X21 and enter a fixed IP address for X22 that matches your network.

6. Click on <Apply settings> to activate the settings.



8.3.3 System function push button S10

The S10 push button has 2 functions:

Reset function

If you press the system function push button S10 longer than 3 s during operation, the measuring files are closed, all applications are shut down and the device is restarted.

Booting without starting data acquisition

If you press the system function push button S10 during the boot process, data acquisition is not started automatically after the device has booted up. Any signal applying at DI00 to shut down the system will also be ignored.

8.4 Communication interfaces

8.4.1 Fiber optic connections X10 and X11

The fiber optic (FO) ports X10 and X11 have the function of an *ibaFOB-io* card. It allows you to connect additional iba devices, such as the *ibaPADU* family, iba bus monitors or system interfaces.

Connection	Description
X10 output (TX):	FO transmitting interface
X11 input (RX):	FO receiving interface

All current ibaNet protocols are supported:

- 2Mbit
- 3Mbit
- 5Mbit
- 32Mbit
- 32Mbit Flex

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. 62.5/125 µm, 50/125 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 73.

The specification of the transmitter's output power and the receiver's sensitivity of the fiber optic components installed in the device can be found in the technical data in chapter ↗ *Interfaces*, page 67 under "ibaNet interface".

8.4.2 Network connection X21, X22

You can connect the device to Ethernet networks via network connections X21 and X22. Settings for the IP address can be made at the rotary switch S1, see ↗ *Rotary switch S1*, page 23.

DHCP is activated by default.

Moreover, the integration of *ibaNet-E* capable devices is possible via these interfaces.

8.4.3 USB ports

The following ISB ports are available_

- USB 2.0 (X25): 480 Mbit/s
- USB 3.0 (X24): up to 5 Gbit/s

8.4.4 DisplayPort X26

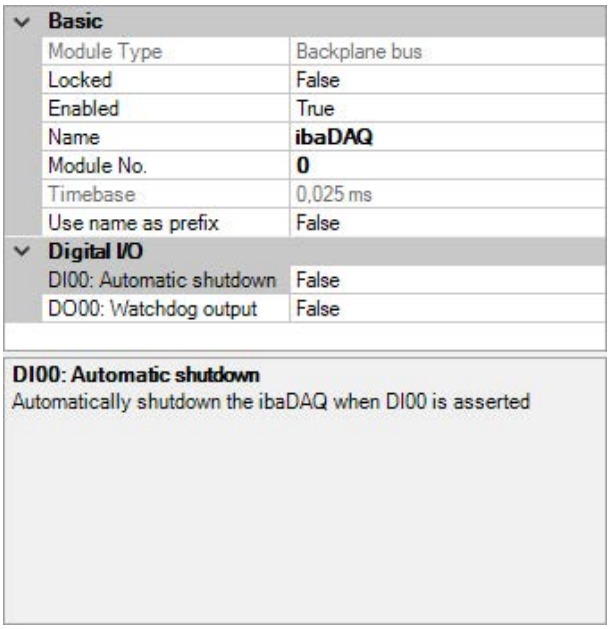
DisplayPort to connect a monitor.

If the monitor does not have a DisplayPort, an adapter can be used, e. g. CSL - 3in1 DisplayPort to VGA + HDMI + DVI adapter.

8.5 Digital inputs X5

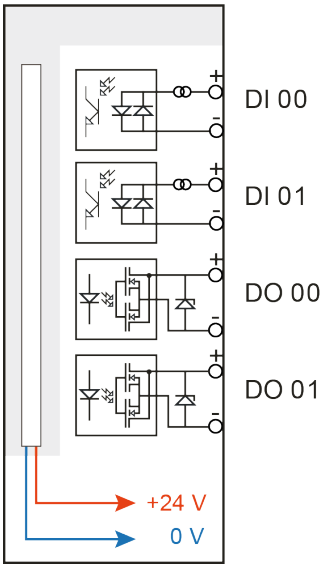
You can connect 2 input signals here, each bipolar and electrically isolated. Each channel is connected by means of two-wire connection. Due to the reverse polarity protection, the measurement signal is indicated logically correct, even if the connection is polarity-reversed.

The DI 00 input can be used to initiate save shutdown and powering off if a trigger signal indicates that the voltage supply is interrupted. This is configured in *ibaPDA*.



8.5.1 Pin assignment

Pin	Connection	LED
1	Digital input 00 +	DI 00
2	Digital input 00–	
3	Digital input 01 +	DI 01
4	Digital input 01–	



Note

Due to the protective diode in the output of DO 00 as well as DO 01, the load to be switched must be connected to the negative pole (-) and the voltage to the positive pole (+).

8.5.2 Debounce filter inputs

Four debounce filters are available for each of the digital inputs. These can be chosen and configured for each signal independently with the I/O Manager of *ibaPDA*. The following filters can be selected:

- Off (no filter)
- Stretch rising edge
- Stretch falling edge
- Stretch both edges
- Delay both edges

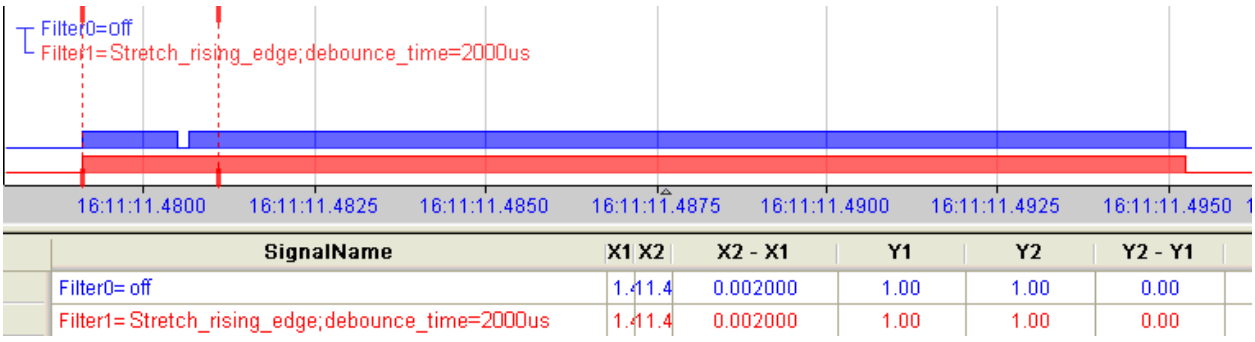
For each filter, a debounce time has to be defined in µs. This debounce time can have a value between [1 µs … 65,535 µs].

Off

The measured input signal is forwarded directly without filtering.

Stretch rising edge

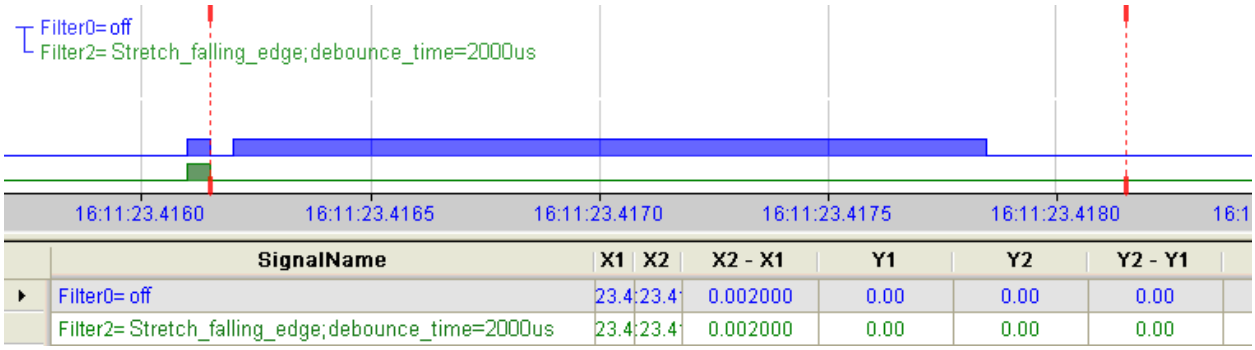
The first rising edge sets the output signal (red) to logical 1 and it remains logical 1 for the set debounce time. Subsequently, the channel is transparent again and waits for the next rising edge.



SignalName	X1	X2	X2 - X1	Y1	Y2	Y2 - Y1
Filter0= off	1.4	11.4	0.002000	1.00	1.00	0.00
Filter1= Stretch_rising_edge;debounce_time=2000us	1.4	11.4	0.002000	1.00	1.00	0.00

Stretch falling edge

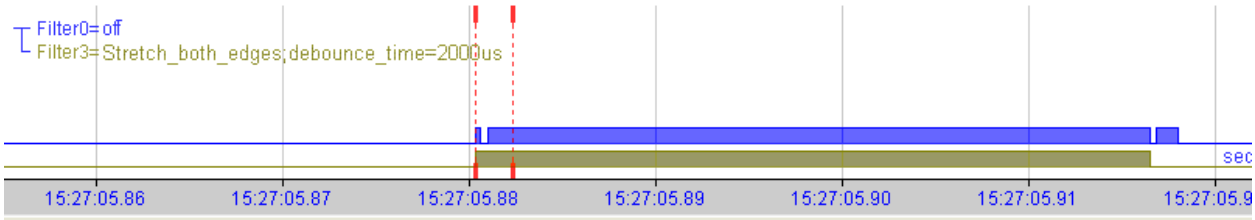
The first falling edge sets the output signal (green) to logical 0 and it remains logical 0 for the set debounce time. Subsequently, the channel is transparent again and waits for the next falling edge.



SignalName	X1	X2	X2 - X1	Y1	Y2	Y2 - Y1
Filter0=off	23.4	23.4	0.002000	0.00	0.00	0.00
Filter2=Stretch_falling_edge;debounce_time=2000us	23.4	23.4	0.002000	0.00	0.00	0.00

Stretch both edges

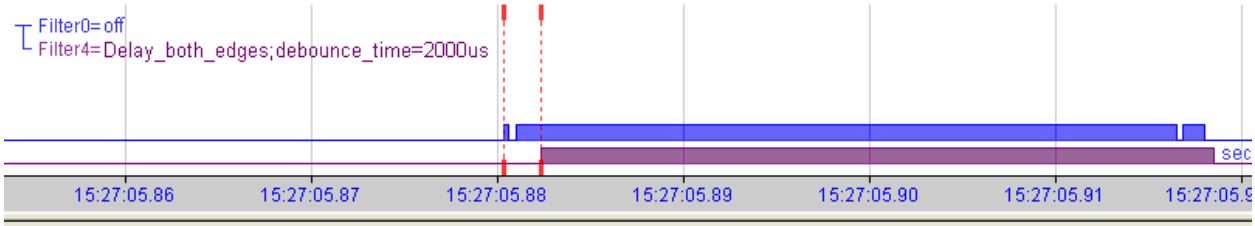
With the first edge, the output signal (ochre) follows the initial signal (blue) and keeps the logical level for the duration of the defined debounce time. Subsequently, the channel is transparent again and waits for the next (rising or falling) edge.



SignalName	X1	X2	X2 - X1	Y1	Y2	Y2 - Y1	Unit
Filter0=off	:05.	:05.	0.0020	1.00	1.00	0.00	
Filter3=Stretch_both_edges;debounce_time=2000us	:05.	:05.	0.0020	1.00	1.00	0.00	

Delay both edges

Beginning with the first edge, the output signal (purple) blocks the input and keeps the logical value of the edge for the duration of the defined debounce time. After the debounce time has elapsed, the channel is transparent again, directly assumes the logical level of the input signal and waits for the next (rising or falling) edge.



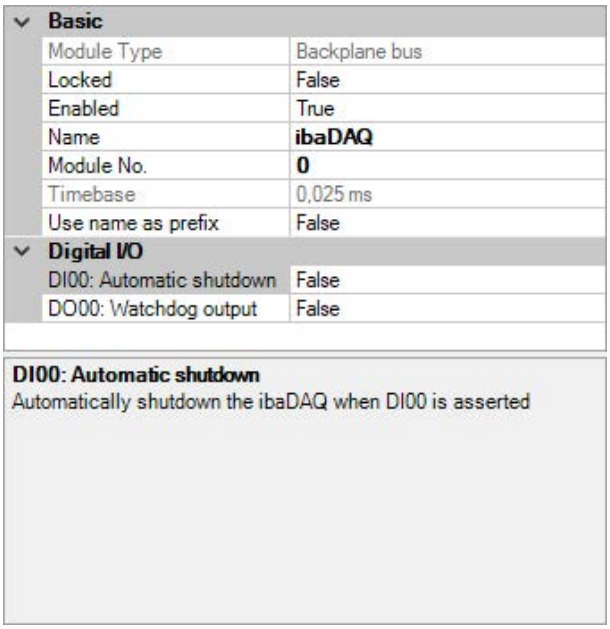
SignalName	X1	X2	X2 - X1	Y1	Y2	Y2 - Y1	Unit
Filter0=off	:05	:05	0.0020	1.00	1.00	0.00	
Filter4=Delay_both_edges;debounce_time=2000us	:05	:05	0.0020	0.00	1.00	1.00	

8.6 Digital outputs

Pin	Connection	LED
5	Digital output 00 +	DO 00
6	Digital output 00 –	
7	Digital output 01 +	DO 01
8	Digital output 01–	

8.6.1 Alarm function

If the watchdog function is enabled in *ibaPDA*, the output DO 00 can be configured as an alarm output.



8.7 Power supply X14

The external voltage supply is connected with a 2-pin connector.

Caution!

Only connect the device to an external voltage supply 24 V DC (±10 % unregulated)!

Pay attention to polarity!

8.8 Battery compartment X30

The internal time is buffered with a 3V Lithium CR2032 battery. The battery can be replaced during operation.

Observe the correct polarity of the battery.

Note

Used batteries and rechargeable batteries must not be disposed of with residual waste.

Batteries contain valuable raw materials that can be recycled and reused. Appliances with the  symbol are subject to EU Directive 2002/96/EC on waste electrical and electronic equipment. As a manufacturer we are obliged under the above directive to make you aware of this directive in the context of selling batteries or rechargeable batteries.

Batteries must not be disposed of in the household waste. This is highlighted by a crossed-out rubbish bin or waste container. You are legally required to properly dispose of batteries. Please dispose of spent batteries as required by law at municipal collection centers or return them to your local retailer free of charge. It is expressly forbidden to dispose of batteries in the household waste; this is harmful for the environment. Batteries delivered by us can be returned free of charge or returned by mail with sufficient postage.

8.9 Type label

The type label contains the following information:

1	Product name	5	Firmware version
2	Order number	6	Manufacturer
3	Serial number	7	Certification, standards
4	Hardware version		

9 System integration

9.1 Default settings

Observe the installed Windows version. The settings that are preset in the *ibaDAQ* device on delivery depend on the Windows version:

↗ *ibaDAQ with Win10 LTSC 2019/v1809*, page 33

↗ *ibaDAQ with Win10 LTSC 2021/v21H2*, page 32

9.1.1 ibaDAQ with Win10 LTSC 2021/v21H2

The following settings are preset for *ibaDAQ* with Win10 LTSC 2021/v21H2 on delivery:

Network parameters

Default settings for rotary switch = 1

Can be configured via rotary switch, see chapter ↗ *Rotary switch S1*, page 23.

Network connection X21	DHCP active
Network connection X22	DHCP active
Hostname	daq-xxxxxx xxxxxx = 6-digit serial number, e. g. daq-000002 The serial number can be found on the type label.

User accounts

User	Password	Rights
daq	iba.SNxxxxxx xxxxxx = 6-digit serial number The serial number can be found on the type label, e. g. iba.SN000036	Administrator

Note

After 5 times of incorrect password entry, the login function is blocked for 30 minutes.

Each system installation also creates an administrator account (without password) by default. However, the account is not visible. To make the account visible, proceed as follows:

1. Run cmd as administrator
2. net user administrator /active:yes
3. Start menu - account screen - "Administrator" account

Note

Change the preset passwords after you have started up *ibaDAQ*. This makes unauthorized use of the system more difficult.

Other system settings

- Auto login is disabled
- The Windows "Account Lockout Threshold" feature is enabled: After 5 times of incorrect password entry, the login function is blocked for 30 minutes.
- The ScreenSaver lock is set to 5 minutes and password entry.

These settings can only be changed at the operating system level, either via a remote desktop connection or when input devices (monitor, mouse, keyboard) are connected directly.

9.1.2 ibaDAQ with Win10 LTSC 2019/v1809

The following settings are preset for *ibaDAQ* with Win10 LTSC 2019/v1809 on delivery:

Network parameters

Default settings for rotary switch = 1

Can be configured via rotary switch, see chapter ↗ *Rotary switch S1*, page 23.

Network connection X21	DHCP active
Network connection X22	DHCP active
Hostname	daq-xxxxxx xxxxxx = 6-digit serial number, e. g. daq-000002 The serial number can be found on the type label.

User accounts

Note

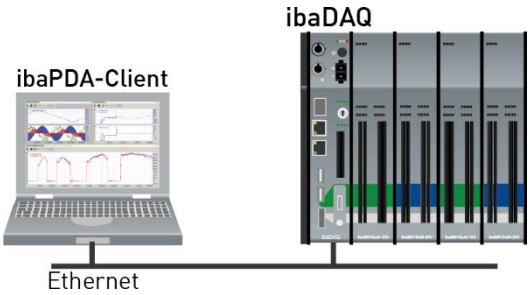
Change the preset passwords after you have started up *ibaDAQ*. This makes unauthorized use of the system more difficult.

User	Password	Rights
daq	daq	Administrator
Administrator	xadmin	Administrator

Note

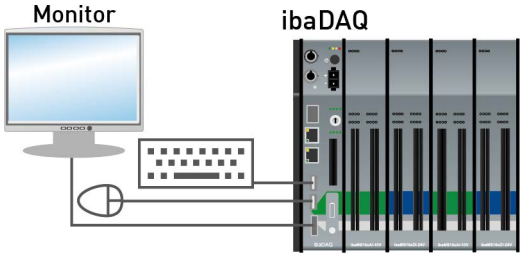
By default, the user daq is set to automatically log in.

9.2 Configuration with ibaPDA client



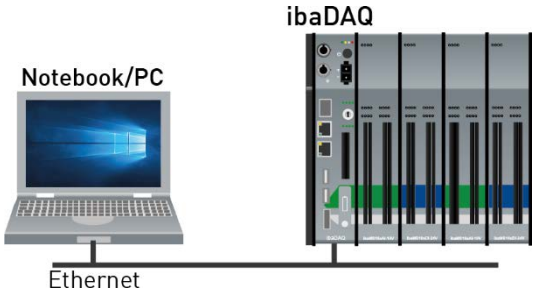
The ibaPDA client is connected to the central unit via Ethernet.

9.3 Configuration of the central unit



The monitor, mouse and keyboard are connected directly to the central unit.

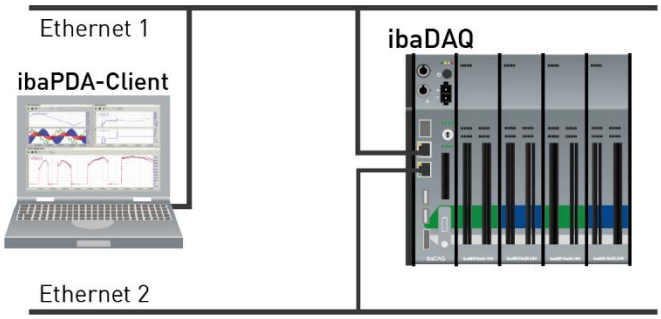
9.4 Remote Desktop



Operation through the network using Remote Desktop

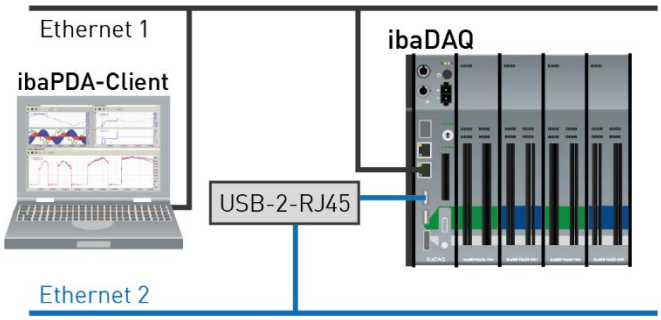
9.5 Connection to networks

ibaDAQ can be operated in two different networks to separate for example the network for measuring data transmission from the rest of the network. For this prupose the device provides 2 Ethernet interfaces. For setting the addresses in the networks, refer to ↗ *Rotary switch S1*, page 23.



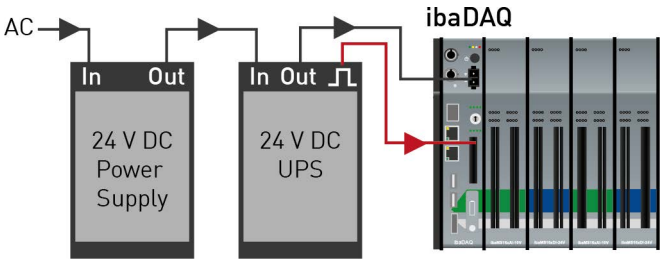
9.6 Connection with USB-WLAN/RJ45 adapter

Using a USB-WLAN or USB-RJ45 adapter at the USB port is another possibility to operate *ibaDAQ* in two different networks. There is no need for a special adapter type. Any commercial adapter that supports Windows 10 or higher can be used for this purpose. However, the corresponding drivers need to be installed on the device.



9.7 Operation with compact UPS

In order to secure an optimal operation, it is recommended to buffer the power supply of the *ibaDAQ* system via an uninterruptible power supply (UPS) with additional digital output. For this purpose, the digital output of the UPS serves as signal for securely shutting down the *ibaDAQ* operating system.



The UPS should be designed in such a way that the system is buffered for at least 5 minutes. The digital input DI00 of the *ibaDAQ* device needs to be configured appropriately for this function in *ibaPDA*.

See also ↗ *ibaDAQ – General tab*, page 46.

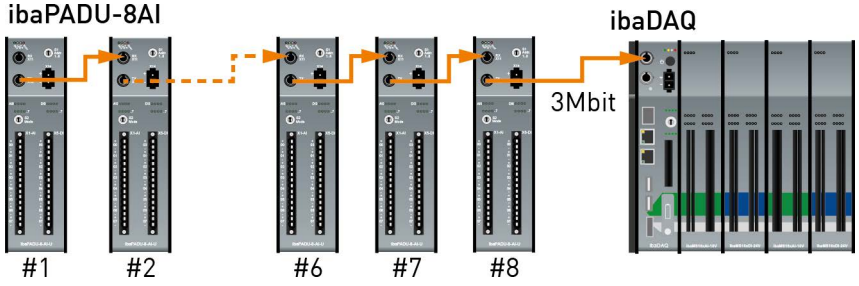
9.8 Supported ibaNet transmission protocols

Protocol	Min. telegram cycle	Max. signal sampling frequency	Direction of communication	Max. data volume (in bytes)	Max. number of participants in the FO link
ibaNet 3Mbit	1 ms	1 kHz	unidirectional	136 B (64 integer values, 64 binary values)	8 (line topology)
ibaNet 32Mbit 50µs	50 µs	20 kHz	unidirectional	144 B (64 integer values, 64 binary values)	1
ibaNet 32Mbit 100µs	100 µs	10 kHz	unidirectional	288 B (128 integer values, 128 binary values)	1
ibaNet 32Mbit Flex	Min. 25 µs	Max. 40 kHz	bidirectional	64 B at 25 µs T_{cycl} 3113 B at 1 ms T_{cycl}	15 (ring topology)

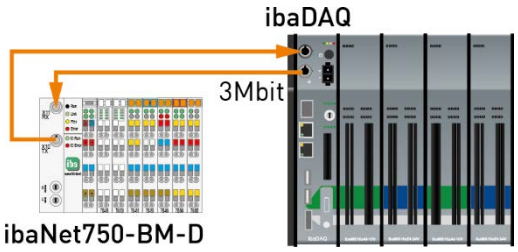
9.8.1 Sample applications

9.8.1.1 Measurement data acquisition with 3Mbit protocol

Unidirectional connection of 3Mbit devices:

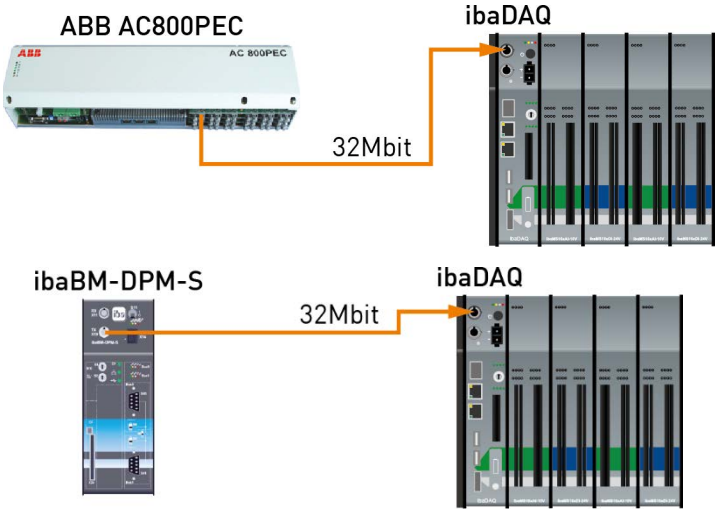


Bidirectional connection of 3Mbit devices:



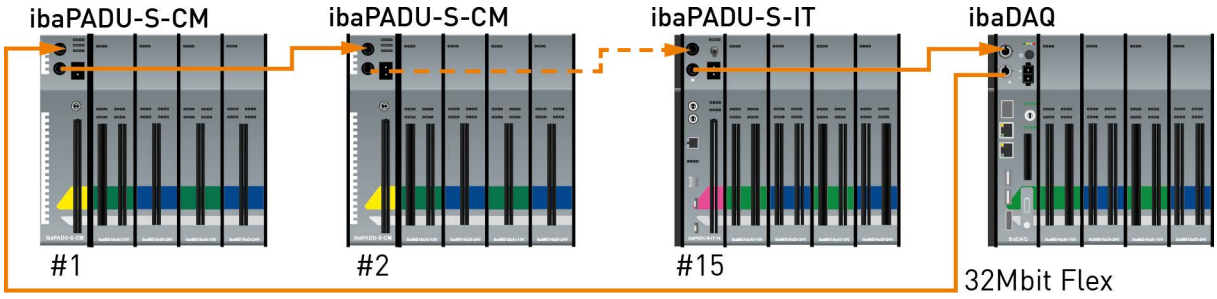
9.8.1.2 Measurement data acquisition with 32Mbit protocol

Unidirectional connection of 32Mbit devices:

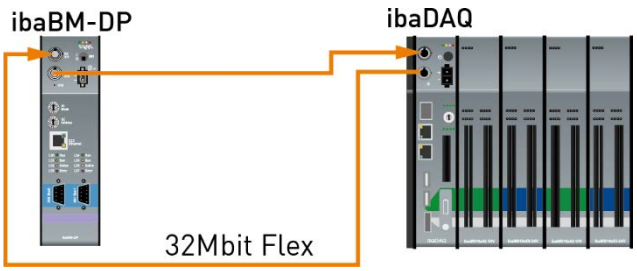


9.8.1.3 Measurement data acquisition with 32Mbit Flex protocol

32Mbit Flex devices in a ring topology:



Connection of ibaBM-DP:



10 Configuration in ibaPDA

With *ibaPDA*, you can configure, capture and record the analog and digital signals of the connected modules.

For the configuration you can connect the input devices (monitor, mouse, keyboard) directly to the unit, see ↗ *Adding I/O modules*, page 39.

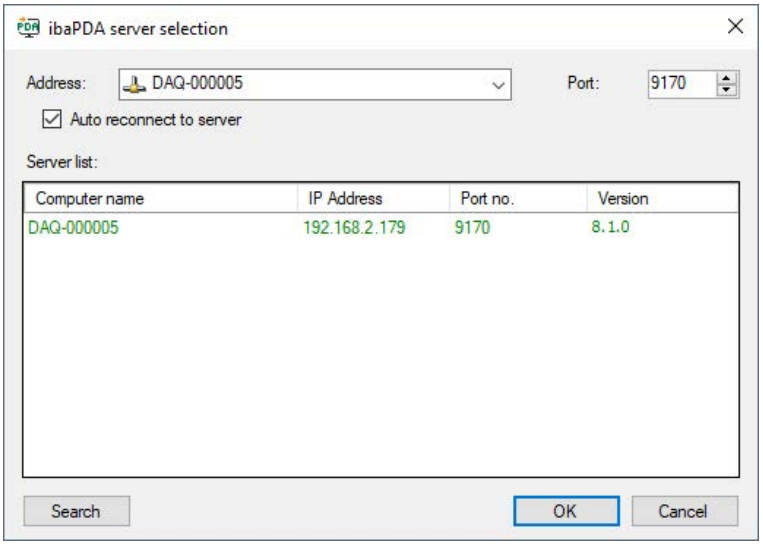
If you use an external *ibaPDA* client for configuration, see ↗ *Connection with an external ibaPDA client*, page 38.

10.1 Connection with an external ibaPDA client

If you are using an external *ibaPDA* client for the configuration, the *ibaPDA* client and *ibaDAQ* must be connected through the network.

1. Start *ibaPDA* on the external *ibaPDA* client.
2. Select *ibaDAQ* as *ibaPDA* server.

   To do this, click on the PDA button in the toolbar or select *Configuration - Select server...* from the menu.



Address
Enter the name or the IP address of the *ibaDAQ* device in the *Address* field. The name is composed of the DAQ-<six-digit serial number>. The serial number is found on the device name plate.

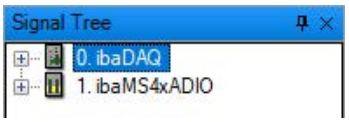
Example: DAQ-000005.

Port-no.
The port number is assigned automatically.

<Search>
The button starts the search for active *ibaPDA* servers in the network. If the *ibaPDA* client and *ibaDAQ* are located in the same network, the device should be displayed in the list of servers.

The device can be selected either by double-clicking the device or by selecting it and subsequently clicking <OK>.

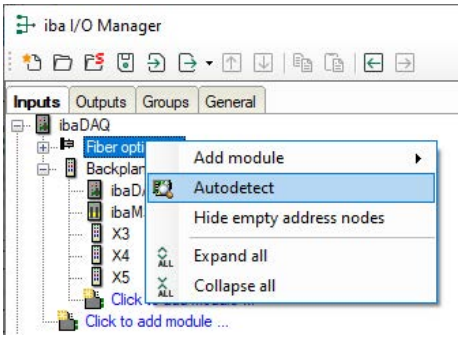
After the connection has been established, the device is displayed in the *ibaPDA* signal tree.



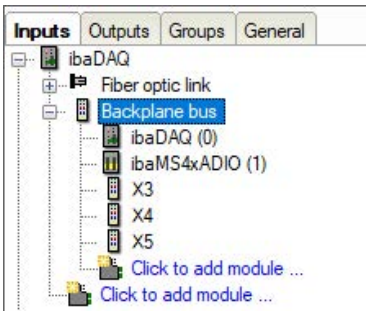
For further configuration, open the I/O manager, see ↗ *Adding I/O modules*, page 39.

10.2 Adding I/O modules

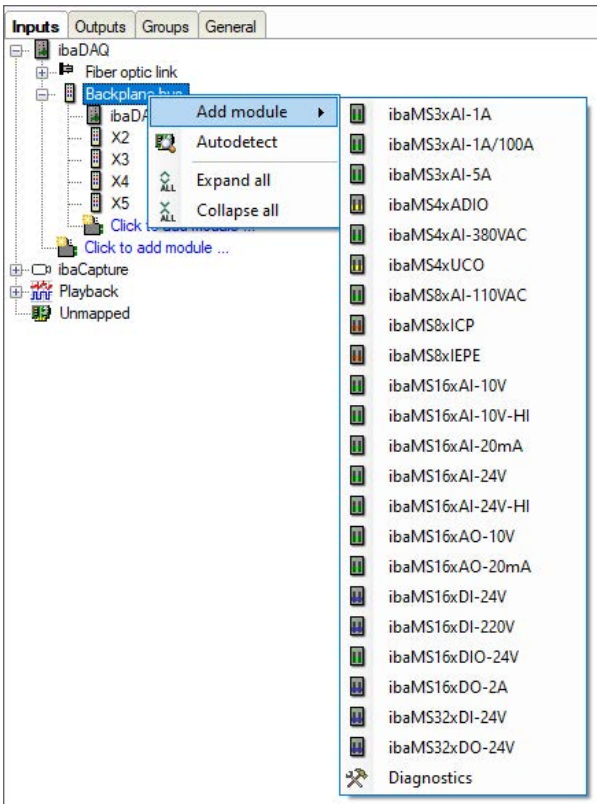
1. Start *ibaPDA* and open the I/O Manager.
2. Select the "Backplane bus" link in the I/O Manager.
3. Right-click the link to open a submenu. Select *Autodetect*.



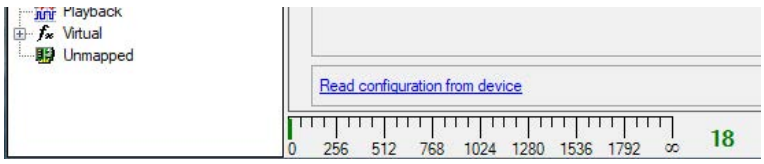
→ If *ibaPDA* detects the device automatically, the device and the connected modules are listed in the module tree.



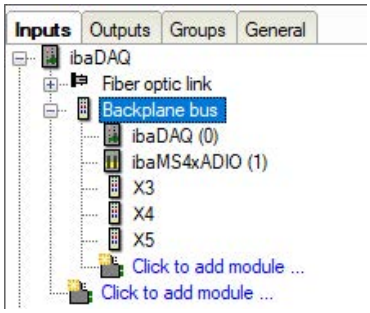
4. If *ibaPDA* does not detect the modules automatically, you can add the modules manually.
5. Right-click the "Backplane bus" link.
6. Select *Add module*.
7. Select the desired modules from the list.



8. Optionally, an existing configuration can be read from the device by clicking *Read configuration from device* on the *General* tab.



→ The connected modules are detected automatically and displayed in the module tree.



9. Configure *ibaDAQ* and the modules, e. g. assign a name, debouncing, etc.

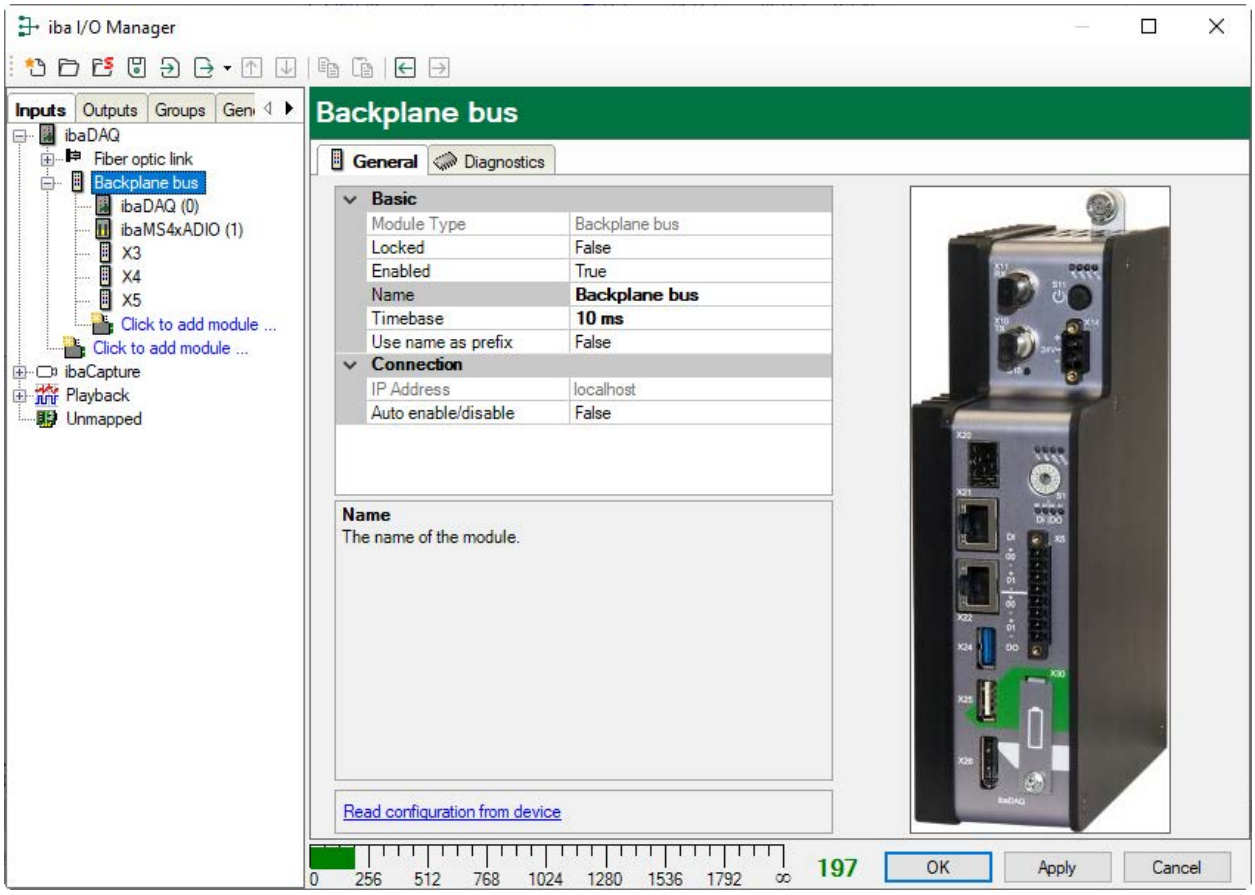
   See ↗ *Backplane bus – General tab*, page 41.

10. To apply the configuration, click <Apply> or <OK>.

10.3 General Settings

10.3.1 Backplane bus – General tab

In the *General* tab, make the basic settings and the connection settings for the "Backplane bus" module.



Basic settings

Module type
Display of the module type (read only)

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

Enabled
Data acquisition is enabled for this module.

Name
You can enter a name for the module.

Timebase
Specifies the acquisition time base used for *ibaDAQ* and the connected modules.

Use name as prefix
If "True" is selected, the module name is prefixed to the signal names of this module.

Connection

IP address
IP address or host name of the *ibaDAQ* device (read only).

Auto enable/disable
When this option is enabled and *ibaPDA* cannot establish a connection to this device when starting the acquisition, it will disable this module and start the acquisition without it. During the acquisition it will try to reconnect to the device. When it succeeds it will automatically re-start the acquisition with this module enabled.

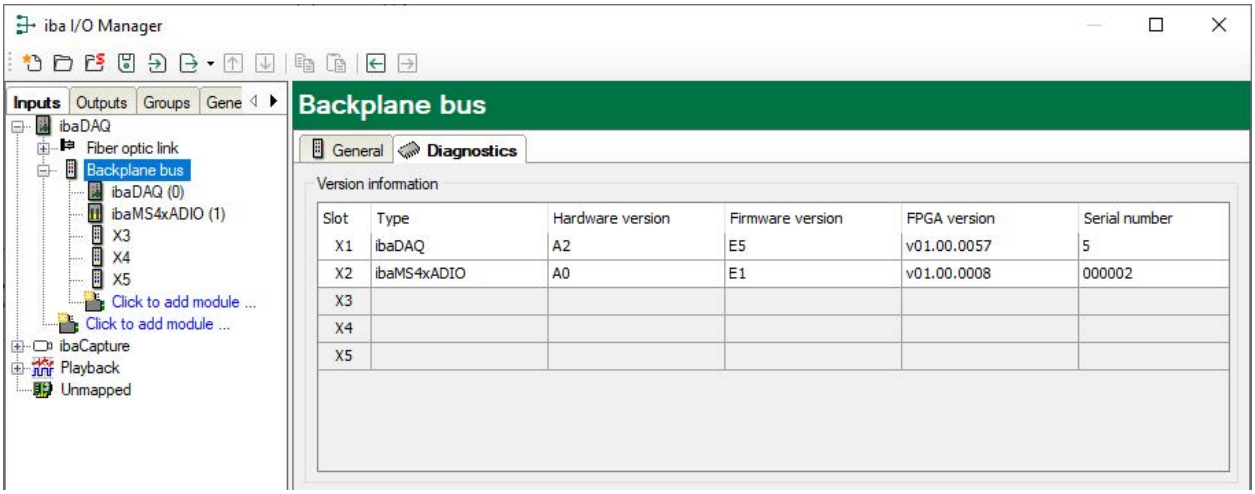
If this option is not enabled then *ibaPDA* won't start the acquisition when it cannot connect to the device.

More functions

Read configuration from device
Reads the configuration that has been stored last from the device.

Changed settings are applied by clicking on <OK> or <Apply>.

10.3.2 Backplane bus – Diagnostics tab

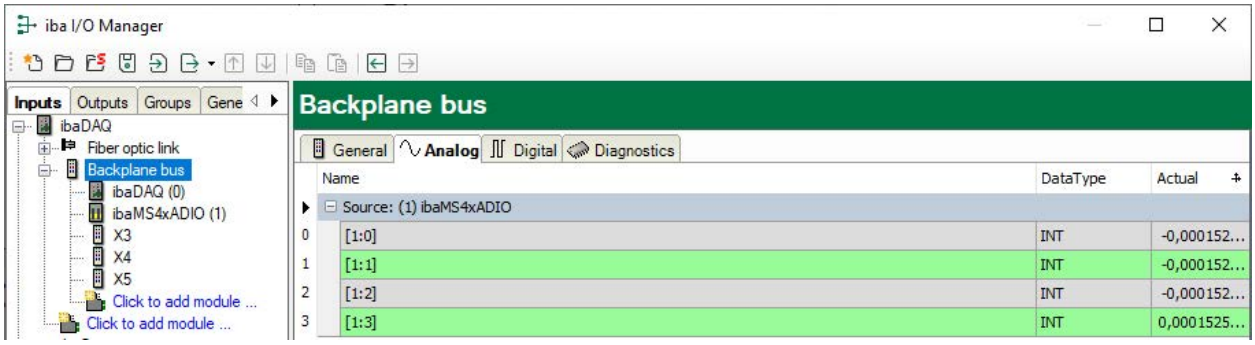


In the *Diagnostics* tab you find information about the hardware version, firmware version, FPGA version and the serial number of the central unit and the connected modules.

10.3.3 Backplane bus – Analog tab

The *Analog* tab is only displayed when acquisition with analog input modules has been started.

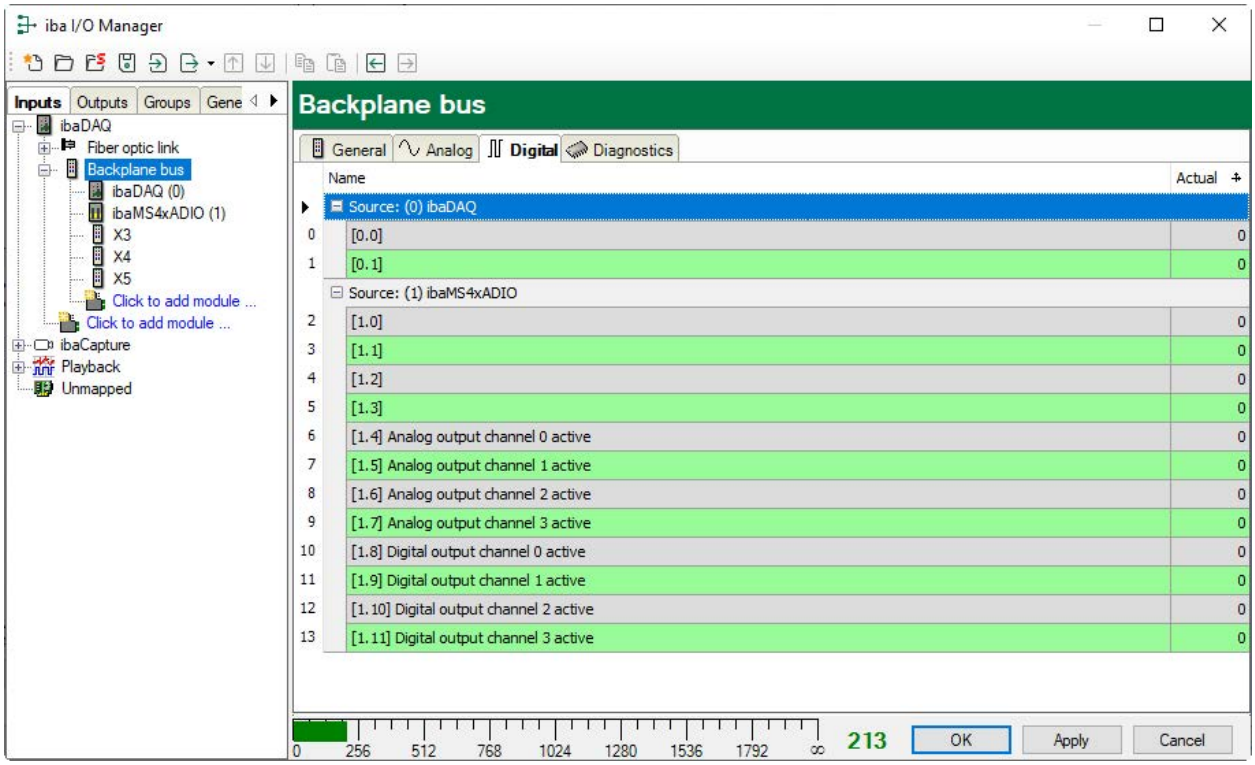
In the list, you can see the configured analog signals and the current values.



10.3.4 Backplane bus – Digital tab

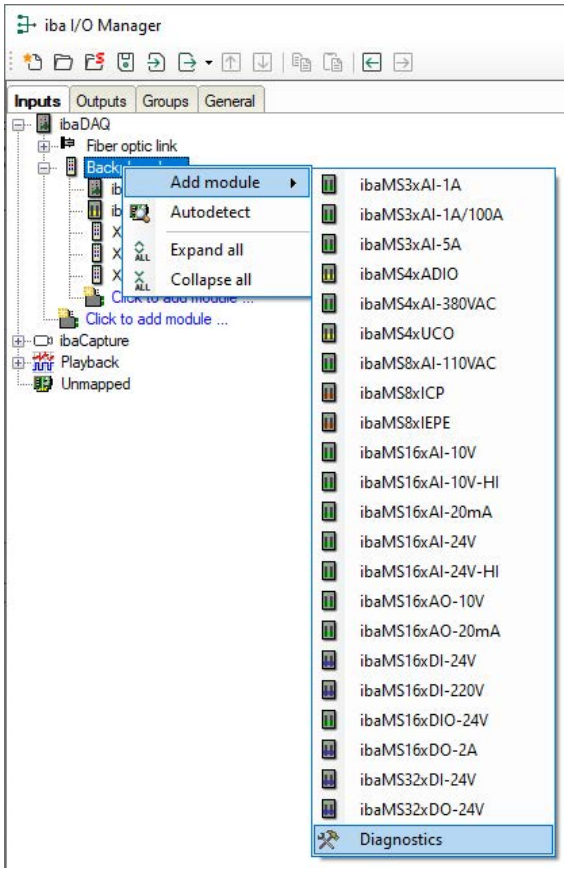
The *Digital* tab is only displayed when acquisition with digital input modules has been started.

In the list, you can see the configured digital signals of *ibaDAQ* and the digital input modules and the current values.



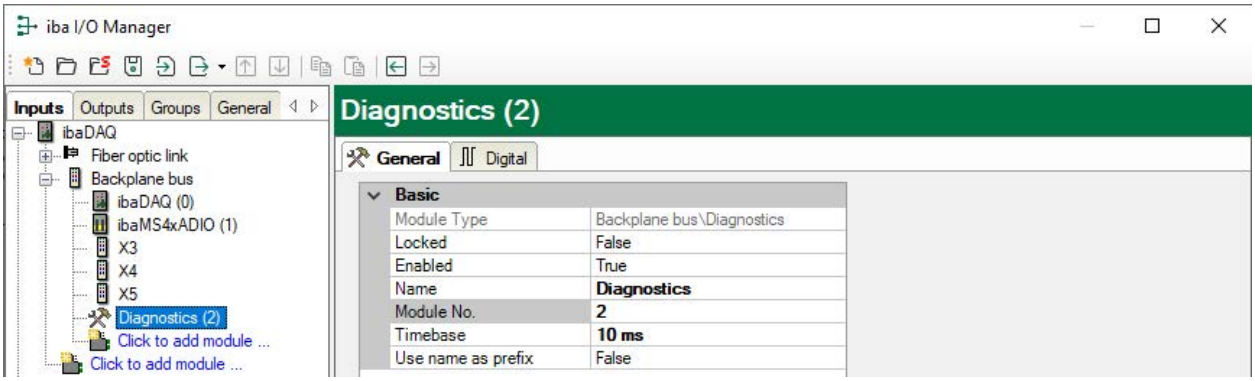
10.3.5 Diagnostic signals

The "Diagnostics” module provides diagnostic signals. The module has to be added manually by right-clicking the "Backplane bus” module and selecting "Diagnostics” from the context menu.



10.3.5.1 Diagnostics – General tab

In the *General* tab make the basic settings for “Diagnostic” modules.



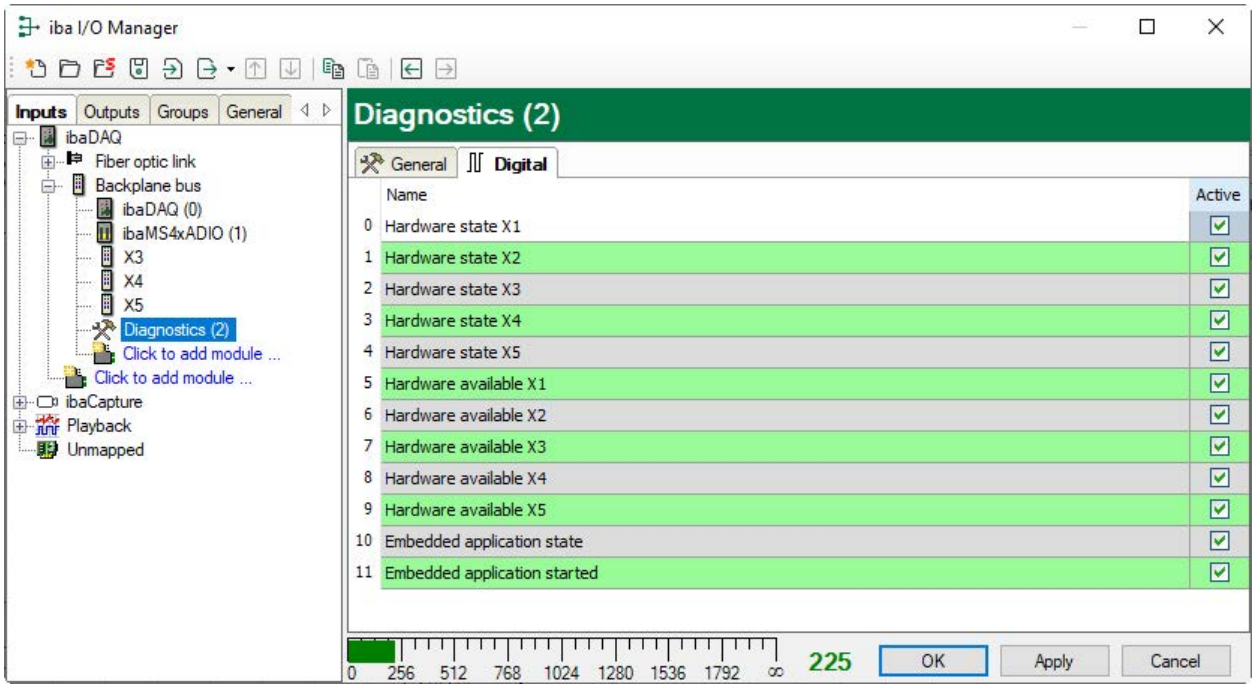
Basic settings

Module type, Locked, Enabled, Name, Timebase, Use name as prefix
See ↗ *Basic settings*, page 41

Module no.
Reference number for clearly referencing of signals, e.g. in expressions and *ibaAnalyzer*. It is assigned by *ibaPDA* in ascending order but can be changed by the user.

10.3.5.2 Diagnostics – Digital tab

The diagnostics signals can be activated in the *Digital* tab.

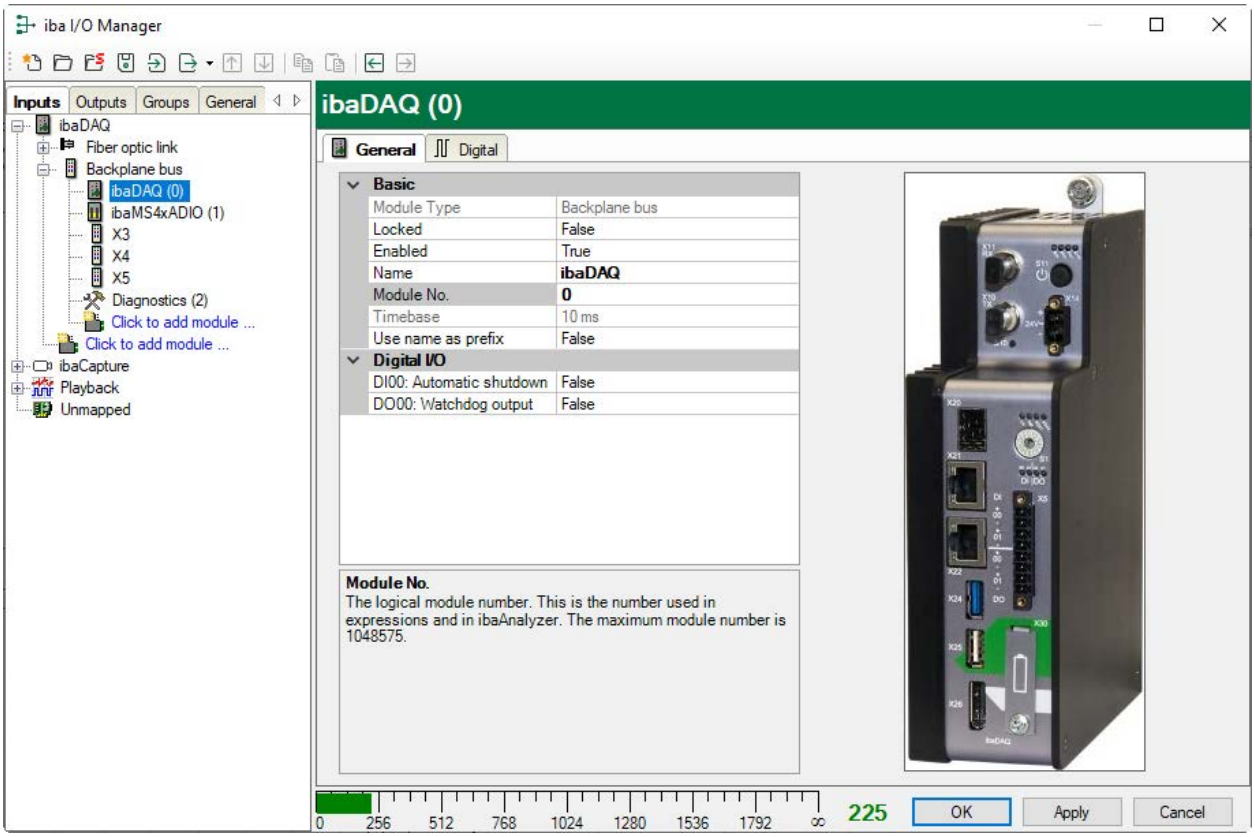


Signal	Meaning
Hardware state X[…]	Module on slot X[…] is OK
Hardware available X[…]	Module on slot X[…] was detected and initialized properly
Embedded application state	Embedded application is currently available
Embedded application started	Embedded application has been started. When the embedded application is finished properly, the signal will change to FALSE.

10.4 Configuring inputs

10.4.1 ibaDAQ – General tab

In the *General* tab, make the basic settings and settings for automatic shutdown and the watchdog function for the "ibaDAQ" module.



Basic settings

Module type, Locked, Enabled, Name, Timebase
See chapter ↗ *Backplane bus – General tab*, page 41.

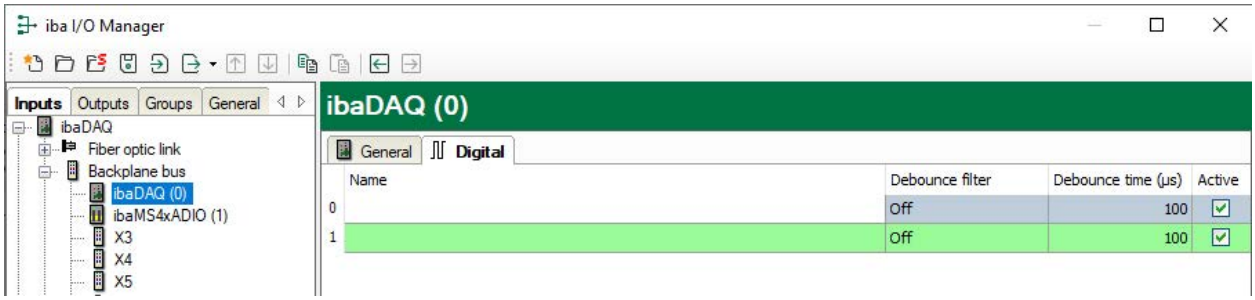
Module no.
Reference number for clearly referencing of signals, e.g. in expressions and *ibaAnalyzer*.

Digital I/O

DI00: Automatic shutdown
TRUE: *ibaDAQ* is shut down automatically if DI00 is set.

DO00: Watchdog output
TRUE: If *ibaPDA* cannot read data from the *ibaDAQ* hardware during acquisition, DO00 is set.

10.4.2 ibaDAQ – Digital tab

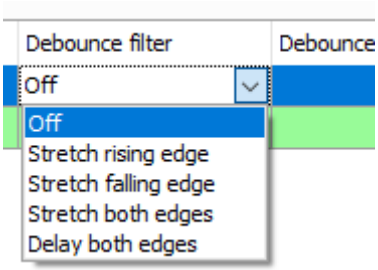


Name

You can enter a signal name and additionally two comments when clicking on the symbol in the *Name* field.

Debounce filter

In the drop-down menu, you can choose the operating mode for the debounce filter. The following settings are available: off, Stretch rising edge, Stretch falling edge, Stretch both edges, Delay both edges.



See chapter ↗ *Debounce filter inputs*, page 28.

Debounce time (µs)

Here you can define the debounce time in µs

Active

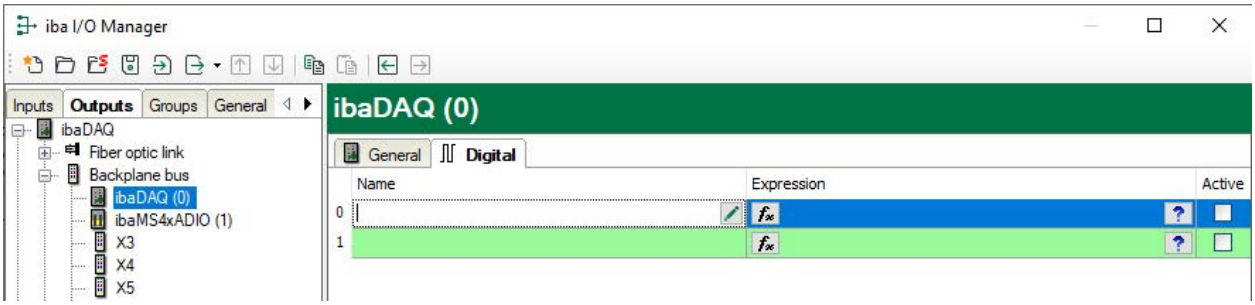
Enabling/disabling the signal

Note

Configure the plugged analog and digital I/O modules. For a detailed description, refer to the module documentations.

10.5 Configuring outputs

Select the *Outputs* tab to define settings for the output signals. The following parameters can be set on the *Digital* tab:



Name

You can enter a signal name and additionally two comments when clicking on the symbol in the *Name* field.

Expression

The expression editor can be used to assign signals to the outputs or to link signals logically and/or mathematically.

Active

Enabling/disabling the signal.

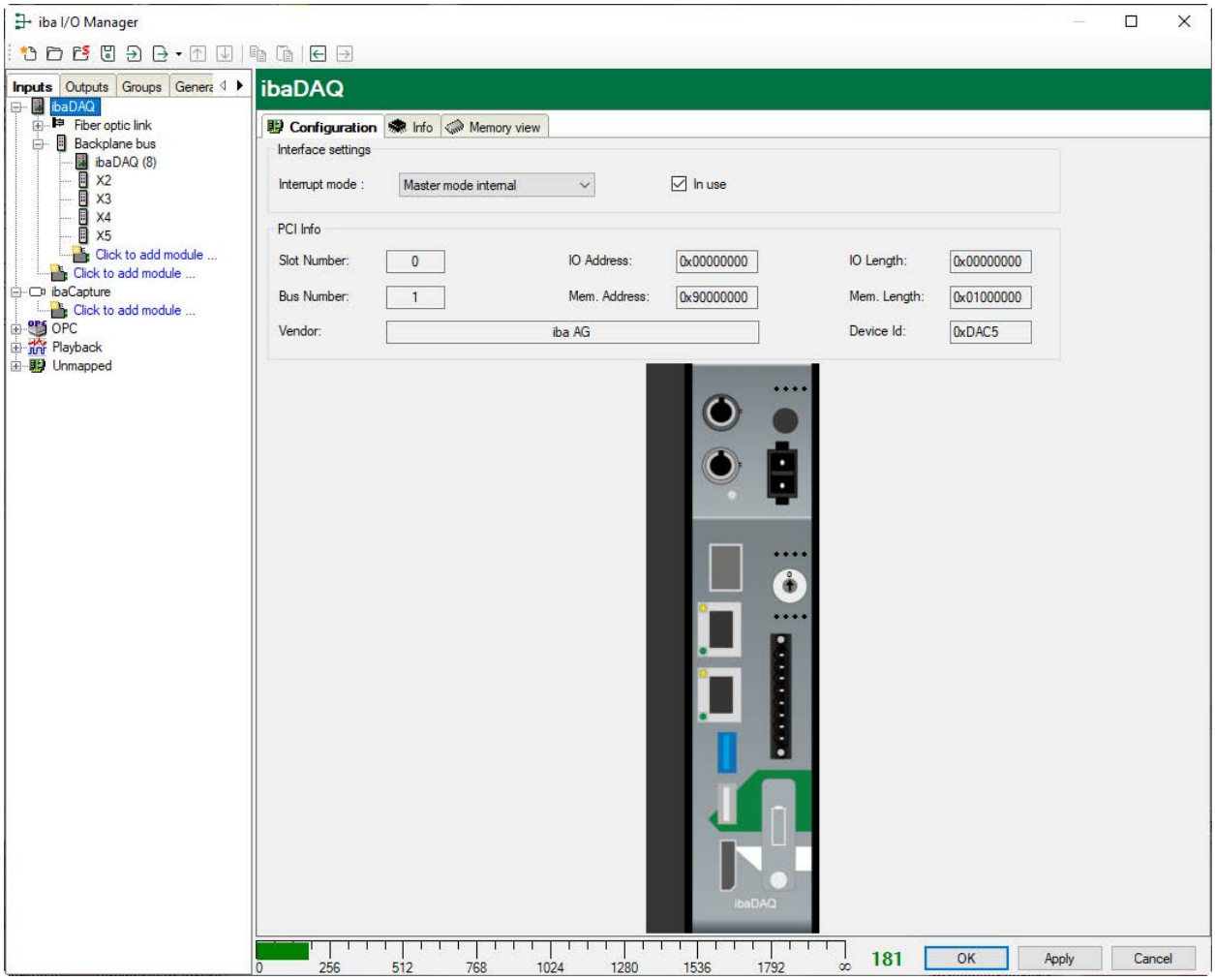
10.6 Settings for network and FO interface, special functions

The following settings are made in the *ibaDAQ* node:

- Configuration of the interrupt mode, see ↗ *ibaDAQ – Configuration tab*, page 49
- Network settings of the device, see ↗ *ibaDAQ – Info tab*, page 50
- Firmware update and restarting the device, see ↗ *ibaDAQ – Info tab*, page 50
- User-defined signal assignment of the LEDs PDA1 and PDA2, see ↗ *ibaDAQ – Info tab*, page 50
- Connection of further iba devices, see ↗ *Connection of an external iba device*, page 52
- Displaying the connection status of the FO link, see ↗ *FO link – Info tab*, page 53
- Operation in mirror mode, see ↗ *Mirror mode with 32Mbit Flex*, page 58
- Calculating the frame size with 32Mbit Flex, see ↗ *Calculation of the telegram size with 32Mbit Flex*, page 61

10.6.1 ibaDAQ – Configuration tab

In the *Configuration* tab, make the settings for the interrupt mode for the "ibaDAQ" module.



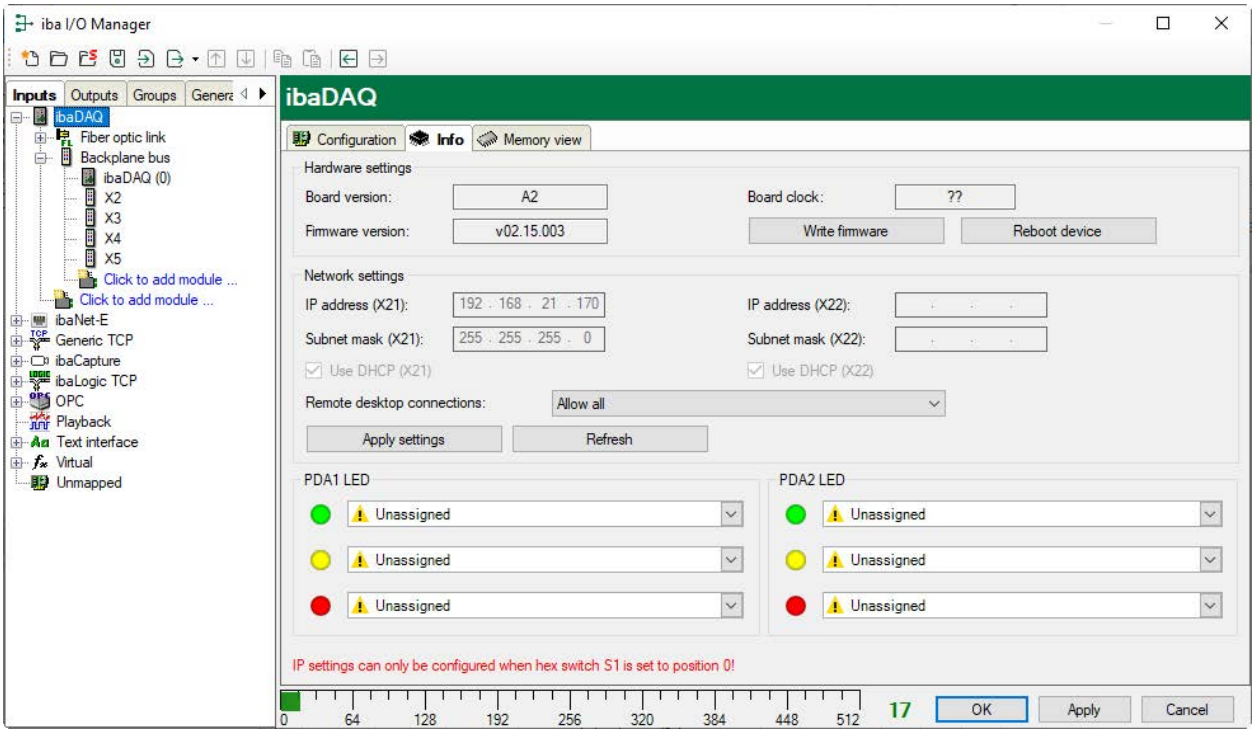
Interrupt mode
The interrupt mode can be set here.

- Master mode internal (the device is the interrupt master itself)
- Master mode external (external interrupt master)

The option *in use* is enabled by default. This option allows the device to be disabled temporarily while preserving the configuration.

10.6.2 ibaDAQ – Info tab

In the *Info* tab, make the hardware settings and network settings for the "ibaDAQ" module. Here you can assign signals to the LEDs PDA1 and PDA2.



Hardware settings

Information on the *card version* and *firmware version* of the internal *ibaFOB* card as well as information on the card clock

<Write firmware>

With this button it is possible to perform firmware updates, see ↗ *Firmware update*, page 64.

Note

This process may take several minutes and must not be interrupted. After an update, the device driver and the *ibaPDA* service will restart automatically.

<Reboot device>

Click this button to restart the device.

Network settings

The settings of IP address, subnet mask and DHCP server are only available if the rotary switch S1 is set to "0".

Use DHCP

Here you can select separately for the two network interfaces X21 and X22 whether a DHCP server is used or not.

IP address
Here you can enter a user-defined IP address for the network interfaces X21 and X22. The option "Use DHCP server" must not be enabled to do so.

Subnet mask
Enter the suitable subnet mask for your network here.

The option "Use DHCP server" must not be enabled to do so.

Note

It is also possible to select different address assignment methods for the two interfaces X21 and X22, e. g. DHCP active for X21 and a fixed IP address for X22, see ↗ *Rotary switch S1*, page 23.

Remote desktop connections
Here you can allow or deny remote desktop connections. Possible settings:

- Disabled
- Allow all
- Only secure connections

<Apply settings>
Click <Apply settings> to apply the network settings in the device.

<Refresh>
Click <Refresh> to update the network settings.

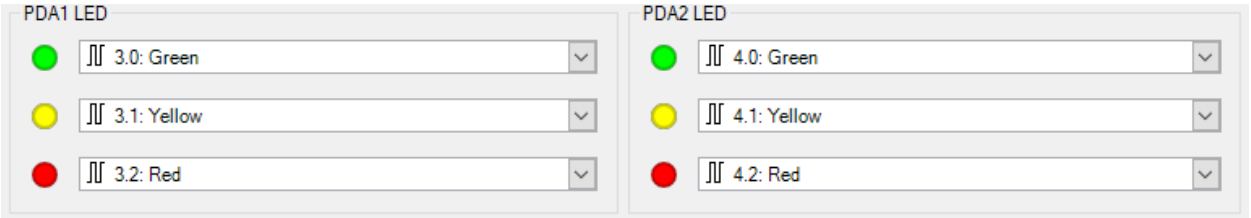
Note

Please remember to assign the corresponding user authorizations when setting up the remote desktop connection for the first time.

This is only possible directly at the device and not via the *ibaPDA* client.

If you run *ibaDAQ* in a domain, you may ask the IT department to assign the authorizations.

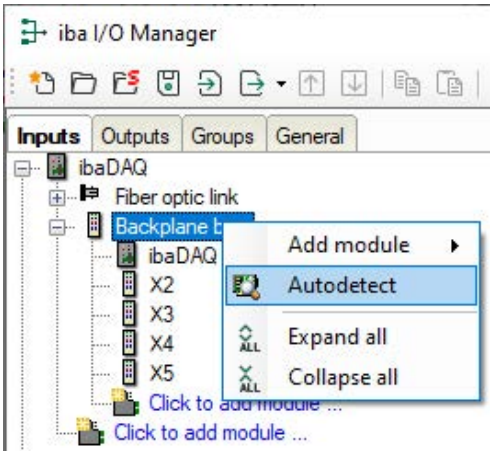
PDA1/2 LED
Here you can assign signals to the LEDs PDA1 and PDA2. 3 colors (green, yellow, and red) are available for each LED. Select one input signal respectively from the drop-down menu. If the corresponding signal applies, the LED will light up in the configured color.



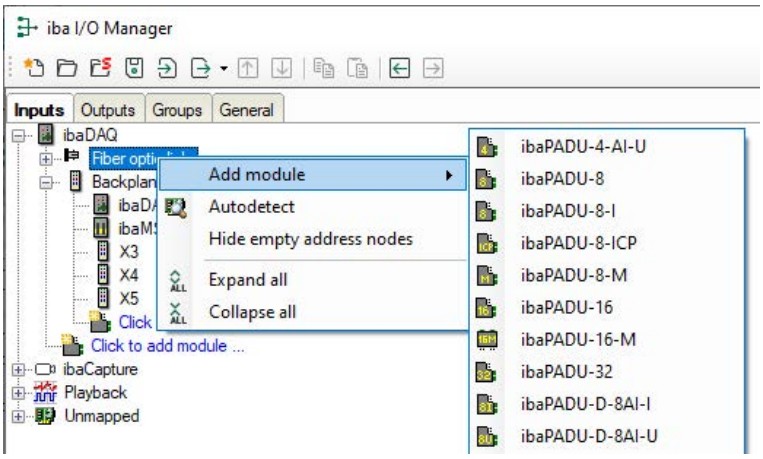
10.6.3 Connection of an external iba device

An external iba device can be connected to the FO input and output for measurement data acquisition.

To integrate the device in *ibaPDA*, right-click the link "Fiber optic link" and select *Autodetect*. The device and the used ibaNet protocol will be automatically detected and displayed in the module tree.



Alternatively, the device can be manually added. Select "Add module" in the context menu and then the corresponding device.

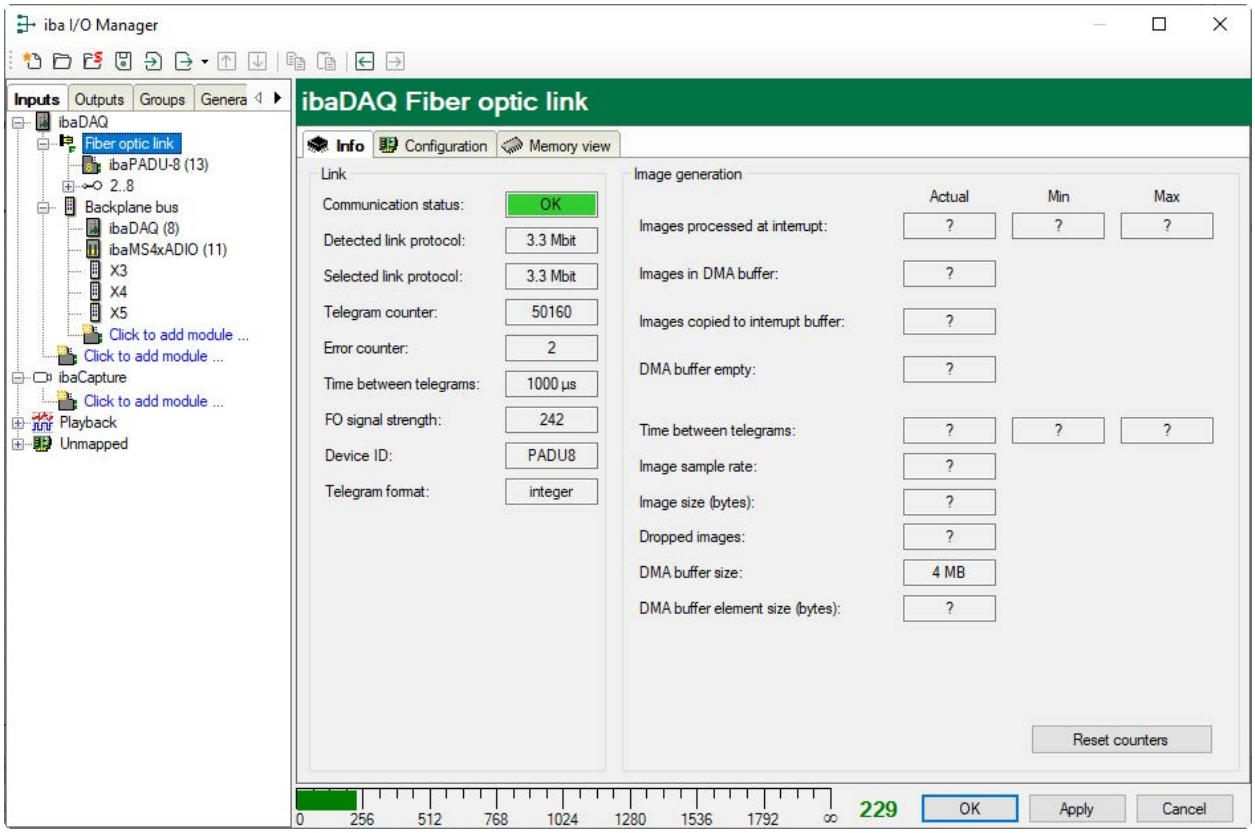


For further information regarding the configuration of the external iba device, please refer to the corresponding device documentation.

10.6.4 FO link – Info tab

In the *Info* tab, information about the FO communication is displayed in the left part. The displayed information depends on the protocol used.

10.6.4.1 3Mbit protocol



”Link” area

Communication status
OK when FO communication is working properly. This means that the telegrams received correspond to the mode configured on the link. The transmission mode is determined by the device (module) connected to the FO interface. For example, if an *ibaPADU-8AI* is connected, the link will be set to 3Mbit mode. If an *ibaPADU-D-8AI* is connected, the link will be set to 32Mbit Flex.

Detected link protocol
This is the detected transmission protocol. Possible values: 2Mbit, 3Mbit, 5Mbit, 32Mbit, 32Mbit Flex or "?" (no device connected).

Selected link protocol
This is the transmission protocol set for this FO interface. It is determined by the attached module.

Telegram counter
Counter of correctly received telegrams

Error counter
Counter of received faulty telegrams (e.g. checksum error). If this counter reading changes, the fiber optic communication is not correct.

Time between telegrams
The time interval between the last 2 correctly received telegrams.

FO signal strength
This is the difference between the maximum value and the minimum value received from the FO unit. This can be a maximum 255. The higher this value the stronger the FO input signal.

Device ID
The ID of the last device in an FO series connection at this FO interface.

Telegram format
This is the format of the analog data transferred in the telegram. Possible formats are "Integer", "Real" and "S5 real".

“Image generation” area

The information on the right side of the dialog describes the image generation (process image). An image is a collection of bytes that the card writes into the PC system memory via DMA. This image contains all data of the measured signals on that link.

The following list explains the image generation information:

Images processed at interrupt
These counters show how many images were available in the DMA buffer when the last interrupt fired. This should normally correspond with the interrupt time divided by the image sampling rate.

Images in DMA buffer
This is the number of images available in the DMA buffer. This number should remain constant. If this number increases, the system does not work correctly. This can be a missing interrupt for example.

Images copied to interrupt buffer
This counter shows how many images have been retrieved from the DMA buffer and have been processed by ibaPDA. This counter should count up continuously.

DMA buffer empty
This counter increments each time the DMA buffer is empty when the interrupt fires. If this is the case, the driver will set all signal values of the respective port to zero (0). This may happen if the FO link is disconnected.

Time between telegrams
The time between the last 2 correctly received telegrams. This is the same value as the time in the FO communication information but the driver maintains the minimum and maximum values. The differences between min. and max. value should not deviate significantly from each other.

Image sample rate
The rate at which the card writes images to the DMA buffer. It should be greater than or equal to the fastest acquisition rate of the modules connected to this link.

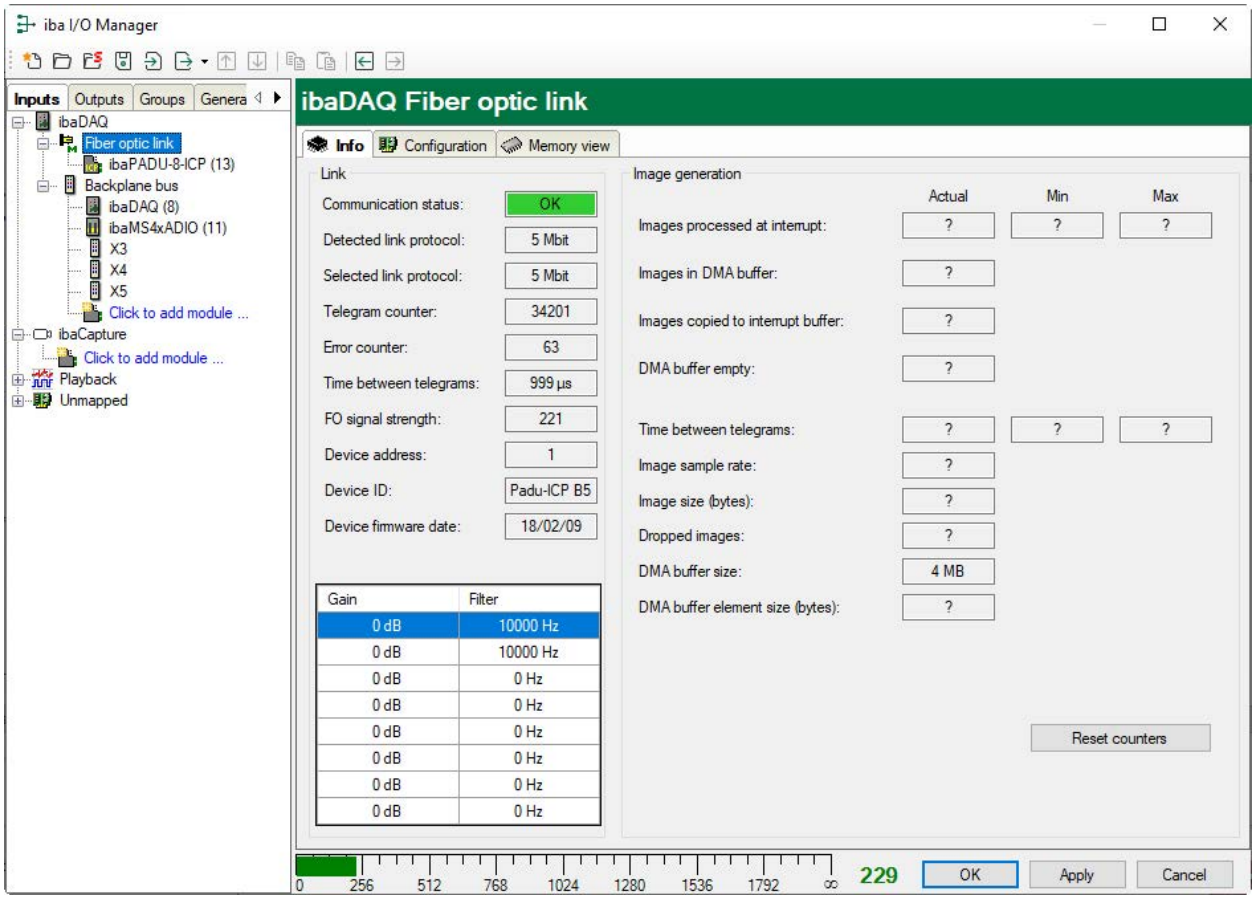
Image size
This is the image size in bytes. If you multiply the image size with the image sample rate, you know how many bytes per second are transferred by this link over the PCI bus.

Dropped images
This counter increments when the card's DMA FiFo is full and additional images are added. If this happens then something is seriously wrong. The card cannot transfer images over the PCI bus.

DMA buffer size
Size of the DMA buffer for this interface.

DMA buffer element size (bytes)
Size of the elements in the DMA buffer (in bytes).

10.6.4.2 5Mbit protocol



The screenshot shows the information you receive when the FO link operates with 5Mbits, e. g. with *ibaPADU-8-ICP*.

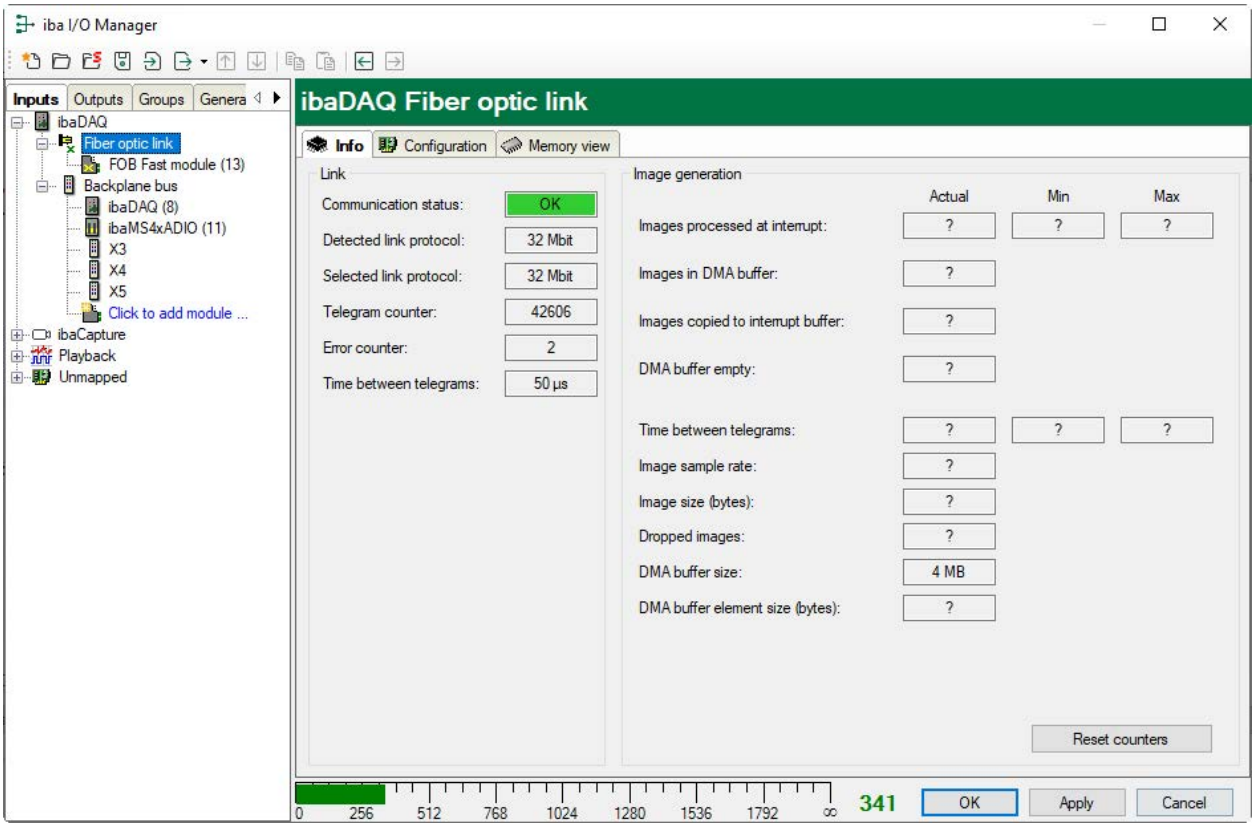
For explanations see ↗ *3Mbit protocol*, page 53.

Additional information are:

Device firmware date
The date of the firmware loaded in the currently connected device.

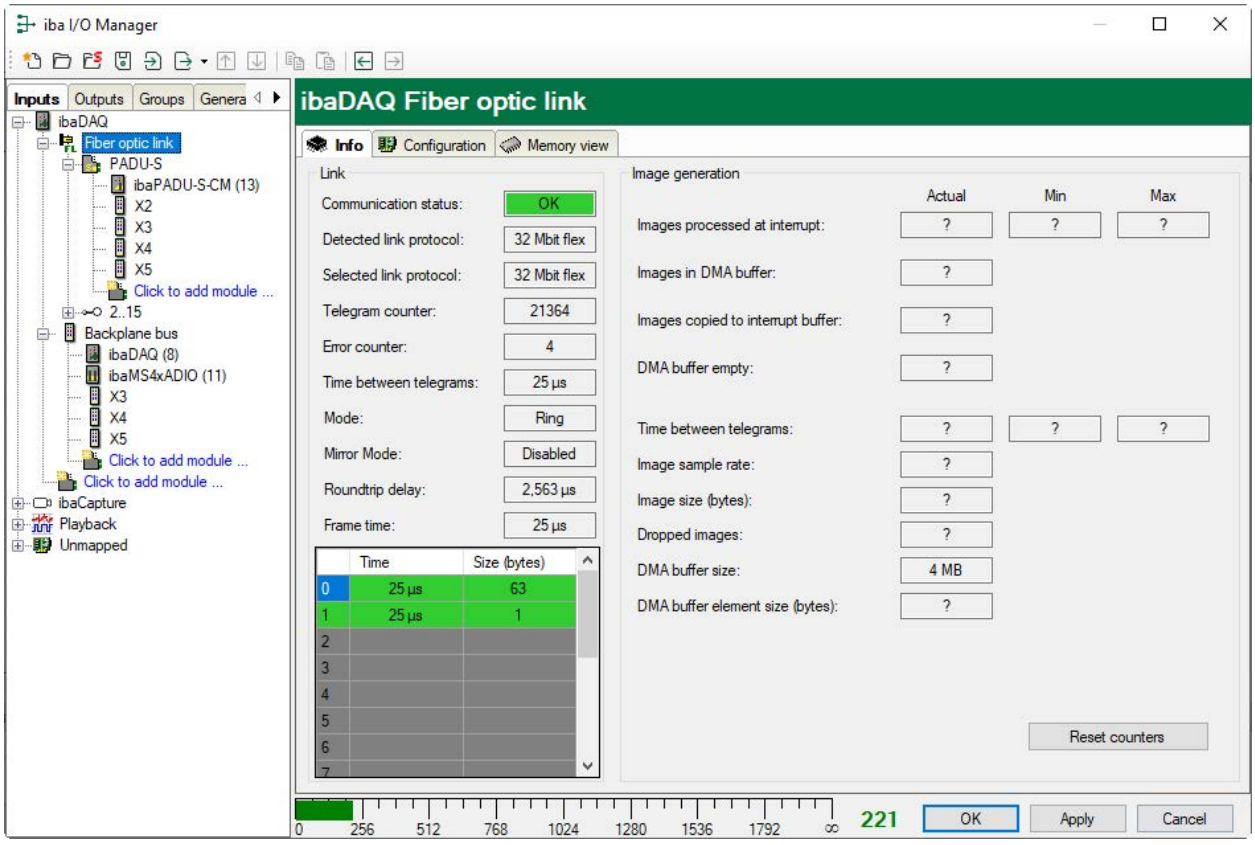
Gain and filter table
Gains and filter factors are configured in the device. This only applies to *ibaPADU-8-ICP* devices.

10.6.4.3 32Mbit protocol



See ↗ *3Mbit protocol*, page 53.

10.6.4.4 32Mbit Flex protocol



The screenshot shows the information you see when the link is in 32Mbit Flex mode. Up to 15 devices can be connected in a ring topology per FO link. In the signal tree on the left, the links 1 - 15 below the FO link correspond to the address set at the connected device by means of the rotary switch.

For explanations of the setting options, see ↗ *3Mbit protocol*, page 53.

Additional items (compared to 3Mbit protocol):

In the Link area

Time between telegrams
Time between two telegrams measured by the *ibaFOB-D* card It should be equal to the configured frame time.

Mode
The status of the link is shown:

- Ring: One or more devices (cascade) are bidirectionally connected and the FO ring is closed.
- Open chain: Only the FO input is connected to a device. The output is not connected or the ring is interrupted at one point in the cascade.

Mirror mode
Indicates whether mirror mode is disabled or enabled. If mirror mode is enabled, the display shows whether the device is configured as master or slave system. For description of mirror mode refer to chapter ↗ *Mirror mode with 32Mbit Flex*, page 58.

Roundtrip delay
Telegram cycle in the closed FO ring. The time depends on the number of connected devices in the ring (approx. 2 µs per device).

Due to the roundtrip delay the data of the connected devices might be captured asynchronously (up to one telegram cycle).

Frame time
Cycle in which the data frames are sent

(Smallest configurable timebase of the connected devices or 100 µs if this timebase is an integer multiple of 100 µs. The timebase of all devices must be a multiple of the smallest timebase.)

Table
The table shows the cycle time and the data size of the respective channel:

- Row 0: Ethernet channel
- Rows 1-15: connected devices with the respective address 1-15

10.6.5 FO link – Configuration tab

10.6.5.1 Mirror mode with 32Mbit Flex

The mirror mode allows multiple *ibaPDA* systems to acquire simultaneously the data of the same Flex devices. For this purpose, one ibaPDA system is configured as the master. This is the only system that can configure the connected Flex devices. The other *ibaPDA* systems are configured as slaves and can only acquire the data of the Flex devices, but not change the configuration. Since *ibaDAQ* has an integrated *ibaPDA* system, the device can also be operated as master or slave in mirror mode.

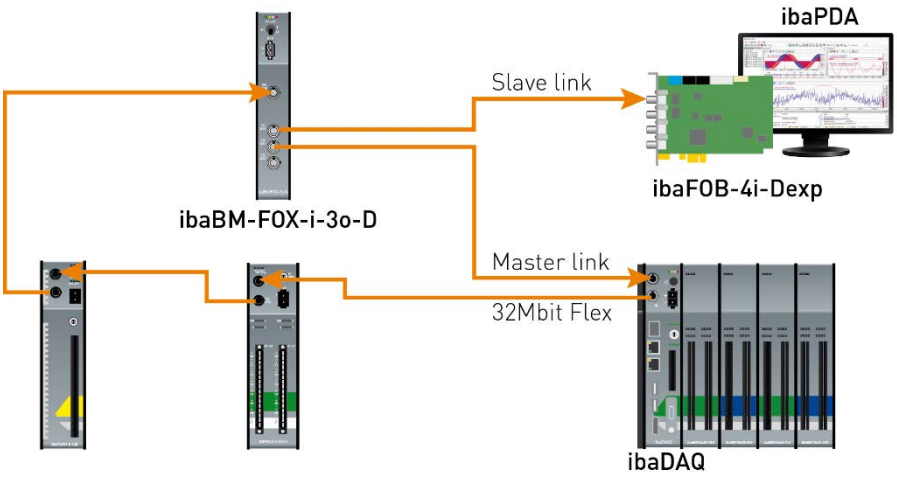
The master ibaPDA system requires a bidirectional fiber optic connection to receive and send data to the Flex devices. The *ibaPDA* slave only needs a single FO connection to receive data from the Flex devices and the device configuration.

Note

The slave system cannot output data via fiber optics.

Possible connections

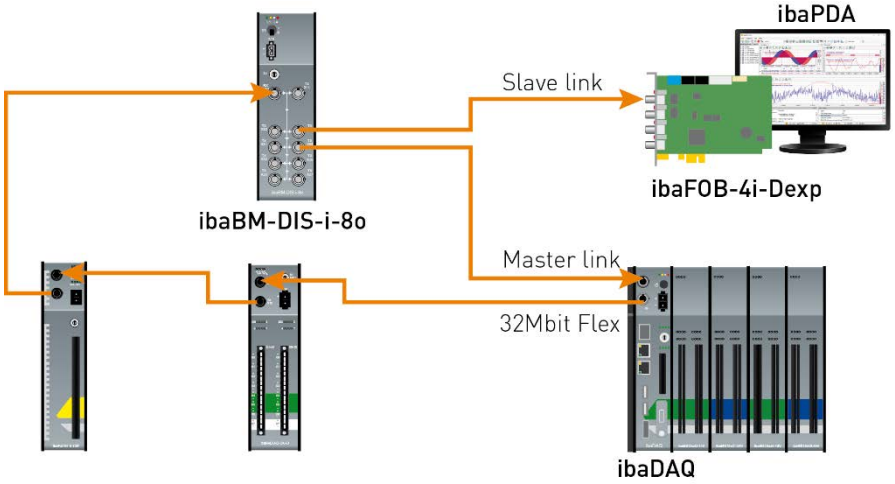
Connection in mirror mode with *ibaBM-FOX-i-3o-D*



The fiber optic output of the last Flex device is connected to the input of an *ibaBM-FOX-i-3o-D* device. One FO output of *ibaBM-FOX-3o-D* is connected to the FO input of the *ibaPDA* master (*ibaDAQ* in the example) and of the *ibaPDA* slave.

This connection allows the *ibaPDA* slave to acquire data even when the *ibaPDA* master has been shut down.

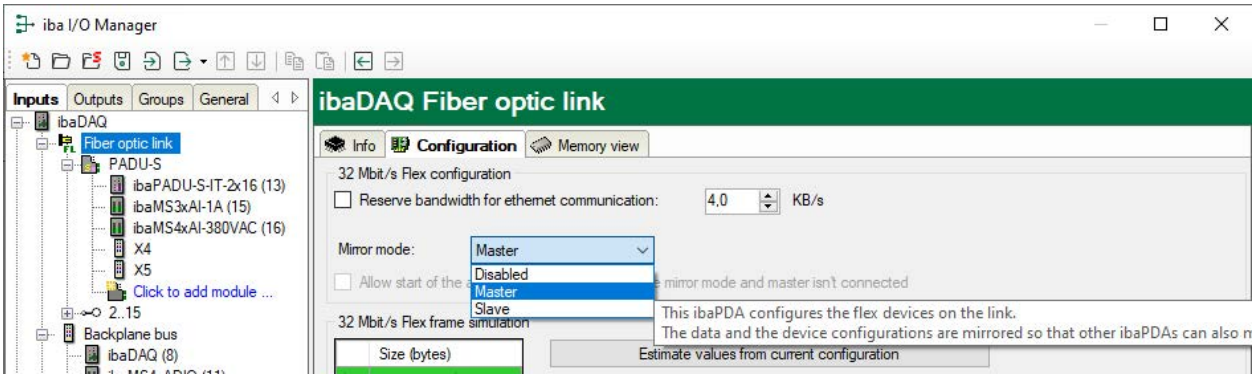
Connection in mirror mode with *ibaBM-DIS-i-8o*



The example above with *ibaBM-DIS-i-8o* is similar to the example with *ibaBM-FOX-i-3o-D*. The *ibaBM-DIS-i-8o* device must operate in copy mode (S1 = 0).

Configuration in ibaPDA

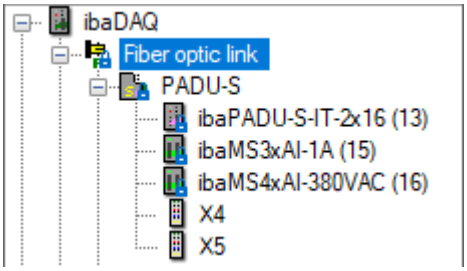
The mirror mode is configured in the *Configuration* tab in the fiber optic connection view.



3 settings are available for mirror mode:

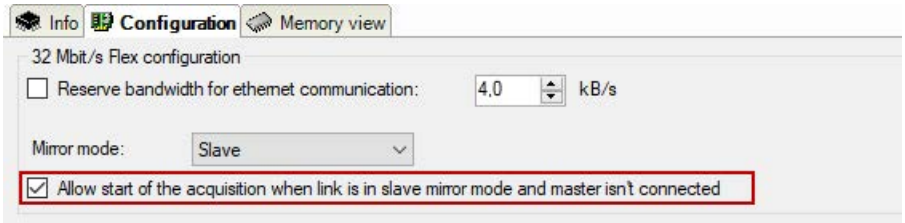
- **Disabled**: The data is not mirrored, so this *ibaPDA* system is the only one that can acquire data and configure the devices.
- **Master**: This *ibaPDA* system configures the Flex devices on the link. The data and the device configurations are mirrored so that other *ibaPDA* systems can also acquire the data.
- **Slave**: This *ibaPDA* system receives the device configuration from the master *ibaPDA* so that it can acquire data configured by the master *ibaPDA*.

If an *ibaPDA* system is configured as a slave, it can use the *autodetect* function to load the configuration of the devices from the *ibaPDA* master. A slave *ibaPDA* cannot change the device configuration. The slave *ibaPDA* shows the link and its modules in the signal tree with lock symbols.



When the acquisition has been started on the slave *ibaPDA*, the slave waits until it receives the configuration from the master. If this configuration is different from the current configuration, the slave will load the new configuration.

If the slave doesn't receive a configuration within 6 s, *ibaPDA* generates an error message. If the option *Allow start of the acquisition when the link is in slave mirror mode and master isn't connected* is enabled, then the acquisition will start anyway with the last configuration.

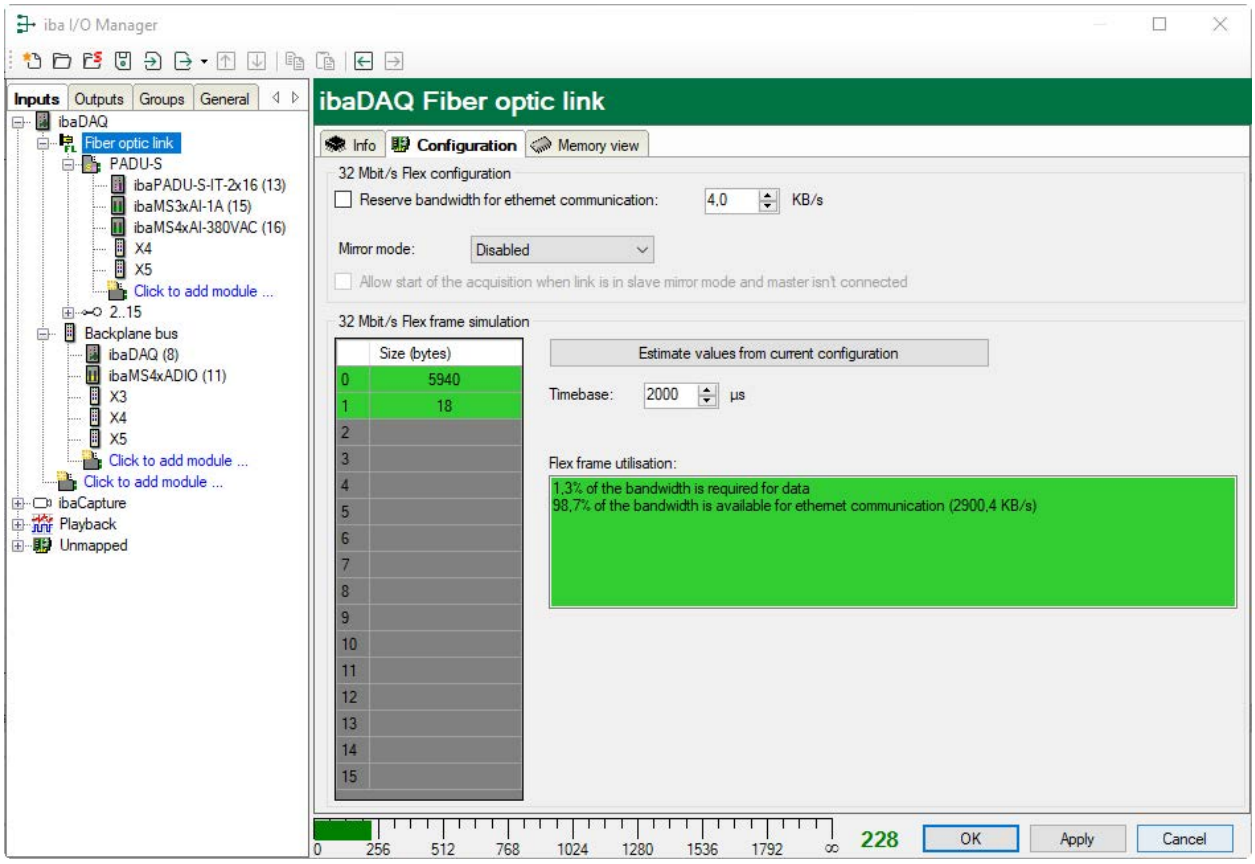


When the master *ibaPDA* changes the configuration while the slave *ibaPDA* is acquiring then the slave will automatically restart.

10.6.5.2 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 is reserved for 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 initially estimated. After the configuration has been applied with a click on <OK> or <Apply>, the actual data values are displayed on the *Info* tab.

If too much data is configured, you can either reduce 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.

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

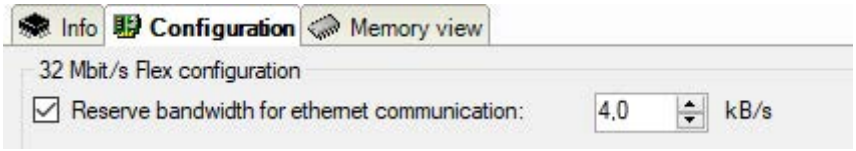
Set the smallest planned sampling time in the *Timebase* field. Now, you can enter manually the planned or expected data amount (in bytes) in the table rows 1 to 15. With every new entry, the result values in the *Flex frame utilization* field are recalculated.

This allows you to estimate whether the planned number of signals or devices can be processed on one Flex link or whether an additional Flex link should be used.

Reserved bandwidth in the Ethernet channel for configuration data

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 the Ethernet channel. 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.

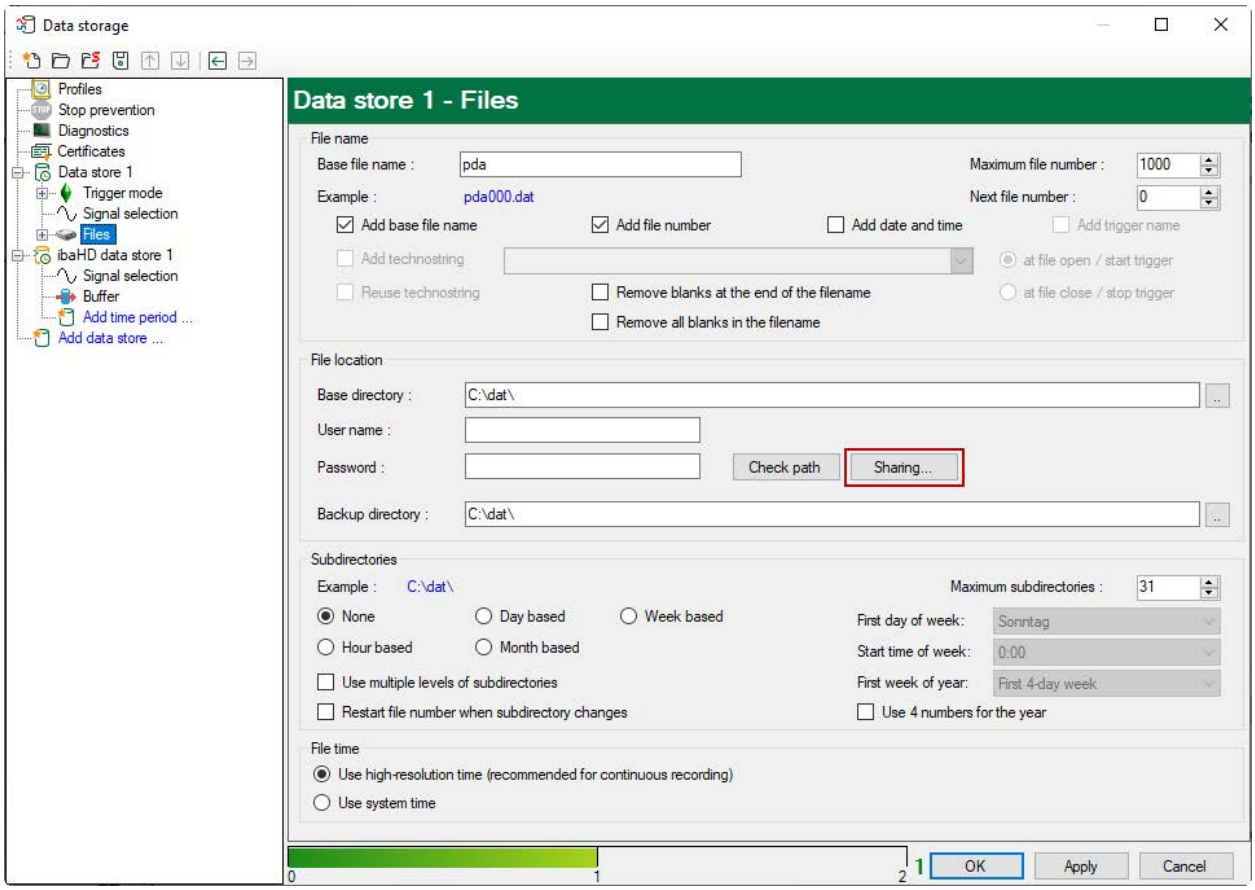
It is now possible to reserve a fixed bandwidth for the Ethernet channel with the option *Reserve bandwidth for ethernet communication*. The default value of 4 kB/s is usually sufficient for configuration data and Profibus diagnosis.



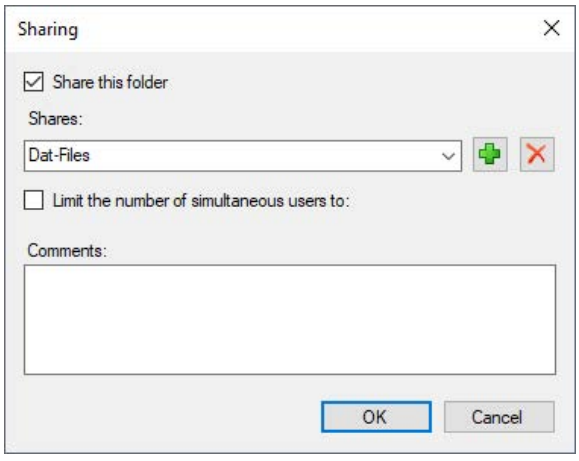
10.7 Setting up file sharing

To comfortably access recorded data through the network, the *ibaPDA* client allows setting up read-only access.

Click the <Sharing> button in the data storage configuration, on the files node.



Specify a folder.



Note

When running *ibaDAQ* in a so-called workgroup, you need the user name and the password to access it.

If *ibaDAQ* and the accessing PC are in the same domain, a separate authentication is usually not necessary.

11 Updates

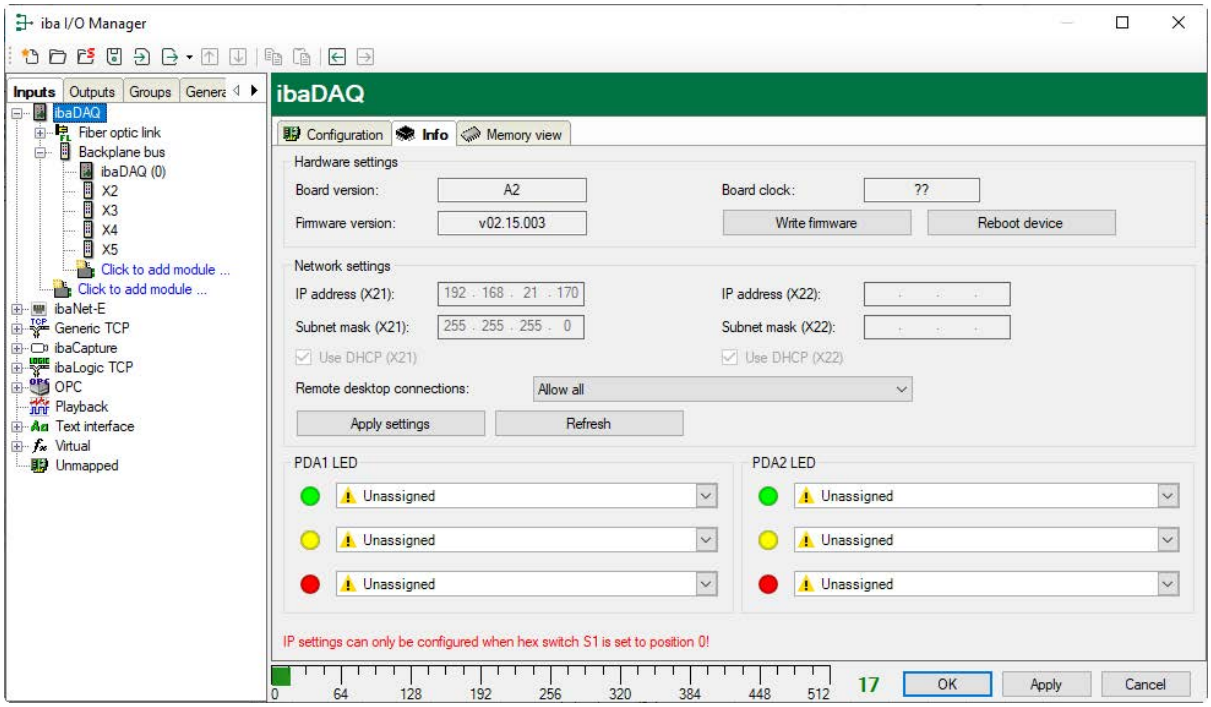
11.1 Firmware update

A firmware update always upgrades the entire iba modular system, i.e. the central unit and the plugged-in I/O modules.

Caution!

Do not switch off the device when an update is running. This might damage the device. Installing an update can take some minutes.

1. Open the I/O manager in *ibaPDA*.
2. Navigate to the main node of your *ibaDAQ* system.
3. Click the <Write firmware> button on the "Info" tab and select the "daqs_v[xx.yy.zzz].iba" update file.
4. Start the update with <OK>.

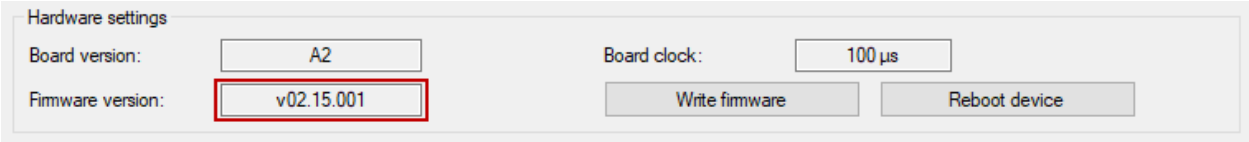


11.2 Auto-updating the modules

After having mounted the modules and switched on the voltage of the central unit, *ibaDAQ* detects the modules and checks the firmware version.

ibaDAQ has a so-called "overall release version". This version contains the current firmware version of the central unit as well as the firmware versions of the modules.

The overall release version is displayed in *ibaPDA* in the "Info" tab (here referred to as the "firmware version").



When the firmware version of a module does not match the "overall release version" of the central unit, *ibaDAQ* does an automatic upgrade or downgrade of the module. After that the module is ready for use.

Note

The device must not be switched off during an auto-update.

Note

The "overall release version" contains all modules known until then and the corresponding firmware versions. If a module is not yet known (i.e. it is more recent than the central unit's firmware version), this module is ignored and not displayed in *ibaPDA*.

In this case, a new update file has to be installed for the "overall release version". Please contact the iba support.

12 Technical data

In the following you will find the technical data and dimensions for *ibaDAQ*.

12.1 Main data

Short description

Name	ibaDAQ		
Description	Central unit for stand-alone data acqusition		
Order number	10.170001	10.170031	10.170041

Processor unit

Processor	Intel Atom E3845 quad core CPU 1.91 GHz	Intel Atom E3950 quad core CPU 1.6 GHz	
Operating system	Win10 LTSC 2019/v1809 Win10 LTSC 2021/v21H2 (from 12/2023)		
RAM	4 GB	8 GB	4 GB
Flash memory (SSD)	256 GB (SN < 1000), 512 GB (SN≥ 1000)	512 GB	
Clock	Buffered by battery, can be replaced during operation (3V lithium CR2032) Synchronization possible via DCF77 (digital input) or NTP		

Supply

Power supply	24 V DC ,±10 % not stabilized, 24 V DC, ± 10 % not stabilized, 1 A (without I/O modules), 3 A (with up to 4 I/O modules)
Power consumption	Up to 36 W

Operating and indicating elements

Indicators	6 LEDs for device status 2 LEDs for digital inputs 2 LEDs for digital outputs 2 LEDs for customized applications, configurable in ibaPDA

Operating and environmental conditions

Temperature ranges Operation Storage/transport	 0 °C … 50 °C -25 °C to 70 °C
Mounting position	vertical or horizontal
Installation height	Up to 2000 m
Cooling	Passive
Humidity class acc. to DIN 40040	F, no condensation
Protection class	IP20
Certification / standards	EMC: IEC 61326-1 FCC part 15 class A
MTBF[1)]	162,168 hours / ca. 18 years
Dimensions (width x height x depth)	56 mm x 214 mm x 148 mm With module rack: 229 mm x 219 mm x 156 mm
Weight	1.5 kg (incl. packing and documentation)

12.2 Interfaces

ibaNet

Number	1 (e. g. for the connection to ibaPDA)	
ibaNet protocols	ibaNet 32Mbit Flex (bidirectional) ibaNet 32Mbit 50µs / 100µs / 800µs ibaNet 5Mbit ibaNet 3Mbit ibaNet 2Mbit	
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 ↗ *Example for FO budget calculation*, page 73	
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)	

[1)] MTBF (mean time between failure) according to Telcordia Issue 3 (SR232) and Reliability Prediction Procedure of Electronic Equipment (Issue 3 Jan. 2011)

Light wavelength	850 nm	
Laser class	Class 1	
Receiving interface (RX)		
Receiving sensibility[2)]	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	2x RJ45, 1 Gbit/s
USB	1x USB 3.0, 1x USB 2.0
DisplayPort	Port for monitor

12.3 Digital inputs and digital ouputs

Digital inputs

Number	2
Version	Electrically isolated, protected against polarity reversal, single ended
Input signal	24 V DC
Max. input voltage	±60 V permanent
Signal level log. 0 Signal level log. 1	> -6 V; < +6 V < -10 V; > +10 V
Input current	1 mA, constant
Debounce filter	Optionally with 4 different operating modes, configurable in *ibaPDA*
Sampling rate	max. 40 kHz, freely adjustable
Delay	typ. 10 µs
Electrical isolation Channel-channel Channel-housing	 2.5 kV AC 2.5 kV AC
Connection technology	Screw-type terminal (0.14 mm^2 to 1.5 mm^2), screw connection, included in delivery

Digital outputs

Number	2
Version	Galvanically isolated, solid-state DC switch
Switching voltage	max. 200 V DC, protection against surge voltages
Switching current	max. 350 mA (permanent), overcurrent protection
Switch delay	< 2 ms (at 100 mA)

[2)] Information on other fiber optic cable diameters not specified

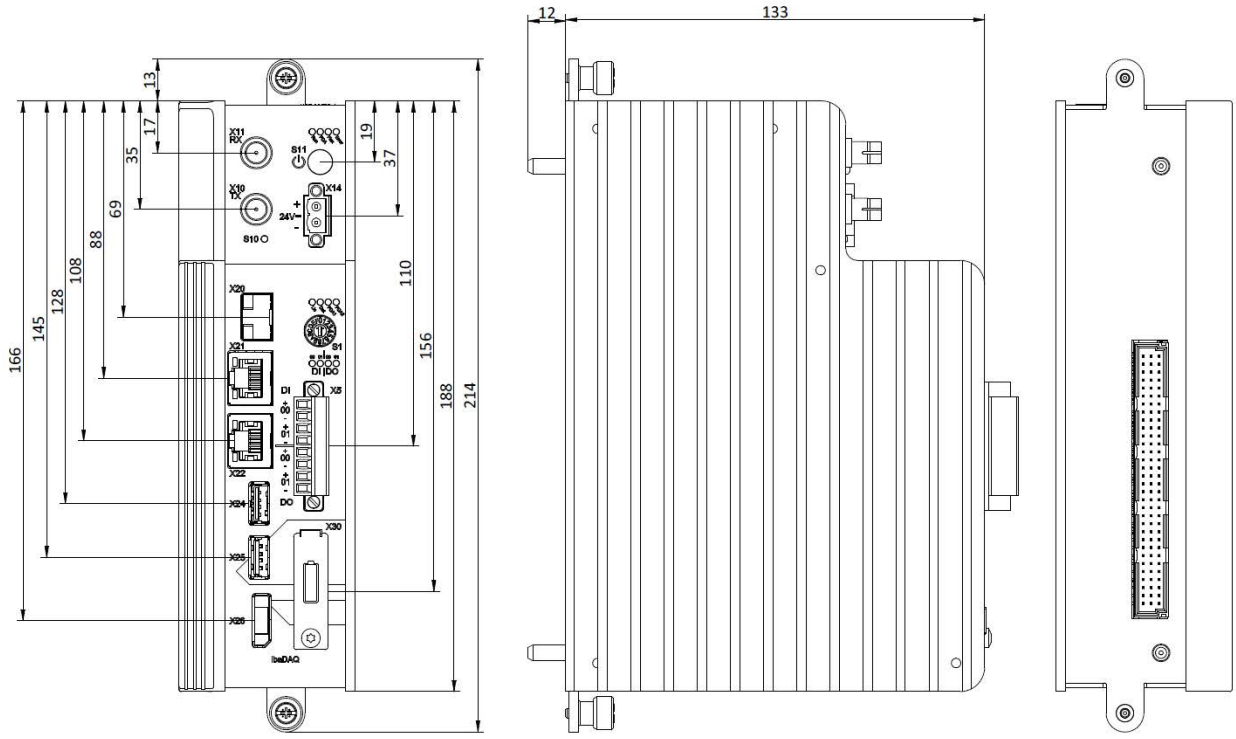
ON resistance (log. 1)	max. 3.75 Ω (at 100 mA)
OFF resistance (log. 0)	min. 100 MΩ
Electrical isolation Channel-channel Channel-housing	 2.5 kV AC 2.5 kV AC
Connection technology	Screw-type terminal (0.14 mm^2 to 1.5 mm^2), screw connection, included in delivery

12.4 Supported I/O modules

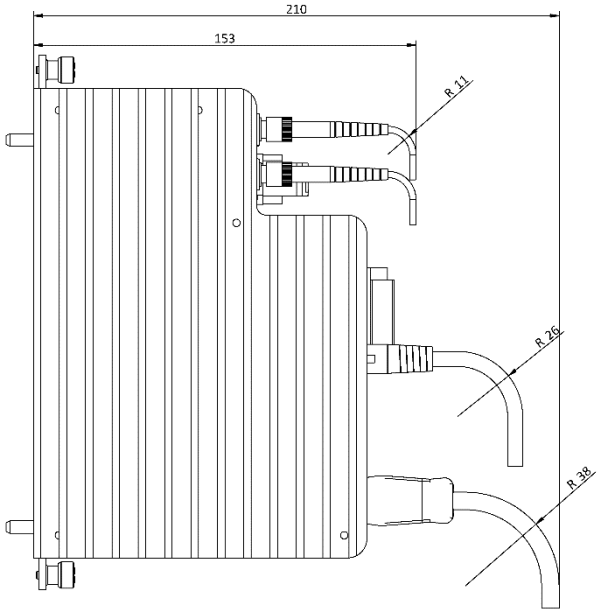
I/O module	Order no.	Use in backplane panel, e.g. *ibaPADU-S-B4S*	Use in *ibaMBox*
ibaMS3xAI-1A	10.124600	●	●
ibaMS3xAI-5A	10.124610	●	●
ibaMS3xAI-1A/100A	10.124620	●	●
ibaMS4xAI-380VAC	10.124521	●	●
ibaMS8xAI-110VAC	10.124500	●	●
ibaMS16xAI-10V	10.124100	●	●
ibaMS16xAI-10V-HI	10.124101	●	●
ibaMS16xAI-24V	10.124102	●	●
ibaMS16xAI-24V-HI	10.124103	●	●
ibaMS16xAI-20mA	10.124110	●	●
ibaMS16xDI-220V	10.124200	●	●
ibaMS16xDI-24V	10.124201	●	●
ibaMS32xDI-24V	10.124210	●	●
ibaMS8xICP	10.124300	●	●
ibaMS8xIEPE	10.124302	●	●
ibaMS4xUCO	10.124310	●	●
ibaMS16xAO-10V	10.124150	●	-
ibaMS16xAO-20mA	10.124160	●	-
ibaMS32xDO-24V	10.124260	●	-
ibaMS16xDIO-24V	10.124220	●	●
ibaMS4xADIO	10.124120	●	●

12.5 Dimensions

ibaDAQ

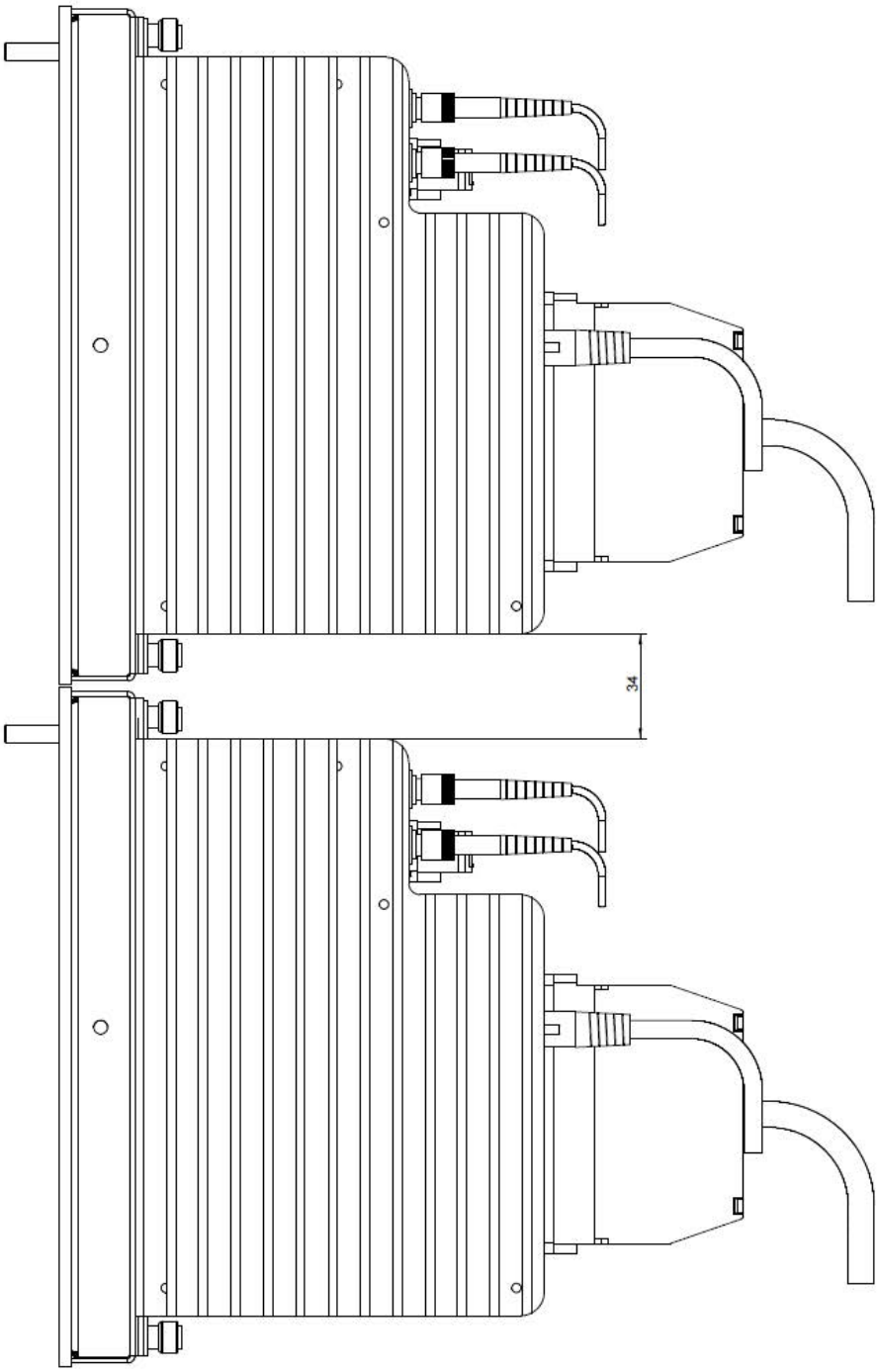


(dimensions in mm)



with cables (dimensions in mm)

Distance between 2 ibaDAQ systems



Minimum distance between 2 *ibaDAQ* systems (dimensions in mm)

12.6 Declaration of conformity

Supplier's Declaration of Conformity
47 CFR § 2.1077 Compliance Information

Unique Identifier:
10.170001, ibaDAQ
10.170031, ibaDAQ-MA5
10.170041, ibaDAQ-TQ-M

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.

12.7 Connection diagrams

12.7.1 Pin assignment power supply X14

Pin	Connection	
1	+ 24 V	
2	0 V	

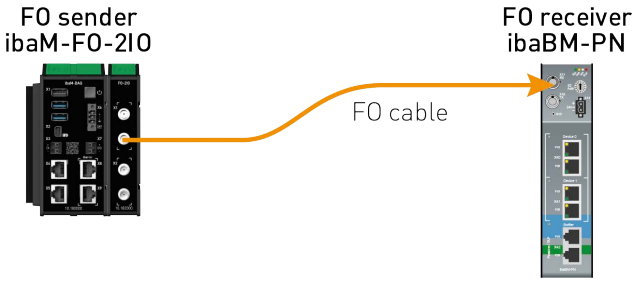
12.7.2 Pin assignment digital inputs and outputs X5

Pin	Connection	
1	Digital input 00 +	
2	Digital input 00 -	
3	Digital input 01 +	
4	Digital input 01 -	
5	Digital output 00 +	
6	Digital output 00 -	
7	Digital output 01 +	
8	Digital output 01 -	

12.8 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.

13 Accessories

13.1 Backplane panels

13.1.1 ibaPADU-S-B4S

Backplane panel for mounting 1 central unit and up to 4 I/O modules.

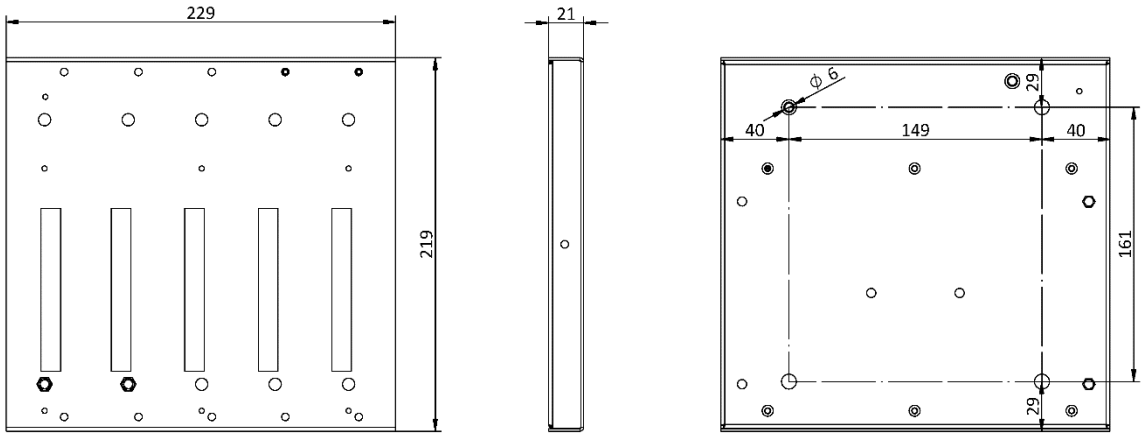
13.1.1.1 Scope of delivery – ibaPADU-S-B4S

The scope of delivery of the *ibaPADU-S-B4S* backplane panel includes:

- Backplane panel
- Assembly kit

Assembly kit

13.1.1.2 Dimensions – ibaPADU-S-B4S



(dimensions in mm)

13.1.1.3 Grounding – ibaPADU-S-B4S

For grounding the backplane panel use the enclosed grounding cable and the enclosed grounding screws as shown below.

1 Spring lock washer

2 Ground wire with cable lug

3 Contact washer

13.1.1.4 Technical data – ibaPADU-S-B4S

Short description

Product name	ibaPADU-S-B4S
Description	Backplane panel for 1 central unit and up to 4 I/O modules from the iba modular system
Order number	10.124000

Interface central unit

Number	1
Connection technology	Female header, pole number 3 x 32
Slot	X1

Interface I/O modules

Number	4
Connection technology	Female header, pole number 3 x 32
Slot	X2 - X5

Supply

Power supply	none

Mounting

Housing	4 thread M6, rear side
Assembly kit	enclosed
Grounding	1 thread M6, rear side
Assembly kit	enclosed

Environmental conditions

MTBF[3)]	47,872,504 hours / 5,464 years
Dimensions (width x height x depth)	229 mm x 219 mm x 21 mm
Weight / incl. packaging	0.66 kg / 0.85 kg

[3)] MTBF (mean time between failure) according to Telcordia Issue 3 (SR232) Reliability Prediction Procedure of Electronic Equipment (Issue 3 Jan. 2011)

13.1.2 ibaPADU-S-B1S

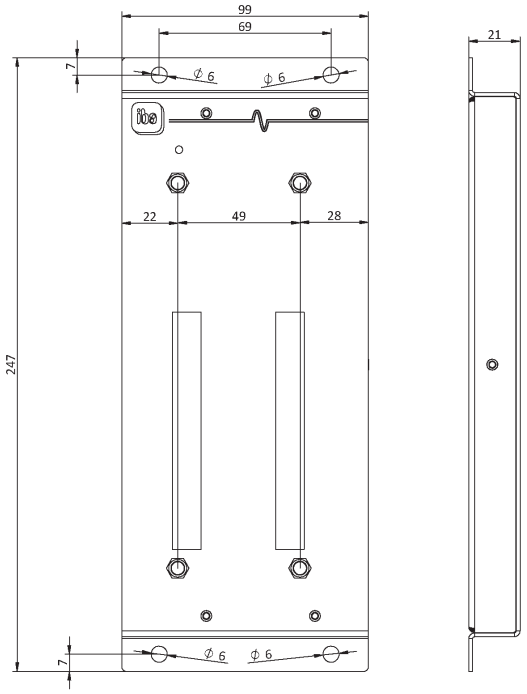
Backplane panel for mounting 1 central unit and 1 I/O module.

13.1.2.1 Scope of delivery – ibaPADU-S-B1S

The scope of delivery of the *ibaPADU-S-B1S* backplane panel includes:

- Backplane panel
- Assembly kit

13.1.2.2 Dimensions – ibaPADU-S-B1S



13.1.2.3 Grounding – ibaPADU-S-B1S

See ↗ *Grounding – ibaPADU-S-B4S*, page 76.

13.1.2.4 Technical data – ibaPADU-S-B1S

Short description

Product name	ibaPADU-S-B1S
Description	Backplane panel for 1 central unit and 1 I/O module from the iba modular system; with mounting angles
Order number	10.124002

Interface central unit

Number	1
Connection technology	Female header, pole number 3 x 32
Slot	X1

Interface I/O modules

Number	1
Connection technology	Female header, pole number 3 x 32
Slot	X2

Supply

Power supply	none

Mounting

Housing	4 through holes M6
Assembly kit	-
Grounding	1 thread M6, rear side
Assembly kit	enclosed

Design

Dimensions (width x height x depth)	99 mm x 247 mm x 21 mm
Weight / incl. packaging	0.32 kg / 0.43 kg

13.2 Mounting system for central unit

13.2.1 ibaPADU-S-B

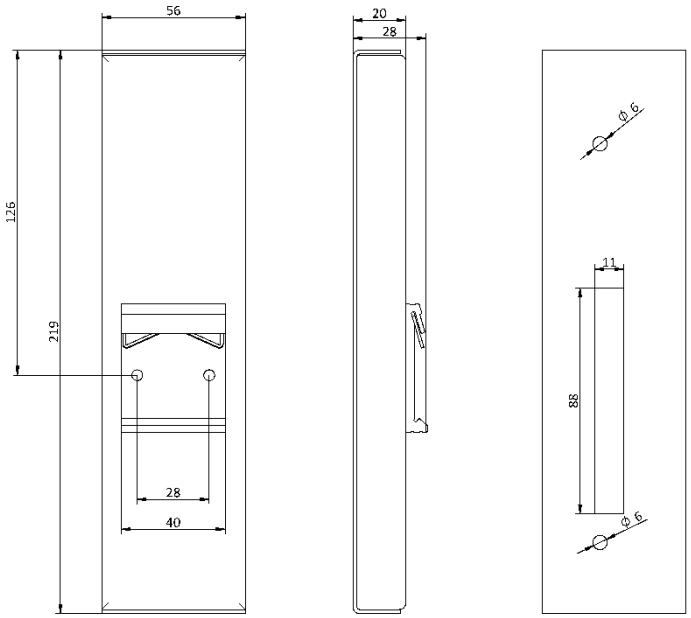
Mounting panel with DIN rail clip for 1 central unit (without I/O modules).

13.2.1.1 Scope of delivery – ibaPADU-S-B

The scope of delivery of the mounting system for the *ibaPADU-S-B* central unit includes:

- Mounting panel

13.2.1.2 Dimensions – ibaPADU-S-B



(dimensions in mm)

13.2.1.3 Grounding – ibaPADU-S-B

The grounding must be done via the DIN rail.

13.2.1.4 Technical data – ibaPADU-S-B

Short description

Product name	ibaPADU-S-B
Description	Mounting panel for 1 central unit from the iba modular system; with DIN rail clip
Order number	10.124001

Mounting

Panel	on DIN rail according to EN 50022 (TS 35, DIN Rail 35)
Assembly kit	-
Grounding	via DIN rail
Assembly kit	-

Design

Dimensions (width x height x depth)	56 mm x 219 mm x 28 mm
Weight / incl. packaging	0.17 kg / 0.26 kg

13.3 Mounting systems for ibaPADU-S-B4S

13.3.1 Mounting angles

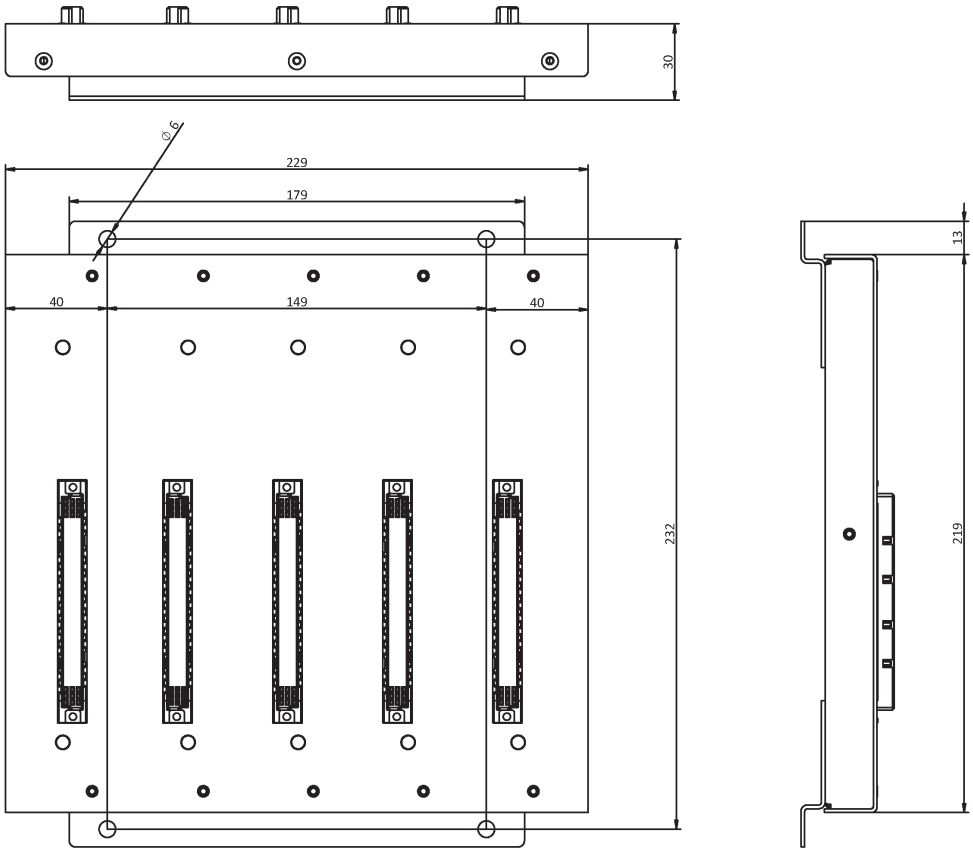
Mounting angles for mounting an iba modular system in a cabinet, 2 pieces, matching for *ibaPADU-S-B4S* (10.124000).

1 set (2 pieces) is needed for one backplane panel.

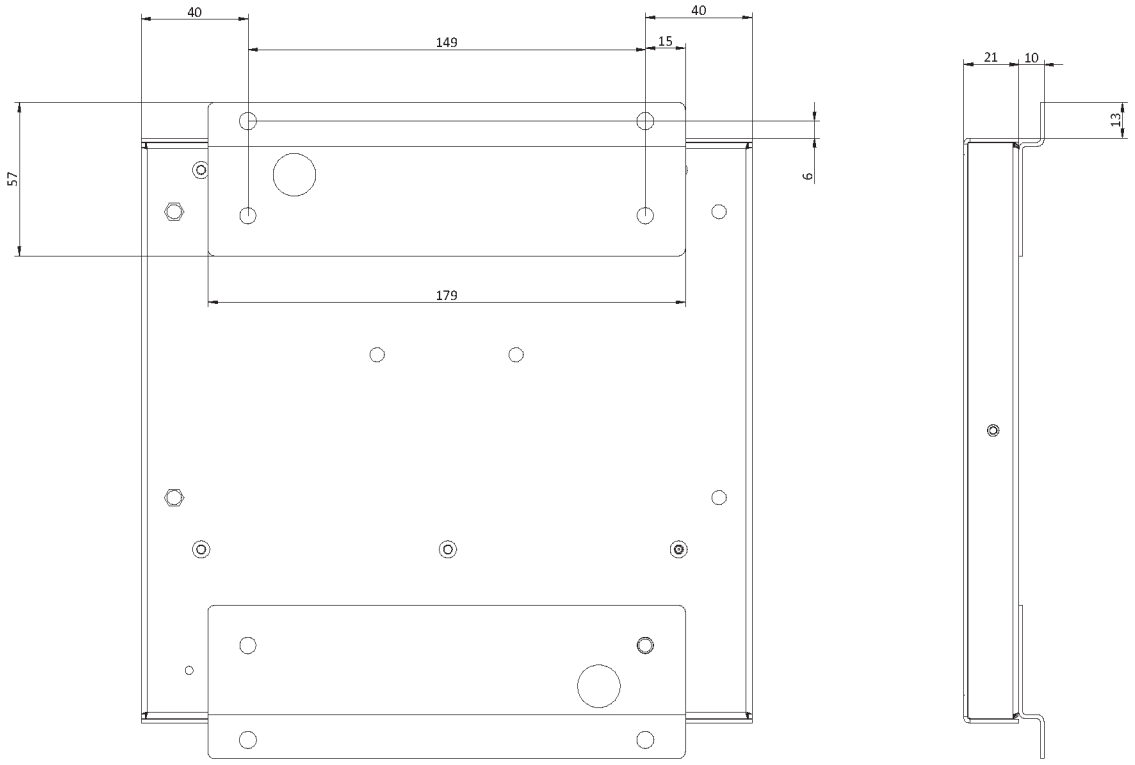
13.3.1.1 Scope of delivery – mounting angles

- 2 pieces mounting angles (1 set)

13.3.1.2 Dimensions – mounting angle



(dimensions in mm)



(dimensions in mm)

13.3.1.3 Technical data – mounting angle

Short description

Product name	Mounting angles for iba modular system
Description	1 set (2 pieces) mounting angles, matching for backplane panel ibaPADU-S-B4S, for a front side mounting of the backplane
Order number	10.124006

Mounting

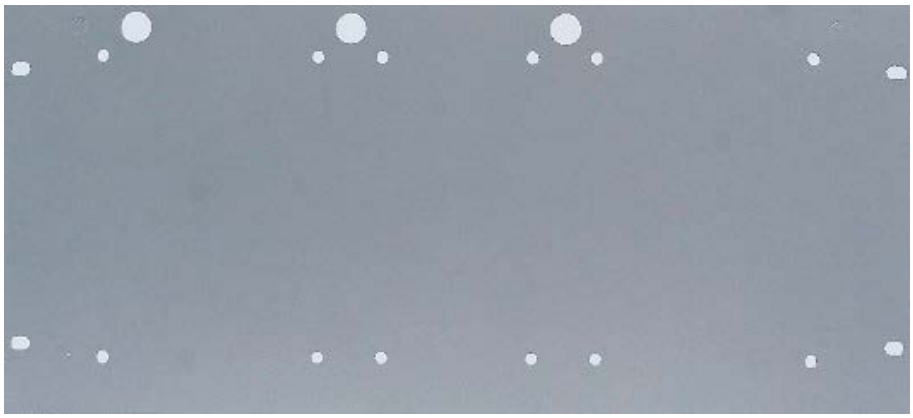
Angle	4 through holes M6
Assembly kit	-

Design

Dimensions (width x height x depth)	179 mm x 57 mm x 10 mm
Weight / incl. packaging	0.091 kg / 0.092 kg

13.3.2 Mounting panel 19"

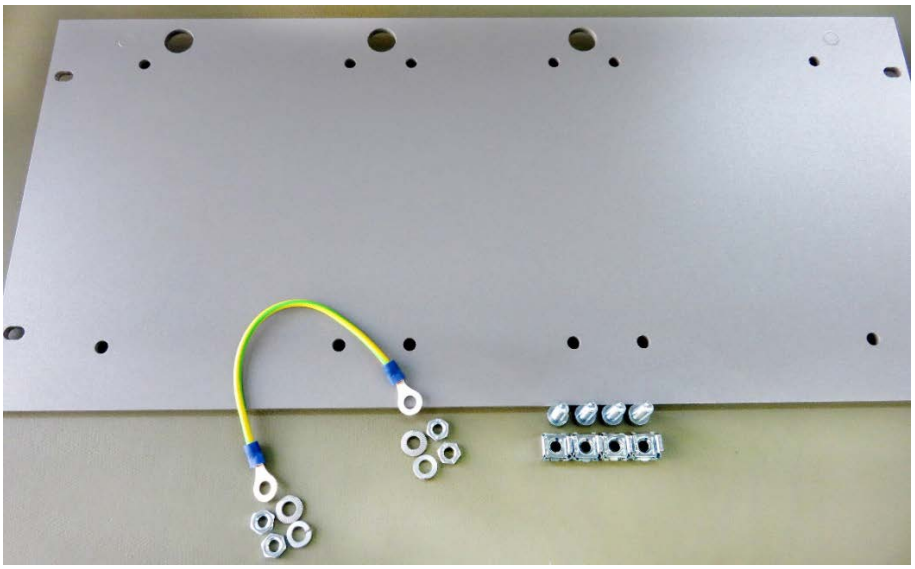
Mounting panel (483 mm/19") for up to 2 *ibaPADU-S-B4S* backplane panels.



13.3.2.1 Scope of delivery – mounting panel 19"

The scope of delivery of the mounting panel includes:

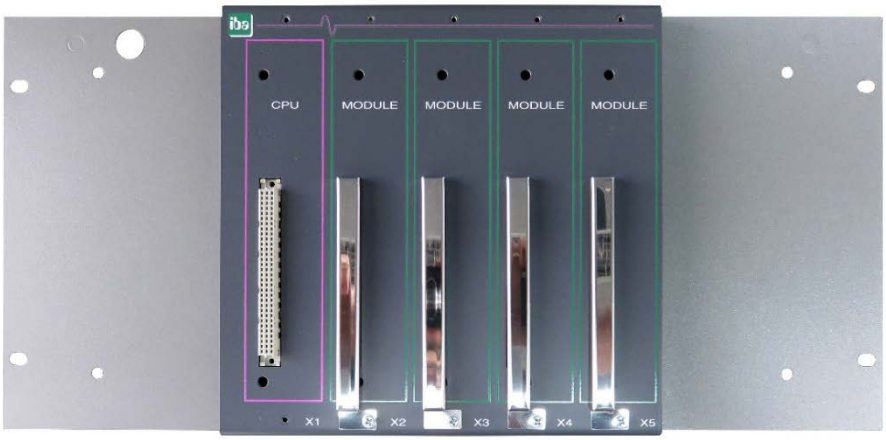
- Mounting panel
- Assembly kit



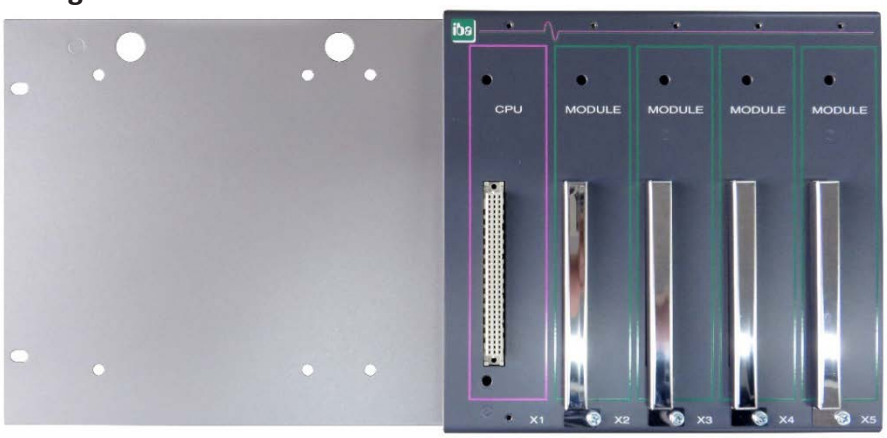
13.3.2.2 Mounting backplane panel

Up to 2 *ibaPADU-S-B4S* backplane panels can be mounted on the 19" mounting panel. The mounting of one backplane panel is possible either in the center or on the right or left side.

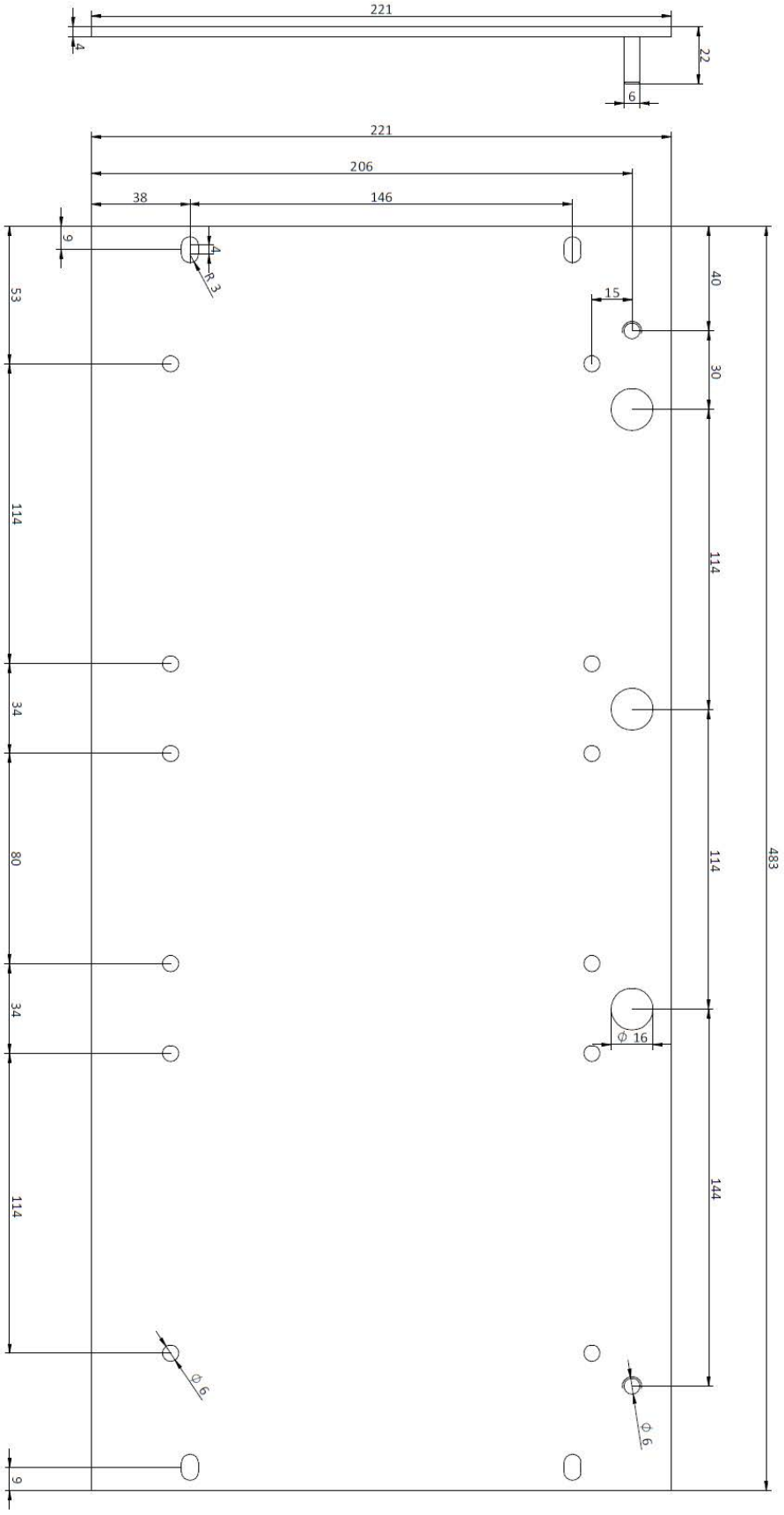
Mounting centered



Mounting on the right



13.3.2.3 Dimensions – mounting panel 19"



(dimensions in mm)

13.3.2.4 Grounding – mounting panel 19"

The following variants are available for grounding.

Variant 1:

One backplane panel and grounding of the mounting panel are on the **same side**.

After the backplane panel is mounted on the 19" mounting panel, the backplane panel must be grounded via the mounting panel. Screw the grounding cable on the back of the mounting panel to the backplane panel. Use the screw connection, see ↗ *Grounding – ibaPADU-S-B4S*, page 76.

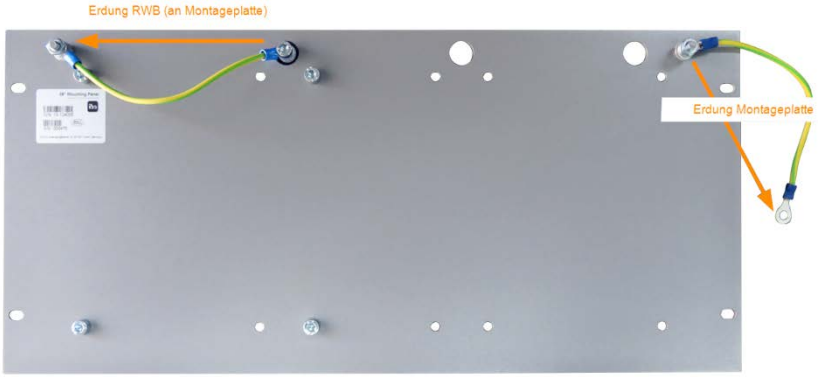
Connect the cable to the next threaded bolt of the mounting panel. The grounding of the mounting panel is also connected to the threaded bolt.

Both grounding cables are attached to the threaded bolt as shown.

Variant 2:

One backplane panel and grounding of the mounting panel are **not on the same side**.

The backplane panel is mounted on the right or left side of the mounting panel, the grounding of the mounting panel is connected on the respective other side. Ground the backplane panel at the next threaded bolt of the mounting panel. The grounding of the mounting panel can then be connected at the opposite side. See figure:

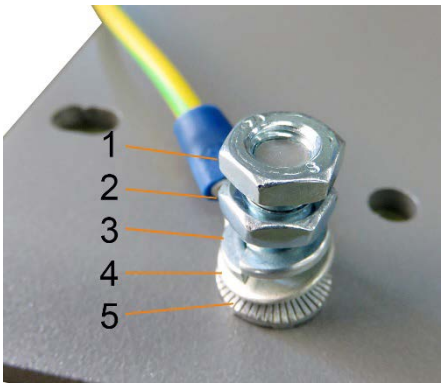


Variant 3:

Two backplane panels are mounted.

Ground the two backplane panels at the next threaded bolt on the left or right. The grounding of the mounting panel must be connected to one of the threaded bolts.

Connection for grounding the 19" mounting panel



1 Hexagon nut/lock nut

2 Hexagon nut

3 Spring lock washer

4 Ground wire with cable lug

5 Contact washer

13.3.2.5 Technical data – mounting panel 19”

Short description

Product name	Mounting panel 19" for iba modular system
Description	Mounting panel (483 mm/19") for up to 2 *ibaPADU-S-B4S* backplane panels
Order number	10.124005

Mounting

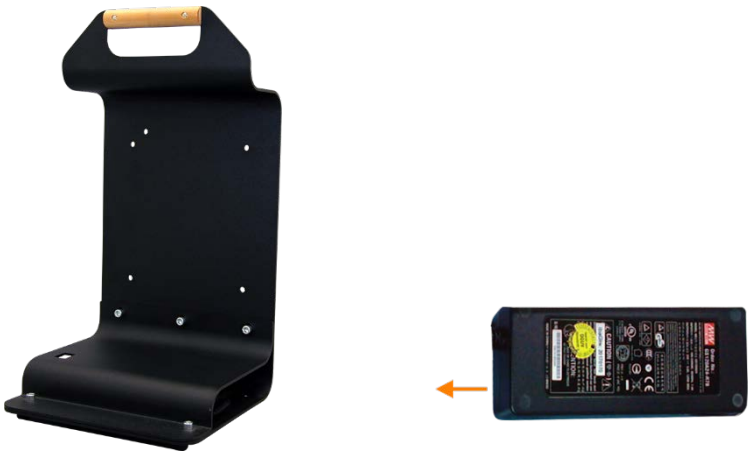
Panel	4 through holes
Assembly kit	enclosed
Grounding	2 threaded bolts M6, rear side
Assembly kit	enclosed

Design

Height units (HU)	5
Dimensions (width x height x depth)	483 mm x 221 mm x 22 mm
Weight / incl. packaging	1.2 kg / 1.4 kg

13.3.3 Module carrier

Module carrier for mounting 1 backplane panel *ibaPADU-S-B4S*.



Module carrier with power supply

The included table power supply can be conveniently stored in the bottom of the module carrier.

13.3.3.1 Scope of delivery – module carrier

The scope of delivery for the module carrier includes:

- Module carrier
- Table power supply 24 V DC / 5 A

13.3.3.2 Dimensions – module carrier

Width x height x depth: 230 mm x 435 mm x 200 mm

13.3.3.3 Technical data – module carrier

Short description

Product name	Module carrier for iba modular system
Description	Module carrier for mounting 1 backplane panel *ibaPADU-S-B4S*; incl. power supply 24 V DC / 5 A (10.800007)
Order number	10.124007

Design

Dimensions (width x height x depth)	230 mm x 435 mm x 200 mm
Weight	1.8 kg

Accessories

Power supply 24 V DC / 5 A	10.800007

13.4 Terminal blocks

12 pin RM 3.81 terminal block PHOENIX		
Order number	52.000024	
2 pin RM 5.08 terminal block WAGO		
Order number	52.000022	

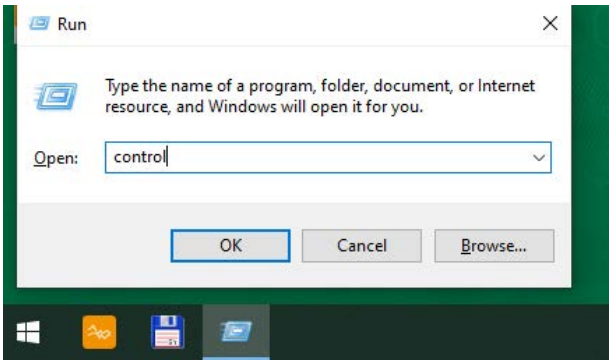
14 Appendix

14.1 NTP time synchronization

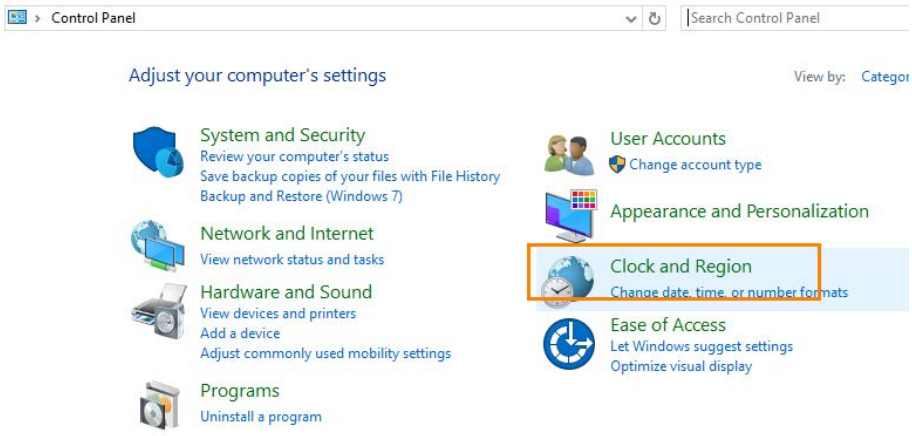
The system clock can be synchronized with a network NTP server using the NTP (Network Time Protocol) settings at the operating system level.

To configure this function, proceed as follows (using Windows 10 as an example):

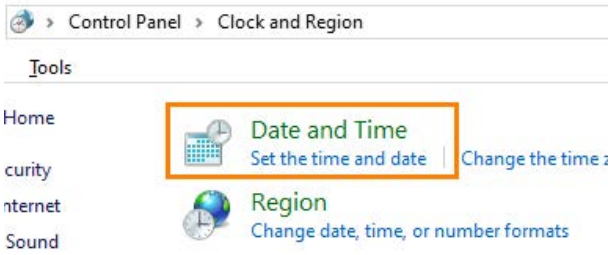
1. Open the “Run” dialog box in Windows using the keyboard shortcut <Windows> + <R>.
2. Enter “control” in the input field and confirm with Return or <OK>.



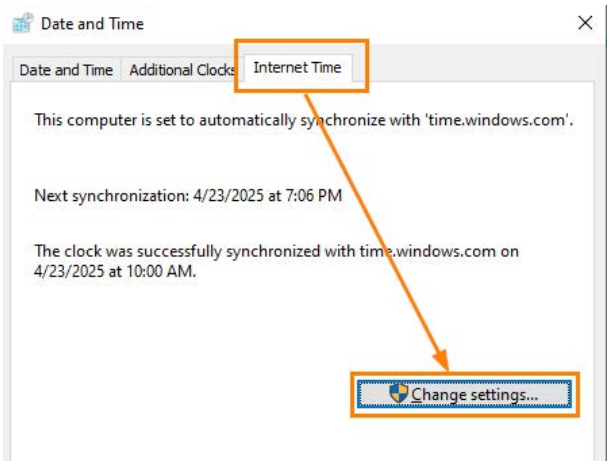
3. In the Control Panel, open the settings for *Clock and Region*.



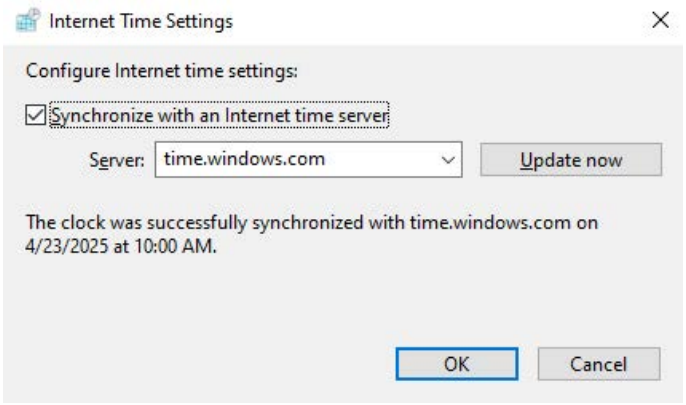
4. Select *Date and Time*.



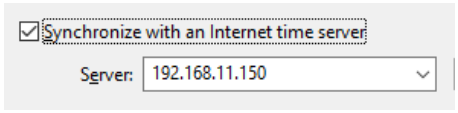
5. Switch to the *Internet Time* tab and open the settings by clicking <Change settings...>.



6. Enable time synchronization and specify an accessible NTP server.



7. You can specify the NTP server either via a host name or an IP address.



15 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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please refer to our web site:

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