



ibaDAQ

Central unit for stand-alone data acquisition

Manual

Issue 1.8

Measurement Systems for Industry and Energy

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Certification

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

Further international customary standards and directives have been observed.



Note: 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.

Issue	Date	Version History	Chapter	Author	Version HW/FW
1.8	03-2024	Dimension drawings		Ms, st	02.15.005

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1 About this manual

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



Note

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 manuals:

□ Central units

The manuals of the central units contain information about:

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

□ Modules

The manuals of the single modules contain specific information about the module. For example:

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

1.1 Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded as a 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.

1.2 Notations

The following designations are used in this manual:

Action	Notations
Menu command	Menu <i>Logic diagram</i>
Call of menu command	<i>Step 1 – Step 2 – Step 3 – Step x</i> Example: Select menu <i>Logic diagram – Add – New logic diagram</i>
Keys	<Key name> Example: <Alt>; <F1>
Press keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	„File name“, „Path“ Example: „Test.doc“

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:

- By an electric shock!
- Due to the improper handling of software products which are coupled to input and output procedures with control function!

If you do not observe the safety instructions regarding the process and the system or machine to be controlled, there is a risk of death or severe injury!



⚠ WARNING

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



⚠ CAUTION

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



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 stand-alone unit to acquire and record data. ibaDAQ integrates a complete ibaPDA system and an internal solid state disk (SSD) with sufficient memory space.

The range of applications includes:

- Mobile measurement acquisition
- Commissioning
- 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

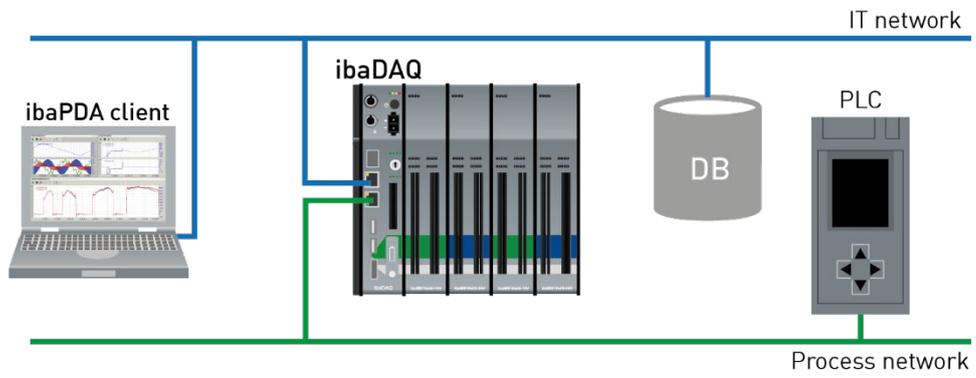
2 digital inputs and 2 digital outputs are available and can be configured for special functions. One output can serve as an alarm output if the watchdog function is activated in ibaPDA. In addition, the device can be shut down and powered off safely if a trigger signal signals the interruption of the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



3 **Scope of delivery**

After unpacking, check the delivery for completeness and possible damages.

The scope of delivery comprises:

- ibaDAQ device
- 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 (voltage supply)
- Data medium "iba Software & Manuals"

4 Safety instructions

4.1 Intended use

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

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

The device must only be used as described in chapter 11 Technical data.

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.



Strictly observe the operating voltage range!

Never supply the device with a voltage other than 24 V DC $\pm 10\%$!
Excess voltage may destroy the device!



ATTENTION!

Modules and CPU must never be inserted or removed to/from the rack under voltage!
Switch off ibaDAQ and disconnect the power supply before inserting or removing modules.



Important note

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



Important note

Please shutdown the device properly at any time to prevent dataloss. Uncontrolled shutdowns e.g. by disconnecting the power can lead to dataloss.



Caution!

Make sure that the cooling fins have sufficient ventilation!



Note

Clean the device only on the outside with a dry or slightly damp and statically discharged cloth.

5 System requirements

5.1 Hardware

For operation

- Power supply 24 V DC \pm 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 ibaMBox¹

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).

5.2 Software

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

5.3 Firmware

ibaDAQ version 02.15.005 or higher

¹ The selection of I/O modules to be used in ibaMBox is limited, see chapter 11.4.

6 Mounting, connecting, dismounting, first configuration



Caution!

Only work on the device when it is de-energized!

6.1 Mounting on the backplane panel

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



Important note

Always screw tight the device and the modules. If you do not screw it tight, connecting or disconnecting the connectors for the inputs and outputs might cause damages.



A description of how to attach the grounding can be found in chapter 12 "Accessories" for the different mounting systems:

- Mounting with backplane panels, chapter 12.1
- Mounting system for central unit only, chapter 12.2
- Mounting systems for ibaPADU-S-B4S, chapter 12.3

6.2 Dismounting

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 backplane.

6.3 Operation with ibaMBox

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.

6.4 First configuration

6.4.1 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. daq-000002.

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



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.



Important 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.

6.4.1.1 ibaPDA client

If not already existing, please 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“.

Start the ibaPDA client.

Click on the icon  to start the dialog "ibaPDA server selection" and enter the host name or the IP address of ibaDAQ as address. By default, the port number is 9170. If ibaDAQ is already in the list of servers, you can also select the device there.

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.

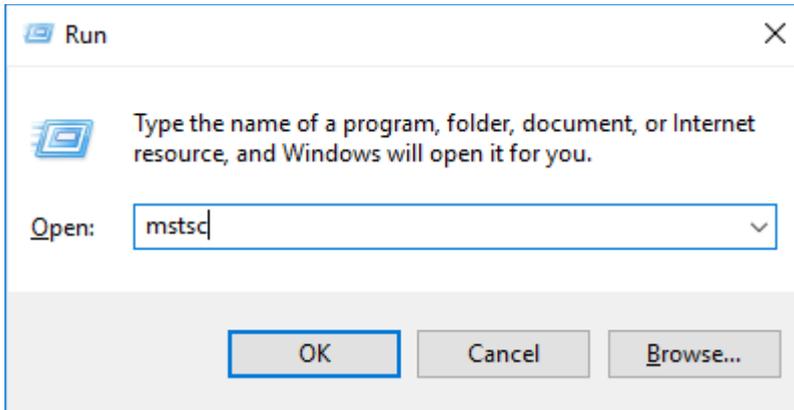
To further configure the system, proceed as described in chapter 10.

6.4.1.2 Remote Desktop

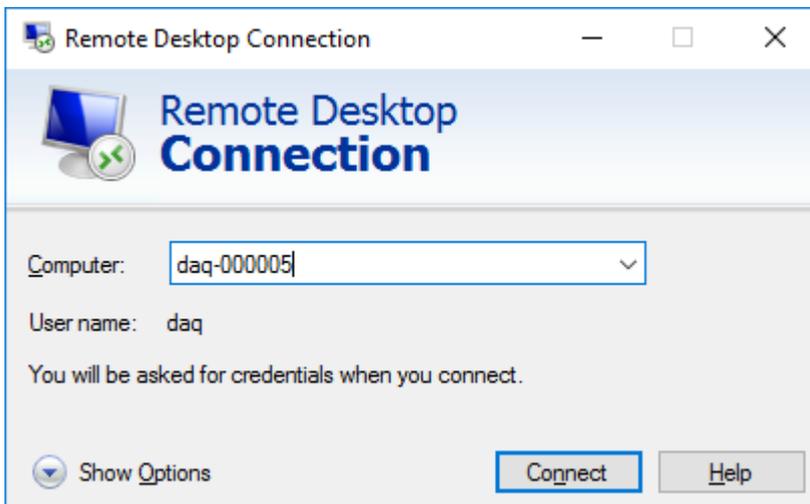
Open the Remote Desktop Connection on the system used to configure ibaDAQ. You can find this in the Windows task bar under “Accessories”.

There is another option to open the Remote Desktop Connection:

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



Enter the host name or the IP address of the ibaDAQ system in the field “Computer”.



If you are requested to enter login information, use the information given in chapter 8.1.

Start the ibaPDA client from the Windows Start menu.

For further configuration, proceed as described in chapter 10.

6.4.2 Set up via monitor, keyboard and mouse

Connect a monitor to the DisplayPort connection of ibaDAQ. If necessary, use an adapter.

Connect a keyboard and a mouse to the USB ports of ibaDAQ.

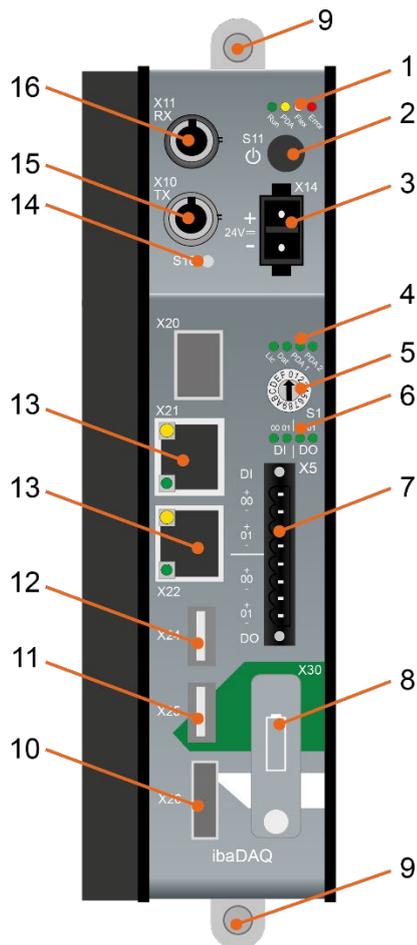
If required, log in to the system. You can find the login data in chapter 8.1.

Start the ibaPDA client from the Windows Start menu.

For further configuration, proceed as described in chapter 10.

7 Device description

7.1 Views



- 1 Operating status indicators L1 ... L4
- 2 ON/OFF switch S11
- 3 Connector for power supply 24 V X14
- 4 Display (operating status, user-defined)
- 5 Rotary switch S1
- 6 Display digital inputs and outputs
- 7 Connection digital inputs and outputs X5
- 8 Battery compartment X30
- 9 Fixing screws
- 10 Monitor connection X26
- 11 USB 2.0 port X25
- 12 USB 3.0 port X24
- 13 Network interfaces X22 and X21
- 14 System function pushbutton S10
- 15 Connection FO output (TX) X10
- 16 Connection FO input (RX) X11

X20, SFP port for future functions

7.2 Display elements

7.2.1 Operating state

The operating state of the device is indicated by colored LEDs.

LED	Color	Status	Description
Run	Green	Off	Device down, no power supply, hardware error, controller stopped
		Flashing	Ready
		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	Disturbance, internal applications do not run
		On	Hardware error



Important note

Contact the iba support when the error LED indicates an error.

7.2.2 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	Status	Description
Lic	Yellow		Demo licenses released on dongle
	Green		Dongle OK
	Red		No 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		
PDA2	Yellow		
	Green		User-defined display
	Red		
	Off		

7.2.3 Status of digital inputs

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

LED	Status	Description
DI 00, DI 01	Off	No signal, logical 0
	On	Signal ok, logical 1

7.2.4 Status of digital outputs

LED per channel ²	Status	Description
DO 00, DO 01	Off	No signal, logical 0
	On	Signal ok, logical 1

² If an output is deactivated by ibaPDA, the corresponding channel LED will remain dark.

7.3 Operating elements

7.3.1 ON/OFF switch S11

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

- Press briefly: system shuts down
- Press and hold (> 5 s): system switches off (no controlled shut-down)

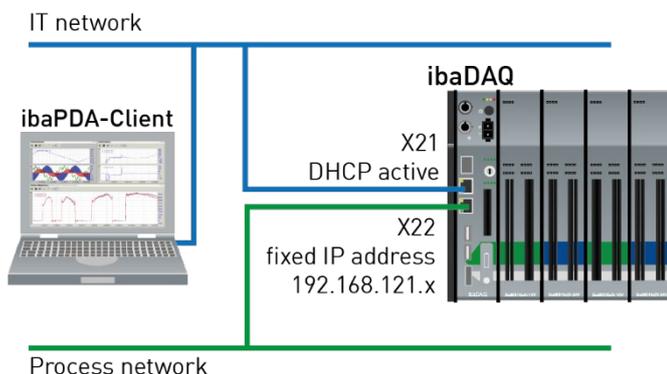
7.3.2 Rotary switch S1

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)
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:

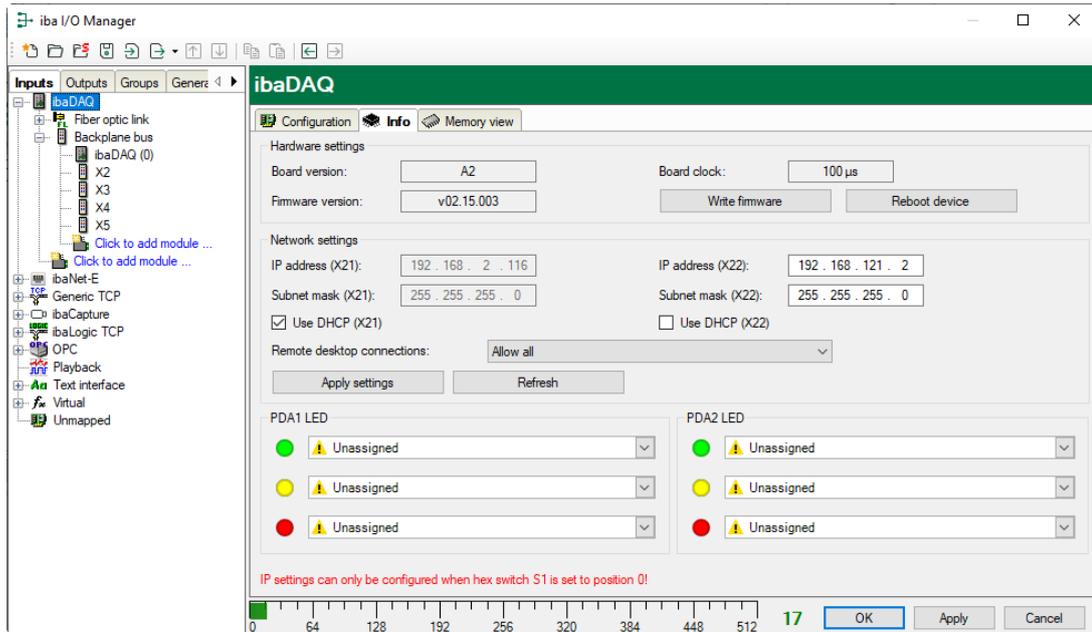
- X21 = Interface for the IT network, DHCP is active
- X22 = Interface for the process network with fixed IP address (192.168.121.2)



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 10.1.
2. Set switch **S1** to position **0**.
3. Open the I/O Manager in ibaPDA, select the first node ibaDAQ and switch to the "Info" tab.

- Assign the appropriate settings for the network interfaces. For the given example, select "Use DHCP" for X21, and for X22, enter a fixed IP address that matches your network. Click on <Apply settings> to activate the settings.



7.3.3 System function pushbutton S10

The S10 pushbutton has 2 functions:

Reset function

If S10 is pressed 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 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 equally be ignored.

7.4 Communication interfaces

7.4.1 Fiber optic connections X10 and X11

- X11 (RX): FO input
- X10 (TX): FO output

The fiber optic (FO) ports X10 and X11 have the function of an ibaFOB-io card. Here, more iba devices can be connected, such as the ibaPADU family, iba bus monitors or system interface connections.

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. 50/125 μm , 62.5/125 μm , etc.), or the attenuation of other components in the fiber optic cable plant such as couplers or patch panels.

However, the maximum distance can be estimated on the basis of the output power of the transmitting interface (TX) or the sensitivity of the receiving interface (RX). A model calculation can be found in chapter 11.7.

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 chapter "Technical data" 11.2 under "ibaNet interface".

7.4.2 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 chapter 7.3.2

Upon delivery, DHCP is activated.

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

7.4.3 USB ports

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

7.4.4 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.

7.5 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.

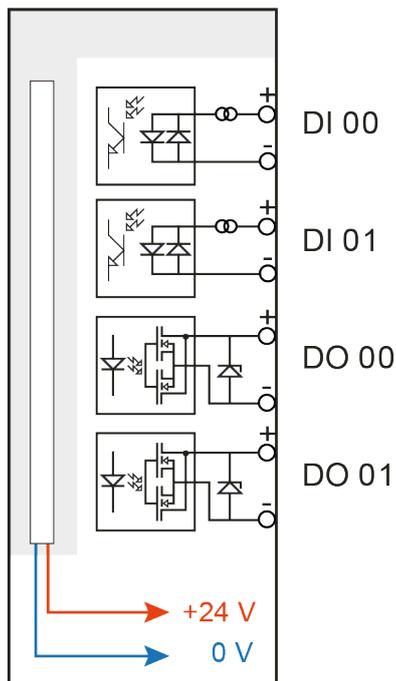
The DI 00 input can be used to initiate save shutdown and powering off if a trigger signal indicates that the voltage supply is interrupted. This is configured in ibaPDA.

Basic	
Module Type	Backplane bus
Locked	False
Enabled	True
Name	ibaDAQ
Module No.	0
Timebase	0,025 ms
Use name as prefix	False
Digital I/O	
DI00: Automatic shutdown	False
DO00: Watchdog output	False
DI00: Automatic shutdown Automatically shutdown the ibaDAQ when DI00 is asserted	

7.5.1 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 –	

Connection diagram for digital inputs and outputs X5:



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 (+).

7.5.2 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"

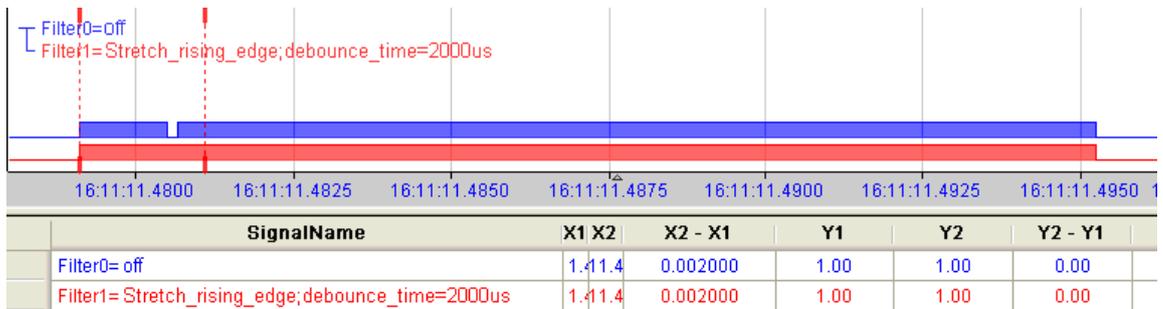
For each filter, a debounce time has to be defined in μs . This debounce time can have a value between $[1\mu\text{s} \dots 65535\mu\text{s}]$.

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.



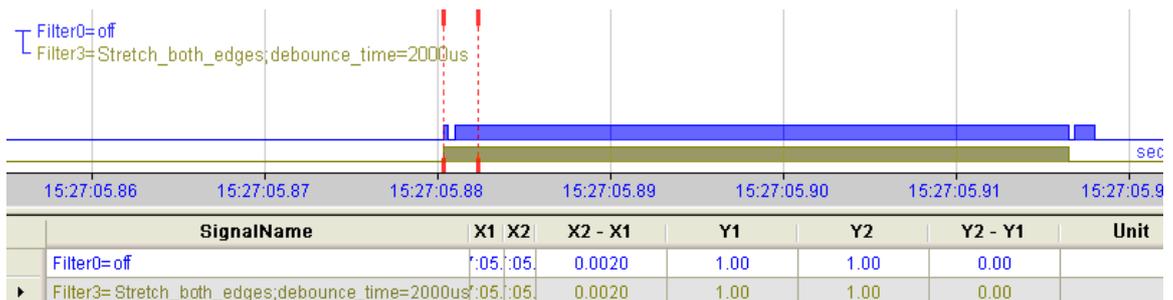
"Stretch falling edge"

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.



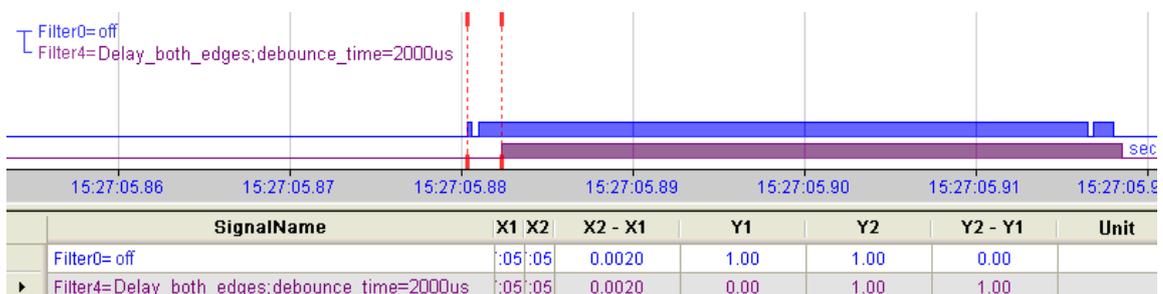
"Stretch both edges"

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.



"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.



7.6 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 –	

7.6.1 Alarm function

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

Basic	
Module Type	Backplane bus
Locked	False
Enabled	True
Name	ibaDAQ
Module No.	0
Timebase	0,025 ms
Use name as prefix	False
Digital IO	
DI00: Automatic shutdown	False
DO00: Watchdog output	False
DI00: Automatic shutdown Automatically shutdown the ibaDAQ when DI00 is asserted	

7.7 Voltage 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 ($\pm 10\%$ unregulated)!

Pay attention to polarity!

7.8 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.



Important 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. Devices 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 System integration

8.1 Default settings

The following parameters are preset in the device at delivery.

8.1.1 ibaDAQ with Win10 LTSC 2019/v1809

8.1.1.1 Network parameters

Default settings for rotary switch = 1

Can be configured via rotary switch, see chapter 7.3.2.

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.

8.1.1.2 User accounts



Important note

Change the default 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.

8.1.2 ibaDAQ with Win10 LTSC 2021/v21H2

8.1.2.1 Network parameters

Default settings for rotary switch = 1

Can be configured via rotary switch, see chapter 7.3.2.

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.

8.1.2.2 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

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



Important note

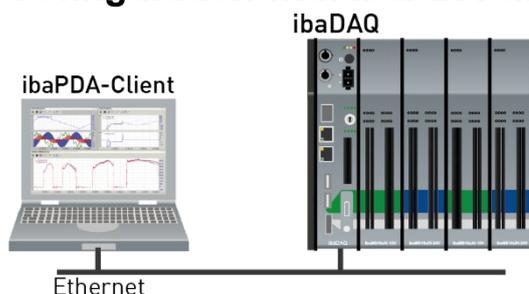
Change the default passwords after you have started up ibaDAQ! This makes unauthorized use of the system more difficult.

8.1.2.3 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.

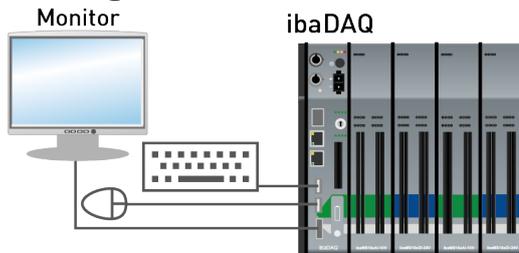
These settings can only be changed at the operating system level, either via a remote desktop connection or when input devices (monitor, mouse, keyboard) are connected directly.

8.2 Configuration with ibaPDA client



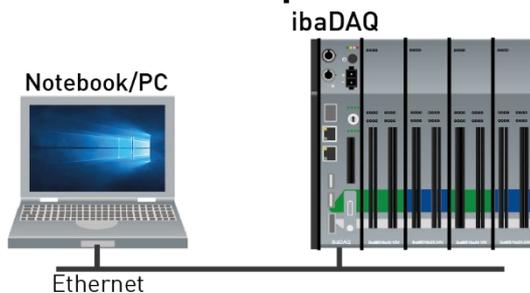
- The ibaPDA client is connected to the central unit via Ethernet.

8.3 Configuration of the central unit



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

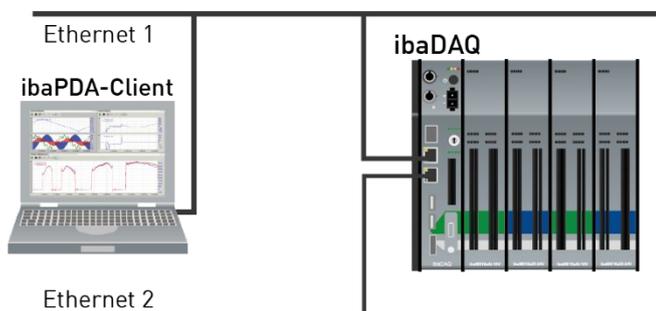
8.4 Remote Desktop



- Operation through the network using Remote Desktop

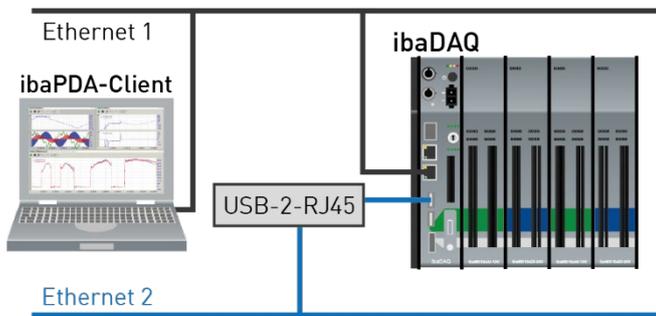
8.5 Connection to networks

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 purpose the device provides 2 Ethernet interfaces. For setting the addresses in the networks, please refer to chapter 7.3.2.



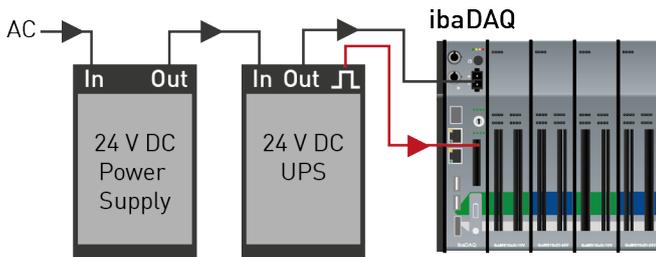
8.6 Connection with USB-WLAN/RJ45 adapter

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.



8.7 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.

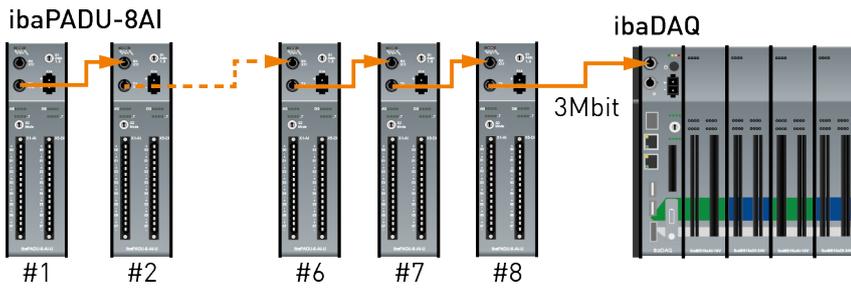
See also chapter 10.4.1.

8.8 Supported ibaNet communication protocols

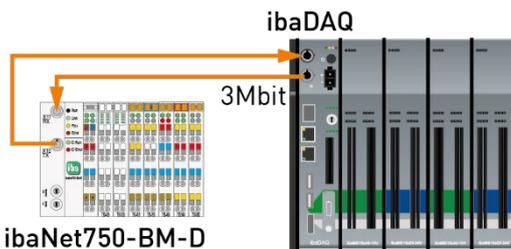
Protocol	Min. telegram cycle (T_{cycl})	Max. signal sampling frequency	Direction of communication x-directional	Max. data volume (in bytes)	Max. number of participants in the FO connection
ibaNet 3Mbit	1 ms	1 kHz	uni	136 B (64 integer values, 64 binary values)	8 (line topology)
ibaNet 32Mbit 50 μ s	50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

8.8.1 Sample applications

8.8.1.1 Measured data acquisition with 3Mbit protocol

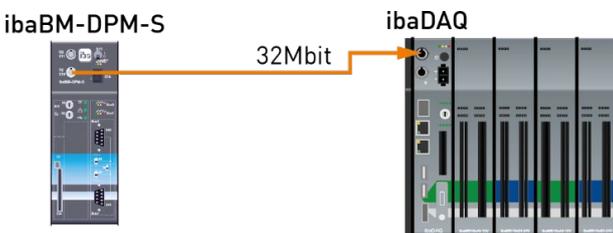
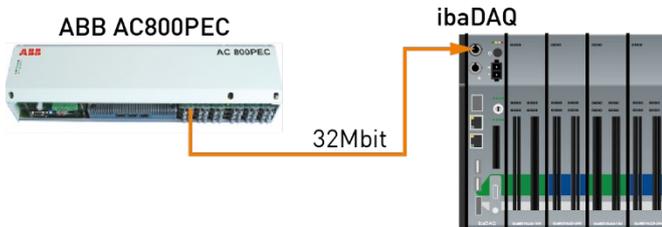


Unidirectional connection of 3Mbit devices



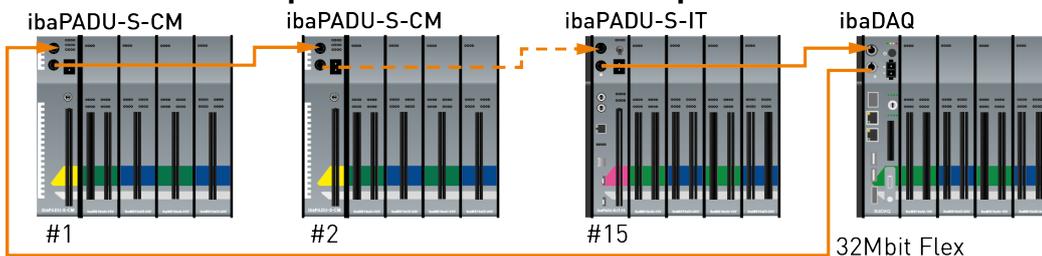
Bidirectional connection of 3Mbit devices

8.8.1.2 Measured data acquisition with 32Mbit protocol

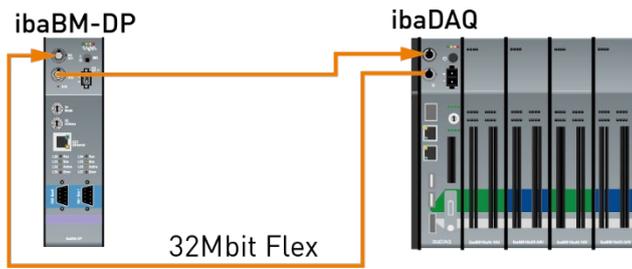


Unidirectional connection of 32Mbit devices

8.8.1.3 Measured data acquisition with 32Mbit Flex protocol



32Mbit Flex devices in a ring topology



Connection of ibaBM-DP

9 Updates

9.1 Firmware update

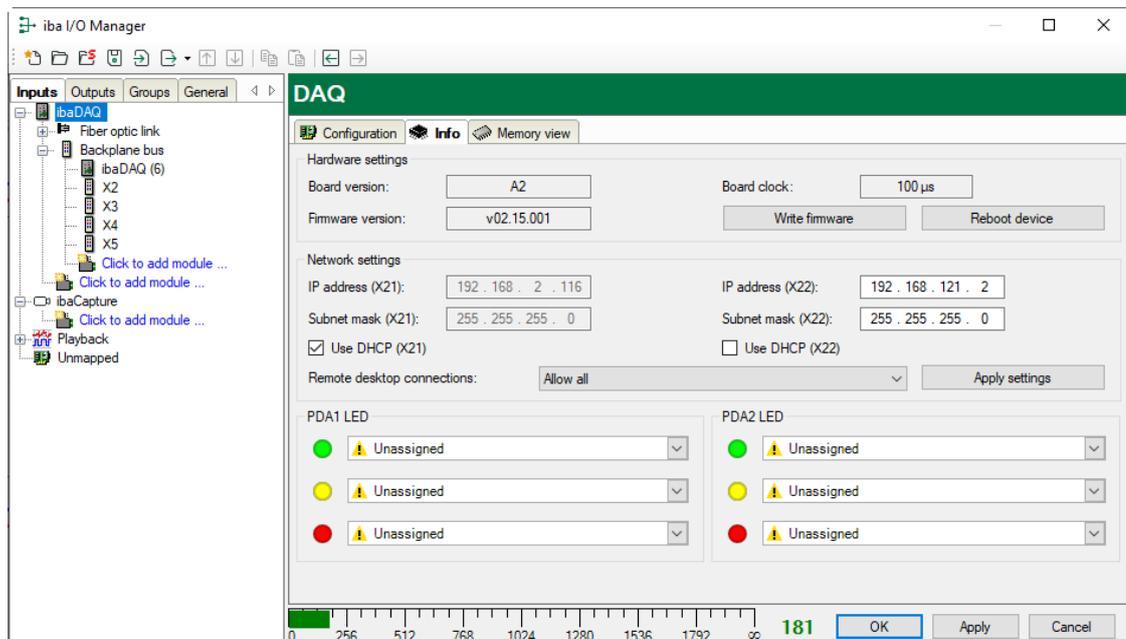
A firmware update always upgrades the entire iba modular system, i.e. the central unit and the plugged-in I/O modules.



CAUTION

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

- Open the ibaPDA I/O Manager and navigate to the main node of your ibaDAQ system.
- Click the <Write firmware> button on the "Info" tab and select the "daqs_v[xx.yy.zzz].iba" update file.
- Click <OK> to start the update.

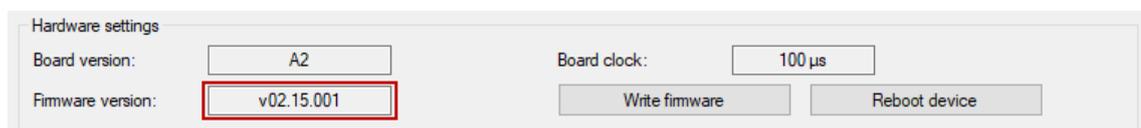


9.2 Auto-updating the modules

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", i.e. the firmware version of the entire system. 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.



Important note

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



Important 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". If you want to get the current update file, please contact the iba support.

10 Configuration with 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. In this case, continue with chapter 10.2.

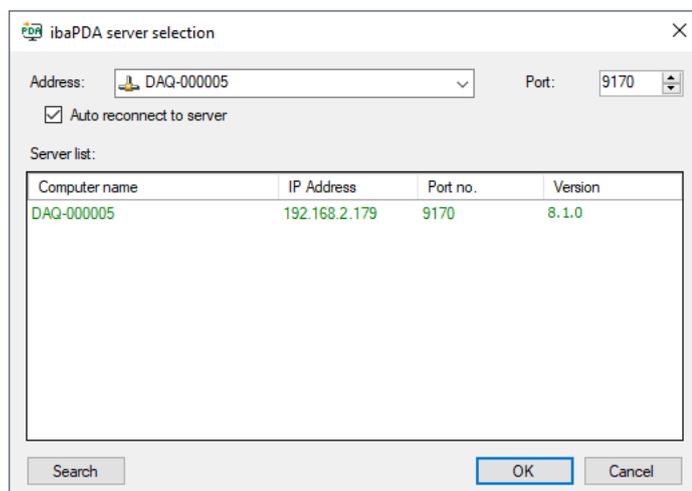
If you are using an external ibaPDA client for configuration, continue with the next chapter 10.1.

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.

Start ibaPDA and select ibaDAQ as ibaPDA server.

Click the  button on the toolbar or click "Select server..." in the Configuration 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.

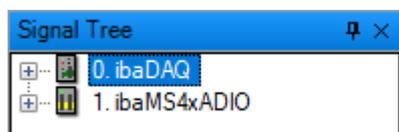
Port-no.

The port number is assigned automatically.

The <Search> button

This button starts and stops 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.

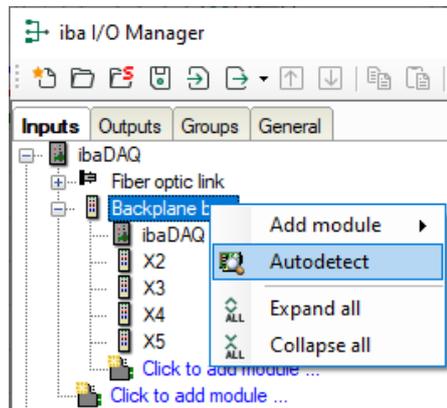


For further configuration activities, open the I/O Manager as described in the next chapter.

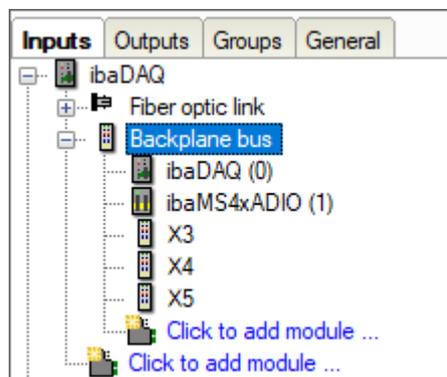
10.2 Adding I/O modules

Start ibaPDA, open the I/O Manager and proceed as follows:

1. Select the "Backplane bus" link in the I/O Manager. Right-click the link to open a submenu. Select "Autodetect".

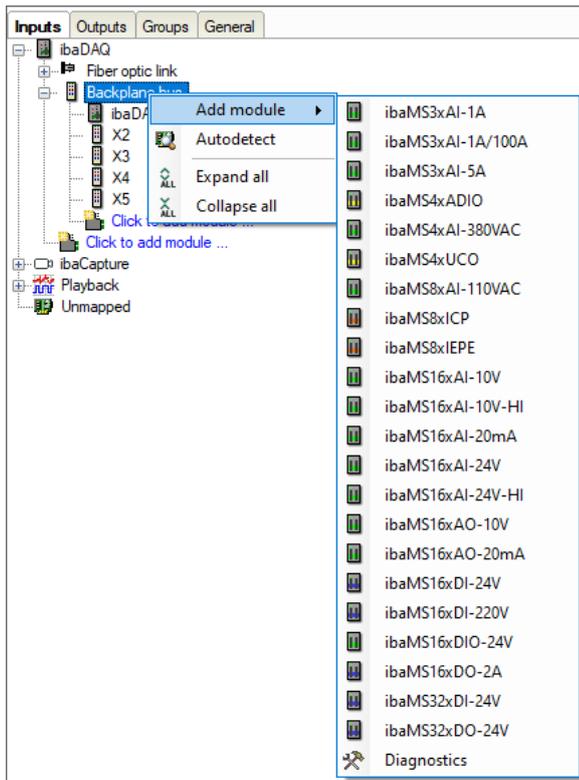


If ibaPDA detects the device automatically, the device and the connected modules are listed in the module tree.

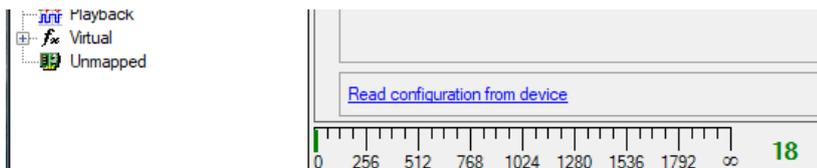


2. If ibaPDA does not detect the modules automatically, you can add the modules manually.
3. Right-click the "Backplane bus" link.

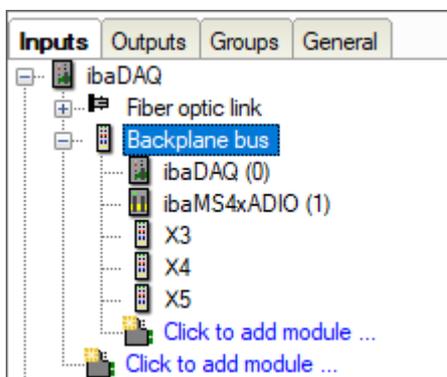
4. Select "Add module". Select the desired modules from the list.



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



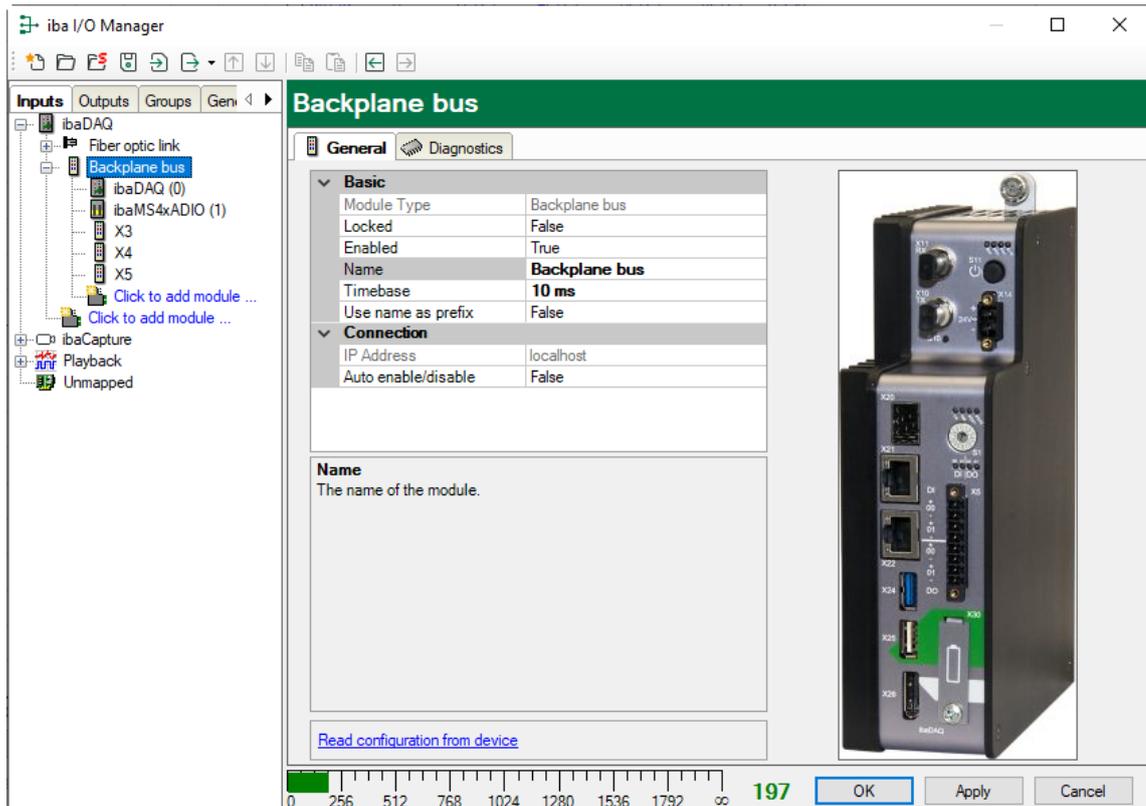
The connected modules are detected automatically and displayed in the module tree.



6. Configure ibaDAQ and the modules, e.g. assign a name, debouncing, etc. (see chapter 10.3.1 "Backplane bus – General tab" and following).
7. Click <Apply> or <OK> for applying a new configuration.

10.3 General Settings

10.3.1 Backplane bus – General tab



Basic settings

Module type

Display of the module type (read only)

Locked

A locked module can only be changed by an authorized user.

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 connect to this device during the start of the acquisition then 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 restart 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.

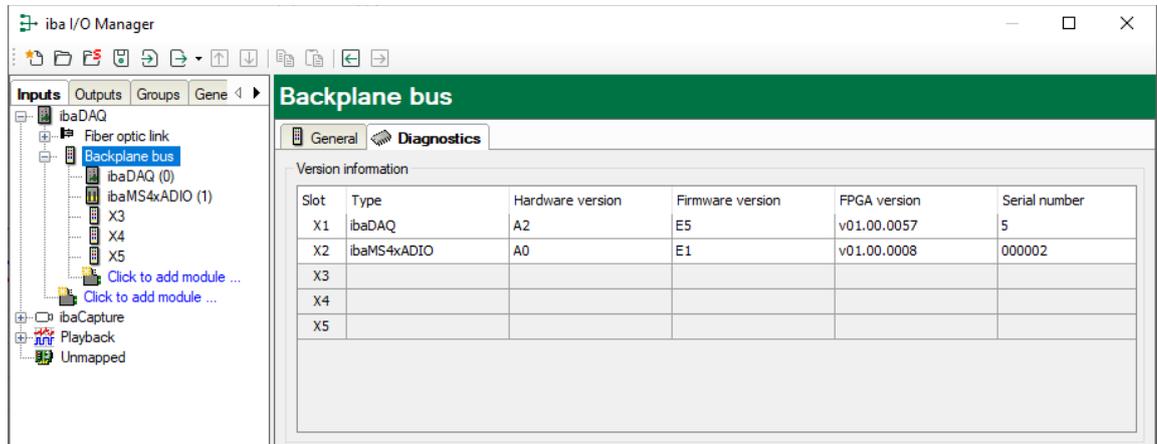
More functions

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>.

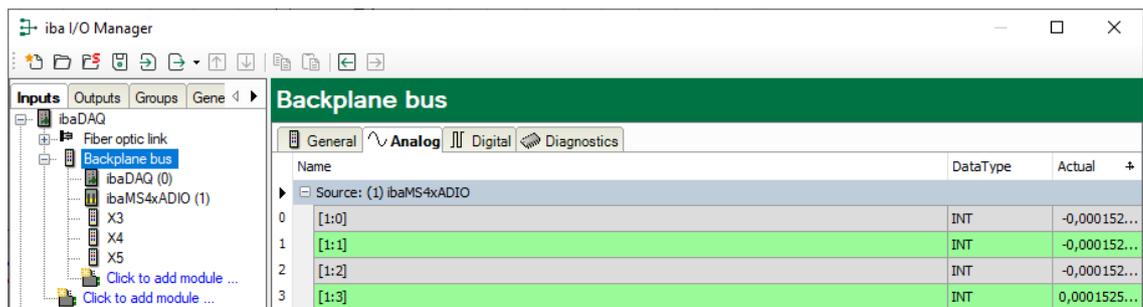
10.3.2 Backplane bus – Diagnostics tab



Here, you find information about the hardware version, firmware version, FPGA version and the serial number of the central unit and the connected modules.

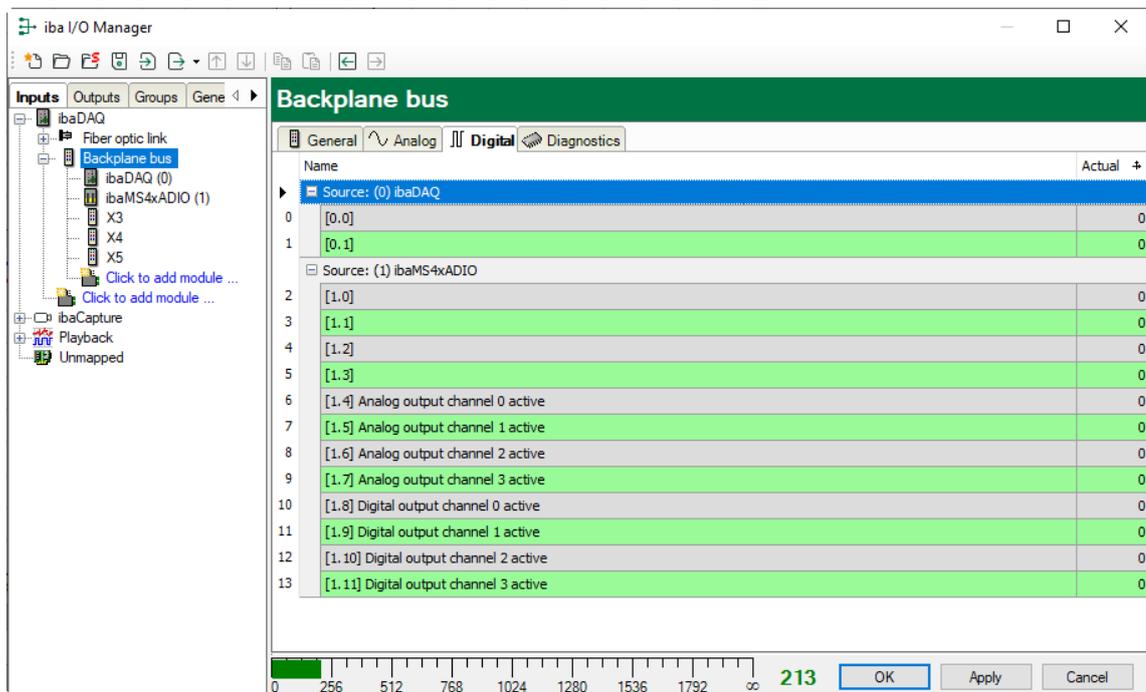
10.3.3 Backplane bus – Analog tab

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.



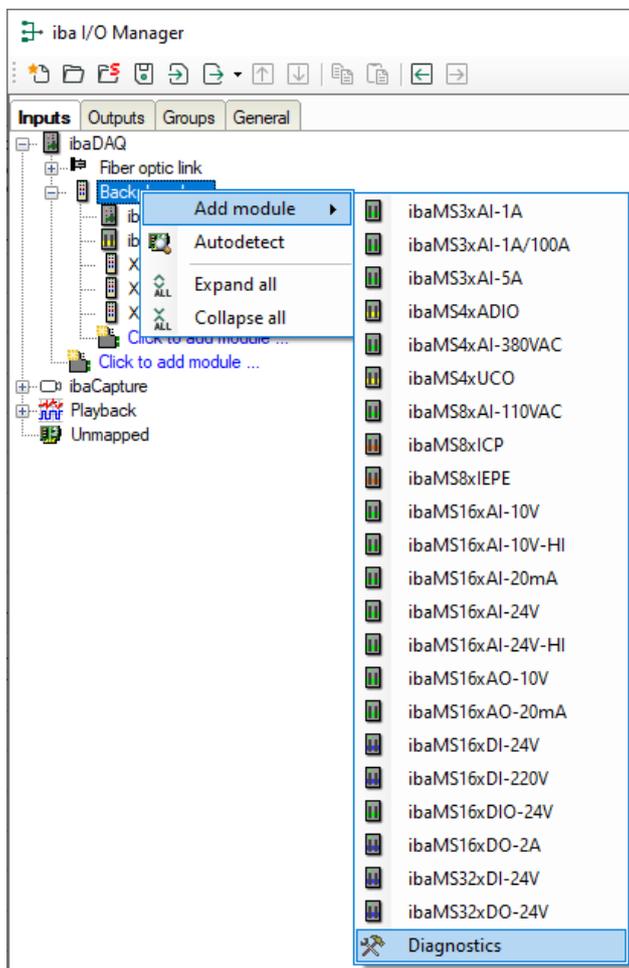
10.3.4 Backplane bus – Digital tab

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.

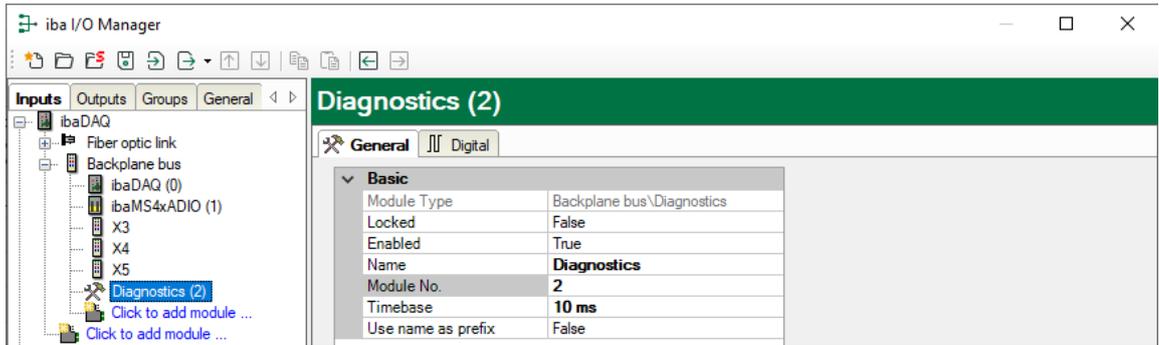


10.3.5 Diagnostics signals

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



Basic settings

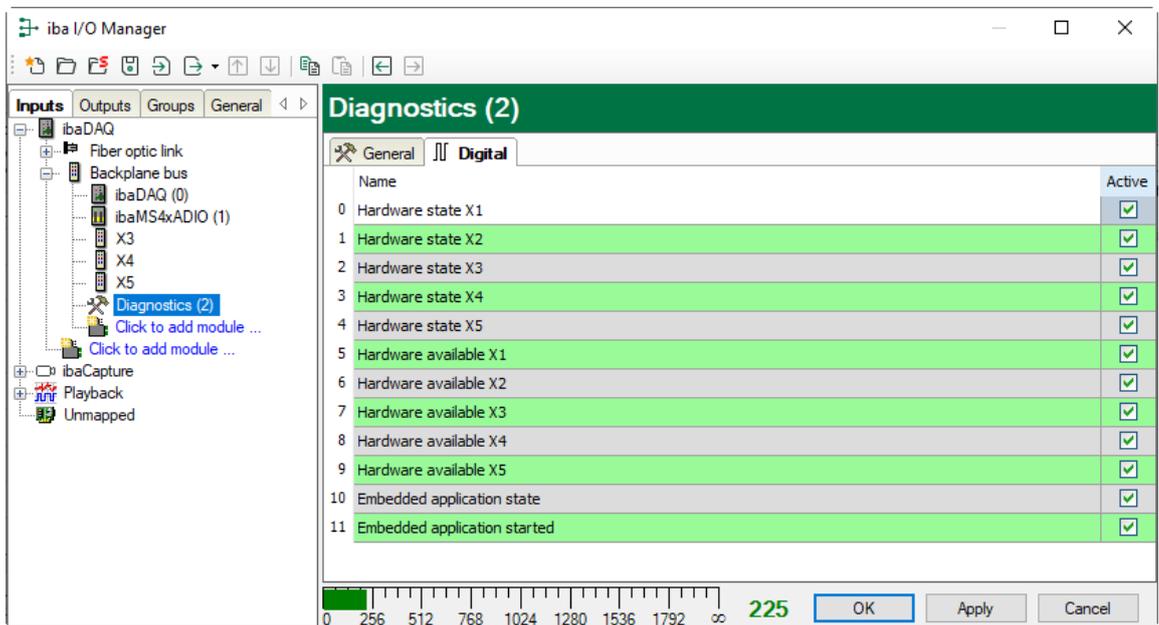
Module type, Locked, Enabled, Name, Timebase, Use name as prefix see chapter 10.3.1.

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

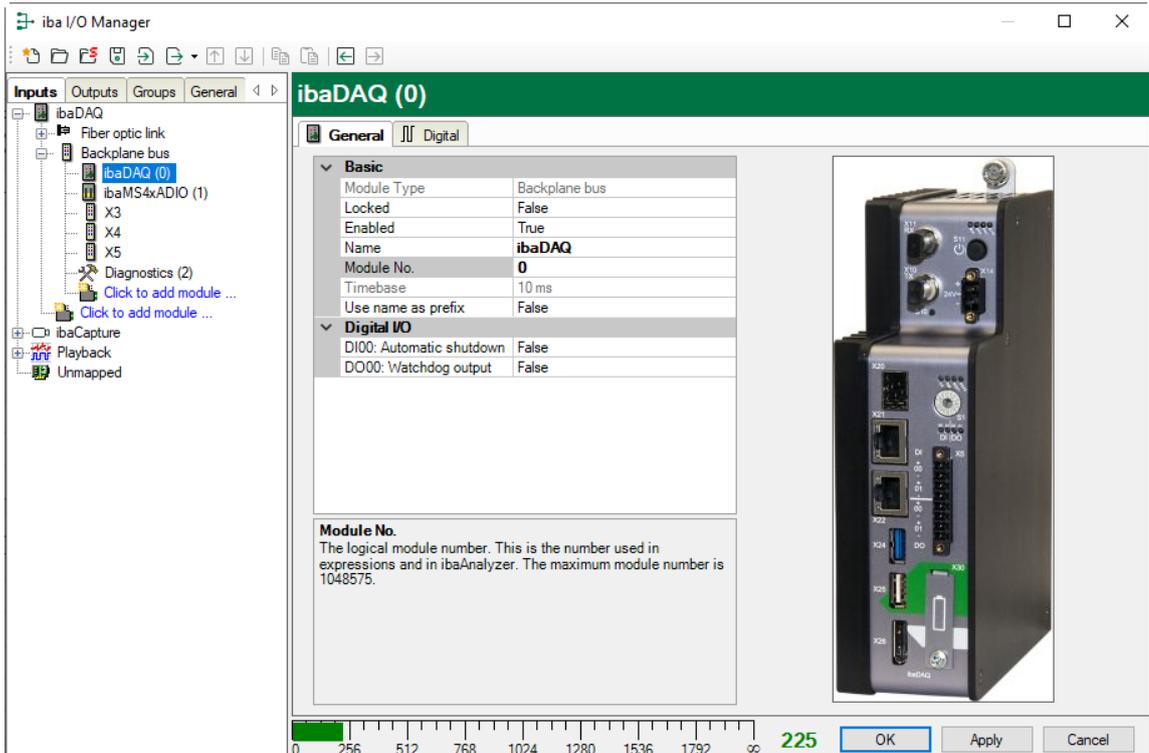
The diagnostics signals can be activated in the Digital tab.



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



Basic settings

Module type, Locked, Enabled, Name, Timebase
see chapter 10.3.1 "Backplane bus – General tab"

Module No.

Reference number for the unambiguous referencing of signals, e.g. in expressions and ibaAnalyzer. It is assigned by ibaPDA in ascending order, but can be changed by the user.

Digital I/O

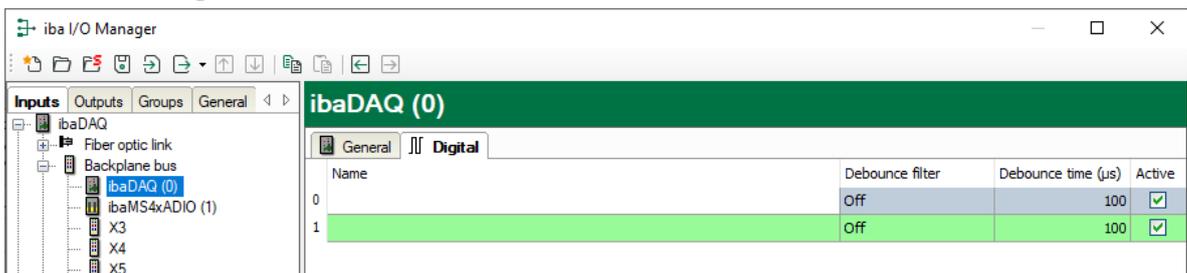
DI00: Automatic shutdown

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

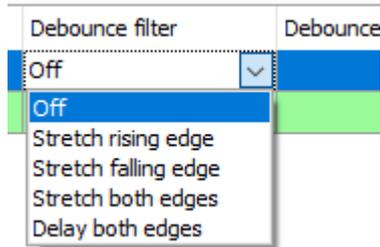


Name

Here you can enter a signal name and additionally two comments when clicking the icon  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 7.5.2 "Debounce filter"

 Debounce time (μs)

Here you can define the debounce time in μs

 Active

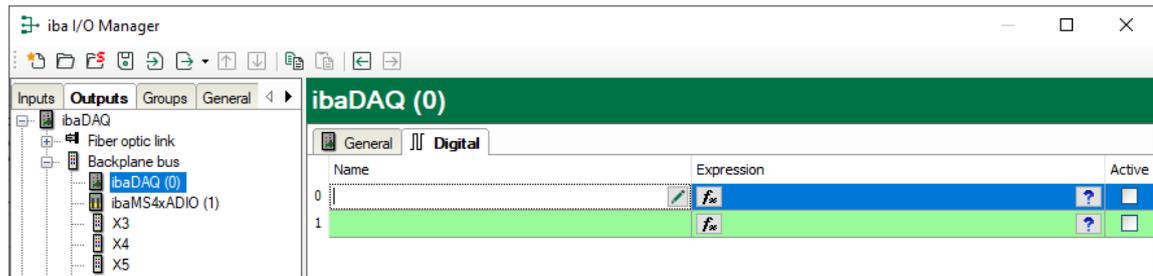
Enabling/disabling the signal

**Note**

Configure the plugged analog and digital modules. For a detailed description, please refer to the module manuals.

10.5 Configuring outputs

Select the "Outputs" section to configure the output signals. The following parameters can be set on the "Digital" tab:



Name

Here you can enter a name for the signal and two additional comments when clicking the  icon in the Name field.

Expression

You can use the expression builder  to assign signals to the outputs or to combine signals through logical or mathematical operations.

Active

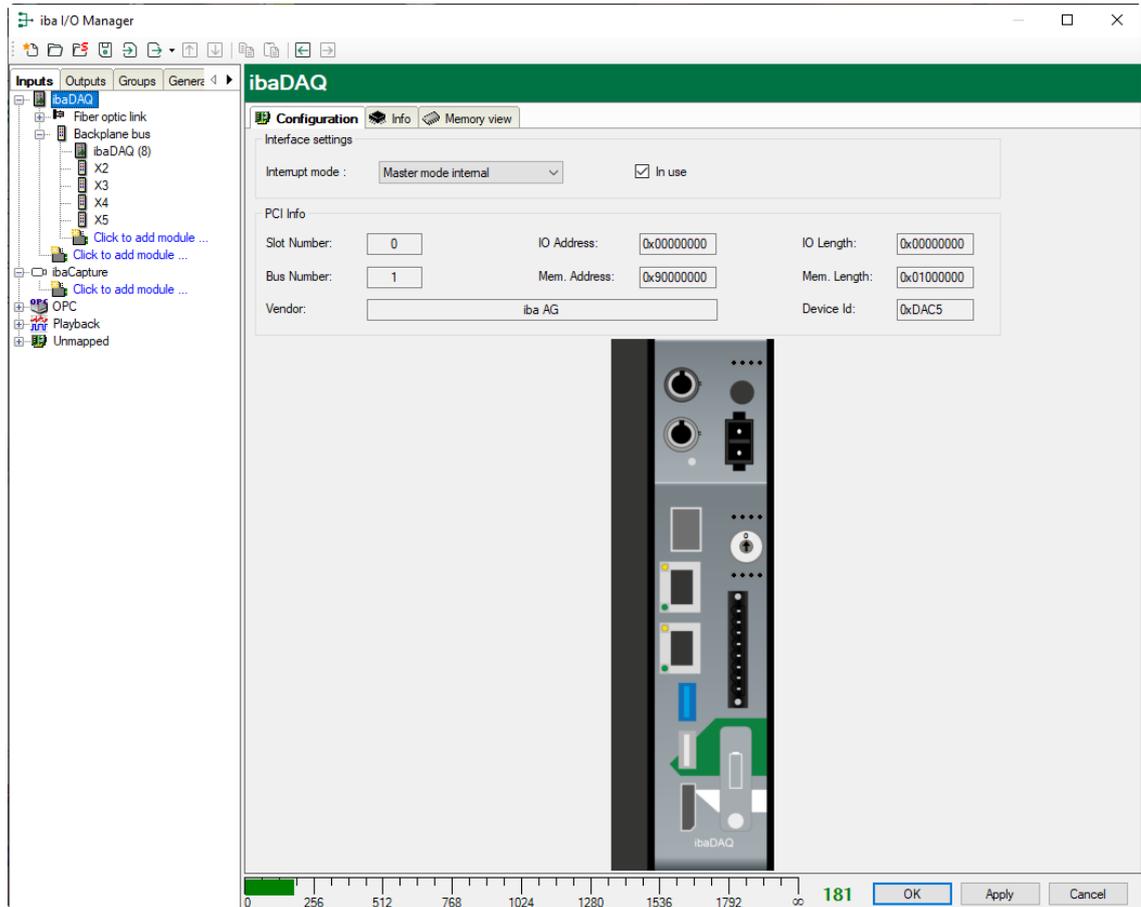
Enabling/disabling the signal.

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 chapter 10.6.1
- Network settings of the device, see chapter 10.6.2
- Firmware update and restarting the device, see chapter 10.6.2
- User-defined signal assignment of the LEDs PDA1 and PDA2, see chapter 10.6.2
- Connection of further iba-devices, see chapter 10.6.3
- Displaying the connection status of the FO link, see chapter 10.6.4
- Operation in mirror mode, see chapter 10.6.5.1
- Calculating the frame size with 32Mbit Flex, see chapter 10.6.5.2

10.6.1 ibaDAQ – Configuration tab



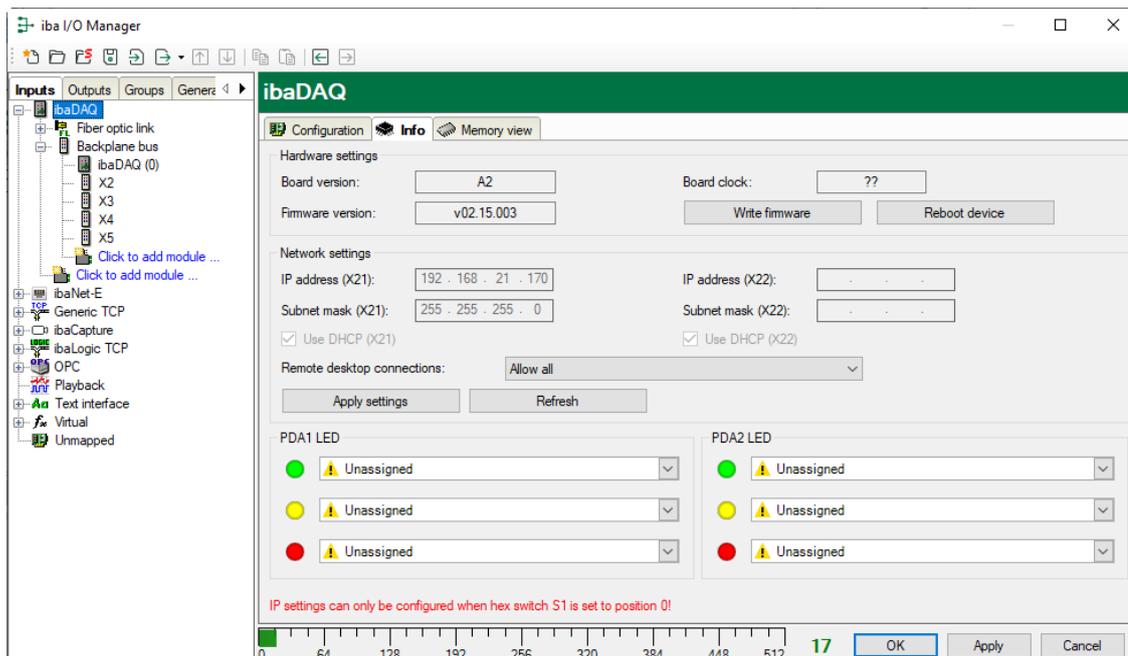
Interrupt mode

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



The "Hardware settings" section provides information on the board and firmware version of the internal FOB card and the board clock.

Write firmware

This button allows running firmware updates. Select the update file "daqs_v[xx.yy.zzz].iba" in the browser and start the update by clicking <Ok>.



Important 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. Procedure see chapter 7.3.2.

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.



Important 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

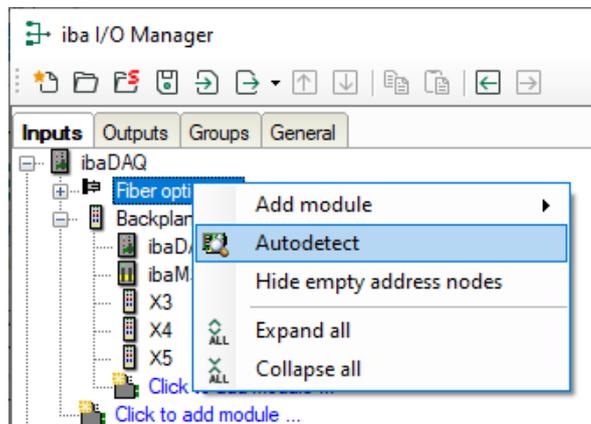
Here you can assign signals to the LEDs PDA1 and PDA2. 3 colors (green, yellow, and red) are available for each LED. Select one input signal respectively from the drop-down menu. If the corresponding signal applies, the LED will light up in the configured color.

PDA1 LED	PDA2 LED
<input type="radio"/> 3.0: Green	<input type="radio"/> 4.0: Green
<input type="radio"/> 3.1: Yellow	<input type="radio"/> 4.1: Yellow
<input type="radio"/> 3.2: Red	<input type="radio"/> 4.2: Red

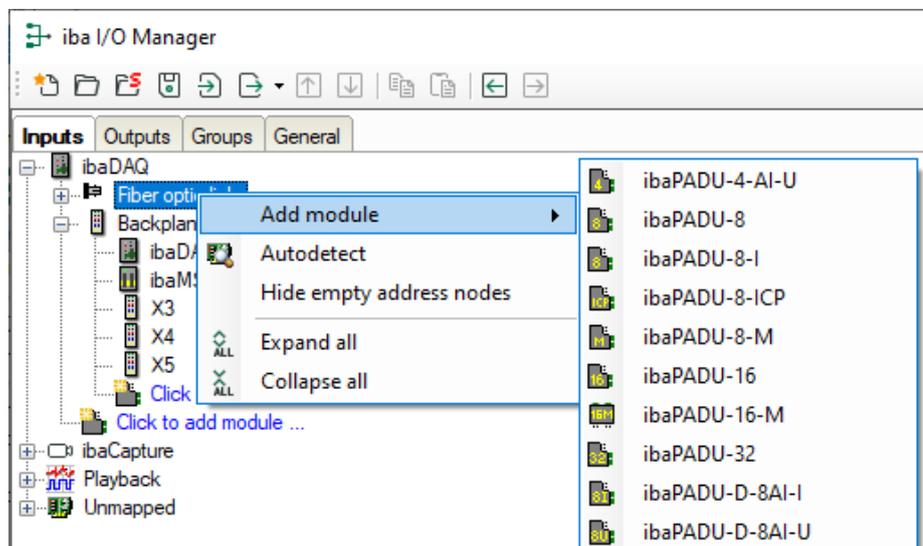
10.6.3 Connection of an external iba device

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.

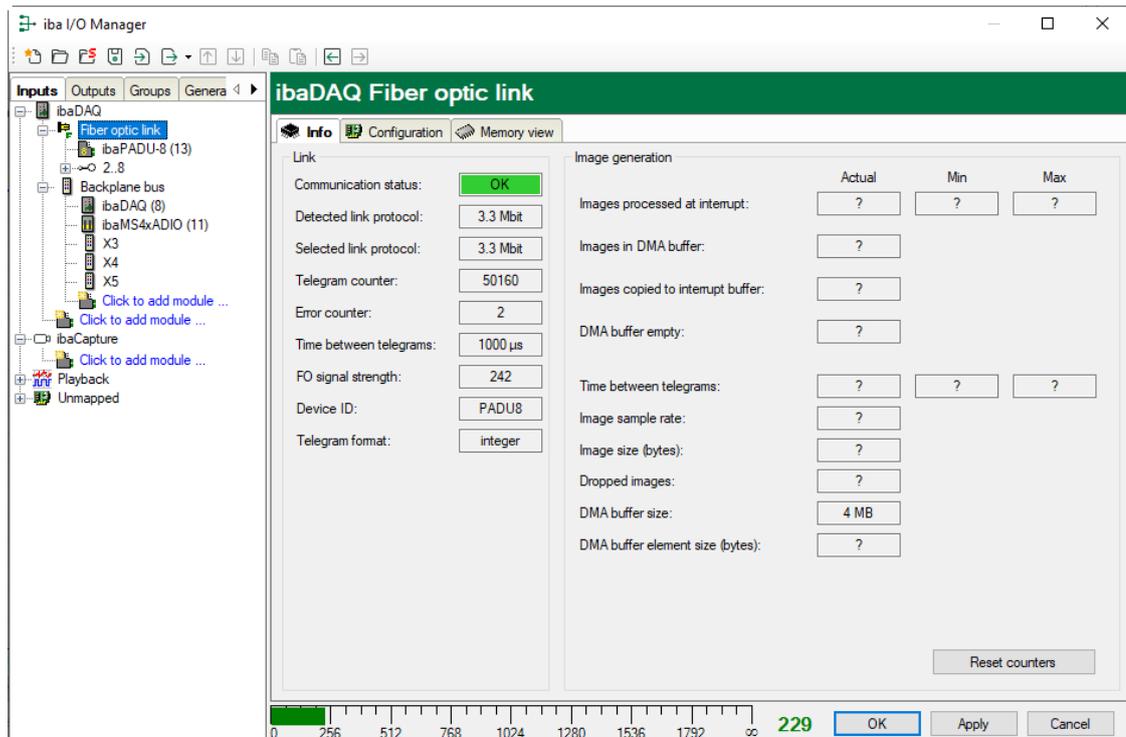


For further information regarding the configuration of the external iba device, please refer to the corresponding device manual.

10.6.4 FO link – Info tab

The left-hand part of the "Info" tab shows information on FO communication. 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 connected module.

Telegram counter

Counter of correctly received telegrams

Error counter

Counter of received faulty telegrams (e.g. checksum error). If this counter changes, FO communication is not working properly.

Time between telegrams

The time 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. It can be 255 max. 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. "Integer", "Real" and "S5 real" are possible formats.

"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 board writes into the computer memory via DMA. This image includes 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. The number should be 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 read from the DMA buffer and processed by ibaPDA. This counter should gradually count upwards.

 DMA buffer empty

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

 Time between telegrams

The time between the last 2 correctly received telegrams. It is the same value as in the left section of the dialog box, but additionally specifies the maximum and minimum distance. The differences between min. and max. value should not deviate significantly from each other.

 Image sample rate

The rate at which the board 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. This is a serious problem. The card cannot transfer images over the PCI bus.

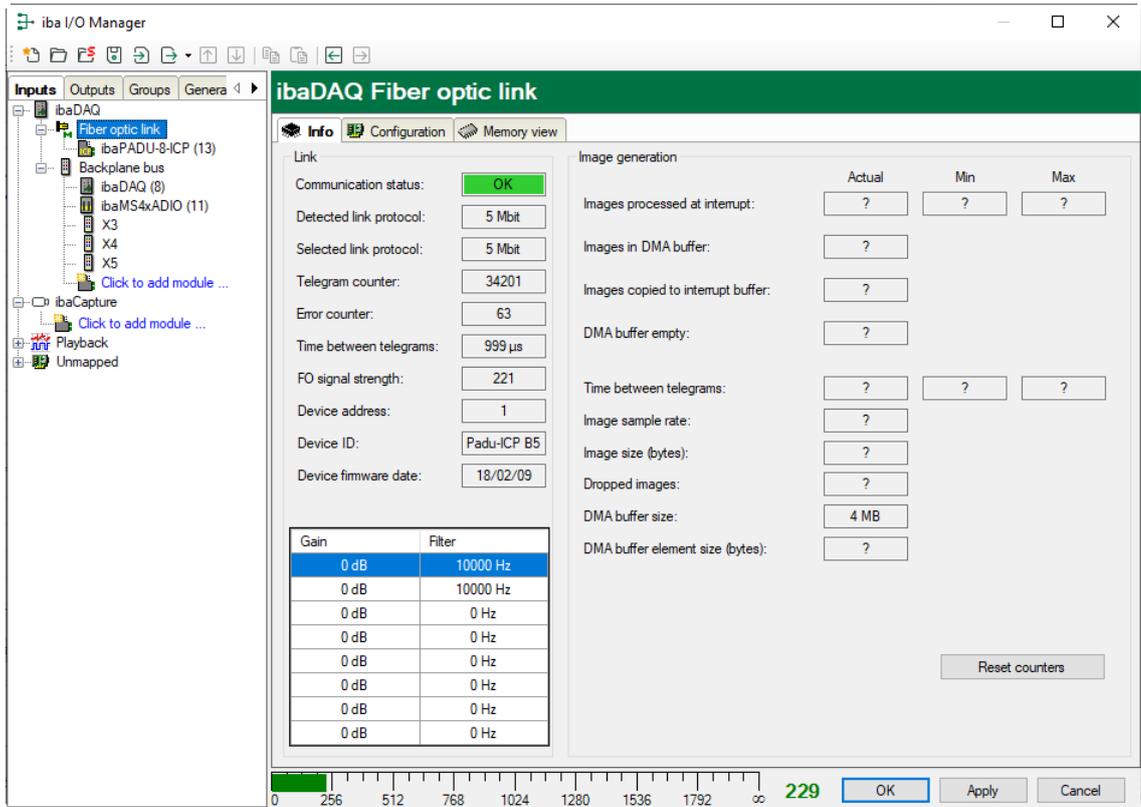
 DMA buffer size

Size of the DMA buffer for this interface.

 DMA buffer element size

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

10.6.4.2 5Mbit protocol



The screenshot above shows the information you receive when the FO link operates with 5Mbits, e.g. with ibaPADU-8-ICP. For explanation see 3Mbit protocol. Additional items:

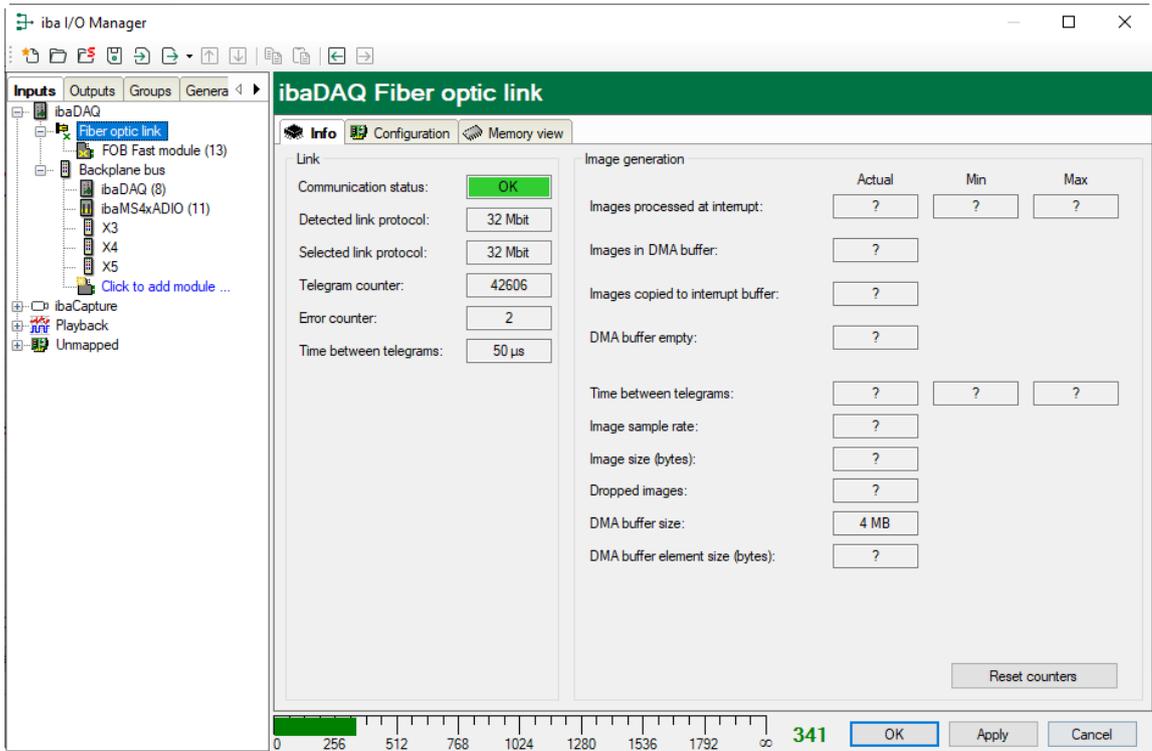
- ❑ Device firmware date

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

- ❑ Gain and Filter table

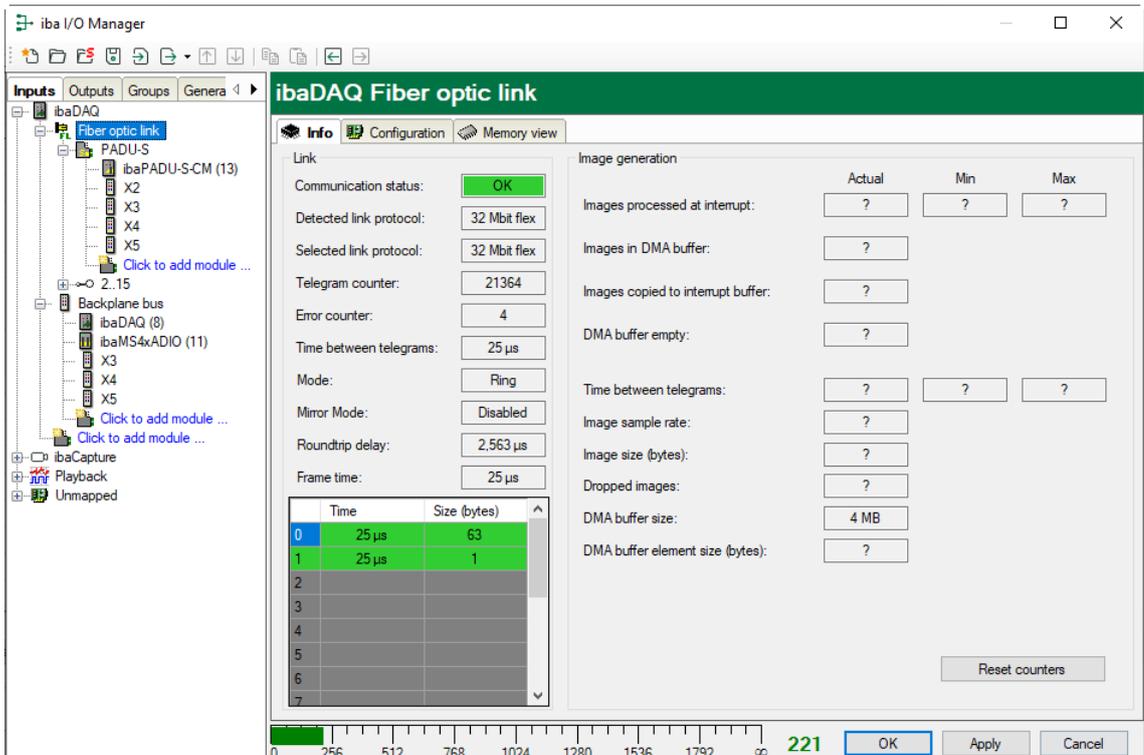
Gains and filter factors are configured in the device. This applies only to ibaPADU-8-ICP devices.

10.6.4.3 32Mbit protocol



Display and explanation, see 3Mbit protocol.

10.6.4.4 32Mbit Flex protocol



The screenshot above shows the information you see when the link is in 32Mbit Flex mode. For explanation see 3Mbit protocol. 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.

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 connected bidirectionally and the FO ring is closed.

Open chain: Only the FO input is connected to a device. The output is not connected or the FO ring is interrupted in one place.

Mirror mode

Display 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 10.6.5.1.

Roundtrip delay

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

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

Frame time

Cycle time during which the frames are being sent. (Smallest configurable timebase of the connected devices or 100 μ s if this timebase is an integer multiple of 100 μ s. The timebase of all devices must be a multiple of the smallest timebase).

Table

The table shows the cycle time and the data volume for the corresponding channels:

Line 0: Ethernet channel

Line 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 simultaneously acquire the data of the same 32Mbit 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 they 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.

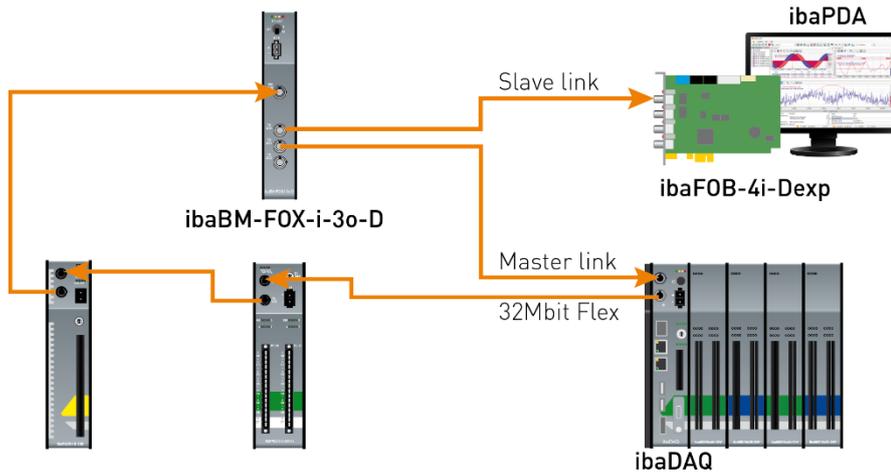
The master ibaPDA system requires a bidirectional fiber optic connection to receive and send data to the Flex devices. The slave ibaPDA only needs a unidirectional FO connection to receive data from the Flex devices and the device configuration.



Note

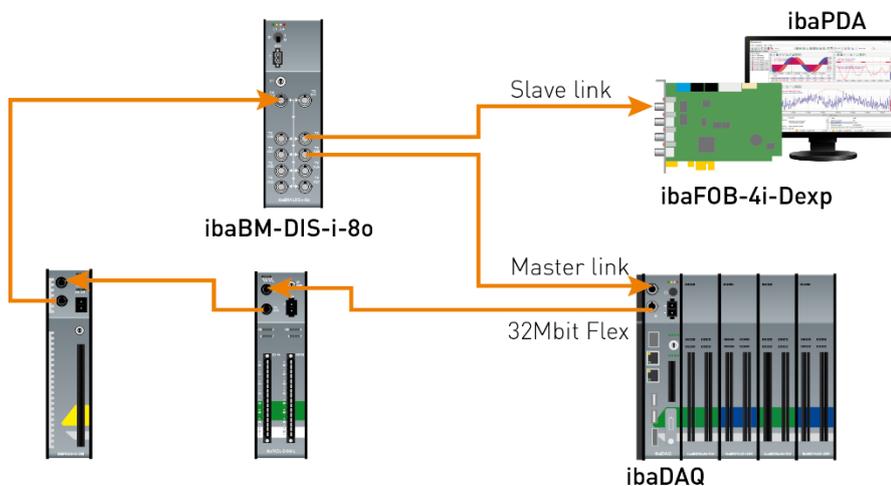
The slave system cannot output data via fiber optics.

Possible connections



The FO output of the last Flex device is connected to the FO 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.

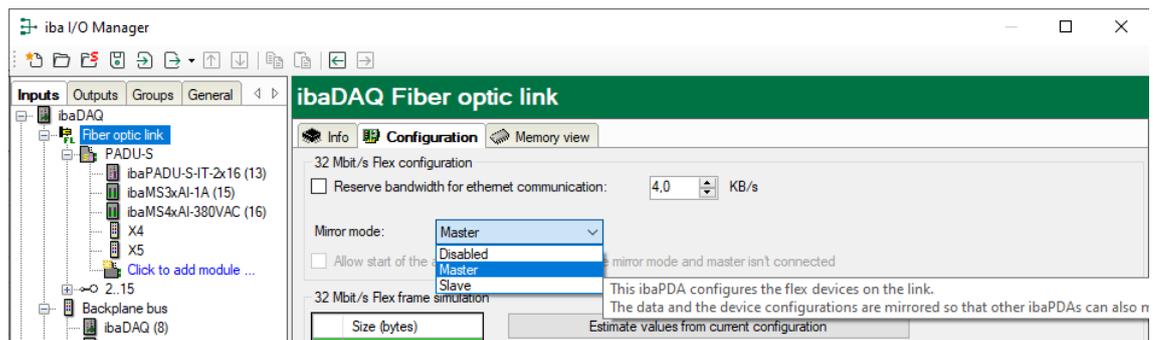
This connection allows the ibaPDA slave to still acquire data when the ibaPDA master has been shut down.



For the above connection example with ibaBM-DIS-i-8o, the same applies as to ibaBM-FOX-i-3o-D. The ibaBM-DIS-i-8o device must be set to copy mode (S1 = 0) for this purpose.

Configuration in ibaPDA

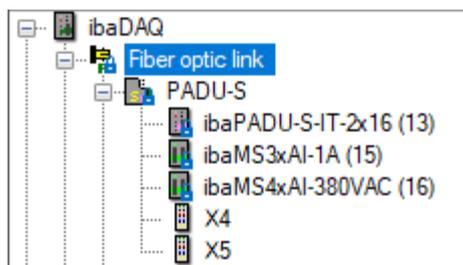
Open the "Configuration" tab in the Link view.



3 settings are available for mirror mode:

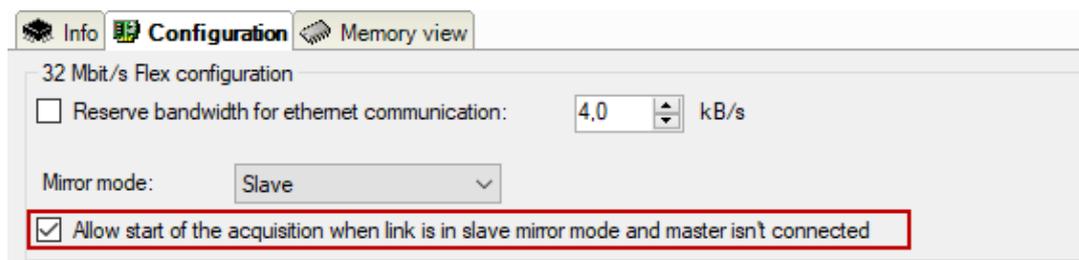
- Disabled:** Data is not mirrored, so this ibaPDA system is the only one that can configure the devices and acquire data.
- Master:** This ibaPDA system configures the Flex devices on the link. The data and the device configurations are mirrored so that other ibaPDA systems can also acquire the data.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

The slave ibaPDA can get the device configuration from the master ibaPDA using the "autodetect" function. A slave ibaPDA cannot change the device configuration. The modules in the signal tree are displayed with a padlock symbol in the slave ibaPDA.



When 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 does not receive a configuration from the master within 6 s, ibaPDA will generate 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, acquisition will be started anyway with the last configuration.

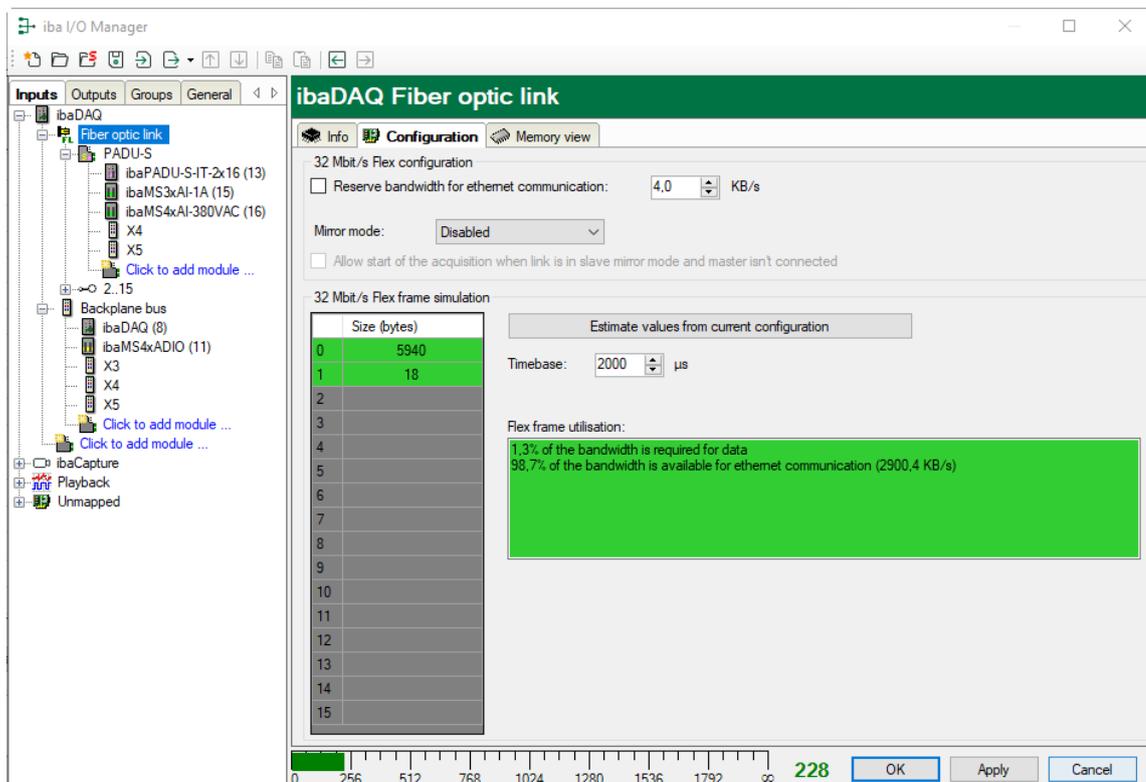


When the master ibaPDA changes the configuration while the slave ibaPDA is acquiring data, the slave will automatically restart acquisition.

10.6.5.2 Calculating the telegram size with 32Mbit Flex

The data size per participant is dynamically allocated in a 32Mbit Flex ring and is calculated by ibaPDA. The data size depends on the configured number of analog and digital signals and the smallest configured timebase in the ring.

ibaPDA version 6.33.1 and higher provides a simulator (32 Mbit/s Flex frame simulation) which calculates the data size that can be transmitted by each participant via the FO link using the 32Mbit Flex protocol. Open the "Configuration" tab for this purpose.



The data size 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 entered manually or retrieved automatically from the current configuration either by clicking the button <Estimate values from current configuration> or by selecting the corresponding link of the ibaFOB card in the module tree.

The devices in the Flex ring and the corresponding data sizes are listed in the table on the left. Address 0 is reserved for the Ethernet channel and is not editable.

The "Flex frame utilisation" section shows how much 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

The data values obtained automatically are estimated first. When the configuration is applied by clicking <OK> or <Apply>, the actual data sizes are shown 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.

Simulating the load

Even when 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 scheduled sampling rate in the "Timebase" field. Now, you can enter the scheduled or expected data volume (in bytes) manually in the table rows 1 to 15. Each new entry causes the result values in the "Flex frame utilisation" field to be 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 a web interface and especially for ibaBM-DP to display 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 minimum size is often not sufficient and the Profibus diagnosis may not be displayed as a result or communication with the web interface may become very slow.

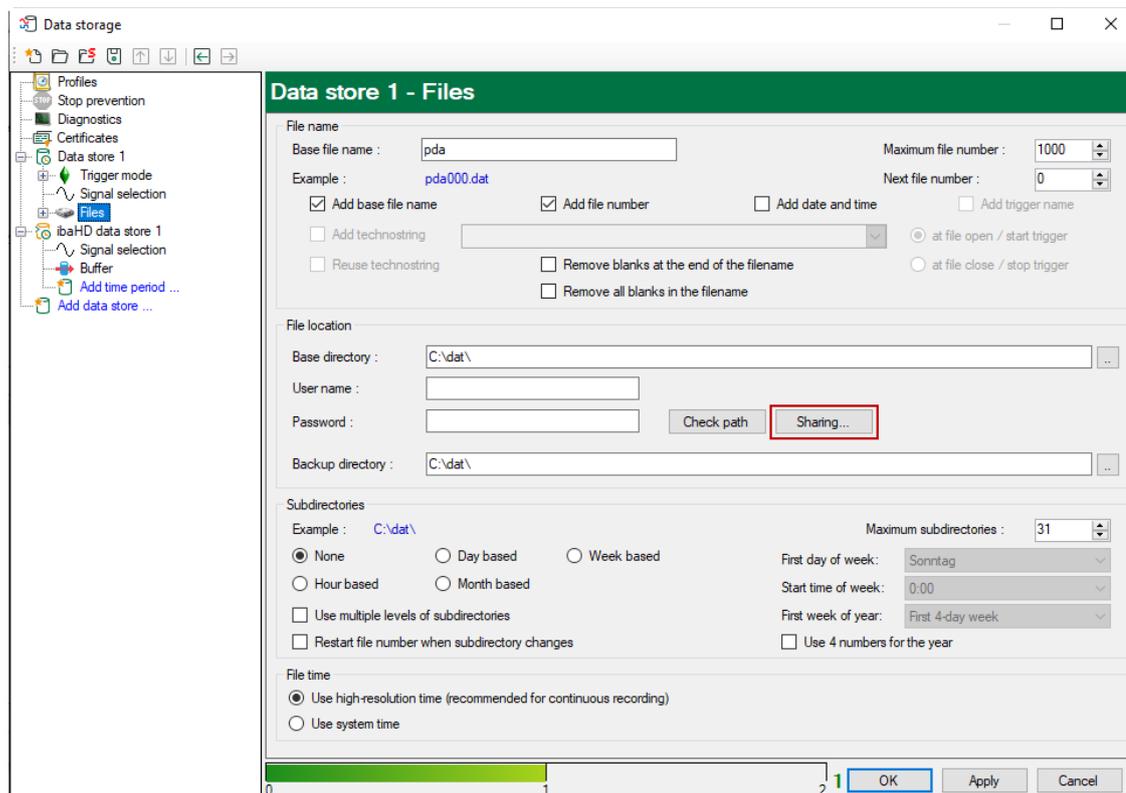
The option "Reserve bandwidth for Ethernet communication" allows you to reserve a fixed bandwidth for the Ethernet channel. The default value of 4 kB/s is usually sufficient for configuration data and Profibus diagnosis.



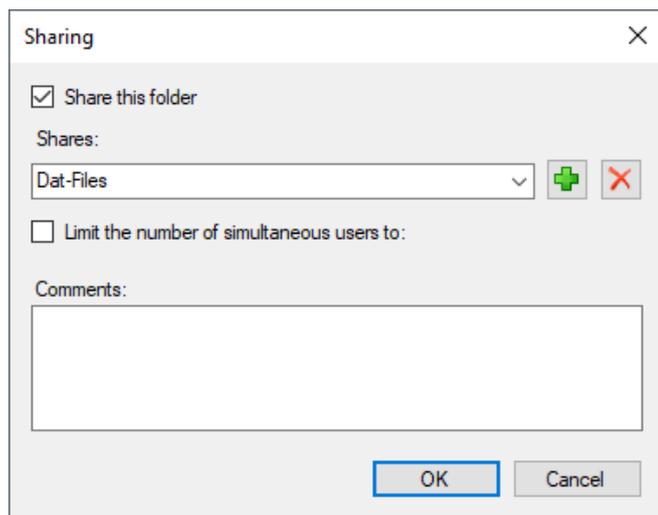
10.7 Setting up file sharing

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 Technical data

11.1 Main data

Brief description			
Description	ibaDAQ		
Description	Central unit for stand-alone data acquisition		
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			
Voltage supply	24 V DC, ± 10 % not stabilized, 1 A (without I/O modules), 3 A (with up to 4 I/O modules)		
Power consumption	Max. 36 W		
Operating and indicating elements			
Displays	6 LEDs for operating state 2 LEDs for digital inputs 2 LEDs for digital outputs 2 LEDs for customized applications, configurable in ibaPDA		
Operating and environmental conditions			
Cooling	Passive		
Temperature ranges	Operation	0°C ... 50 °C	
	Storage / transport	-25°C ... 70°C	
Installation 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 ³	162,168 hours / ca. 18 years		

³ MTBF (mean time between failure) according to Telcordia 3 SR232 (Reliability Prediction Procedure of Electronic Equipment; Issue 3 Jan. 2011) and NPRD (Non-electronic Parts Reliability Data 2011).

Dimensions (width x height x depth)	56 mm x 214 mm x 148 mm with backplane panel: 229 mm x 219 mm x 156 mm
Weight	1.5 kg (incl. packing and documentation)

**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.

11.2 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 chap. 11.7.	
Transmitting interface (TX)		
Output power	50/125 µm FO cable	-19.8 dBm to -12.8 dBm
	62.5/125 µm FO cable	-16 dBm to -9 dBm
	100/140 µm FO cable	-12.5 dBm to -5.5 dBm
	200 µm FO cable	-8.5 dBm to -1.5 dBm
Temperature range	-40 °F to 185 °F (-40 °C to 85 °C)	
Light wavelength	850 nm	
Laser class	Class	
Receiving interface (RX)		
Sensitivity ⁴	100/140 µm FO cable	-33.2 dBm to -26.7 dBm
Temperature range	-40 °F to 185 °F (-40 °C to 85 °C)	
Additional interfaces		
Ethernet	2x RJ45, 1 Gbit/s	
USB	1x USB 3.0, 1x USB 2.0	
DisplayPort	Port for monitor	

11.3 Digital inputs/outputs

Digital inputs	
Number	2
Design	Electrically isolated, protected against polarity reversal, single ended
Input signal	24 V DC
Max. input voltage	±60 V permanent
Signal level log. 0	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V
Input current	1 mA, constant

⁴ Data for other FO cable diameters not specified

Debounce filter	Optionally with 4 different operating modes, configurable in ibaPDA
Sampling rate	Up to 40 kHz, freely adjustable
Delay	typ. 10 μ s
Electrical isolation	
Channel-channel	2.5 kV AC
Channel-housing	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

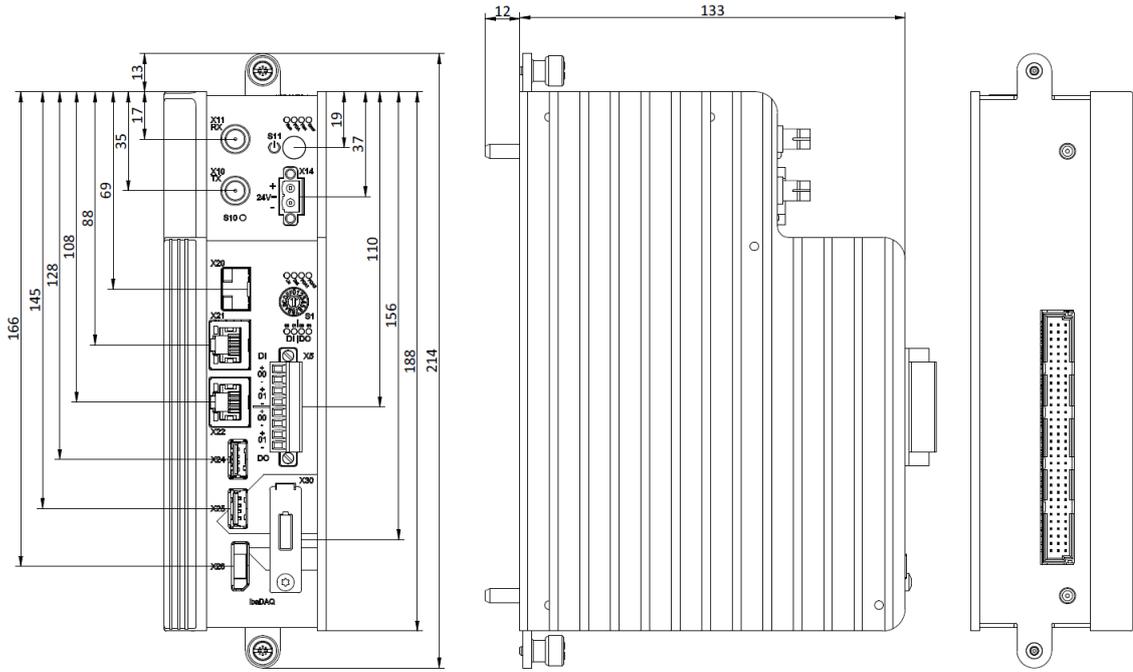
Number	2
Version	Electrically isolated, solid-state DC switch
Switching voltage	max. 200 V DC, protection against surge voltages
Switching current	max. 350 mA (permanent), overcurrent protection
Switch delay	< 2 ms (at 100 mA)
ON resistance (log. 1)	max. 3.75 Ω (at 100 mA)
OFF resistance (log. 0)	min. 100 M Ω
Electrical isolation	
Channel-channel	2.5 kV AC
Channel-housing	2.5 kV AC
Connection technology	Screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery

11.4 Supported I/O modules

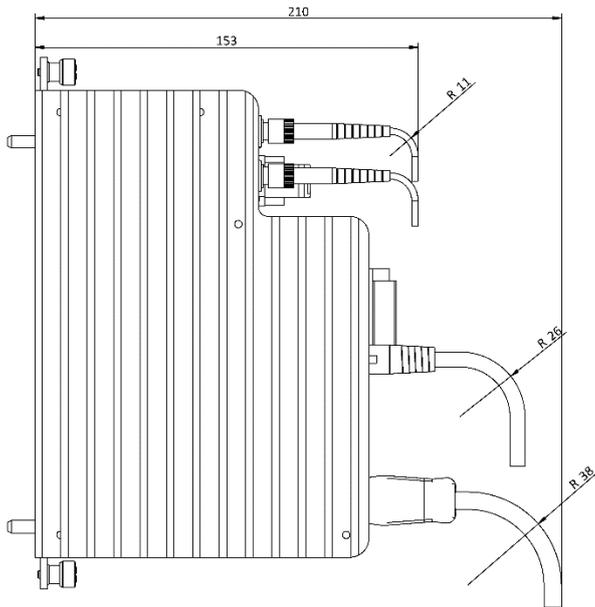
I/O module	Order no.	Use in backplane panel, e.g. ibaPADU-S-B4S	Use in ibaMBox
ibaMS3xAI-1A	10.124600	✓	✓
ibaMS3xAI-5A	10.124610	✓	✓
ibaMS3xAI-1A/100A	10.124620	✓	✓
ibaMS4xAI-380VAC	10.124521	✓	✓
ibaMS8xAI-110VAC	10.124500	✓	✓
ibaMS16xAI-10V	10.124100	✓	✓
ibaMS16xAI-10V-HI	10.124101	✓	✓
ibaMS16xAI-24V	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	✓	-
ibaMS16xDO-2A	10.124250	✓	-
ibaMS32xDO-24V	10.124260	✓	-
ibaMS16xDIO-24V	10.124220	✓	✓
ibaMS4xADIO	10.124120	✓	✓

11.5 Dimensions

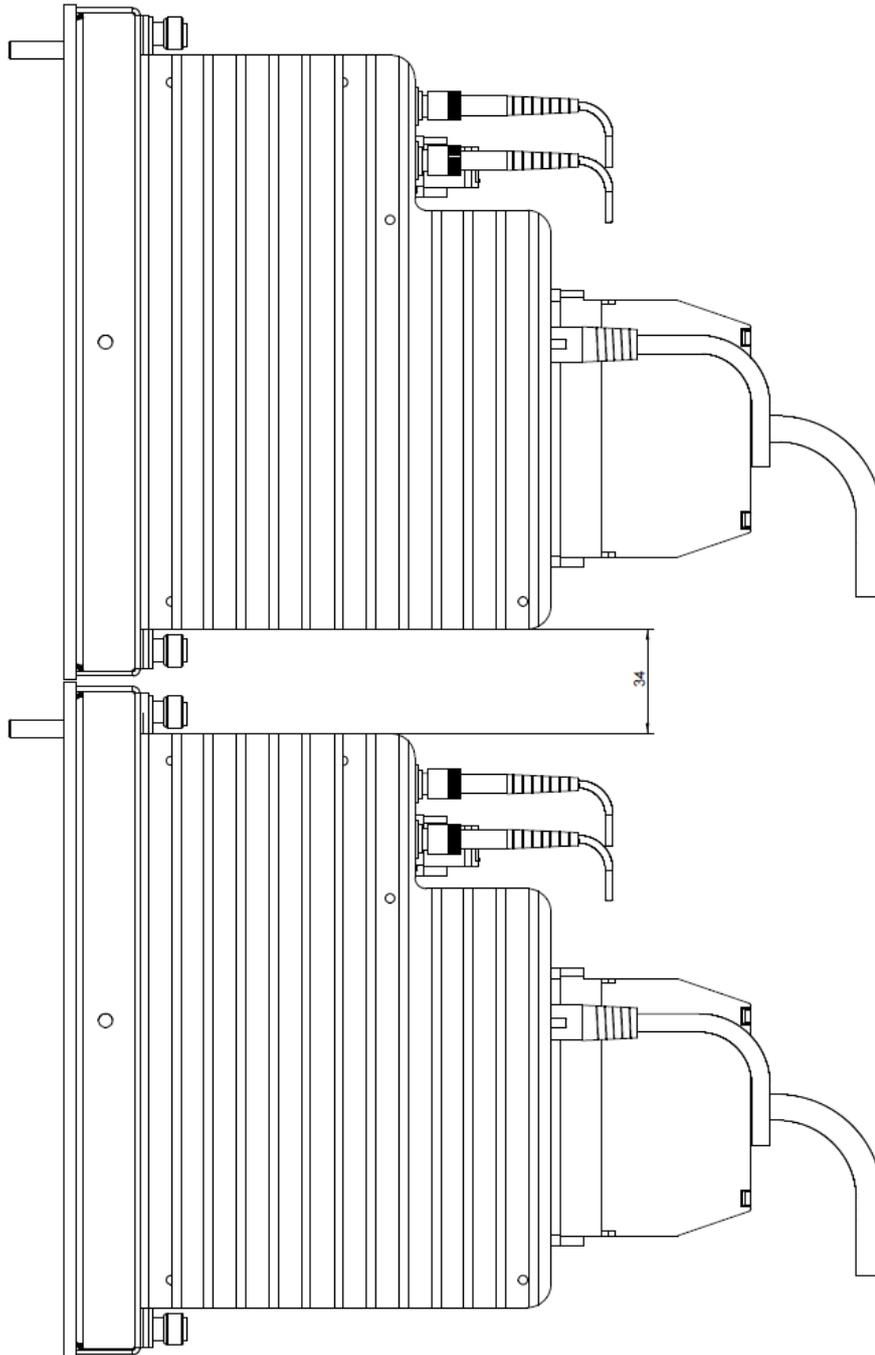
ibaDAQ



(Dimensions in mm)



Dimensions ibaDAQ with cables (dimensions in mm)

Distance between 2 central units

Minimum distance between 2 central units (dimensions in mm)

11.6 Connection diagram

11.6.1 Pin assignment voltage supply X14

Pin	Connection
1	+ 24 V
2	0 V



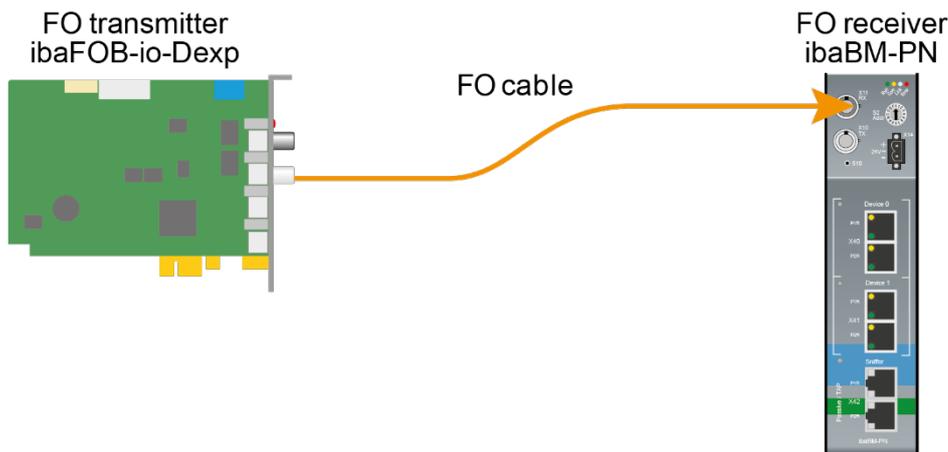
11.6.2 Pin assignment digital inputs and outputs X5

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 -



11.7 Example for FO budget calculation

As an example, an FO connection from an ibaFOB-io-Dexp card (FO transmitter) to an ibaBM-PN device (FO receiver) is used.



The example refers to a point-to-point 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 respective device manual in the chapter "Technical data" under "ibaNet interface".

Specification ibaFOB-io-Dexp:

Output power of FO transmitting interface		
FO cable in μm	Min.	Max.
62.5/125	-16 dBm	-9 dBm

Specification ibaBM-PN:

Sensitivity of FO receiving interface		
FO cable in μm	Min.	Max.
62.5/125	-30 dBm	

Specification FO cable

To be found in the data sheet of 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 ibaFOB-io-Dexp -> ibaBM-PN in the best case:

$$A_{Budget} = |(-30 \text{ dBm} - (-9 \text{ dBm}))| = 21 \text{ dB}$$

$$l_{Max} = \frac{21 \text{ dB} - (2 \cdot 0.5 \text{ dB})}{3.5 \frac{\text{dB}}{\text{km}}} = 5.71 \text{ km}$$

Calculation for the example ibaFOB-io-Dexp -> ibaBM-PN in the worst case:

$$A_{Budget} = |-30 \text{ dBm} - (-16 \text{ dBm})| = 14 \text{ dB}$$

$$l_{Max} = \frac{14 \text{ dB} - (2 \cdot 0.5 \text{ dB})}{3.5 \frac{\text{dB}}{\text{km}}} = 3.71 \text{ km}$$

**Note**

When connecting several devices as daisy chain (e.g. ibaPADU-8x with 3Mbit) or as 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 distance reduction of 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.

12 Accessories

12.1 Backplane panels

12.1.1 ibaPADU-S-B4S

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



12.1.1.1 Scope of delivery

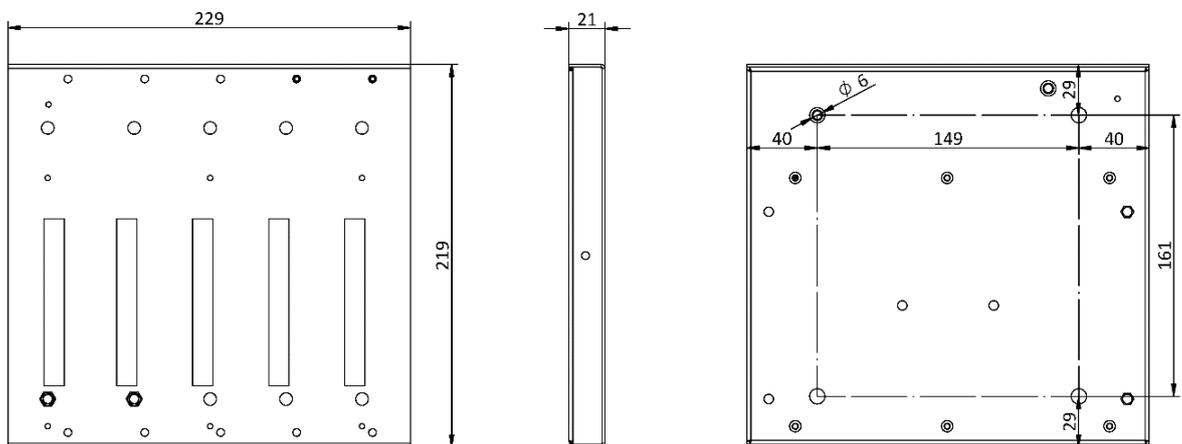
- Backplane panel
- Assembly kit





Assembly kit

12.1.1.2 Dimensions



Dimensions ibaPADU-S-B4S (dimensions in mm)

12.1.1.3 Grounding

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



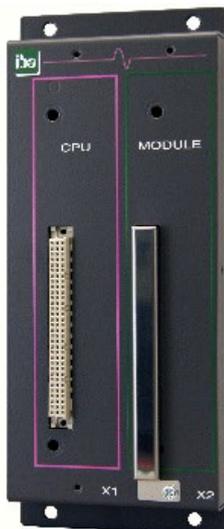
- 1 Spring lock washer
- 2 Ground wire with cable lug
- 3 Contact washer

12.1.1.4 Technical data

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 type	Female header, pole number 3 x 32
Slot	X1
Interface I/O modules	
Number	4
Connection type	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
Design	
Dimensions (width x height x depth)	229 mm x 219 mm x 21 mm
Weight / incl. packaging	0.66 kg / 0.85 kg

12.1.2 ibaPADU-S-B1S

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

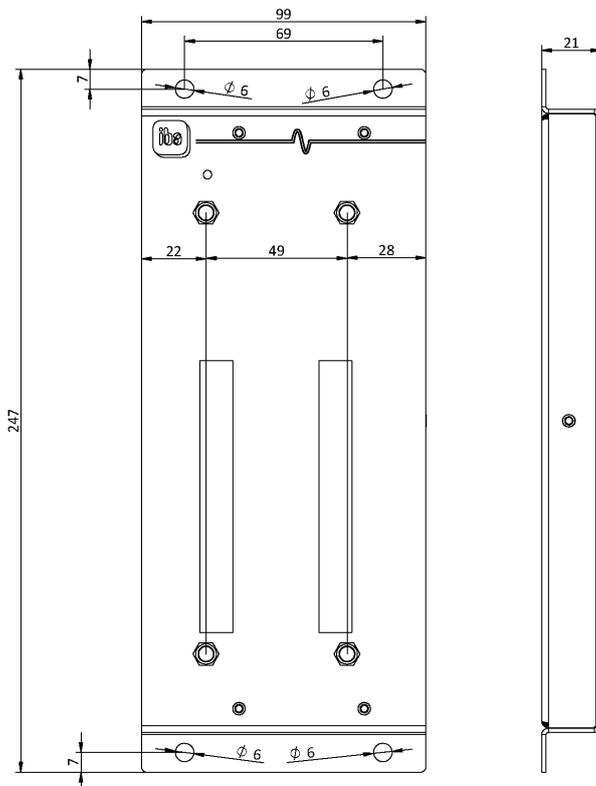


12.1.2.1 Scope of delivery

- Backplane panel
- Assembly kit



12.1.2.2 Dimensions



12.1.2.3 Grounding

See chapter 12.1.1.3

12.1.2.4 Technical data

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 type	Female header, pole number 3 x 32
Slot	X1
Interface I/O module	
Number	1
Connection type	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

12.2 Mounting system for central unit

12.2.1 ibaPADU-S-B

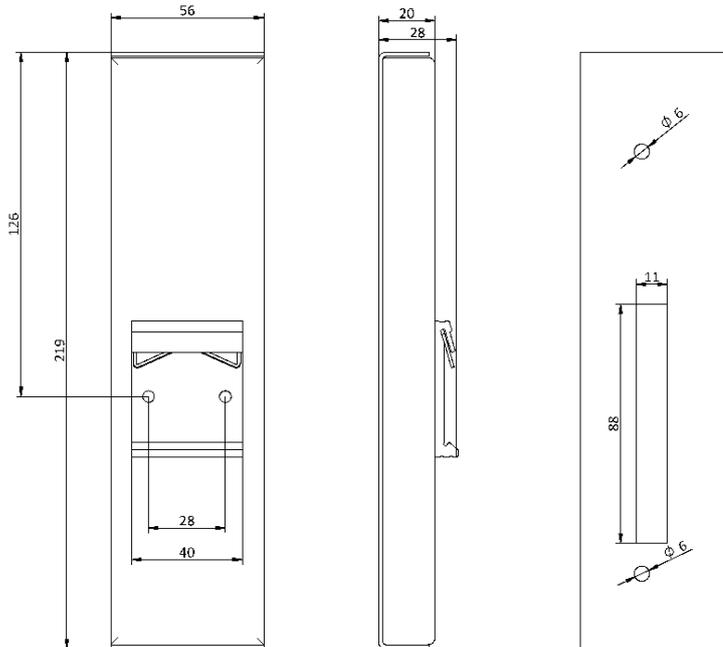
Mounting panel with DIN rail clip for 1 central unit (without I/O modules).



12.2.1.1 Scope of delivery

- Mounting panel

12.2.1.2 Dimensions



12.2.1.3 Grounding

The grounding must be done via the DIN rail.

12.2.1.4 Technical data

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

12.3 Mounting systems for ibaPADU-S-B4S

12.3.1 Mounting angles

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

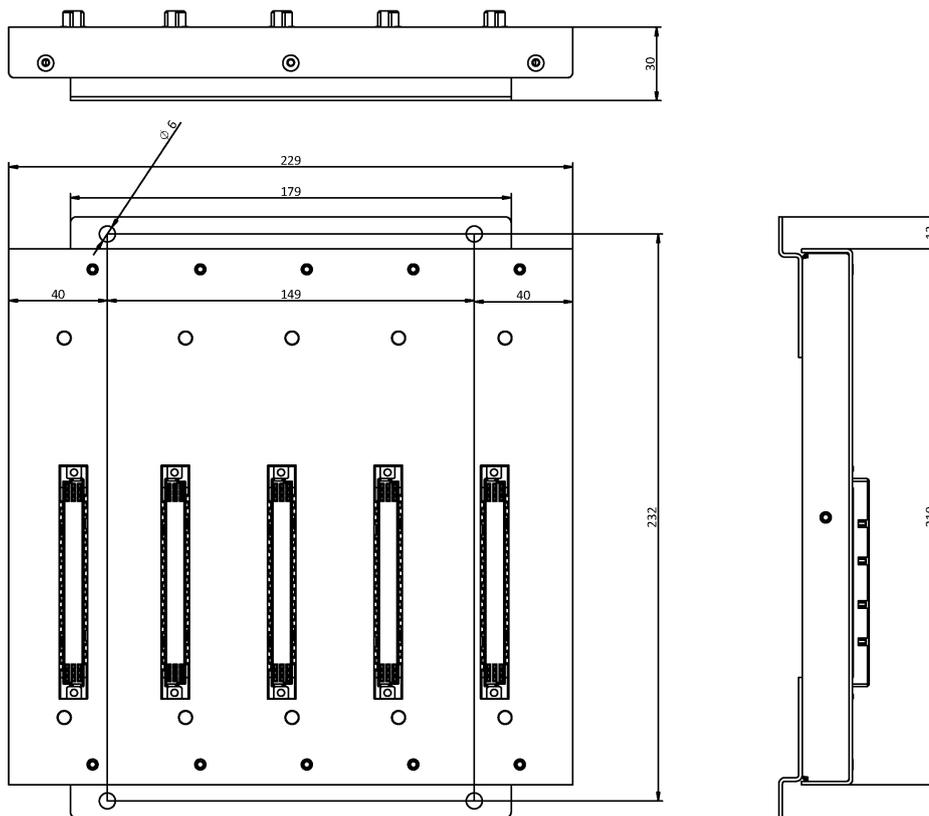
1 set (2 pieces) is needed for one ibaPADU-S-B4S backplane panel.



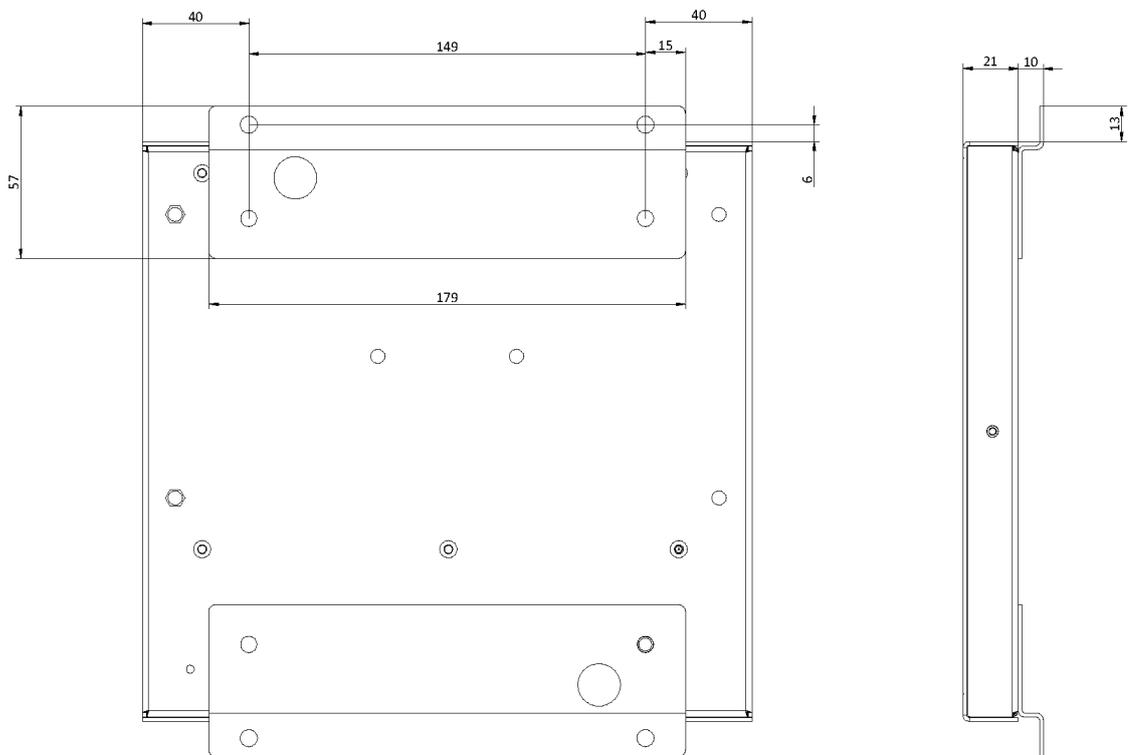
12.3.1.1 Scope of delivery

- 2 pieces mounting angles (1 set)

12.3.1.2 Dimensions



Dimensions in mm



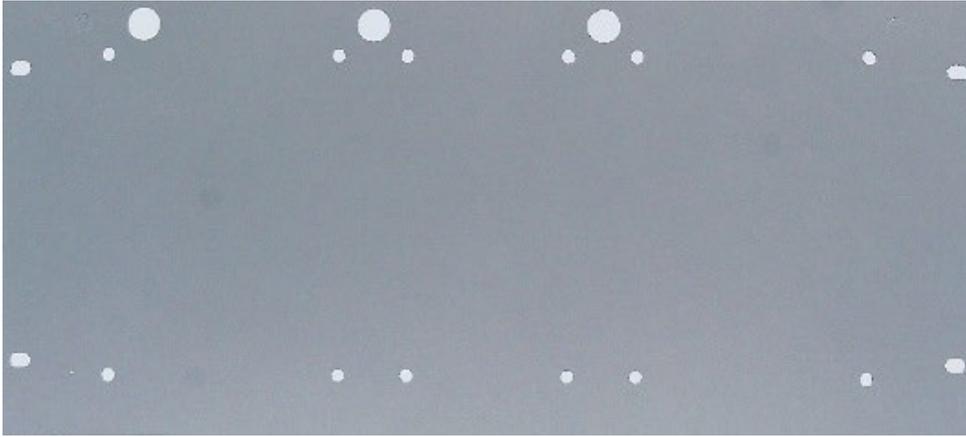
Dimensions in mm

12.3.1.3 Technical data

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

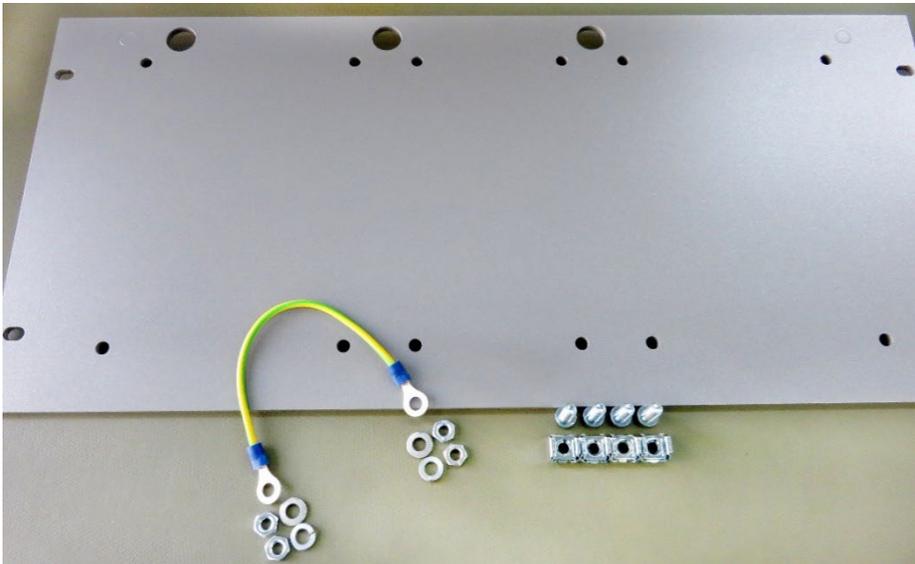
12.3.2 Mounting panel 19"

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



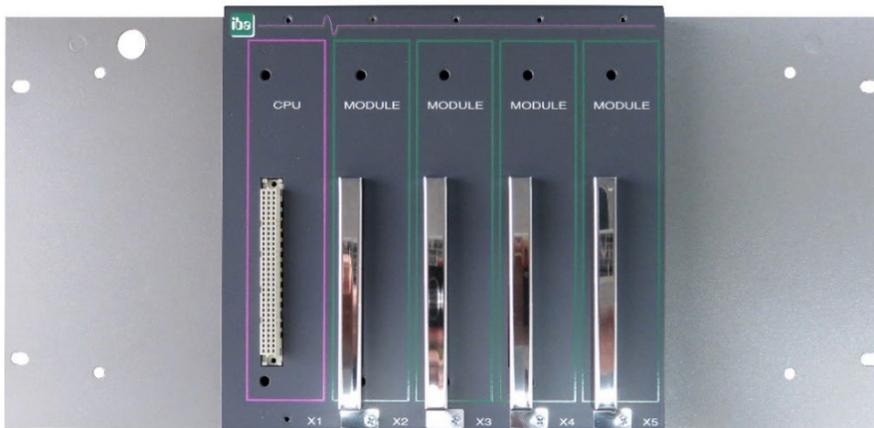
12.3.2.1 Scope of delivery

- Mounting panel
- Assembly kit

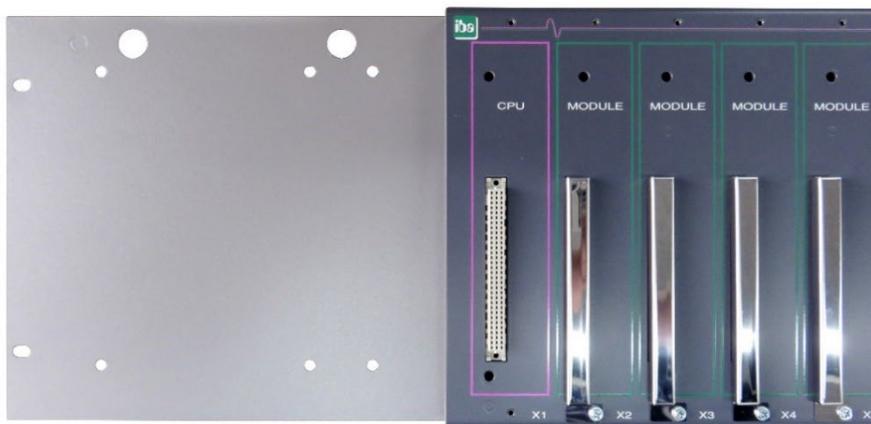


12.3.2.2 Mounting backplane panel

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.

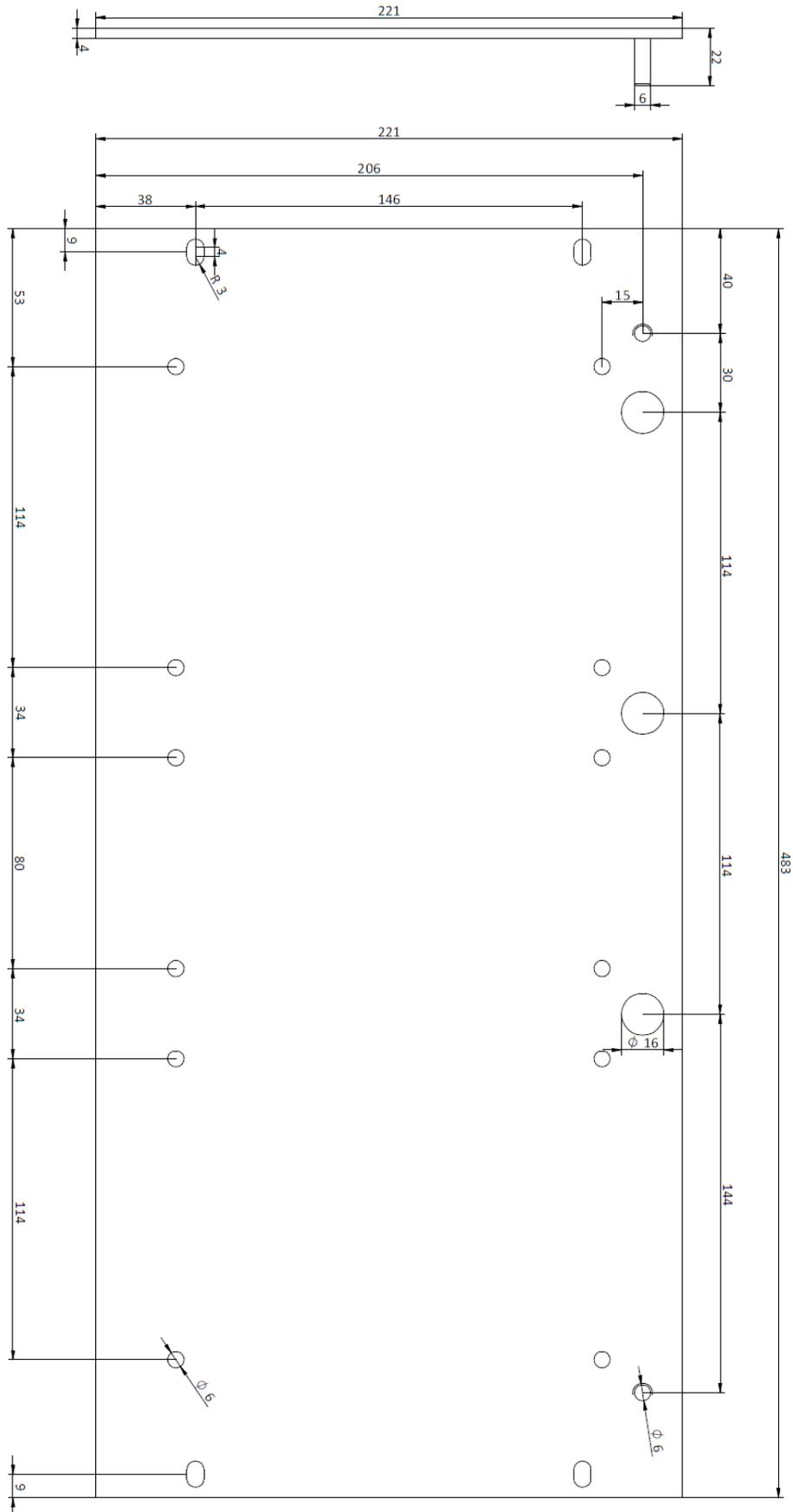


Mounting centered



Mounting on the right

12.3.2.3 Dimensions



Dimensions in mm

12.3.2.4 Grounding

Variation 1:

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

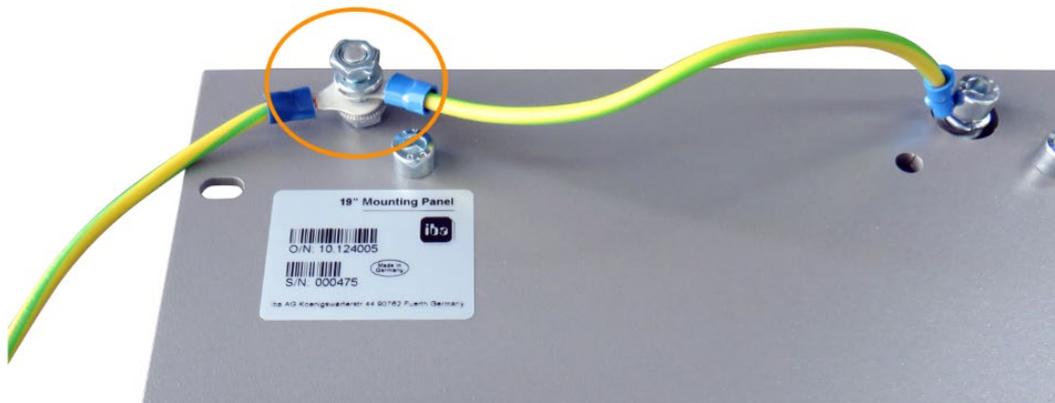
After the backplane panel is mounted on the 19" mounting panel, the backplane panel must be grounded via the mounting panel. Screw the grounding cable on the back of the mounting panel to the backplane panel. Use the screw connection as described in chapter 12.1.1.3.



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.



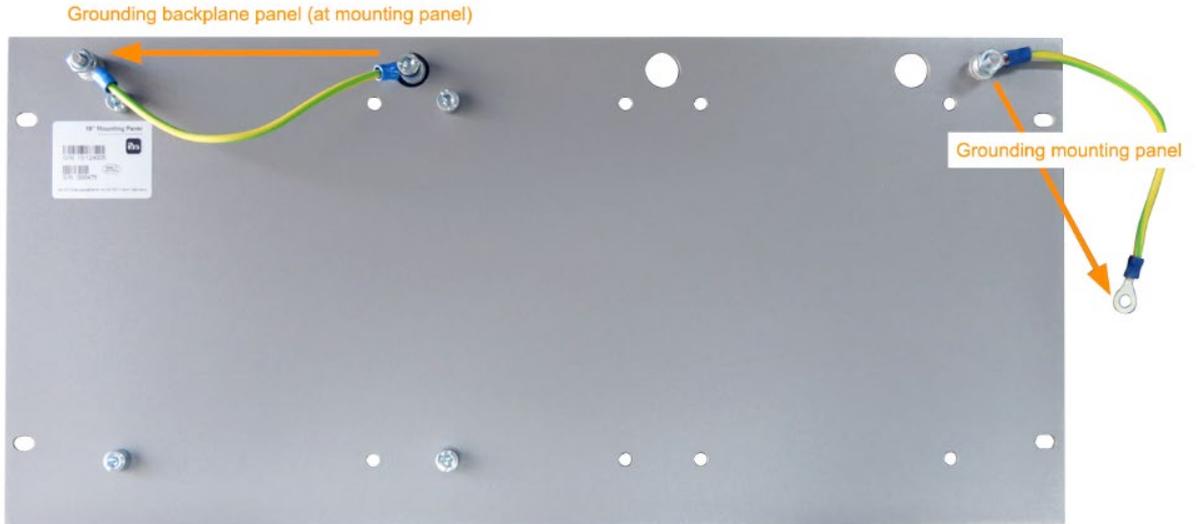
Both grounding cables are attached to the threaded bolt as shown.



Variation 2:

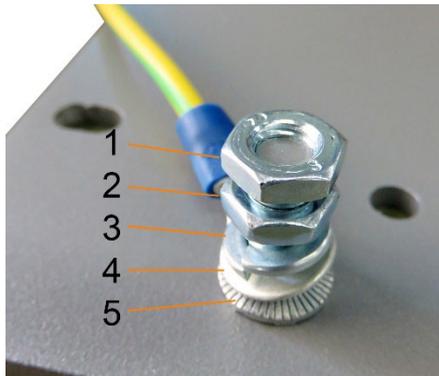
One backplane panel and grounding of the mounting panel are **not on the same side**.

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 below.

**Variation 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

12.3.2.5 Technical data

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

12.3.3 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.

12.3.3.1 Scope of delivery

- Module carrier
- Power supply 24 V DC / 5 A

12.3.3.2 Dimensions

W x h x d: 230 mm x 435 mm x 200 mm

12.3.3.3 Technical data

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
Accessory	
Power supply 24 V DC / 5 A	10.800007

12.4 Terminal blocks

12 pin RM 3.81 terminal block PHOENIX

Order number	52.000024
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2 pin RM 5.08 terminal block WAGO

Order number	52.000022
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14 Contact and Support

Support

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Note

If you require support, specify the serial number (iba-S/N) of the product.

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