
# ibaPADU-S-CM

## Central unit for the iba modular system

Manual

Issue2.2

Measurement Systems for Industry and Energy

www.iba-ag.com

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The content of this publication has been checked for compliance with the described hardware and software. Nevertheless, deviations cannot be excluded completely so that the full compliance is not guaranteed. However, the information in this publication is updated regularly. Required corrections are contained in the following regulations or can be downloaded on the Internet.

The current version is available for download on our web site http://www.iba-ag.com.

| Issue | Date | Revision | Author | Version HW/FW |
|---|---|---|---|---|
| 2.2 | 06-2024 | Dimension drawings, FO budget | st | v02.14.015 |



**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 manual describes the construction, the use and the operation of the *ibaPADU-S-CM* device.

**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". The documentation is also available at www.iba-ag.com in the download area.

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

- **Central units**

  Manuals of the central units contain the following information:

  - 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.

## 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*<br>Example:<br>Select the menu *Logic diagram – Add – New function block*. |
| Keys | <Key name><br>Example: <Alt>; <F1> |
| Press the keys simultaneously | <Key name> + <Key name><br>Example: <Alt> + <Ctrl> |
| Buttons | <Key name><br>Example: <OK>; <Cancel> |
| Filenames, paths | `Filename`, `Path`<br>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 About ibaPADU-S-CM

The modular concept of the ibaPADU-S device family is designed on the basis of a backplane. You can plug on this backplane not only the central unit, but also up to 4 input/output modules. The *ibaPADU-S-CM* central unit offers 8 digital inputs.

When equipped with the right input/output modules and combined with the *ibaPDA* software, *ibaPADU-S-CM* can be used for fast applications in the fields of data capturing and recording.

Examples of applications are as follows:

- Measurement data acquisition
- Condition Monitoring
- Noise recognition and eccentricity analysis

As the device has got a robust housing, no fan and no rotating parts, it is almost free of maintenance.

# 3 Scope of delivery

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

The scope of delivery includes:

- Device *ibaPADU-S-CM*
- Covering caps for FO cables and USB
- 16-pin terminal block with spring terminals (digital input channels)
- 2-pin terminal block with spring terminals (power supply)
- Data medium "iba Software & Manuals"

# 4 Safety instructions

Observe the following safety instructions for *ibaPADU-S-CM*.

## 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 may only be used as defined in the technical data, see chapter ↗ *Technical data*, page 37.

## 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 mearures.

**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!

**Warning!**

Modules and CPU must not be attached or detached to/from the rack under voltage!

Switch off *ibaPADU-S-CM* or disconnect power supply before attaching/detaching the modules.

**Note**

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

**Note**

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

# 5 System requirements

**Hardware**

For operation

- Power supply 24 V DC ± 10 %, 3 A (fully equipped)
- Backplane panel, e. g. *ibaPADU-B4S*, see ↗ *Accessories*, page 45

For parametrization of the device and for measuring:

- PC with the following minimum equipment
  - One free PCI slot, or
  - One free PCI Express slot, or
  - One ExpressCard/34 or ExpressCard/54 slot (Notebook).

  On the iba homepage http://www.iba-ag.com you will find suitable computer systems with desktop and industrial housing.
- An FO input card of the *ibaFOB-D* type (Firmware version V2.00 build 173 or higher):
  - *ibaFOB-io-D* / *ibaFOB-io-Dexp*
  - *ibaFOB-2io-D* / *ibaFOB-2io-Dexp*
  - *ibaFOB-2i-D* / *ibaFOB-2i-Dexp* with *ibaFOB-4o-D* add-on module
  - *ibaFOB-4i-D* / *ibaFOB-4i-Dexp* with *ibaFOB-4o-D* add-on module
  - *ibaFOB-io-ExpressCard/34* or *ibaFOB-io-ExpressCard/54* (for Notebooks)
  - FO cable (bidirectional)

  An overview of suitable FO cards and FO cables can be found in the "Accessories" chapter, ↗ *FO cards and FO cables*, page 61

**Software**

- *ibaPDA* version 6.39.15 or higher

For license examples, see chapter ↗ *iba software*, page 61

**ibaPADU-S-CM**

- Firmware version 02.14.015 or higher
- Hardware version A0 or higher

# 6 Mounting and dismounting

The following section explains how to install, connect and remove the *ibaPADU-S-CM* device. Also refer to the notes in chapter ↗ *Safety instructions*, page 12.

**Caution!**

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

## 6.1 Mounting

Proceed as follows to mount the *ibaPADU-S-CM* device.

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

A description of how to attach the earthing for the different mounting systems can be found in chapter ↗ *Accessories*, page 45:

- Mounting with backplane panel, see ↗ *Backplane panels*, page 45
- Mounting systems for central unit only, see ↗ *Mounting system for central unit*, page 50
- Mounting systems for *ibaPADU-S-B4S*, see ↗ *Mounting systems for ibaPADU-S-B4S*, page 52

## 6.2 Dismounting

Proceed as follows to dismount the *ibaPADU-S-CM* device.

**Caution!**

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

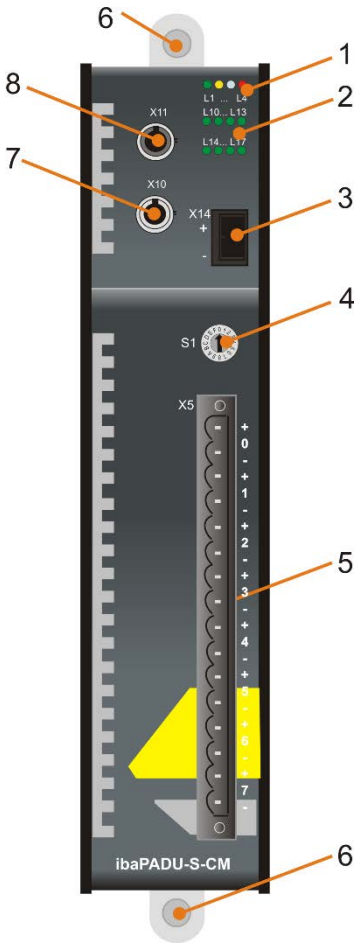
1. Switch off the device.
2. Remove all cables.
3. Hold the device and remove the upper and lower fixing screw.
4. Pull the device off the module rack.

# 7 Device description

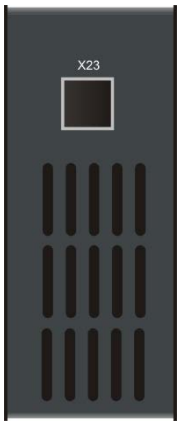
Here you will find views and descriptions of the device *ibaPADU-S-CM*.

## 7.1 Views

The following views show the operating and indicating elements, as well as the connections of the device *ibaPADU-S-CM*




| | | | |
|---|---|---|---|
| 1 | Operating status indicators L1 … L4 | 5 | Connection for digital inputs X5 |
| 2 | Status LED digital inputs L10 … L17 | 6 | Fixing screws |
| 3 | Connection power supply 24 V X14 | 7 | Connection FO output (TX) X10 |
| 4 | Rotary switch S1 | 8 | Connection FO input (RX) X11 |




X23 for service purposes only

## 7.2 Indicating elements

Below you will find information on the indicating elements of the device *ibaPADU-S-CM*.

### 7.2.1 Operating state

Colored LEDs on the *ibaPADU-S-CM* device indicate the operating status of the device.

| LED | State | Description |
|---|---|---|
| L1<br>Red | on | Device boots |
| L1<br>Green | flashing slowly | Device is working |
| | on or off | Controller halted, device "crashed", device 100 % processor load (constantly on) |
| | flashing quickly | System programming mode |
| L2<br>Yellow | off | No backplane access |
| | on | Access to I/O modules via backplane |
| L3<br>White | off | No FO reception at RX |
| | flashing | FO reception available, FO protocol detected, but does not match the internally set FO protocol |
| | on | FO reception OK |
| L4<br>Red | off | Normal state, no errors |
| | flashing | Fault, internal device applications are not running. |
| | on | Device is defective (error during booting) |

**Caution!**

The device must not be switched off during an update or auto update as the device or the connected modules may be damaged.

Only if the green system LED L1 flashes evenly and none of the LEDs L5 ... L8 is on, the device is ready for operation or can be switched off properly.

**Note**

When the LED L4 indicates a failure, please contact the iba Support. Please mention the number of times, the LED L4 is flashing.

### 7.2.2 State of digital inputs L10 … L17

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

| LED | State | Description |
|---|---|---|
| L10 … L17 | on | Signal ok, logical 1 |
| | off | no signal, logical 0 |

For further information, see ↗ *Digital inputs X5*, page 19.

## 7.3 Control elements

Below you will find information on the operating elements of the device *ibaPADU-S-CM*.

### 7.3.1 Rotary switch S1


With the S1 rotary switch, you can define the device addresses in the FO ring.

For further information, see ↗ *FO cascading*, page 22.

## 7.4 Communication interfaces

Below you will find information on the communication interfaces of the device *ibaPADU-S-CM*.

### 7.4.1 Fiber optic connections X10 and X11

You will find the following communication interfaces on the *ibaPADU-S-CM* device:

- X11 (RX): FO receiving interface
- X10 (TX): FO transmitting interface

The device supports the 32Mbit Flex fiber optic transmission protocol. A bidirectional FO connection is required to the *ibaPDA*. A fiber optic card of type *ibaFOB-D* or *ibaFOB-Dexp* must be installed in the *ibaPDA* computer in order to receive and transmit data.

**Maximum distance of fiber optic connections**

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

However, the maximum distance can be estimated on the basis of the output power of the transmitting interface (TX) or the sensitivity of the receiving interface (RX). A model calculation can be found in chapter ↗ *Example for FO budget calculation*, page 43.

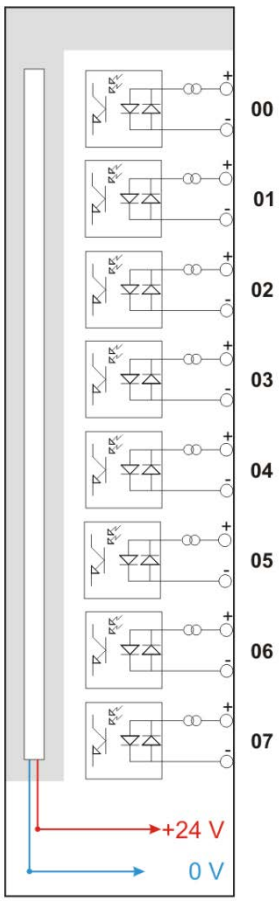
The specification of the transmission power and the reception sensitivity of the FO components installed in the device can be found in the technical data under ↗ *ibaNet interface*, page 38.

## 7.5 Digital inputs X5

### 7.5.1 Connection diagram / pin assignment

Here, you can connect eight input signals (0…7), 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.

For further information, see ↗ *Technical data*, page 37.



### 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

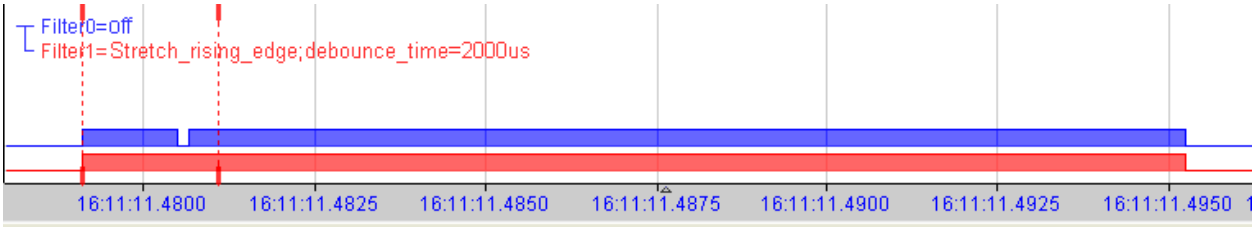
For each filter, a debounce time has to be defined in µs. This debounce time can have a value between [1 µs … 65,535 µs].

#### Off

The measured input signal is forwarded directly without filtering.

#### Stretch rising edge

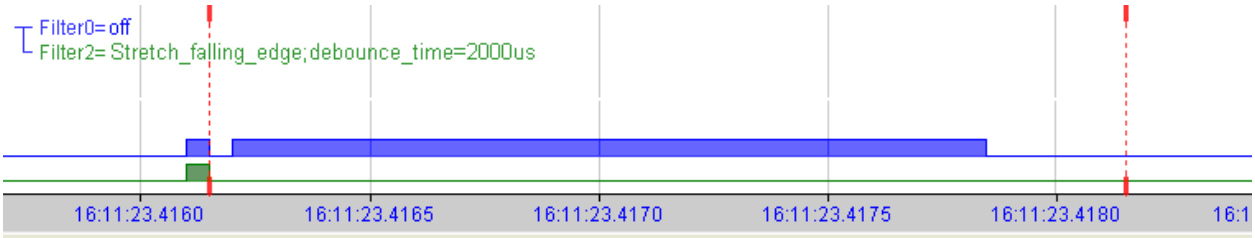
The first rising edge sets the output signal (red) to logical 1 and it remains logical 1 for the set debounce time. Subsequently, the channel is transparent again and waits for the next rising edge.




| 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

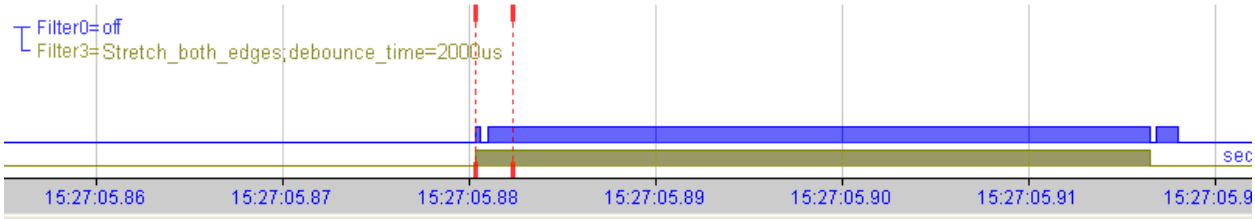
The first falling edge sets the output signal (green) to logical 0 and it remains logical 0 for the set debounce time. Subsequently, the channel is transparent again and waits for the next falling edge.




| 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

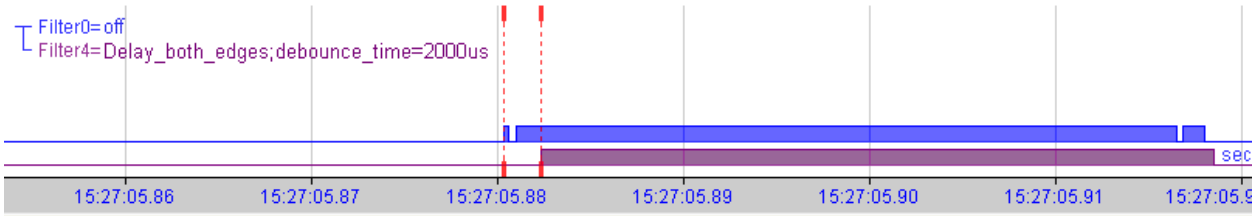
With the first edge, the output signal (ochre) follows the initial signal (blue) and keeps the logical level for the duration of the defined debounce time. Subsequently, the channel is transparent again and waits for the next (rising or falling) edge.




| 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 | |

## 7.6 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 (±10 % unregulated)!

Pay attention to correct polarity!

# 8 System integration

## 8.1 Application examples

The figures below show examples of *ibaPADU-S-CM* combined with *ibaPDA*.

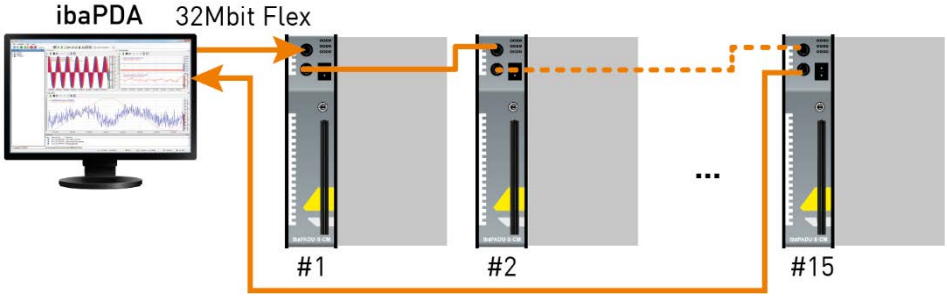
The shown examples can be integrated in other iba systems or external systems, respecting the technical requirements.

### 8.1.1 Measuring system with ibaPDA

The following example shows a pure measurement application (capturing, recording, analyzing), the signals are recorded with *ibaPDA*.


### 8.1.2 FO cascading

With 32Mbit Flex you can group up to 15 modular systems to a ring topology.




The devices are addressed via the S1 rotary switch.

| Device number in the cascade | Position of rotary switch S1 |
|---|---|
| Not allowed | 0 |
| 1. device | 1 |
| 2. device | 2 |
| ... | ... |
| 14. device | E |
| 15. device | F |

**Note**

If the rotary switch position is "0", the connection is interrupted in delivery state.

However, it is possible to configure the device with a predefined FO signal configuration using the ibaNet protocol 32Mbit when the rotary switch position is "0".

For further information see chapter ↗ *FO configuration using 32Mbit ibaNet protocol (StaticFO)*, page 62.

A cascade is possible with all devices that support the ibaNet 32Mbit Flex protocol.

# 9 Updates

**Caution!**

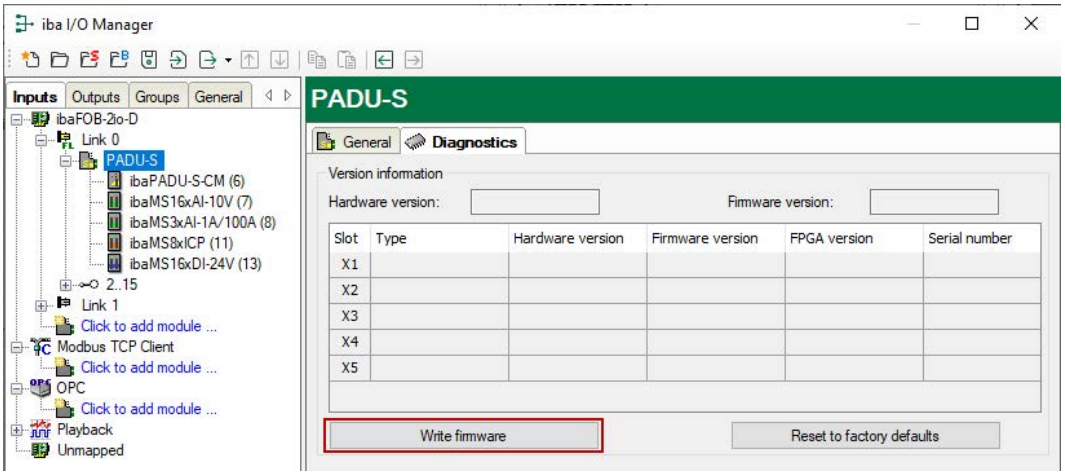
Do not switch off the device when an update is running. This might damage the device. Installing an update can take some minutes.

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

## 9.1 Update via ibaPDA

Proceed as follows to update the *ibaPADU-S-CM* device via *ibaPDA*.

1. Open the *ibaPDA* I/O Manager and choose the *PADU-S* module in the module tree.
2. Click on the "Diagnostics" tab on the <Write firmware> button and choose the "paduscm_v[xx.yy.zzz].iba" update file.
3. Start the update with <OK>.




→ After the update, *ibaPADU-S-CM* reboots automatically.

→ The update is completed, when the LED L1 is flashing slowly and regularly.

## 9.2 Auto-update of the modules

After having mounted the modules and applied the voltage to the central unit, *ibaPADU-S-CM* detects the modules and checks the firmware version.

*ibaPADU-S-CM* 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.

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

**Note**

The automatic upgrade or downgrade may take a few minutes. The device must not be switched off during an auto-update.

The LEDs behave during an auto-update just as during a manually installed update (LED L1 flashes rapidly, etc.). As soon as the LED L1 is flashing green, slowly and regularly, the device can be used again.

**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 in ibaPDA

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

**Note**

You need an FO card with input links and output links of the FOB-D type with firmware beginning with version V2.00 (build 172). Otherwise, you need to do a firmware update. You find a description (in the *ibaFOB-D* manual) and the latest firmware on the data storage medium that is included in delivery.

## 10.1 First steps for the configuration in ibaPDA

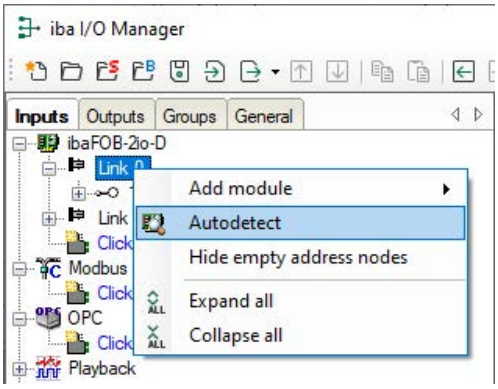
You can add the *ibaPADU-S-CM* device to your configuration in *ibaPDA* using automatic detection or manually. Start *ibaPDA* and open the I/O Manager.

**Adding device automatically**

**Prerequisite**: The *ibaPADU-S-CM* device is connected and switched on.

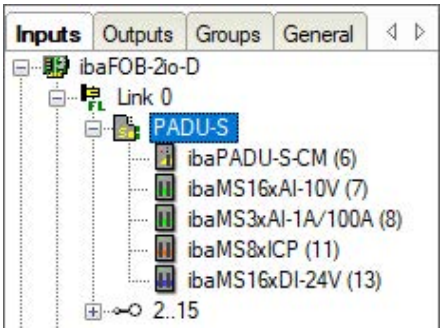
1. Look in the I/O Manager for the link of the FOB-D card, *ibaPADU-S-CM* is connected to.
2. Right-click the link.

→ A submenu opens.




3. Click on *Autodetect*.

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



→ If *ibaPDA* does not detect the device automatically, you can add the device manually.

4. Configure *ibaPADU-S-CM* and the modules, e. g. assign a name, debouncing, etc.

   See chapter ↗ *Modules in ibaPDA*, page 28.

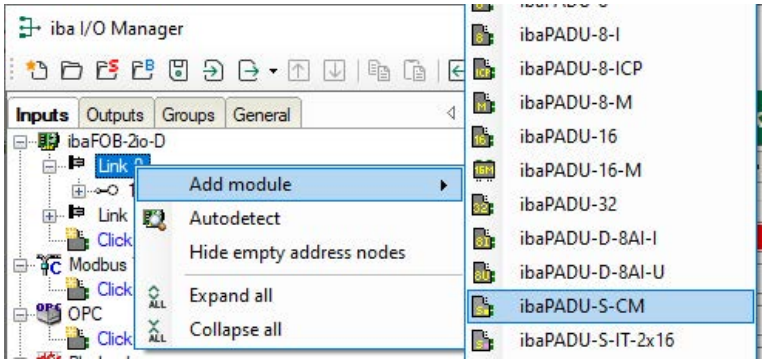
5. To apply the configuration, click <Apply> or <OK>.

**Adding device manually**

1. Click with the right mouse button on the connection (Link) of the *ibaFOB-io-D* card, the device is connected to.
2. Select *Add module*.

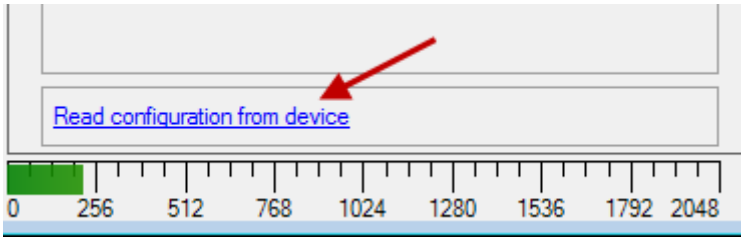
→ The list of the available modules is displayed.

3. Select *ibaPADU-S-CM*.

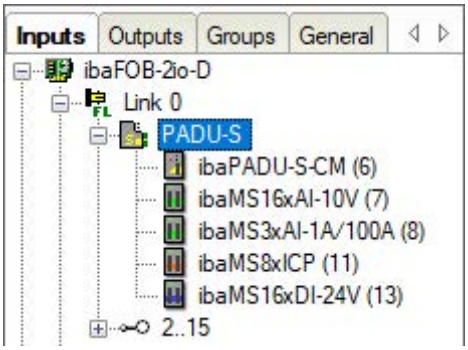



→ The device is displayed in the module tree.

4. Drag the device to the address that is set on the device with the S1 rotary switch (Link 1 – 15 under the device), while keeping the right mouse button pressed: Position 1 – F corresponds to address 1 – 15.
5. Click on the *General* tab on *Read configuration from device*.




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



6. Configure *ibaPADU-S-CM* and the modules, e. g. assign a name, debouncing, etc.

   See chapter ↗ *Modules in ibaPDA*, page 28.

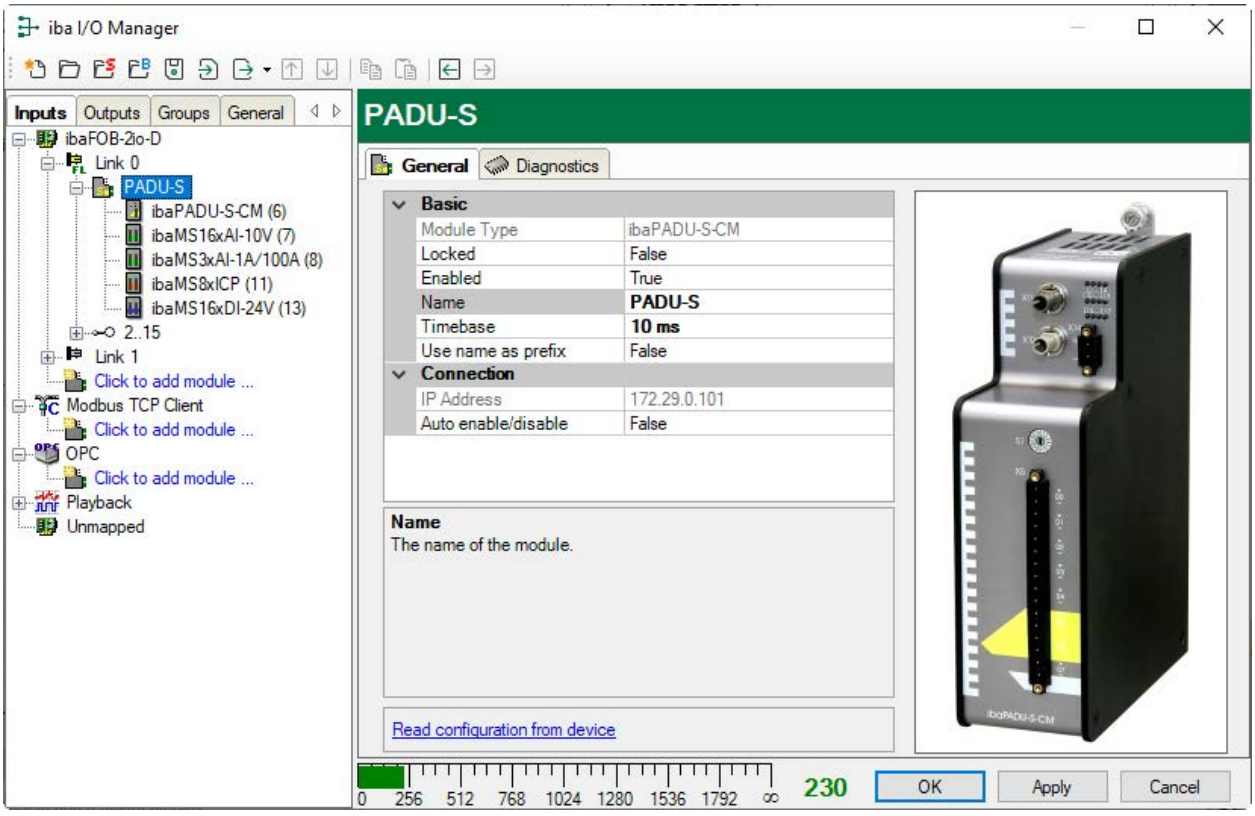
7. To apply the configuration, click <Apply> or <OK>.

## 10.2 Modules in ibaPDA

The device module *PADU-S* and the follow-up module *ibaPADU-S-CM* are described below.

### 10.2.1 PADU-S – General tab

In the *General* tab, you make the basic settings and connection settings for the *PADU-S* 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 here.

**Timebase**
Specifies the acquisition time base used for *ibaPADU-S-CM* and the connected modules.

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

**Connection**

**IP address**
IP address or the host name of the *ibaPADU-S-CM* device (read only).

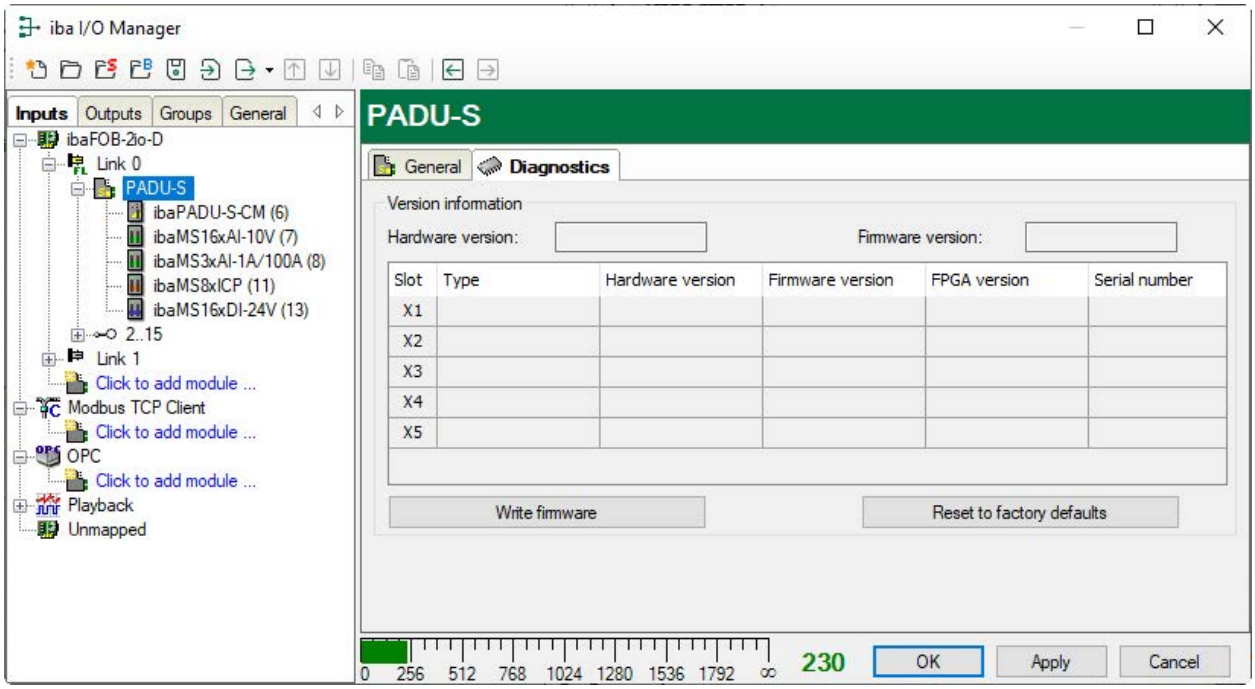
**Auto enable/disable**
If the value is TRUE, the data acquisition is started even though the device is missing.

**More functions**

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

### 10.2.2 PADU-S – 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.



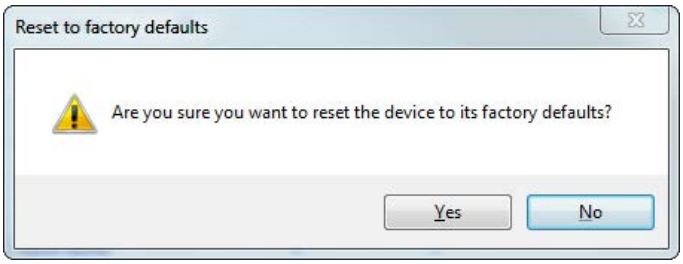

**<Write firmware>**
With this button it is possible to perform firmware updates. Select the update file “paduscm_v[xx.yy.zzz].iba” in the browser and start the update with <OK>.

**Note**

This process may take several minutes and must not be interrupted. After an update the device will be automatically rebooted.

See chapter ↗ *Update via ibaPDA*, page 24.

**<Reset to factory defaults>**
Using this button all settings are reset to factory defaults after having confirmed the following request with <Yes>.



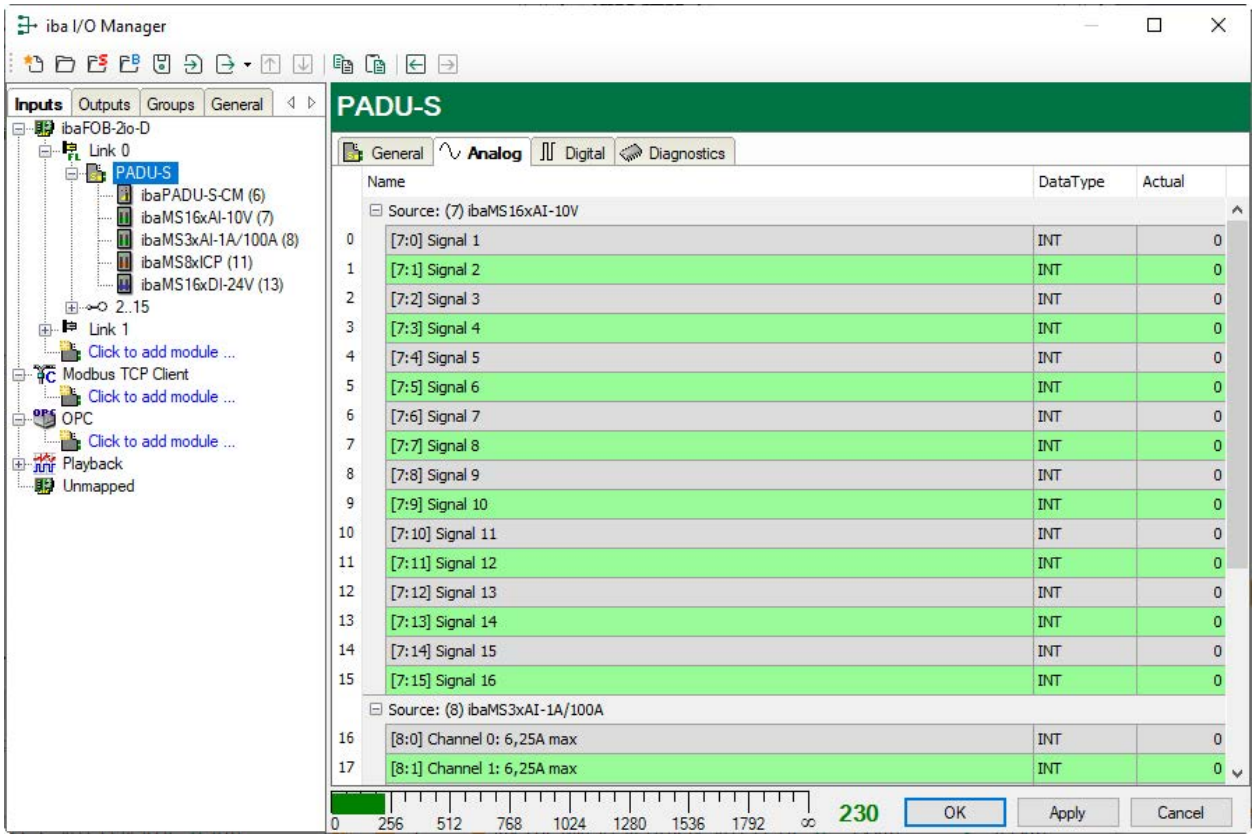

After the reset the following message appears and the device will be automatically rebooted:

### 10.2.3 PADU-S – Analog tab

The configured analog signals and the current values for the *PADU-S* module are displayed in the *Analog* tab.

**Note**

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

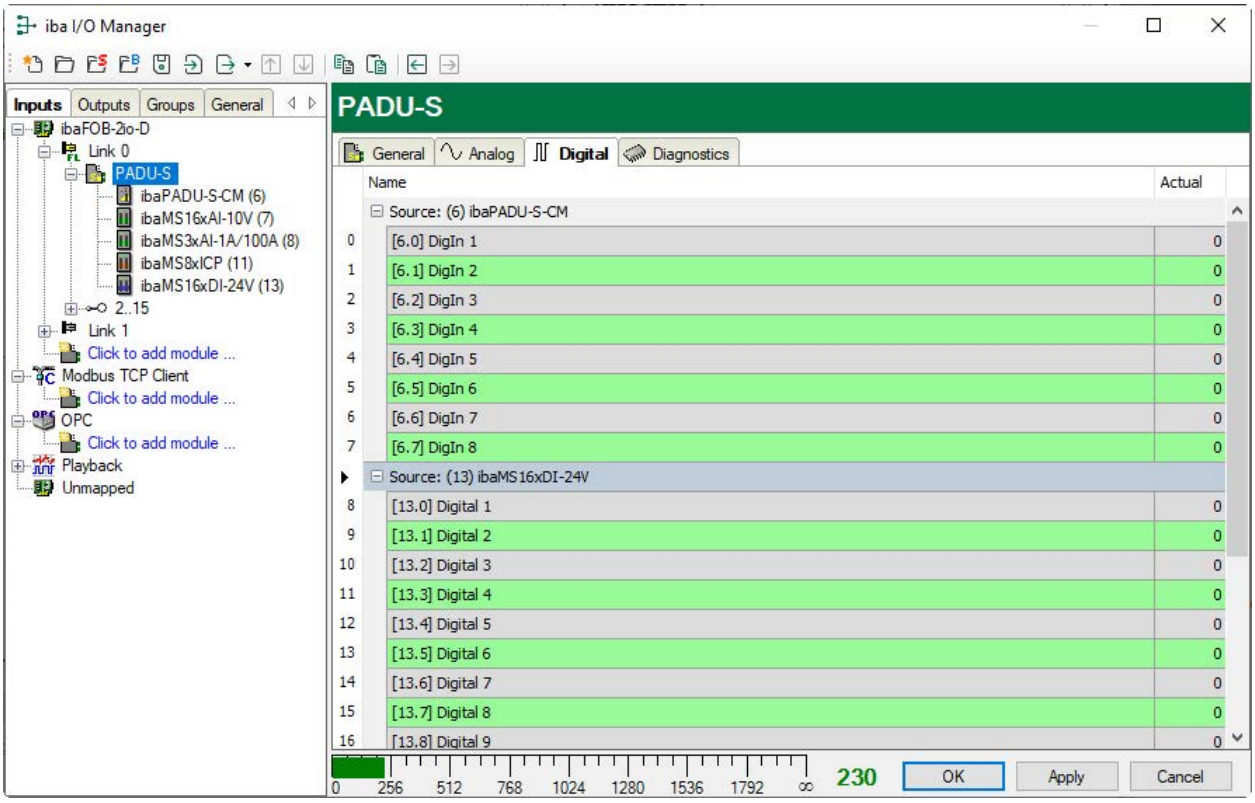


### 10.2.4 PADU-S – Digital tab

The configured digital signals and the current values for the *PADU-S* module are displayed in the *Digital* tab.

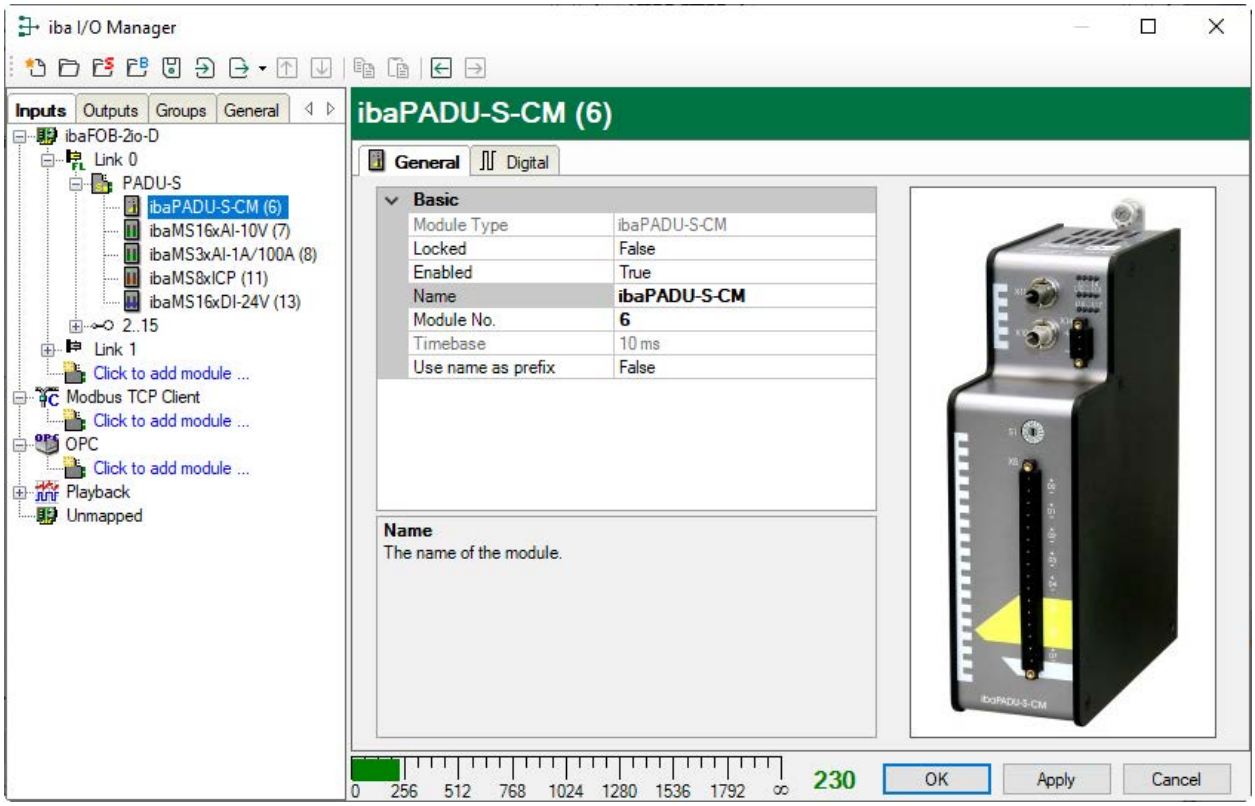
**Note**

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



### 10.2.5 ibaPADU-S-CM – General tab

In the *General* tab, you make the basic settings for the *ibaPADU-S-CM* module.

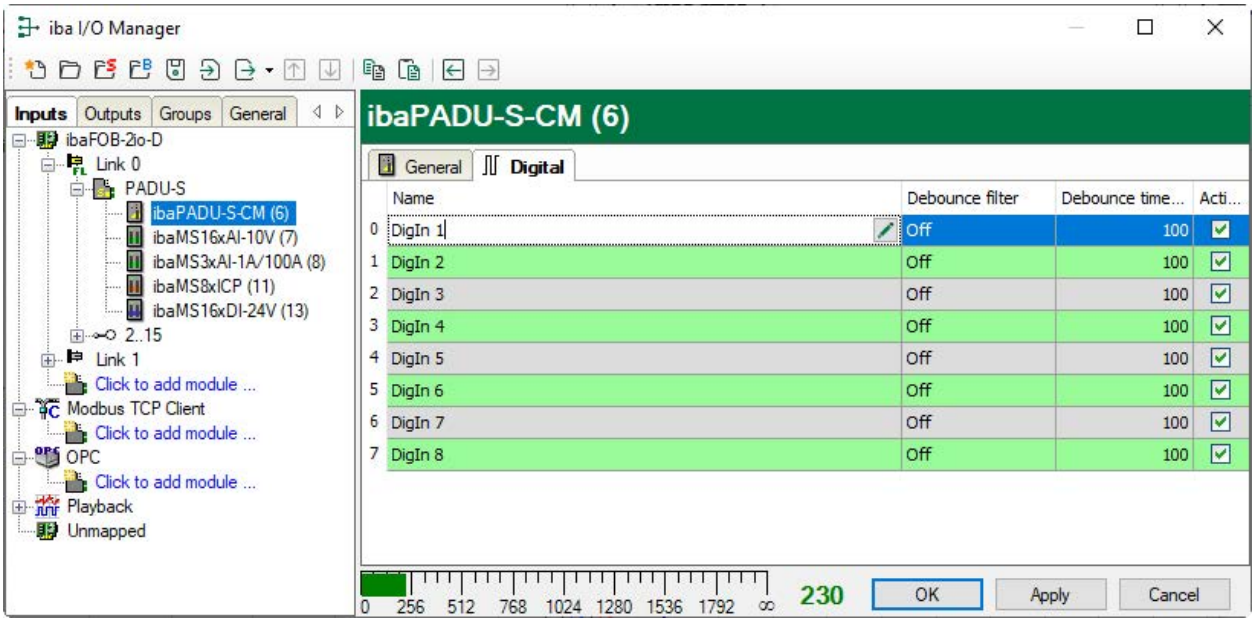



**Basic settings**

**Module type, Locked, Enabled, Name, Timebase, Use name as prefix**
See chapter ↗ *Basic settings*, page 28

**Module no.**
Logical module number for unambiguous referencing of signals, e.g. in expressions and *ibaAnalyzer*

### 10.2.6 ibaPADU-S-CM – Digital tab

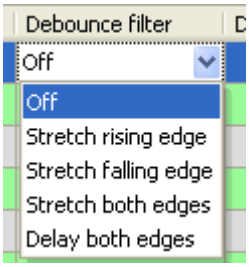



**Name**

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

**Debounce filter**

In the drop-down menu, you can choose the operating mode for the debounce filter.




See chapter ↗ *Debounce filter inputs*, page 20.

**Debounce time (µs)**

Here, you can define the debounce time in µs.

**Active**

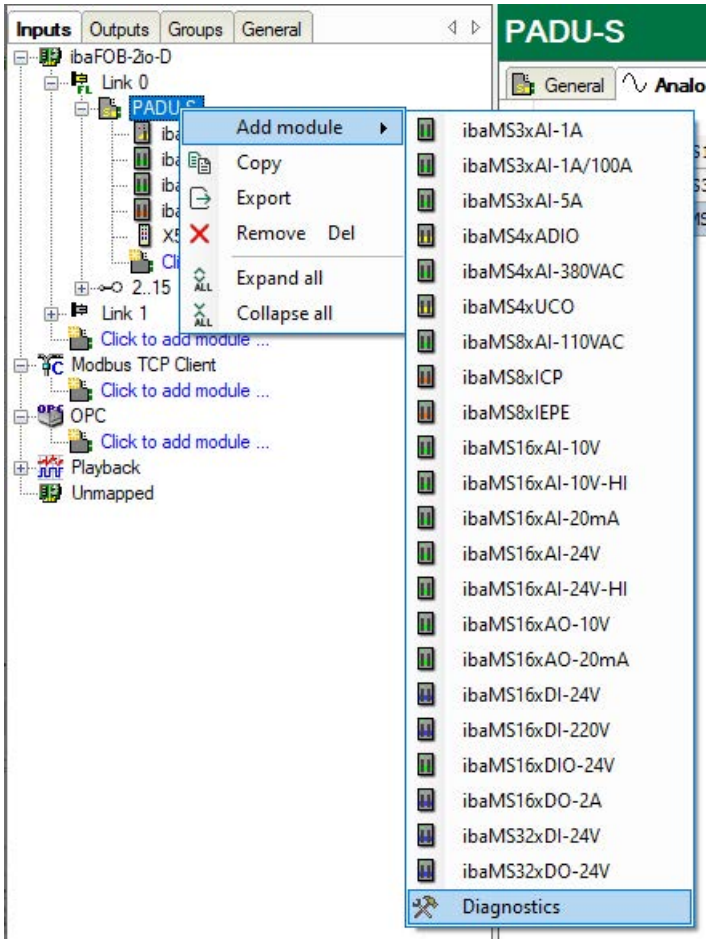
Enabling/disabling the signal

**Note**

Configure the plugged analog and digital modules. The description can be found in the documentation for the respective modules.

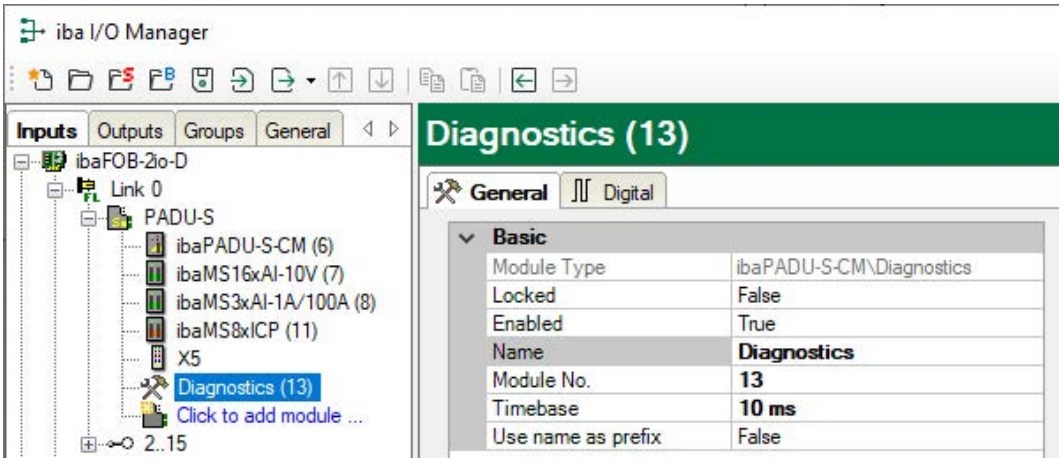
### 10.2.7 Diagnostic signals

Diagnostics signals are available in the *Diagnostics* module and can be additionally recorded. The module must be manually added. Right-click the *PADU-S* module in the module tree and select *Diagnostics* from the context menu.




#### 10.2.7.1 Diagnostics – General tab

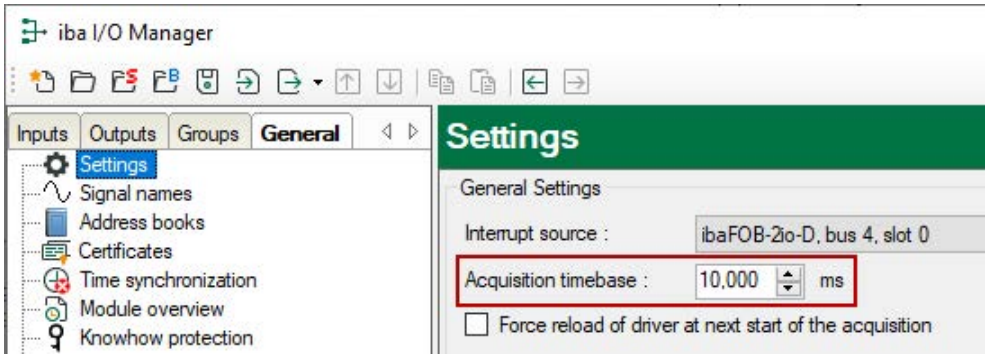
In the *General* tab make the basic settings for diagnostic modules.



**Basic settings**

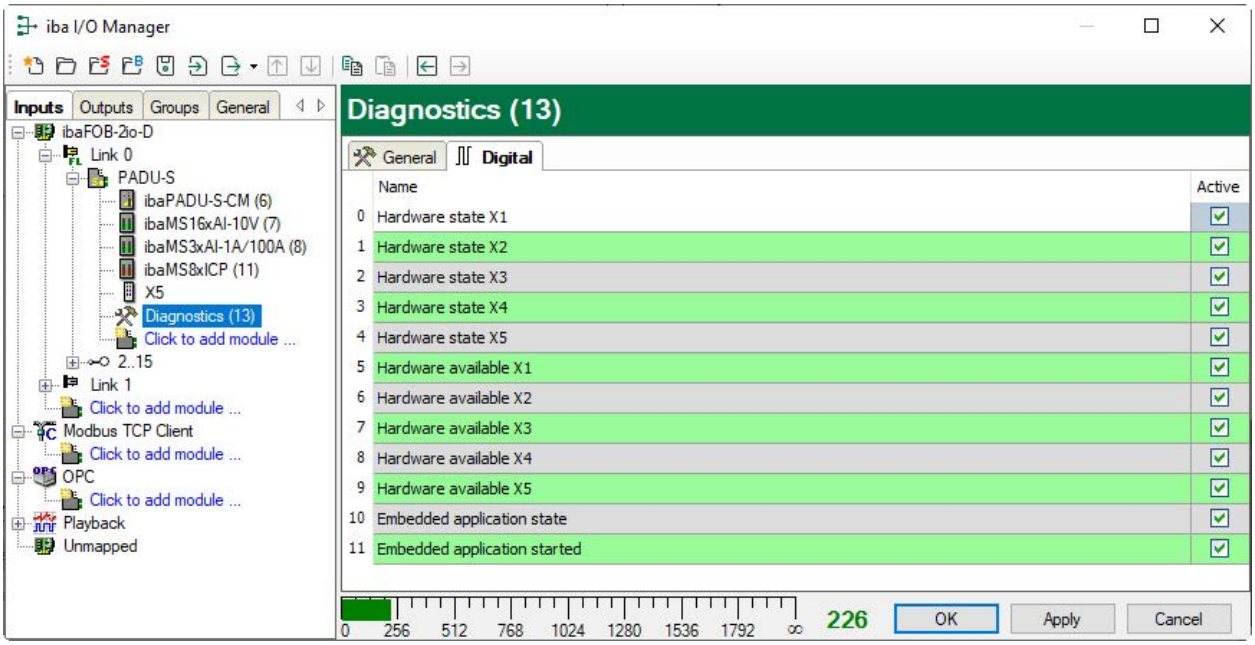
**Module Type, Locked, Enabled, Name, Module No., Use name as prefix**
See chapter ↗ *Basic settings*, page 28.

**Timebase**
The timebase is related to the general acquisition timebase of the *ibaPDA* system. The time base in the diagnostic module cannot be faster than the general acquisition time base.




## 10.2.7.2 Diagnostics – Digital tab

You can activate the diagnostic signals individually in the *Digital* tab.




Meaning of the signals:

| Signal | Meaning |
|---|---|
| Hardware state | Indicates whether the I/O module is ready for operation. |
| Hardware available | Indicates whether the I/O module has been detected and initialized properly during startup. |
| Embedded application state | Signal not available. |
| Embedded application started | Signal not available. |

# 11 Technical data

In the following you will find the technical data and dimensions for *ibaPADU-S-CM*.

## 11.1 Main data

**Short description**

| | |
|---|---|
| Name | ibaPADU-S-CM |
| Description | Central unit for modular data acquisition system |
| Order number | 10.124030 |

**Supply**

| | |
|---|---|
| Power supply | 24 V DC ± 10 %, not stabilized, 200 mA (without I/O modules), 3 A (with I/O modules) |
| Power consumption max. | 5 W |

**Operating and indicating elements**

| | |
|---|---|
| Indicators (LEDs) | 4 LEDs for operating status of the device<br>8 LEDs for state of digital inputs |

**Operating and environmental conditions**

| | |
|---|---|
| Temperature range | |
| Operation | 32 °F … 122 °F (0 °C … 50 °C) |
| Storage/transport | -13 °F … 158 °F (-25 °C … 70 °C) |
| Mounting position | Vertical, plugged into backplane bus |
| Installation height | Up to 6562 ft (2000 m) |
| Cooling | Passive |
| Humidity class | F, no condensation |
| Protection class | IP20 |
| Certification/Standards | EMC: IEC 61326-1<br>FCC part 15 class A |
| MTBF[1)] | 1,951,614 hours / 222 years |
| Dimensions (width x height x depth) | 2.20 in x 8.42 in x 5.83 in (56 mm x 214 mm x 148 mm)<br>With module rack:<br>9.02 in x 8.62 in x 6.14 in (229 mm x 219 mm x 156 mm) |
| Weight (incl. packing) | 2.65 lbs (1.2 kg) |

[1)] 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

## 11.2 Declaration of conformity

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

**Unique Identifier**:
10.124030 ibaPADU-S-CM
10.124000 ibaPADU-S-B4S

**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.

## 11.3 Interfaces

**ibaNet interface**

| | | |
|---|---|---|
| Number | 1 | |
| Version | Fiber optics | |
| ibaNet protocol | 32Mbit Flex | |
| Data transfer rate | 32 Mbit/s | |
| Sampling rate | Up to 40 kHz, freely adjustable | |
| Connector type | 2 ST connectors for RX and TX;<br>iba recommends the use of FO with multimode fibers of type 50/125 µm or 62.5/125 µm.<br>For information on cable length, see chap. ↗ *Example for FO budget calculation*, page 43. | |
| 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 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) | |

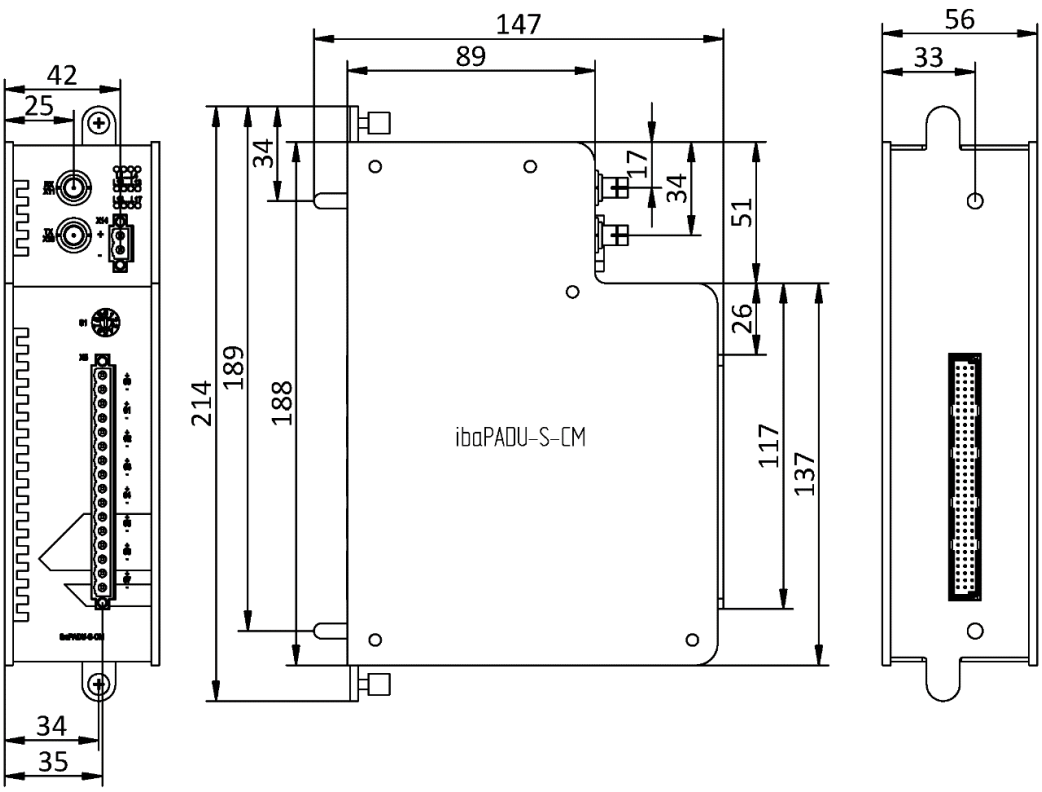
## 11.4 Digital inputs

| | |
|---|---|
| Number | 8 |
| Version | Galvanically isolated, protected against reverse polarity, single ended |
| Input signal | 24 V DC |
| Max. input voltage | ±60 V permanent |
| Signal level | |
| log. 0<br>log. 1 | > -6 V; < +6 V<br>< -10 V; > +10 V |
| Input current | 1 mA, constant |
| Debounce filter | Optional, 4 operating modes |
| Sampling rate | Up to 40 kHz, freely adjustable |
| Delay | Type 10 µs |
| Electrical isolation | |
| Channel-channel<br>Channel-housing | 2.5 kV AC<br>2.5 kV AC |
| Connector type | 16-pin multi-pin connector;<br>clamp-type terminal (0.2 $mm^2$ … 2.5 $mm^2$), screw connection. included in delivery |

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

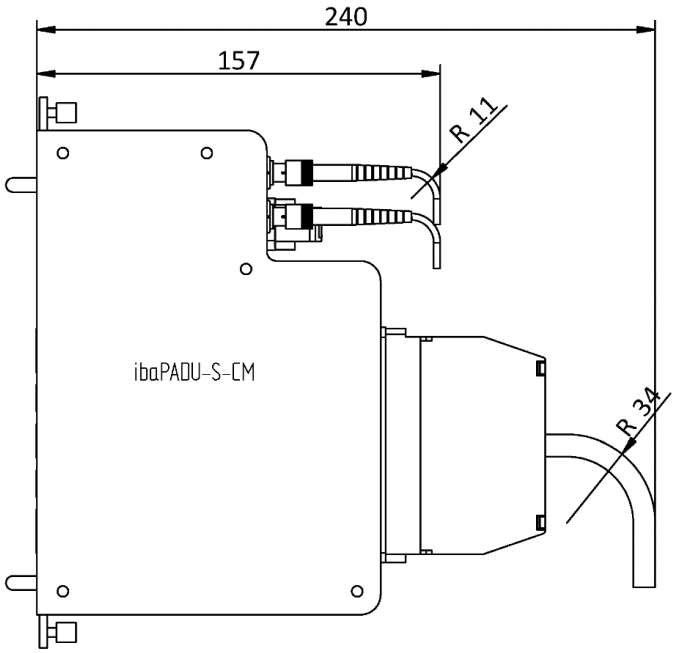
## 11.5 Dimensions

**ibaPADU-S-CM**



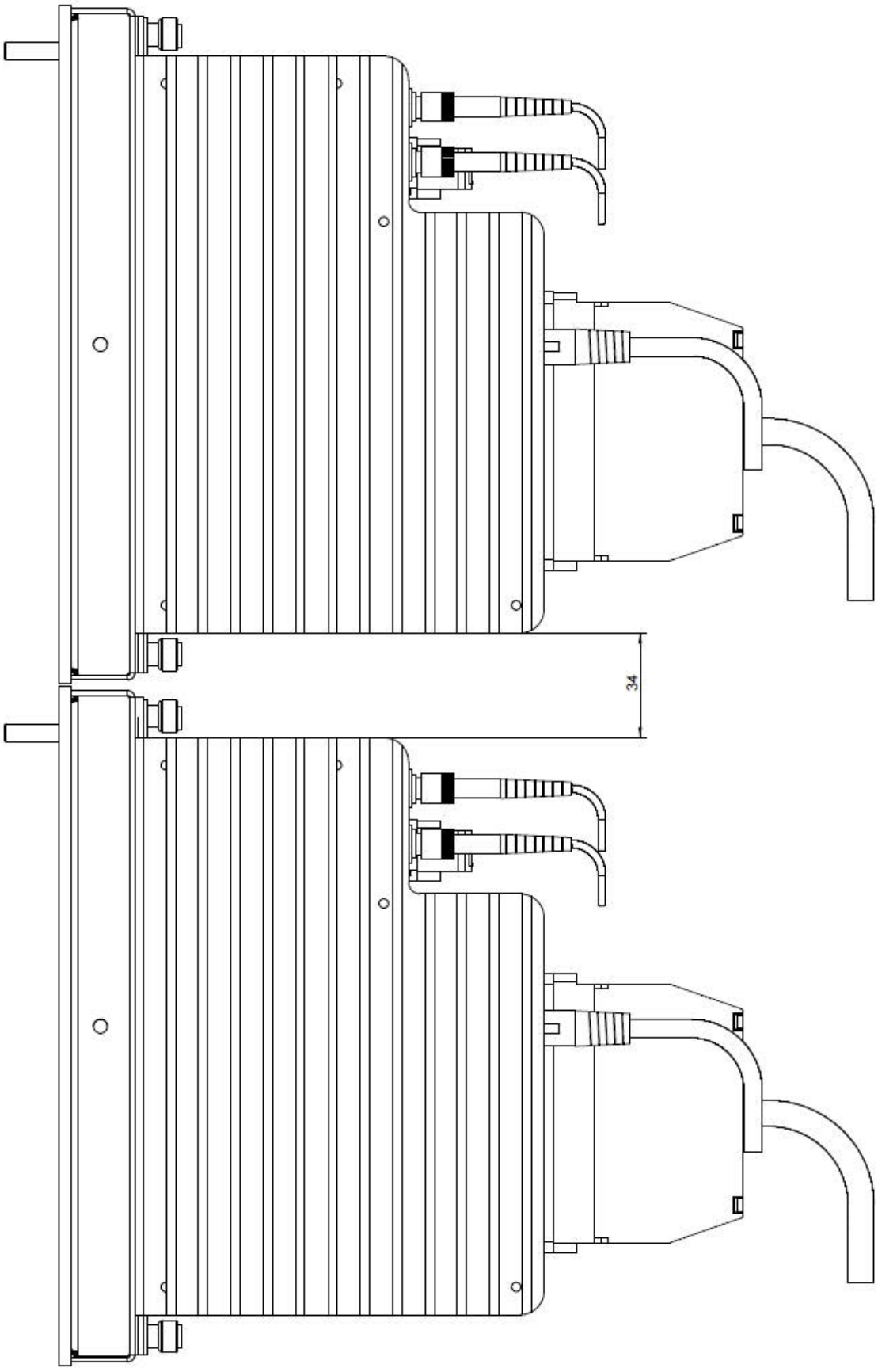

(dimensions in mm)

**ibaPADU-S-CM with cables**




(dimensions in mm)

**Minimum distance between 2 iba modular systems**




(dimensions in mm)

## 11.6 Connection diagrams

### 11.6.1 Pin assignment power supply X14

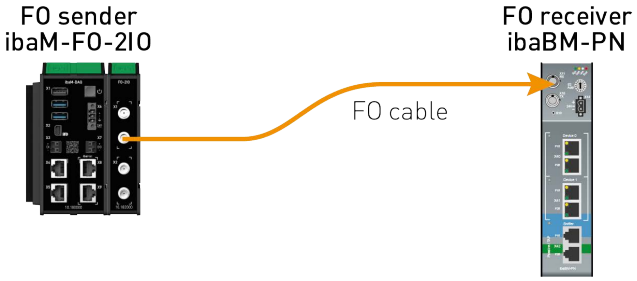
| Pin | Connection | |
|---|---|---|
| 1 | + 24 V |  |
| 2 | 0 V | |

### 11.6.2 Pin assignment digital inputs X5

| Pin | Connection | |
|---|---|---|
| 1 | Digital input 00 + |  |
| 2 | Digital input 00 - | |
| 3 | Digital input 01 + | |
| 4 | Digital input 01 - | |
| 5 | Digital input 02 + | |
| 6 | Digital input 02 - | |
| 7 | Digital input 03 + | |
| 8 | Digital input 03 - | |
| 9 | Digital input 04 + | |
| 10 | Digital input 04 - | |
| 11 | Digital input 05 + | |
| 12 | Digital input 05 - | |
| 13 | Digital input 06 + | |
| 14 | Digital input 06 - | |
| 15 | Digital input 07 + | |
| 16 | Digital input 07 - | |

## 11.7 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 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.

# 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.

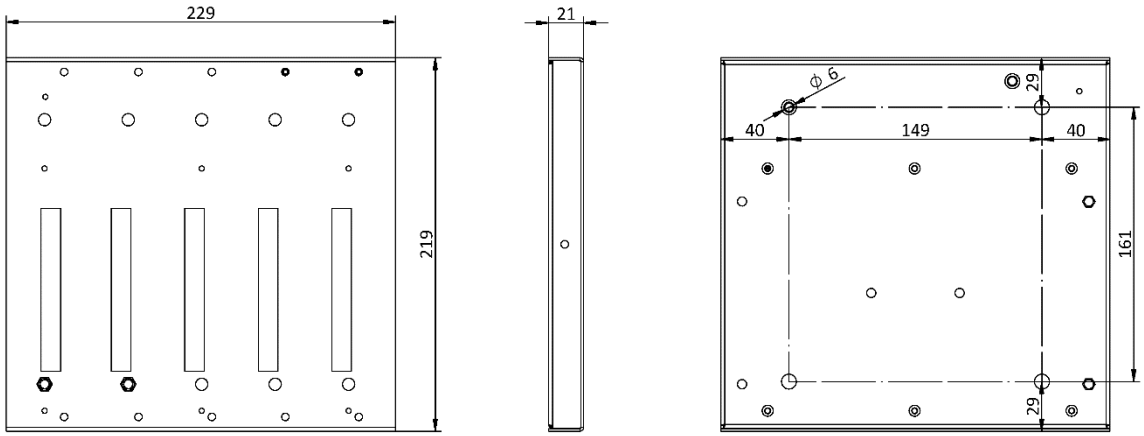

#### 12.1.1.1 Scope of delivery – ibaPADU-S-B4S

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

- Backplane panel
- Assembly kit

Assembly kit

### 12.1.1.2 Dimensions – ibaPADU-S-B4S




(dimensions in mm)

### 12.1.1.3 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

### 12.1.1.4 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)

### 12.1.2 ibaPADU-S-B1S

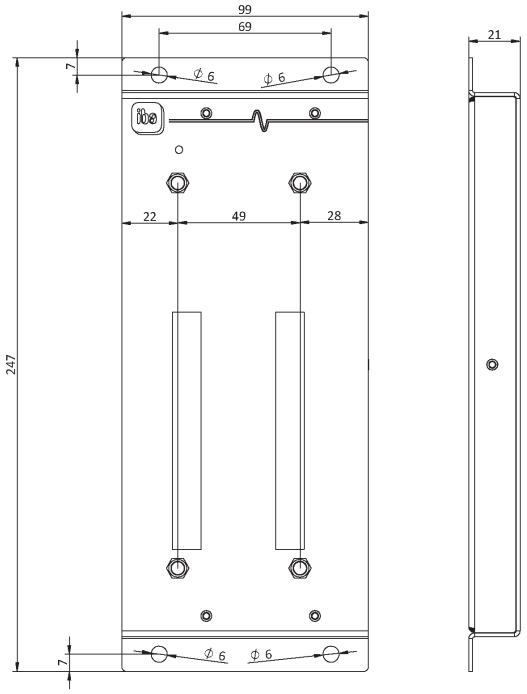
Backplane panel for mounting 1 central unit and 1 I/O module.


#### 12.1.2.1 Scope of delivery – ibaPADU-S-B1S

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

- Backplane panel
- Assembly kit

### 12.1.2.2 Dimensions – ibaPADU-S-B1S




### 12.1.2.3 Grounding – ibaPADU-S-B1S

See ↗ *Grounding – ibaPADU-S-B4S*, page 46.

### 12.1.2.4 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 |

## 12.2 Mounting system for central unit

### 12.2.1 ibaPADU-S-B

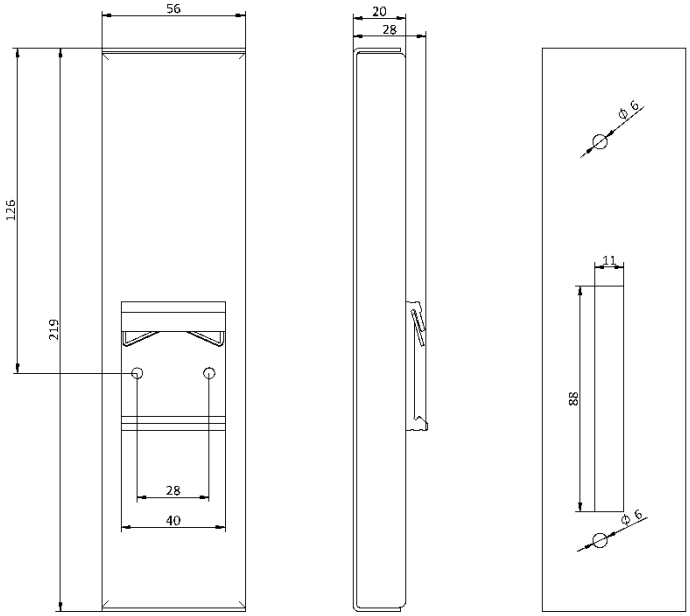
Mounting panel with DIN rail clip for 1 central unit (without I/O modules).

#### 12.2.1.1 Scope of delivery – ibaPADU-S-B

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

- Mounting panel

### 12.2.1.2 Dimensions – ibaPADU-S-B




(dimensions in mm)

### 12.2.1.3 Grounding – ibaPADU-S-B

The grounding must be done via the DIN rail.

### 12.2.1.4 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 |

## 12.3 Mounting systems for ibaPADU-S-B4S

### 12.3.1 Mounting angles

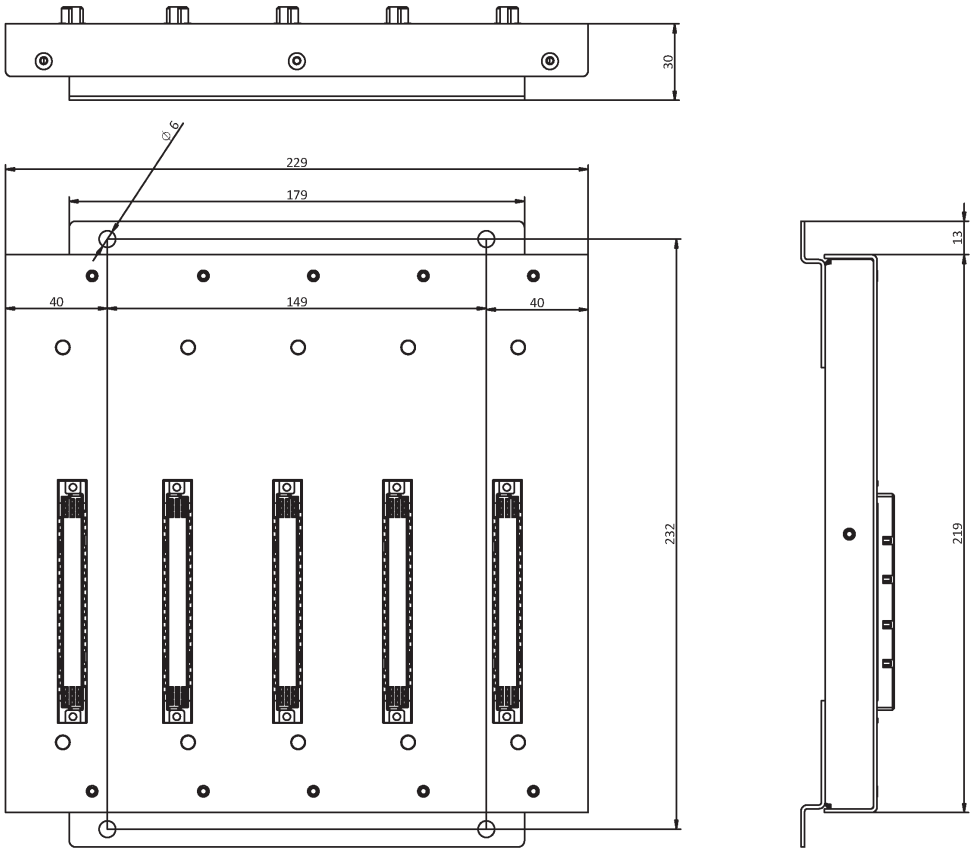
Mounting angles for mounting an iba modular system in a cabinet, 2 pieces, matching for *ibaPADU-S-B4S* (10.124000).

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

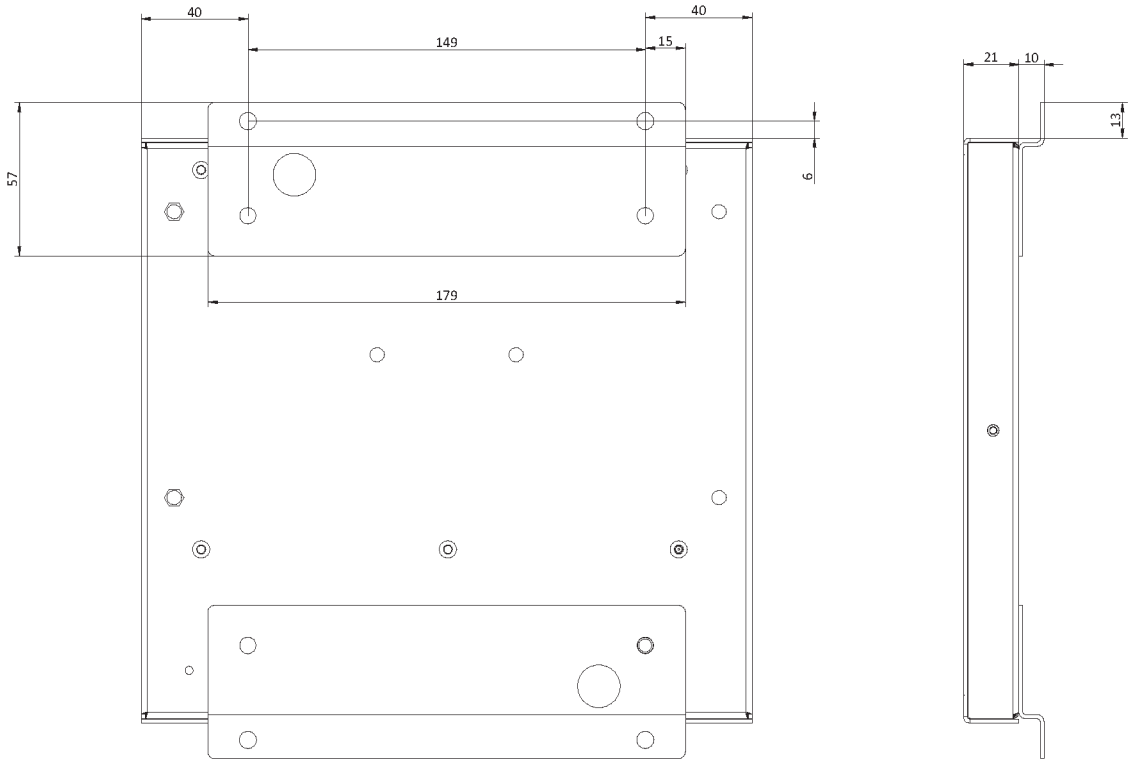
#### 12.3.1.1 Scope of delivery – mounting angles

- 2 pieces mounting angles (1 set)

#### 12.3.1.2 Dimensions – mounting angle




(dimensions in mm)




(dimensions in mm)

### 12.3.1.3 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**

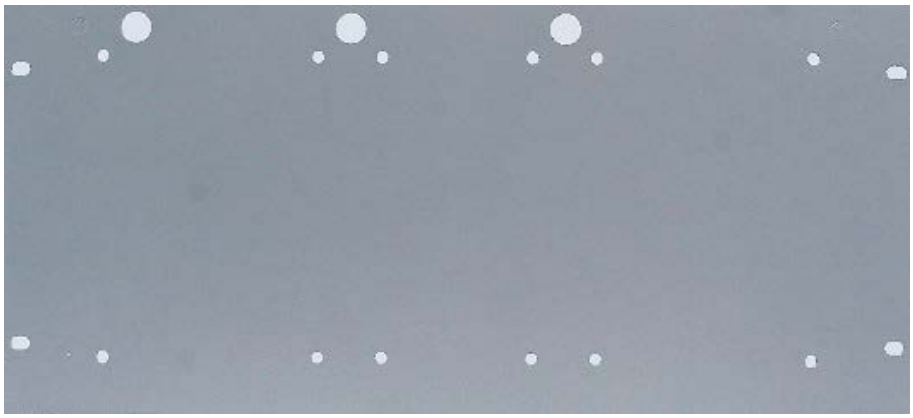
| | |
|---|---|
| Angle | 4 through holes M6 |
| Assembly kit | - |

**Design**

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

### 12.3.2 Mounting panel 19"

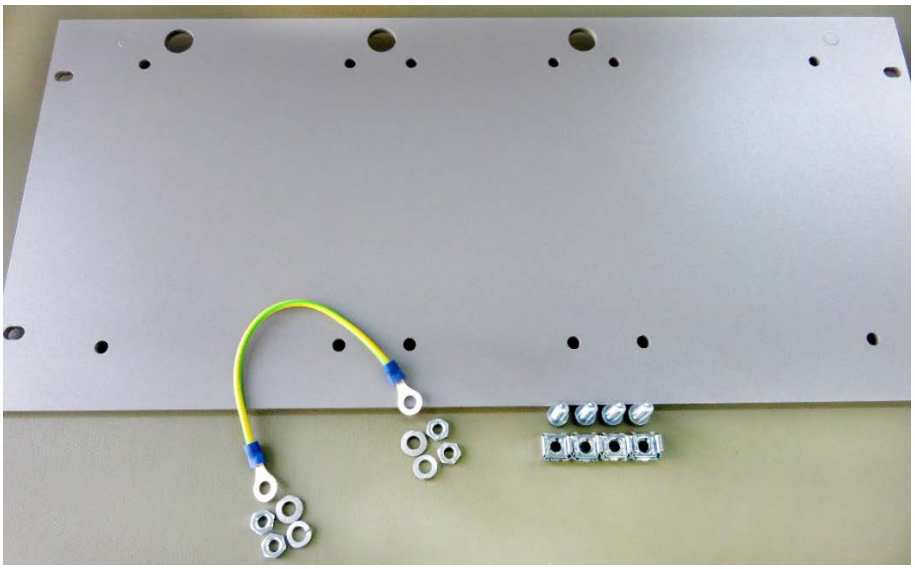
Mounting panel (483 mm/19") for up to 2 *ibaPADU-S-B4S* backplane panels.



#### 12.3.2.1 Scope of delivery – mounting panel 19"

The scope of delivery of the mounting panel includes:

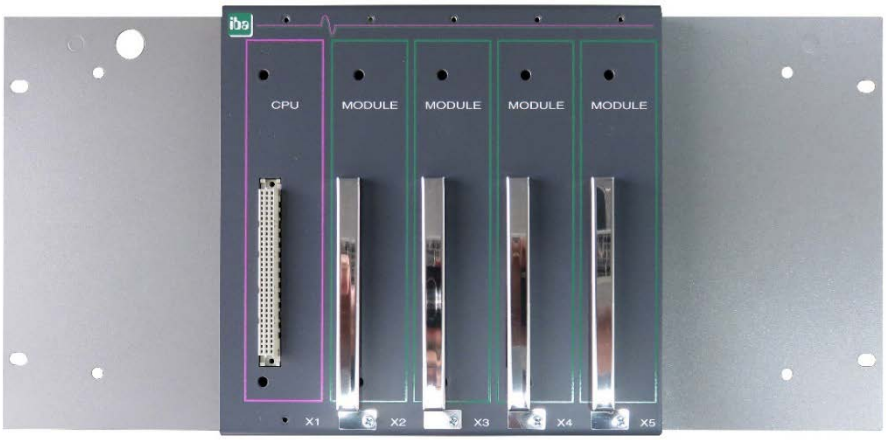
- Mounting panel
- Assembly kit



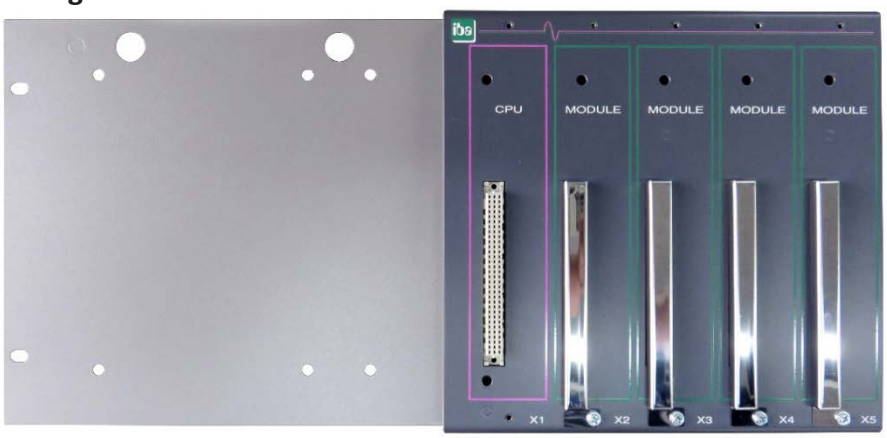
### 12.3.2.2 Mounting backplane panel

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.

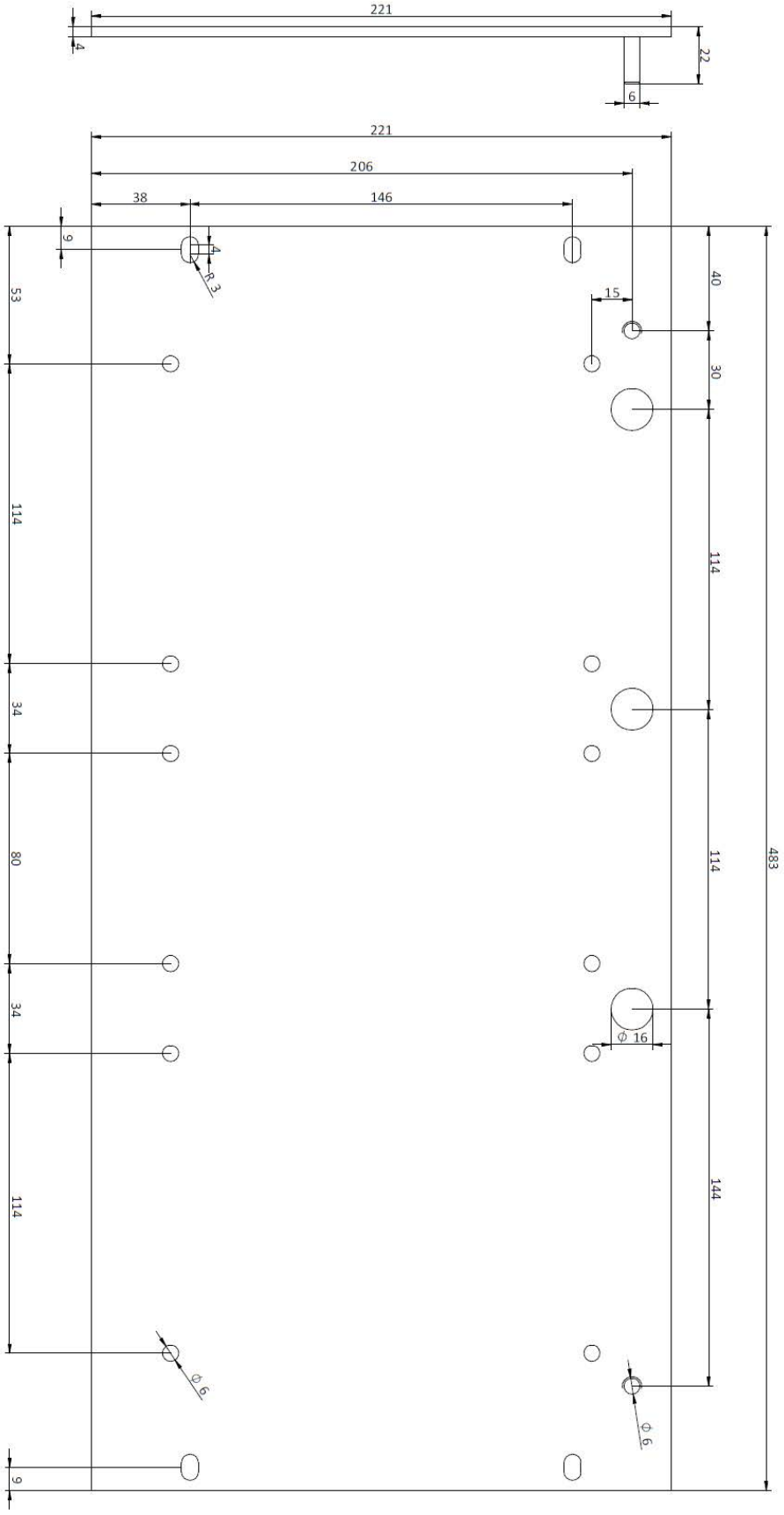
**Mounting centered**




**Mounting on the right**



### 12.3.2.3 Dimensions – mounting panel 19"




(dimensions in mm)

### 12.3.2.4 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 46.

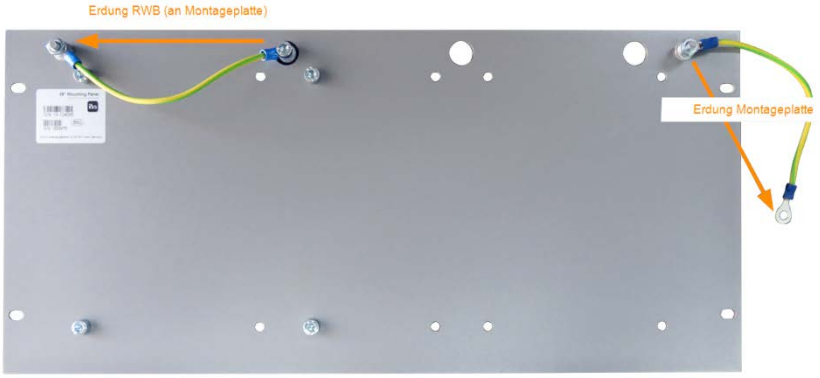

Connect the cable to the next threaded bolt of the mounting panel. The grounding of the mounting panel is also connected to the threaded bolt.


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:

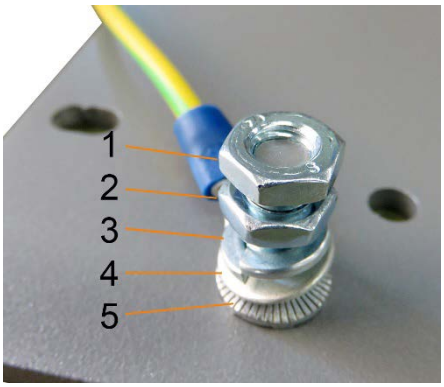



**Variant 3:**

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

#### 12.3.2.5 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**

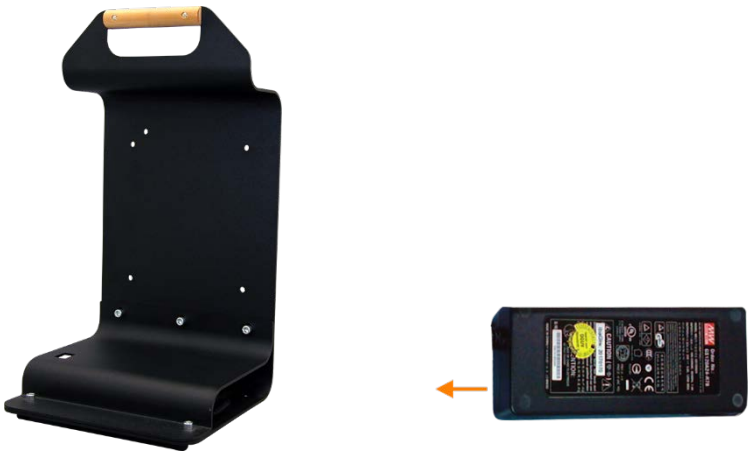
| | |
|---|---|
| Panel | 4 through holes |
| Assembly kit | enclosed |
| Grounding | 2 threaded bolts M6, rear side |
| Assembly kit | enclosed |

**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 |

### 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

The scope of delivery for the module carrier includes:

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

#### 12.3.3.2 Dimensions – module carrier

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

#### 12.3.3.3 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 |

## 12.4 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 |  |
| | | |

## 12.5 FO cards and FO cables

Below you will find an overview of suitable FO cards and FO cables for the operation of *ibaPADU-S-CM*.

| Product | Order no. | Remark |
|---|---|---|
| ibaFOB-io-D | 11.115810 | PCI card (1 input, 1 output) |
| ibaFOB-2i-D | 11.115710 | PCI card (2 inputs) |
| ibaFOB-2io-D | 11.115800 | PCI card (2 inputs, 2 outputs) |
| ibaFOB-4i-D | 11.115700 | PCI card (4 inputs) |
| ibaFOB-4o-D<br>- For PCI slot (long)<br>- For rackline slot (short) | <br>11.116201<br>11.116200 | Extension module (4 outputs)<br>For all *ibaFOB-D* cards as output module or for mirroring the inputs |
| ibaFOB-io-Dexp | 11.118020 | PCI-Express card (1 input, 1 output) |
| ibaFOB-2i-Dexp | 11.118030 | PCI-Express card (2 inputs) |
| ibaFOB-2io-Dexp | 11.118010 | PCI-Express card (2 inputs, 2 outputs) |
| ibaFOB-4i-Dexp | 11.118000 | PCI-Express card (4 inputs) |
| ibaFOB-io-ExpressCard | 11.117000 | For measuring with the notebook |
| ibaFOB-io-USB | 11.117010 | For measuring with the notebook |

iba also offers suitable FO cables in different designs and lengths. Here is an example of a common cable in duplex and 5 m length.

| Product | Order no. | Remark |
|---|---|---|
| FO/p2-5 | 50.102050 | 5 m duplex FO cable |

**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.

## 12.6 iba software

Below you will find license examples for data acquisition with *ibaPDA* and data analysis with *ibaAnalyzer*.

| Product | Order no. | Remark |
|---|---|---|
| ibaPDA-1024 | 30.771024 | For up to 1024 signals |
| ibaPDA-2048 | 30.772048 | For up to 2048 signals |
| ibaAnalyzer | 33.010000 | Offline- and online analysis software with free license if used to analyze *.dat files generated by licensed iba software. |

You can find further accessories in our online catalog at www.iba-ag.com.

# 13 Appendix

## 13.1 FO configuration using 32Mbit ibaNet protocol (StaticFO)

The central unit *ibaPADU-S-CM* supports basically the ibaNet protocol 32Mbit Flex. The rotary switch position can be 1…15 (1…F) depending on the device address.

When the rotary switch is set to "0", it is possible to use the FO connection with 32Mbit protocol and a fixed FO configuration. This function is also called "StaticFO" in short.

Using the fixed configuration, the IO signals are copied 1:1 to the fiber optics according to the slot order (slot X1 … X5) the I/O modules are installed.

The fixed order in the FO configuration can be shifted with a configurabe offset.

In addition, up to 16 *ibaPADU-S-CM* systems can be connected in a chain to *ibaPDA*, with each system being assigned a predefined range with a smaller size on the fiber optic cable (slot or container).

In 32Mbit mode, the signals can be recorded in *ibaPDA* with a FOB Fast module. A connection to an *ibaLogic*-V5 system or to another iba hardware device with 32Mbit protocol is also possible.

**Note**

The configuration "StaticFO-IO” is activated in delivery state.

With this default configuration, it is possible to replace existing *ibaPADU-S-IT-05* systems. These sytems are also called "ibaPADU-S-IT in IO mode", the official designation is *ibaPADU-S-IT-05-SMS-interface* (10.124018).

To ensure that the I/O modules used with *ibaPADU-S-IT-05* can also be used with the new central unit *ibaPADU-S-CM*, an upgrade must be installed for the I/O modules at iba. Therefore the modules need to be sent to iba. Please contact the iba support for this purpose.

When using *ibaPADU-S-CM*, the *ibaPDA* version and configuration can remain unchanged. However, the only exception is, that the offset of the 8 digital inputs (8xDI) will change:

- old (with *ibaPADU-S-IT-05*): 0xC0 Bit0 to Bit7
- new (with *ibaPADU-S-CM*): 0xC0 Bit8 to Bit15

If you want to use another FO configuration of the ibaNet protocol 32Mbit, it is necessary to establish an FTP connection to the device and to modify the configuration file `Config_StaticFO.xml` accordingly. The existing configuration file must be overwritten.

### 13.1.1 FTP connection to the device

In order to establish an FTP connection to the *ibaPADU-S-CM* device proceed as follows:

1. Connect the device to the computer via an USB cable.

   The USB interface is located at the bottom of the device. A type A to B USB cable is required. A suitable cable is available at iba on request.

2. As soon as the computer is connected for the first time to the device, the "Found New Hardware Wizard" will show up and the driver for the USB connection has to be installed.

   You find the driver on the data medium "iba Software & Manuals" in this directory:
   `\02_iba_Hardware\ibaPADU-S-CM\USB_Driver`

→ After having installed successfully, an additional network connection is available with the device name "IBA AG USB Remote NDIS Network Device".

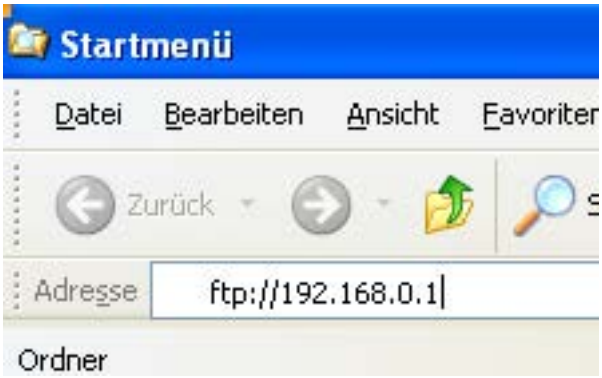
3. A fixed IP address must be assigned to this interface. The address has to be from this range: 192.168.0.n with n = 2…254 and the subnet mask 255.255.255.0.

   **Example**:
   IP: 192.168.0.2
   SubNet: 255.255.255.0

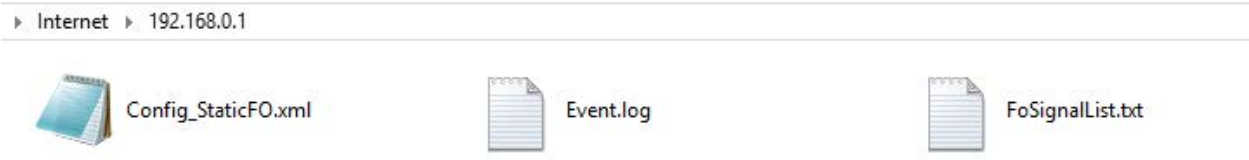
4. Now, you can establish an FTP connection to the device.

   You may use a FTP client or the Windows File Explorer. In both cases, the address is "192.168.0.1" and the user is "anonym" without any password.

   **Example**: Windows File Explorer:

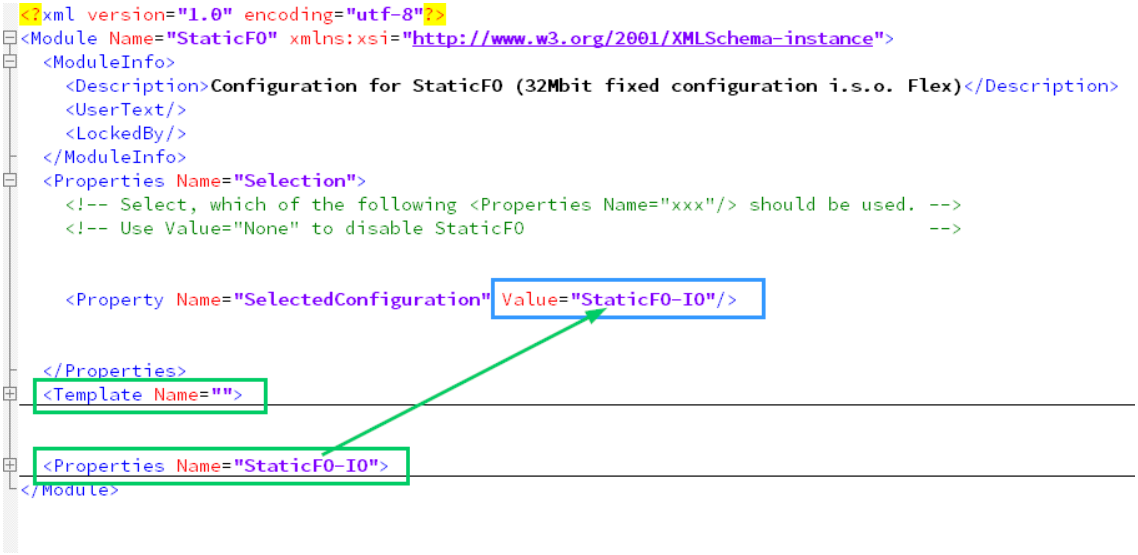



→ The following files are displayed in the file window:



### 13.1.2 Configuration of 32Mbit ibaNet protocol

Copy the file `Config_StaticFO.xml` to your computer and open the file with an editor.




The two green marked regions describe a template for the configuration and the default configuration "StaticFO-IO" configuration of the ibaNet protocol 32Mbit.

The template provides a short description of the required properties.

The blue marked entry "Value" determines the currently active configuration.

The XML configuration file may include several configurations with different names. But only the configuration specified with "Value" is active.

In order to create a new configuration, proceed as follows:

1. Copy either the template or the existing configuration "StaticFO-IO" and paste it at the end of the file:

```
<Properties Name="StaticFO-IO">
  <!-- Configuration for FO mode INT 64A+64D -->
  <!-- Replacement of ibaPADU-S-IT-05 with IO mode -->

  <Property Name="FO_Signals" Value="Int64"/>
  <Property Name="FO_Slot" Value="0"/>
  <Property Name="FO_Period" Value="50" Unit="us"/>

  <Property Name="FO_IN_AO_Offset" Value="0"/>
  <Property Name="FO_IN_DO_Offset" Value="0"/>
  <Property Name="FO_OUT_AI_Offset" Value="0"/>
  <Property Name="FO_OUT_DI_Offset" Value="0"/>

  <Property Name="Use_ibaPADU-S-CM_DI" Value="true" />
  <Property Name="Use_Output_StatusSignals" Value="false" />
  <Property Name="Use_Output_ControlSignals" Value="false" />
  <Property Name="HF_Compatibility" Value="true" />
  <Property Name="Debounce_Delay_Time_32xDI_16xDIO" Value="0" Unit="us"/>
</Properties>
```

copy

```
<Properties Name="StaticFO-IO">
  <!-- Configuration for FO mode INT 64A+64D -->
  <!-- Replacement of ibaPADU-S-IT-05 with IO mode -->

  <Property Name="FO_Signals" Value="Int64"/>
  <Property Name="FO_Slot" Value="0"/>
  <Property Name="FO_Period" Value="50" Unit="us"/>

  <Property Name="FO_IN_AO_Offset" Value="0"/>
  <Property Name="FO_IN_DO_Offset" Value="0"/>
  <Property Name="FO_OUT_AI_Offset" Value="0"/>
  <Property Name="FO_OUT_DI_Offset" Value="0"/>

  <Property Name="Use_ibaPADU-S-CM_DI" Value="true" />
  <Property Name="Use_Output_StatusSignals" Value="false" />
  <Property Name="Use_Output_ControlSignals" Value="false" />
  <Property Name="HF_Compatibility" Value="true" />
  <Property Name="Debounce_Delay_Time_32xDI_16xDIO" Value="0" Unit="us"/>
</Properties>


:/Module>
```

2. Edit the copied part according to the new configuration. At first, enter a new, unambiguous configuration name.


3. After that, configure the different properties:

   <Property Name="FO_Signals" Value="Int64"/>

   Allowed values:

Point-to-point connection (uni- or bidirectional):

| | |
|---|---|
| Int64 | for 64 analog INT and 64 digital signals |
| Int128 | for 128 analog INT and 128 digital signals |
| Int256 | for 256 analog INT and 256 digital signals |
| Int512 | for 512 analog INT and 512 digital signals |
| Int1024 | for 1024 analog INT and 1024 digital signals |
| Real32 | for 32 analog REAL and 32 digital signals |
| Real64 | for 64 analog REAL and 64 digital signals |
| Real128 | for 128 analog REAL and 128 digital signals |
| Real256 | for 256 analog REAL and 256 digital signals |
| Real512 | for 512 analog REAL and 512 digital signals |

Chain (unidirectional):

| | |
|---|---|
| Int16x8 | for 8 analog INT per slot |
| Int16x64 | for 64 analog INT and 64 digital signals per slot |
| Real16x32 | for 32 analog REAL and 32 digital signals per slot |

   <Property Name="FO_Slot" Value="0" Unit=""/>

   Only relevant when configuring a chain:

   Specifies the corresponding slot of the *ibaPADU-S-CM* system.

At least: 0 (default)

Allowed values: 0 … 15

<Property Name="FO_Period" Value="50" Unit="us"/>

This value depends on the configured/required number of signals (FO_Signals):

| | | | |
|---|---|---|---|
| 50 | Int64A+64D | Real32A+32D | - |
| 100 | Int128A+128D | Real64A+64D | Int16x8 |
| 200 | Int256A+256D | Real128A+128D | - |
| 400 | Int512A+512D | Real256A+256D | - |
| 800 | Int1024A+1024D | - | Int16x64 |
| 1000 | - | Real512A+512D | Real16x32 |

The following four properties describe the offset of the signals in the FO configuration:

- <Property Name="FO_IN_AO_Offset" Value="0"/>
- <Property Name="FO_IN_DO_Offset" Value="0"/>
- <Property Name="FO_OUT_AI_Offset" Value="0"/>
- <Property Name="FO_OUT_DI_Offset" Value="0"/>

<Property Name="FO_Period" Value="50" Unit="us"/>

This value depends on the configured/required number of signals (FO_Signals):

The following four properties describe the offset of the signals in the FO configuration:

- <Property Name="FO_IN_AO_Offset" Value="0"/>
- <Property Name="FO_IN_DO_Offset" Value="0"/>
- <Property Name="FO_OUT_AI_Offset" Value="0"/>
- <Property Name="FO_OUT_DI_Offset" Value="0"/>

The following items must be observed:

- Allowed values: 0 … FO_Signals-1 (e.g. Int64: 0 … 63)
- Digital inputs and outputs must be a multiple of 32
- Analog inputs and outputs must be a multiple of 2 in INT mode

<Property Name="Use_ibaPADU-S-CM_DI" Value="true" />

The 8 digital inputs (8xDI) of the central unit are used in the FO configuration

Please note that an offset of 8 bit is necessary in the FO configuration for these digital inputs:

```
**************************
***     Signal lists     ***
**************************

*** Fiber optic output, list of digital signals (called DI in the module
                                    Signal|Len|Fiber optic|PDA setting|
                                          |bit|     Signal|Address|bit|
-------------------------------------+---+-----------+-------+---+
                                    X1_DI00|  1|         D8|   0xC0|  8|
                                    X1_DI01|  1|         D9|   0xC0|  9|
                                    X1_DI02|  1|        D10|   0xC0| 10|
                                    X1_DI03|  1|        D11|   0xC0| 11|
                                    X1_DI04|  1|        D12|   0xC0| 12|
                                    X1_DI05|  1|        D13|   0xC0| 13|
```

This offset must always be observed, even if an offset has been configured for the digital inputs:

```
<Property Name="FO_OUT_DI_Offset" Value="32"/>

of digital signals (called DI in the modules) ***
    Signal|Len|Fiber optic|PDA setting|
          |bit|     Signal|Address|bit|
----------+---+-----------+-------+---+
    X1_DI00|  1|        D40|   0xC4|  8|
    X1_DI01|  1|        D41|   0xC4|  9|
    X1_DI02|  1|        D42|   0xC4| 10|
    X1_DI03|  1|        D43|   0xC4| 11|
```

<Property Name="Use_Output_StatusSignals" Value="false" />

The status signals of the output modules (output signal is available) are used in the FO configuration

<Property Name="Use_Output_ControlSignals" Value="false" />

The error signals of the output modules are used in the FO configuration

<Property Name="HF_Compatibility" Value="false" />

The signals from digital input modules are combined and transmitted as analog values. For saving space, it is thus possible to map digital signals from the digital fiber optic transmission range to the analog range. However, the 8 digital inputs of the central unit remain excluded from this function if they have been activated via the "Use_ibaPADU-S-CM_DI" property.

<Property Name="Debounce_Delay_Time_32xDI_16xDIO" Value="0" Unit="us"/>

The debounce filter "Delay both edges" is parameterized for the two I/O modules ibaMS32x-DI-24V and ibaMS16xDIO-24V (see also chapter ↗ *Debounce filter inputs*, page 20).

Allowed values: 0 ... 65535 µs, where 0 deactivates the debounce filter.

This debouncing is required for these two module types in order to be able to continue acquiring the last measured value in *ibaPDA* after the system has been switched off.

**Note**

Do not forget to activate your new configuration with the corresponding property at the beginning of the file:

```
</ModuleInfo>
<Properties Name="Selection">
  <!-- Select, which of the following <Properties Name="xxx"/> should be used
  <!-- Use Value="None" to disable StaticFO

  <Property Name="SelectedConfiguration" Value="StaticFO-UserDefined"/>

</Properties>
<Template Name="">

<Properties Name="StaticFO-IO">

<Properties Name="StaticFO-UserDefined">
  <!-- Configuration for FO mode INT 64A+64D -->
  <!-- Replacement of ibaPADU-S-IT-05 with IO mode -->

  <Property Name="FO_Signals" Value="Int64"/>
  <Property Name="FO_Slot" Value="0"/>
```

4. After the configuration has been finished, save the file and copy it to the device by overwriting the previous file.
5. Wait approx. 10 seconds until the file `FoSignalList.txt` has been automatically updated. If necessary refresh the display by pressing <F5>. Finally, you may copy the file to your computer.

**Note**

If a new file `Err_Config_StaticFO.xml` appears after 10 seconds waiting time (refresh the display with <F5>), there may be an error in the FO configuration file.


You find a description of analyzing the error in chapter ↗ *Analyzing an invalid configuration*, page 73.

### 13.1.3 Features of the StaticFO function

#### 13.1.3.1 Limited number of signals

Regardless of the fiber optic mode activated via the "FO_Signals" property, only a fixed number of analog and digital signals is available for transmission.

In "Real64A+64D" mode, for example, a maximum of 64 analog and 64 digital signals are available.

If your system contains more than this number of signals, surplus signals are not copied to the fiber optic and therefore cannot be captured or transmitted.

#### 13.1.3.2 Special feature of digital modules - analog transmission of digital signals

Digital modules, no matter how many channels they have, always use a number of 32 digital signals internally.

The same applies to the 8 digital inputs of the central unit if they have been activated via the "Use_ibaPADU-S-CM_DI" property.

If the "Real64A+64D" mode is set for example and the central unit is activated, only 1 additional digital module (in slots X2 - X5) can be acquired. This also applies if the digital module has only 16 input channels.

For digital signals from modules, however, it is possible to combine these with the "HF_Compatibility" property to form analog values and transmit them in the analog range.

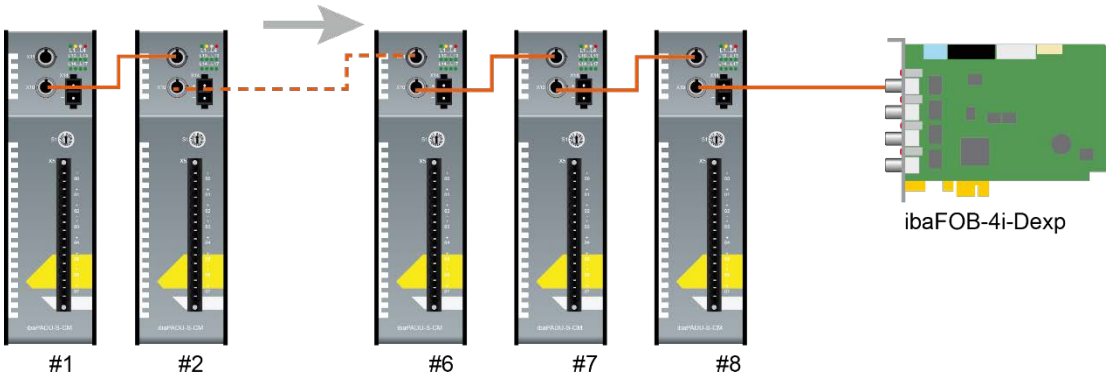
#### 13.1.3.3 No power frequency signals

The signals for measuring the power frequency of the analog modules cannot be acquired or transmitted.

### 13.1.4 Special features ibaPADU-S-CM chain

Up to 16 *ibaPADU-S-CM* systems can be connected in a line topology (chain) with iba software or other iba components. Each fiber optic output of an *ibaPADU-S-CM* system is connected to the next fiber optic input until all devices of a line are connected to the ibaFOB card.

**Setup of a line structure**




Output modules cannot be operated with this structure.

The individual systems are addressed via the StaticFO configuration file in the "FO_Slot" property.

Slot 0 must always or at least be present, since this determines the fiber optic clock in the chain.

Therefore, this system must be connected at the very end, i.e. at the furthest distance from the ibaFOB card.

Restrictions in Int16x8 mode (FO_Signals):

- The acquisition of digital input signals is not possible.
- Analog input modules are only used for acquisition if they provide a maximum of 8 analog input signals.

### 13.1.5 Signal list file

The signal list file contains the FO configuration and the signal mapping of the installed modules. The figure below shows a signal list file using the example of a "StaticFO-IO" configuration.

```
****************************
*** Fiber optic settings ***
****************************
Mode: 32 Mbit Int 64A + 64D, Period: 50 us


****************************
***     Signal lists     ***
****************************

*** Fiber optic output, list of digital signals (called DI in the modules) ***
                                  Signal|Len|Fiber optic|PDA setting|
                                        |bit|     Signal|Address|bit|
-----------------------------------------+---+-----------+-------+---+
                                  X3_DI00|  1|         D0|   0xC0|  0|
                                  X3_DI01|  1|         D1|   0xC0|  1|
                                  X3_DI02|  1|         D2|   0xC0|  2|
                                  X3_DI03|  1|         D3|   0xC0|  3|
                                  X3_DI04|  1|         D4|   0xC0|  4|
                                  X3_DI05|  1|         D5|   0xC0|  5|
                                  X3_DI06|  1|         D6|   0xC0|  6|
                                  X3_DI07|  1|         D7|   0xC0|  7|
                                  X3_DI08|  1|         D8|   0xC0|  8|
                                  X3_DI09|  1|         D9|   0xC0|  9|
                                  X3_DI10|  1|        D10|   0xC0| 10|
                                  X3_DI11|  1|        D11|   0xC0| 11|
                                  X3_DI12|  1|        D12|   0xC0| 12|
                                  X3_DI13|  1|        D13|   0xC0| 13|
                                  X3_DI14|  1|        D14|   0xC0| 14|
                                  X3_DI15|  1|        D15|   0xC0| 15|

*** Fiber optic output, list of analog signals (called AI in the modules) ***
                                  Signal|Len|   Type|Fiber optic   |PDA setting|
                                        |bit|       |Signal|Offset |    Address|
-----------------------------------------+---+-------+------+-------+-----------+
                                  X4_AI00| 16|    INT|    A0|0 Bytes|       0x40|
                                  X4_AI01| 16|    INT|    A1|0 Bytes|       0x42|
                                  X4_AI02| 16|    INT|    A2|0 Bytes|       0x44|
                                  X4_AI03| 16|    INT|    A3|0 Bytes|       0x46|
                                  X4_AI04| 16|    INT|    A4|0 Bytes|       0x48|
                                  X4_AI05| 16|    INT|    A5|0 Bytes|       0x4A|
                                  X4_AI06| 16|    INT|    A6|0 Bytes|       0x4C|
                                  X4_AI07| 16|    INT|    A7|0 Bytes|       0x4E|

*** Fiber optic input, list of digital signals (called DO in the modules) ***
                                  Signal|Len|Fiber optic|PDA setting|
                                        |bit|     Signal|Address|bit|
-----------------------------------------+---+-----------+-------+---+
```

The selected ibaNet protocol 32Mbit is displayed under "Fiber optic settings".

The mapping of the I/O signals and the FO configuration is shown in the signal list. The signals are subdivided according to signal type and signal direction.

The first digital signal (DI00) of the digital input module mounted on slot X3 is at the first position (D0) of the FO configuration in this case.

In another example, when an offset of 32 is configured (<Property Name="FO_OUT_DI_Offset" Value="32"/>) the corresponding bit is at the 32th position (D32) of the FO configuration.

```
****************************
***     Signal lists     ***
****************************

*** Fiber optic output, list of digital signals (called DI in the modules) ***
                                    Signal|Len|Fiber optic|PDA setting|
                                          |bit|     Signal|Address|bit|
-----------------------------------------+---+-----------+-------+---+
                                   X3_DI00|  1|        D32|   0xC4|  0|
                                   X3_DI01|  1|        D33|   0xC4|  1|
                                   X3_DI02|  1|        D34|   0xC4|  2|
                                   X3_DI03|  1|        D35|   0xC4|  3|
                                   X3_DI04|  1|        D36|   0xC4|  4|
```

The given address (0xC4) is an additional information for the use with *ibaPDA*. The FOB fast module can be configured in advanced mode with this setting.

**Note**

If *ibaPADU-S-CM* is reset to factory defaults with *ibaPDA* and 32Mbit Flex, the 32Mbit configuration will be reset too (after power off/on). The configuration file, which might have been modified and enhanced with new entries, will be deleted and replaced by the default configuration file.

### 13.1.6 Analyzing an invalid configuration

If an error occurres in the configuration, the last used configuration and the last configuration file `Config_StaticFO.xml` will be restored.

Additionally, the invalid configuration will be copied into the `Err_Config_StaticFO.xml` file.

Open the file `Err_Config_StaticFO.xml` with an editor in order to analyze the error.

A note is inserted at the invalid property.

```
<Property Name="FO_Signals" Value="Int64"/>
<Property Name="FO_Period" Value="50" Unit="us"/>
<Property Name="FO_IN_AO_Offset" Value="0"/>
<Property Name="FO_IN_DO_Offset" Value="0"/>
<Property Name="FO_OUT_AI_Offset" Value="128" Error="WrongValue" ErrorNo="Value 128 is not in the range [0..63]"/>
<Property Name="FO_OUT_DI_Offset" Value="0"/>
<Property Name="Use_ibaPADU-S-CM_DI" Value="true"/>
<Property Name="Use_Output_StatusSignals" Value="false"/>
```

In the example above, the offset must be in the range of 0…63 when FO configuration "Int64” is used. The offset of 128 is outside of this range and therefore the configuration becomes invalid.

# 14 Support and contact

**Support**

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**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.

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