



# ibaPADU-S-CM

Central unit for the iba modular system

Manual

Issue 2.1

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

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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	Revision	Chapter	Author	Version HW / FW
2.1	09-2023	ON/OFF switch removed		rm	

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# 1 About this manual

In this manual, you learn a lot about the design of the ibaPADU-S-CM device and how to use and operate it. You can find a general description of the systems of the iba-modular system and further information about the design of the modules and how to use and operate them in separate manuals.



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## Note

The documentation for the iba-modular system is part of the data medium “iba Software & Manuals”. The documentation is also available at [www.iba-ag.com](http://www.iba-ag.com) in the download area.

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

### ☐ Central units

Manuals of the central units, e.g. ibaPADU-S-IT-2x16 or ibaPADU-S-CM, contain the following information:

- Scope of supply
- System requirements
- Description of the device
- Mounting/Demounting
- Start-up
- Configuration
- Technical data
- Accessories

### ☐ Modules

The manuals for the single modules contain specific information about the module. There are the following information classes:

- Short 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 to 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	Notations
Menu command	Menu „Logic diagram“
Call of menu command	„Step 1 – Step 2 – Step 3 – Step x“ Example: Select menu „Logic diagram – Add – New logic diagram“
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

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 CPU, but also up to 4 input/output modules. The ibaPADU-S-CM CPU 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:

- ☐ Capturing of measuring signals
- ☐ Condition Monitoring
- ☐ Noise recognition and excentricity 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 the delivery for completeness and possible damages.

The scope of delivery comprises:

- ☐ ibaPADU-S-CM device
- ☐ Covering caps for FO cables and USB
- ☐ 16-pin terminal block with spring terminals (digital input channels)
- ☐ 2-pin terminal block with spring terminals (voltage supply)
- ☐ Data medium „iba Software & Manuals“



## 4 Safety instructions

### 4.1 Proper use

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

- ☐ Capturing of measuring data
- ☐ Applications with iba products (ibaPDA, etc.)

The device is only to be applied as shown in the Technical Data in Chapter 11.

### 4.2 Special safety instructions



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**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.

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**CAUTION****Strictly observe the operating voltage range!**

Never supply the device with a voltage other than 24 V DC +/- 10%!  
A higher voltage may destroy the device or be dangerous to life!

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**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.

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**Important Note**

Do not open the device! Opening the device leads to a loss of warranty!

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**Note**

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

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## 5 System Requirements

### 5.1 Hardware

#### For operation

- ☐ Power supply 24 V DC  $\pm$  10 %, 3 A (fully equipped)
- ☐ Backplane unit, e.g. ibaPADU-B4S (see chap. 12, „Accessories “)

#### 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).

You find suitable computer systems with desktop and industry housing under <http://www.iba-ag.com>.

- ☐ An FO input card of the ibaFOB-D type (Firmware version beginning with V2.00 build 173):
  - 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)

### 5.2 Software

- ☐ ibaPDA beginning with version 6.39.15

### 5.3 ibaPADU-S-CM

- ☐ Firmware beginning with version v02.14.015
- ☐ Hardware beginning with version A0

## 6 Mounting, Connecting, Dismounting



### CAUTION

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

### 6.1 Mounting

1. Mount the backplane 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:

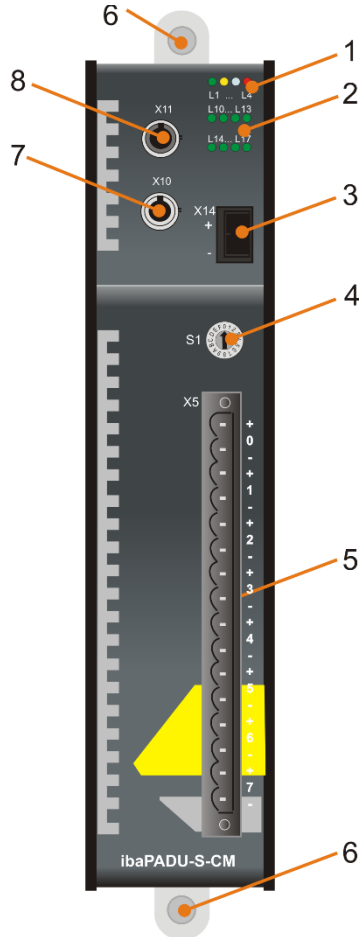
- ☐ Mounting with backplane panels, chapter 12.1
- ☐ Mounting system for central unit only, chapter 12.2
- ☐ Mounting systems for ibaPADU-S-B4S, chapter 12.3

### 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.

## 7 Device description

### 7.1 Views



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



X23 for service purposes only

## 7.2 Indicating elements

### 7.2.1 Operating status

The operating status of the device is shown by colored status LEDs.

LED	Status	Description
L1 Red	On	Device is booting
L1 Green	Slow flashing	Device is working
	On or Off	Controller halted, device „crashed“, device 100 % processor load (constantly on)
	Fast flashing	System programming mode
L2 Yellow	Off	No backplane access
	On	Access to I/O modules via backplane
L3 White	Off	No FO signal detected
	Flashing	FO signal detected, configuration error, the received ibaNet protocol does not match the internally configured protocol
	On	FO signal detected
L4 Red	Off	No error
	Flashing	Malfunction, internal applications do not run
	On	Device failure (during start up)



#### 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.



#### Important 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 Indicators digital inputs L10 ... L17

The green LEDs show whether a digital input is active or not.

LED	Status	Description
L10 ... L17	Off	No signal, logical 0
	On	Signal ok, logical 1

➔ For further information see chapter 7.5 “Digital inputs X5”

## 7.3 Operating elements

### 7.3.1 Rotary switch S1



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

➔ For further information see chapter 8.1.2 „FO cascading“.

## 7.4 Communication interfaces

### 7.4.1 Fiber optic connections X10 and X11

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

The device supports the FO transfer protocol 32Mbit Flex. A bidirectional FO connection is required to connect to an ibaPDA system. A fiber optic card of type ibaFOB-D or ibaFOB-Dexp must be installed in the ibaPDA computer to be able to receive and send the 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 11.6.

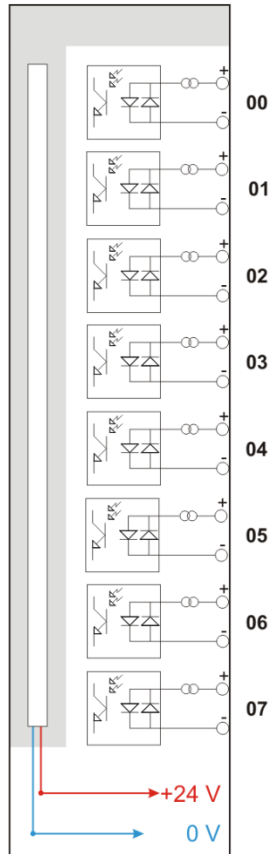
The specification of the transmitter's output power and the receiver's sensitivity of the fiber optic components installed in the device can be found in chapter 11.2 "Technical data" under "ibaNet interface".

## 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 measuring signal is indicated logically correct, even if the connection is polarity-reversed.

➔ For further information see chapter 11 „Technical Data“



### 7.5.2 Debounce filters

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“ (without filter)
- ☐ „Stretch rising edge“
- ☐ „Stretch falling edge“
- ☐ „Stretch both edges“
- ☐ „Delay both edges“

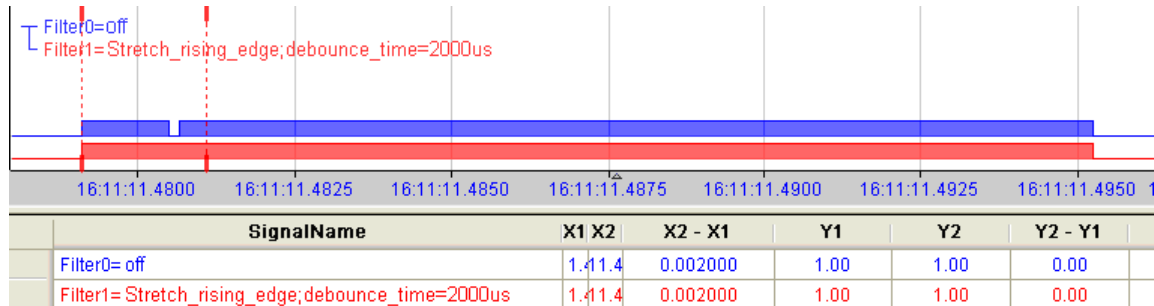
For each filter, a debounce time has to be defined in  $\mu\text{s}$ . This debounce time can have a value between  $[1\mu\text{s} \dots 65535\mu\text{s}]$ .

#### Off

The measured input signal is transferred without filtering.

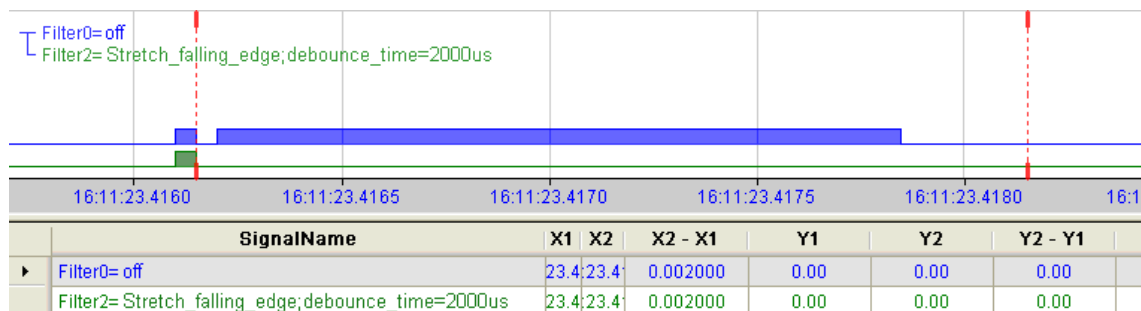
### „Stretch rising edge“

With the first rising edge, the input signal (red) switches to logical 1 and keeps this value for the defined debounce time. Thereafter, the channel is transparent again and waits for the next rising edge.



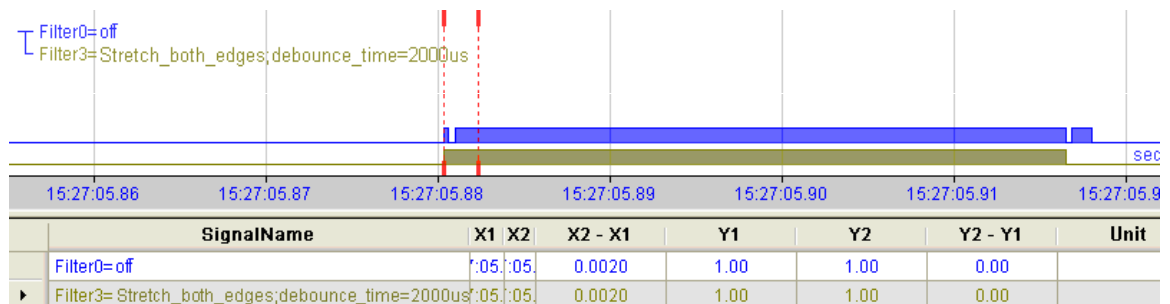
### „Stretch falling edge“

With the first falling edge, the output signal (green) switches to logical 0 and keeps this value for the defined debounce time. Thereafter, the channel is transparent again and waits for the next falling edge.



### „Stretch both edges“

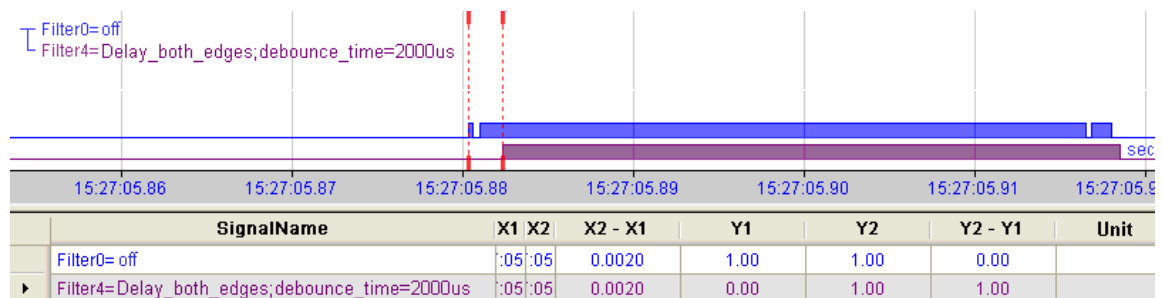
With the first edge, the output signal (ocher) follows the initial signal (blue) and keeps the logical level for the duration of the defined debounce time. Thereafter, the channel is transparent again and waits for the next edge – be it rising or falling.





### „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. Thereafter, the channel is transparent again, directly assumes the logical level of the input signal and waits for the next edge – be it rising or falling.



## 7.6 Voltage supply X14

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



### CAUTION

Only connect the device to an external voltage supply 24 V DC ( $\pm 10\%$  non regulated)!  
Pay attention to the 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.

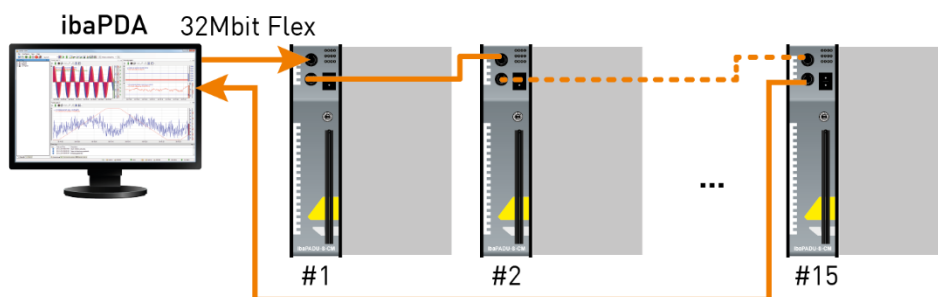
#### 8.1.1 Measuring system with ibaPDA



- ☐ Pure measuring applications (capturing, recording, analyzing)
- ☐ Recording the signals 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 appendix, chapter 13.1.

## 9 Updates



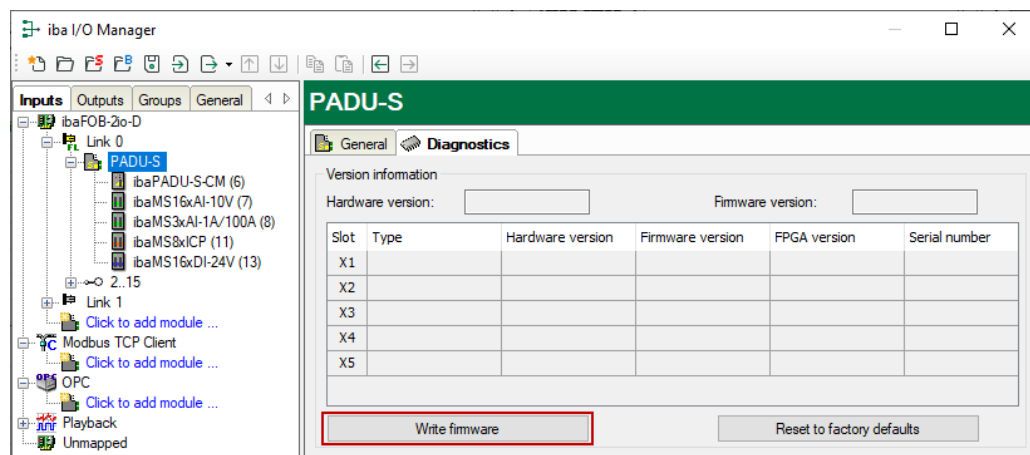
### CAUTION

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

When installing a firmware update, the entire iba modular system will be updated, i.e. the CPU and the I/O modules attached to the system. When the update is completed, the device reboots automatically.

### 9.1 Update via ibaPDA

- ☐ Open the ibaPDA I/O Manager and choose the PADU-S module in the module tree.
- ☐ Click on the “Diagnostics” tab on the <Write firmware> button and choose the “paduscm\_v[xx.yy.zzz].iba” update file.
- ☐ Click <OK> to start the update.



- ☐ 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.



#### Important note

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.

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 cannot be detected yet (i.e. it is more recent than the firmware version of the CPU), this module is ignored and is 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.

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## 10 Configuration with ibaPDA

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



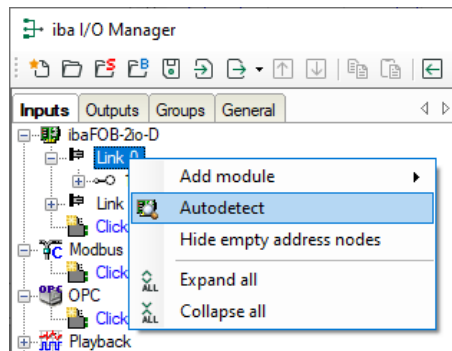
### Important note

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 medium that is included in delivery.

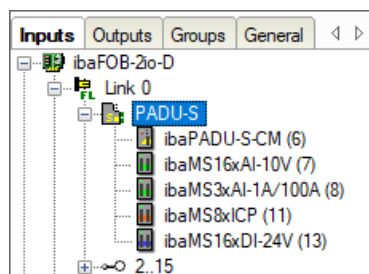
### 10.1 First steps in ibaPDA configuration

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

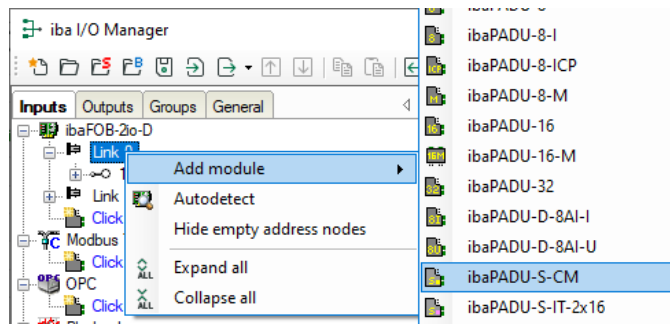
1. Look in the I/O Manager for the link of the FOB-D card, ibaPADU-S-CM is connected to. Click with the right mouse button on the link. The submenu is opened. Choose "Autodetect".



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



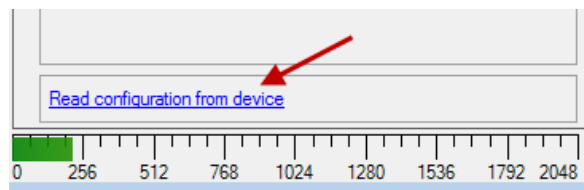
2. If ibaPDA does not detect the device automatically, you can add the device manually.
3. Click with the right mouse button on the connection (Link) of the ibaFOB-io-D card, the device is connected to.
4. Choose "Add module". The list of the available modules is displayed. Choose "ibaPADU-S-CM".



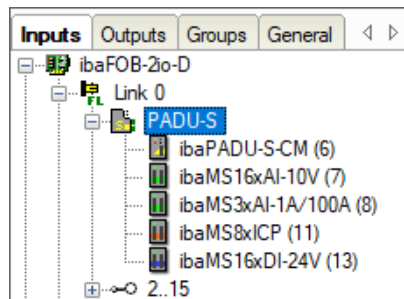
Now, the device is shown in the module tree.

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 shown in the module tree.

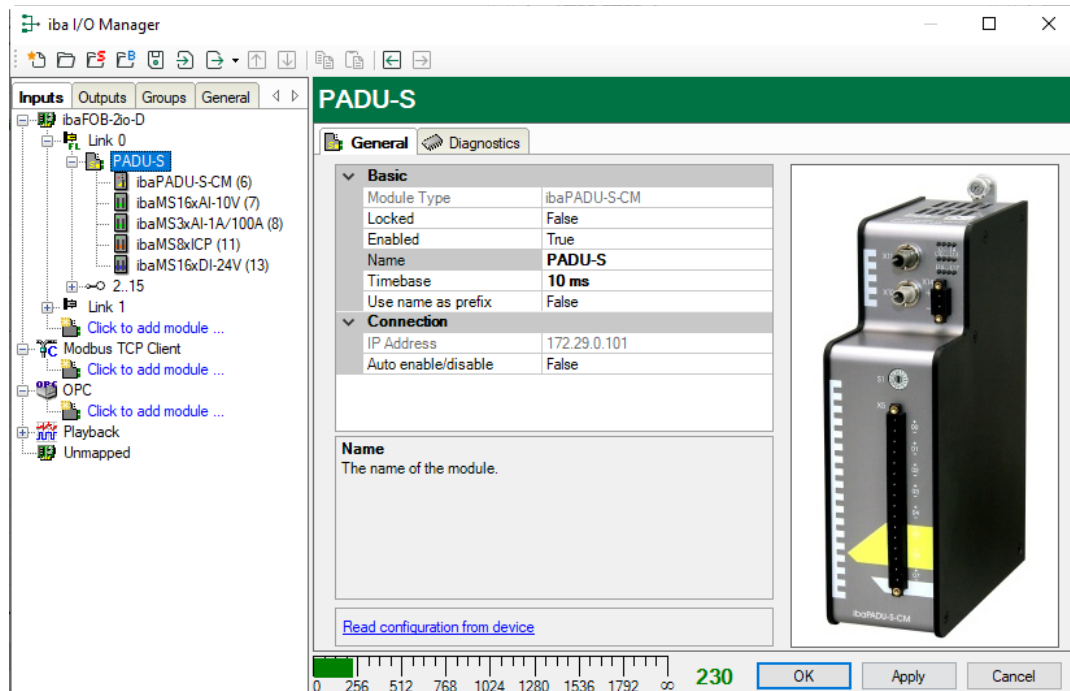


6. Configure ibaPADU-S-CM and the modules (e.g. assign a name, debouncing, etc.) (see chapter 10.2 „Modules in ibaPDA“).
7. Click on <Apply> or <OK>, for applying a new configuration.

## 10.2 Modules in ibaPDA

On the following pages we describe the „PADU-S“ device module and the „ibaPADU-S-CM“ module.

### 10.2.1 PADU-S – General tab



#### Basic settings

##### ☐ Module Type

Display of 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 ibaPADU-S-CM 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 the host name of the ibaPADU-S-CM 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.

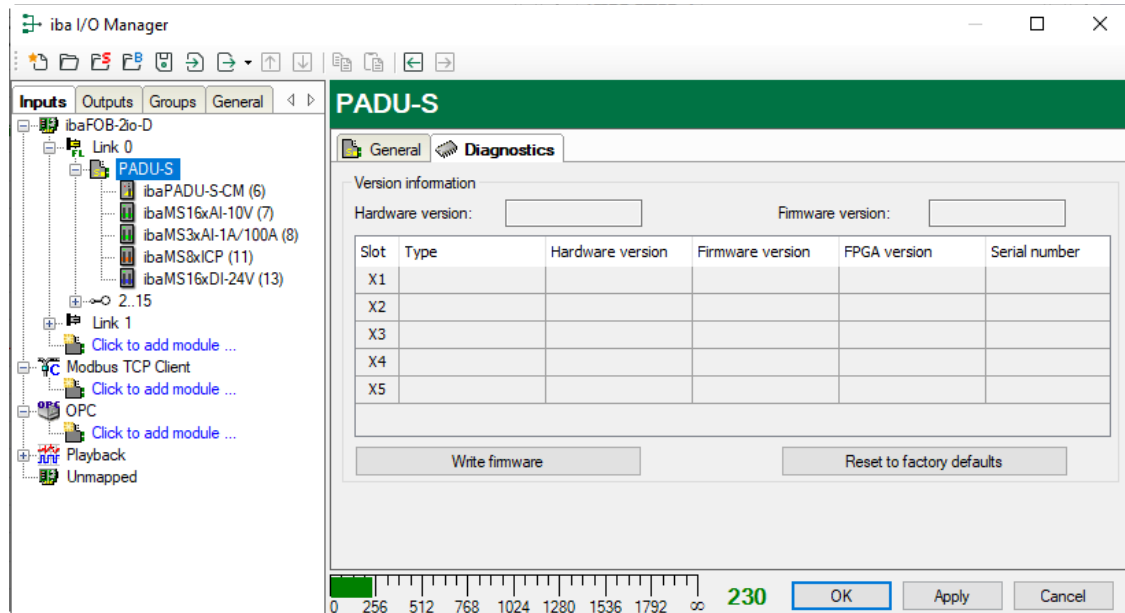
### More functions

- ☐ 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>.

## 10.2.2 PADU-S – 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.

- ☐ Write firmware

Using this button you can install a firmware update. Select the update file „paduscm\_v[xx.yy.zzz].iba “ in the browser and start the update with <OK>.



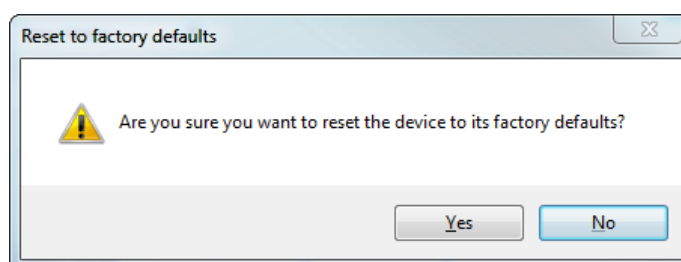
### Important note

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

➔ See chapter 9.1 “Update via ibaPDA”.

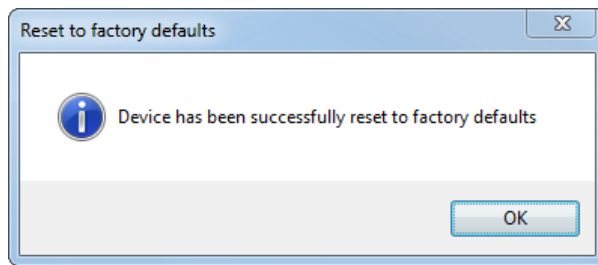
- ☐ Reset to factory defaults

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 "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.

The screenshot shows the "iba I/O Manager" application window. On the left, a tree view shows the hardware configuration under "Inputs", including "Link 0" and "Link 1". The "PADU-S" module is selected under "Link 0". The main window displays the "PADU-S" configuration with tabs for "General", "Analog", "Digital", and "Diagnostics". The "Analog" tab is active, showing a table of configured analog signals.

Name	DataType	Actual
Source: (7) ibaMS16xAI-10V		
[7:0] Signal 1	INT	0
[7:1] Signal 2	INT	0
[7:2] Signal 3	INT	0
[7:3] Signal 4	INT	0
[7:4] Signal 5	INT	0
[7:5] Signal 6	INT	0
[7:6] Signal 7	INT	0
[7:7] Signal 8	INT	0
[7:8] Signal 9	INT	0
[7:9] Signal 10	INT	0
[7:10] Signal 11	INT	0
[7:11] Signal 12	INT	0
[7:12] Signal 13	INT	0
[7:13] Signal 14	INT	0
[7:14] Signal 15	INT	0
[7:15] Signal 16	INT	0
Source: (8) ibaMS3xAI-1A/100A		
[8:0] Channel 0: 6,25A max	INT	0
[8:1] Channel 1: 6,25A max	INT	0

At the bottom of the window, there is a status bar with a scale from 0 to 230. The value 230 is displayed in green. To the right of the scale are buttons for "OK", "Apply", and "Cancel".

### 10.2.4 PADU-S – Digital tab

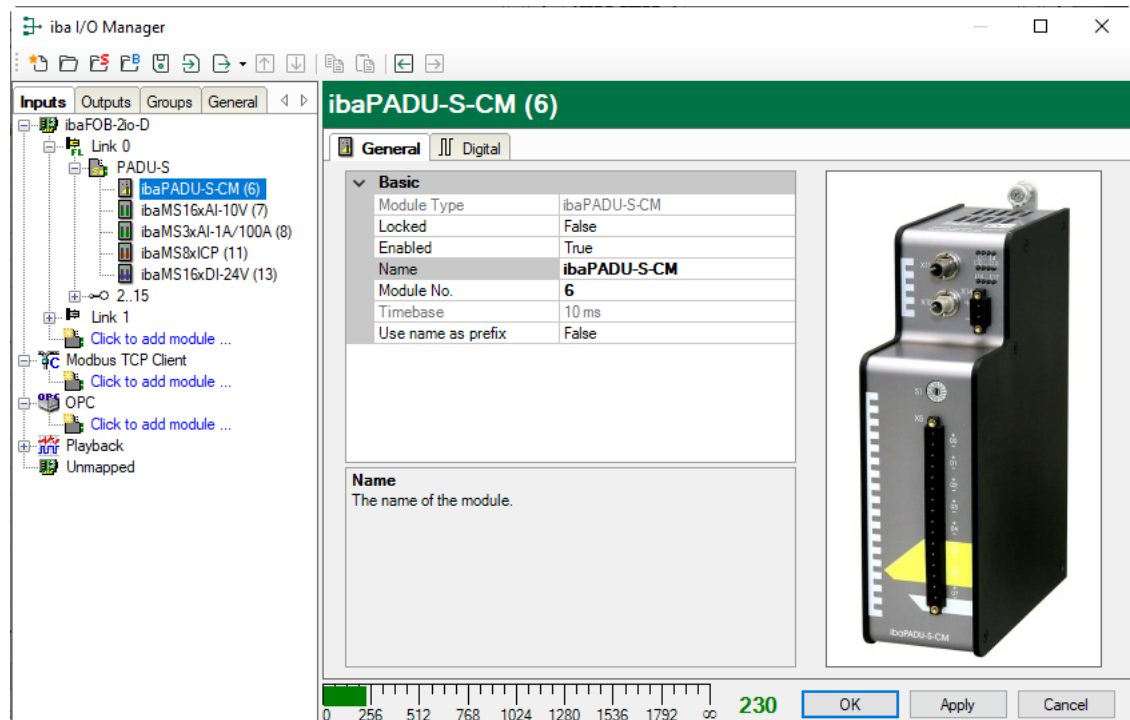
The "Digital" tab is only displayed when acquisition with digital input modules has been started. In the list, you can see the configured digital signals and the current values.

The screenshot shows the 'iba I/O Manager' window. On the left, a tree view lists modules under 'Link 0' and 'Link 1'. The 'PADU-S' module is selected. The main panel is titled 'PADU-S' and has tabs for 'General', 'Analog', 'Digital', and 'Diagnostics'. The 'Digital' tab is active, showing a table of digital inputs.

Name	Actual
Source: (6) ibaPADU-S-CM	
[6.0] DigIn 1	0
[6.1] DigIn 2	0
[6.2] DigIn 3	0
[6.3] DigIn 4	0
[6.4] DigIn 5	0
[6.5] DigIn 6	0
[6.6] DigIn 7	0
[6.7] DigIn 8	0
Source: (13) ibaMS16xDI-24V	
[13.0] Digital 1	0
[13.1] Digital 2	0
[13.2] Digital 3	0
[13.3] Digital 4	0
[13.4] Digital 5	0
[13.5] Digital 6	0
[13.6] Digital 7	0
[13.7] Digital 8	0
[13.8] Digital 9	0

At the bottom of the window, there is a progress bar and a value of 230. Buttons for 'OK', 'Apply', and 'Cancel' are visible.

## 10.2.5 ibaPADU-S-CM – General tab



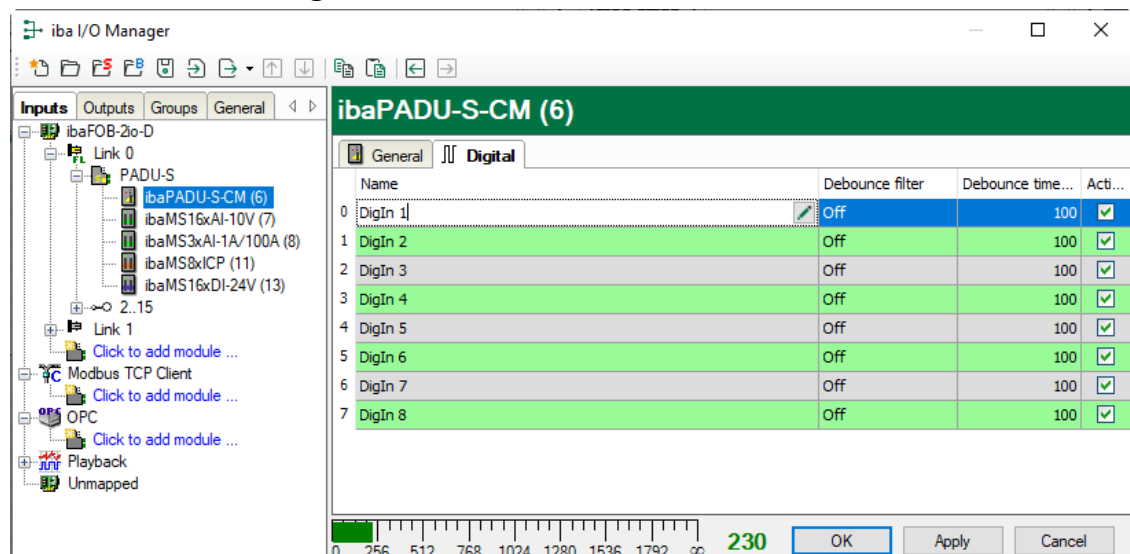
### Basic settings

☐ Module Type, Locked, Enabled, Name, Timebase, Use name as prefix  
see chapter 10.2.1 „PADU-S – General tab“


☐ 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.

## 10.2.6 ibaPADU-S-CM – Digital tab

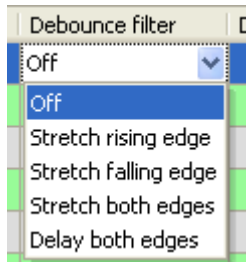


☐ Name

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

☐ Debounce filter

In the dropdown 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 chap. 7.5.2 „Debounce filter“.

☐ Debounce time (µs)

Here, you can define the debounce time in µs

☐ Active

Enabling/disabling the signal

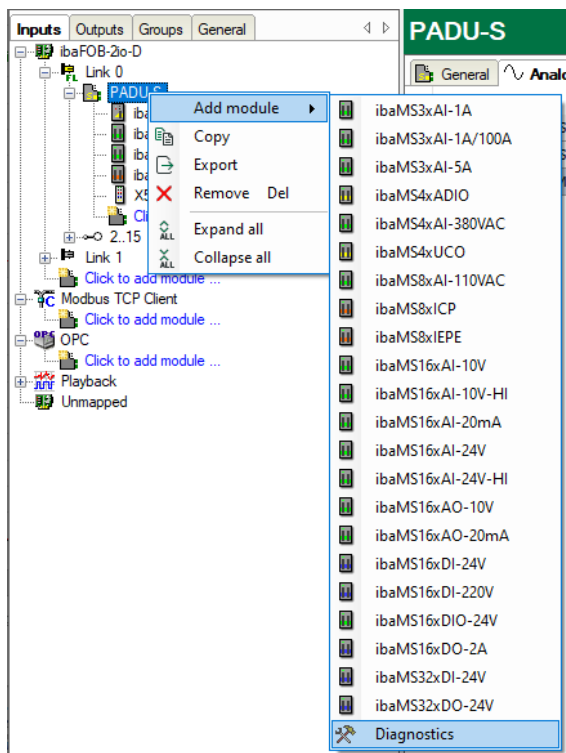


### Note

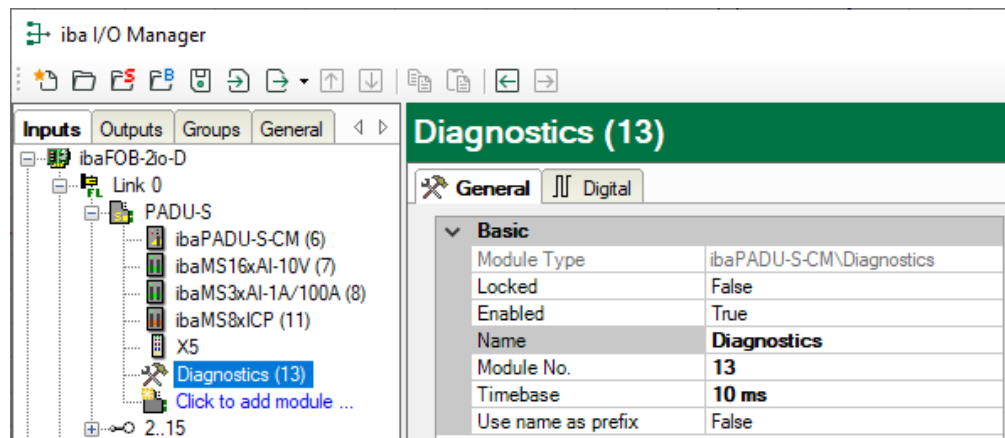
Configure the plugged analog and digital I/O modules. For a detailed description, please refer to the module manuals.

## 10.2.7 Diagnostics 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

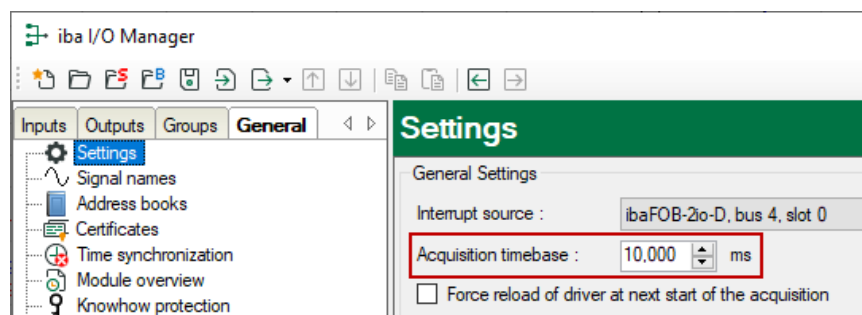


#### Basic settings

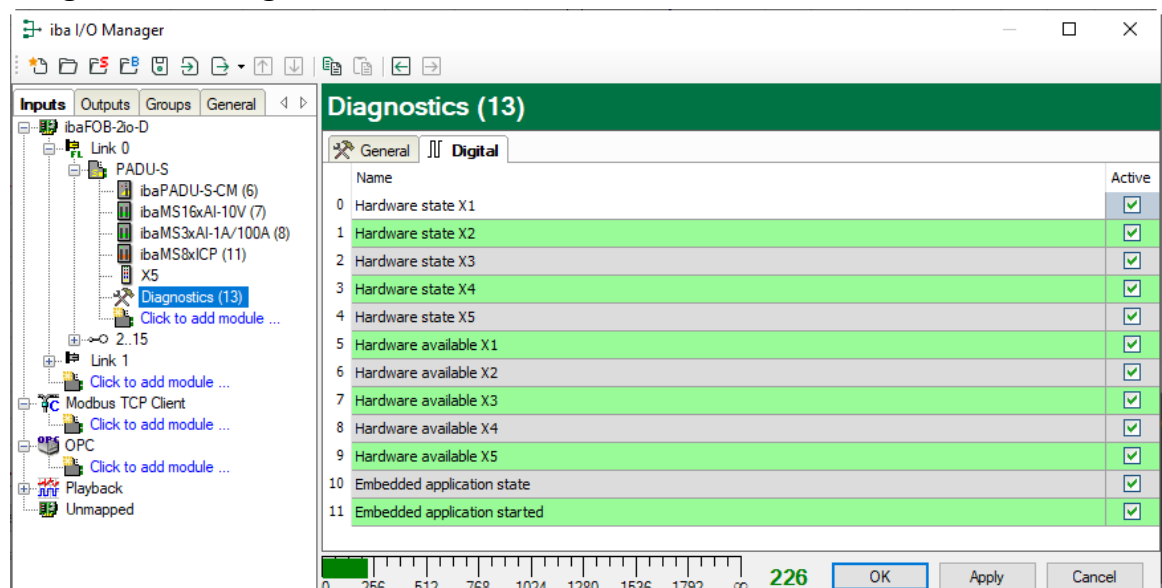
☐ Module Type, Locked, Enabled, Name, Module No., Use name as prefix  
see chapter 10.2.1 “PADU-S – General tab”.

#### ☐ Timebase

The timebase is related to the general acquisition timebase of the ibaPDA system. The timebase here cannot be faster than the general acquisition timebase.



### 10.2.7.2 Diagnostics – Digital tab



The diagnostics signals can be activated individually. The meaning of the signals:

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

## 11 Technical Data

### 11.1 Main data

<b>Short description</b>	
Name	ibaPADU-S-CM
Description	CPU for modular data acquisition system
Order number	10.124030
<b>Supply</b>	
Voltage supply	24 V DC $\pm$ 10 %, not stabilized, 200 mA (without I/O modules), 3 A (with I/O modules)
Power consumption max.	5 W
<b>Operating and indicating elements</b>	
Indicators (LEDs)	4 LEDs for device status 8 LEDs for digital inputs
<b>Operating and environmental conditions</b>	
Temperature ranges	<div>Operation</div> <div>Storage/transport</div> <div>32 °F ... 122 °F (0 °C ... 50 °C)</div> <div>-13 °F ... 158 °F (-25 °C ... 70 °C)</div>
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 FCC part 15 class A
MTBF <sup>1</sup>	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) with installation rack: 9.02 in x 8.62 in x 6.14 in (229 mm x 219 mm x 156 mm)
Weight (incl. packing and documentation)	2.65 lbs (1.2 kg)

<sup>1</sup> 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).

**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](http://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 interface		
Number	1	
Design	Fiber optic cable	
ibaNet protocol	32Mbit Flex	
Data transmission rate	32 Mbit/s	
Sampling rate	Up to 40 kHz, freely adjustable	
Connector type	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. 11.6	
Transmitting interface (TX)		
Output power	50/125 µm FO cable	-19.8 dBm to -12.8 dBm
	62.5/125 µm FO cable	-16 dBm to -9 dBm
	100/140 µm FO cable	-12.5 dBm to -5.5 dBm
	200 µm FO cable	-8.5 dBm to -1.5 dBm
Temperature range	-40 °F to 185 °F (-40 °C to 85 °C)	
Light wavelength	850 nm	
Receiving interface (RX)		
Sensitivity <sup>2</sup>	100/140 µm FO cable	-33.2 dBm to -26.7 dBm
Temperature range	-40 °F to 185 °F (-40 °C to 85 °C)	

<sup>2</sup> Data for other FO cable diameters not specified

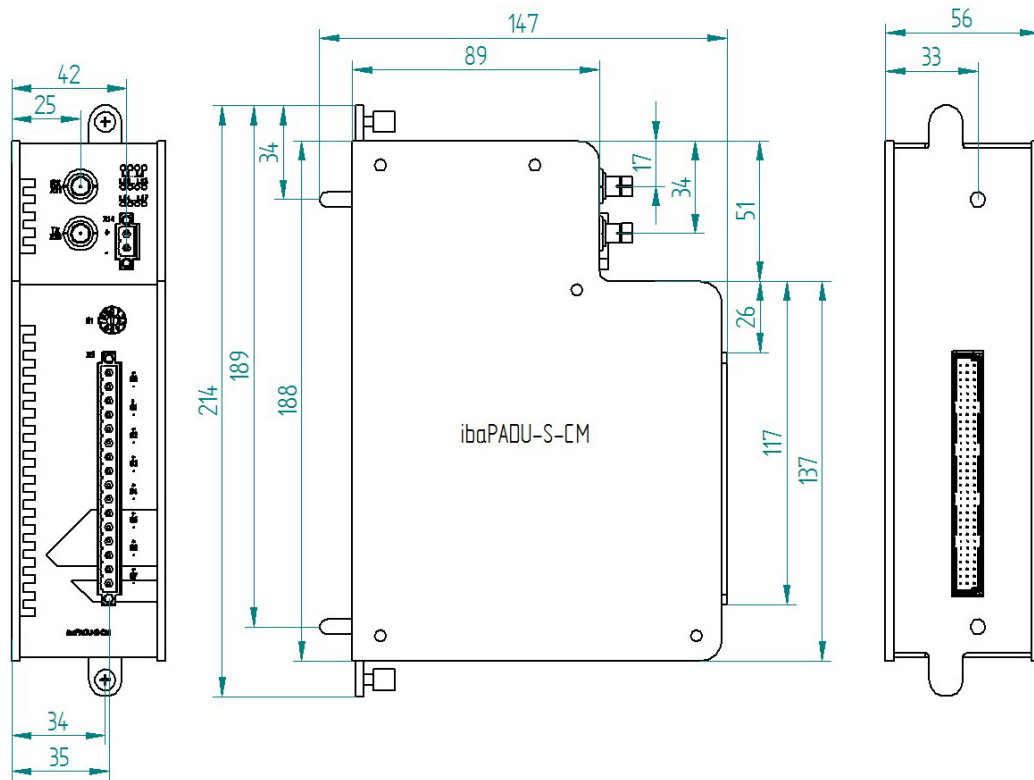


## 11.3 Digital inputs

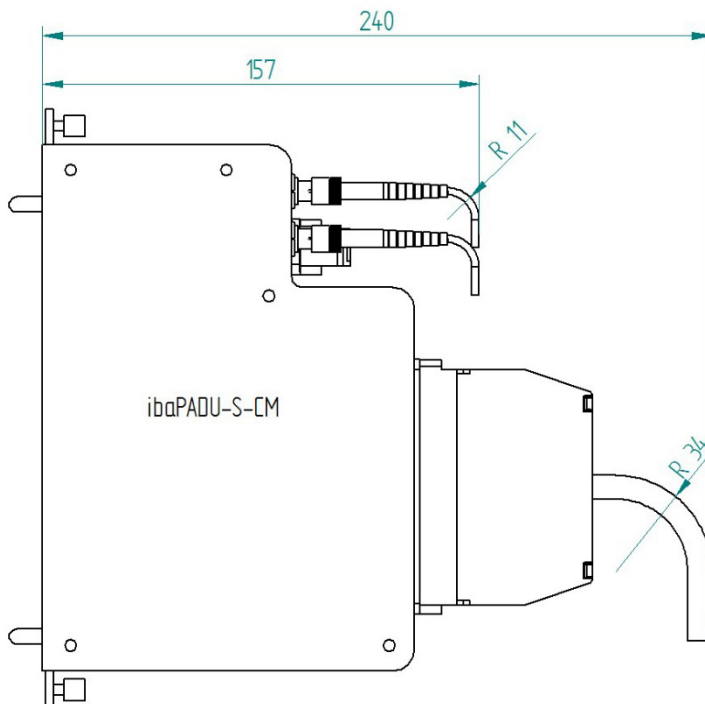
Digital inputs	
Number	8
Design	Galvanically isolated, protected against reverse polarity, single ended
Input signal	24 V DC
Max. input voltage	±60 V permanent
Signal level log. 0	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V
Input current	1 mA, constant
Debounce filter	Optional, 4 operating modes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

## 11.4 Dimensions

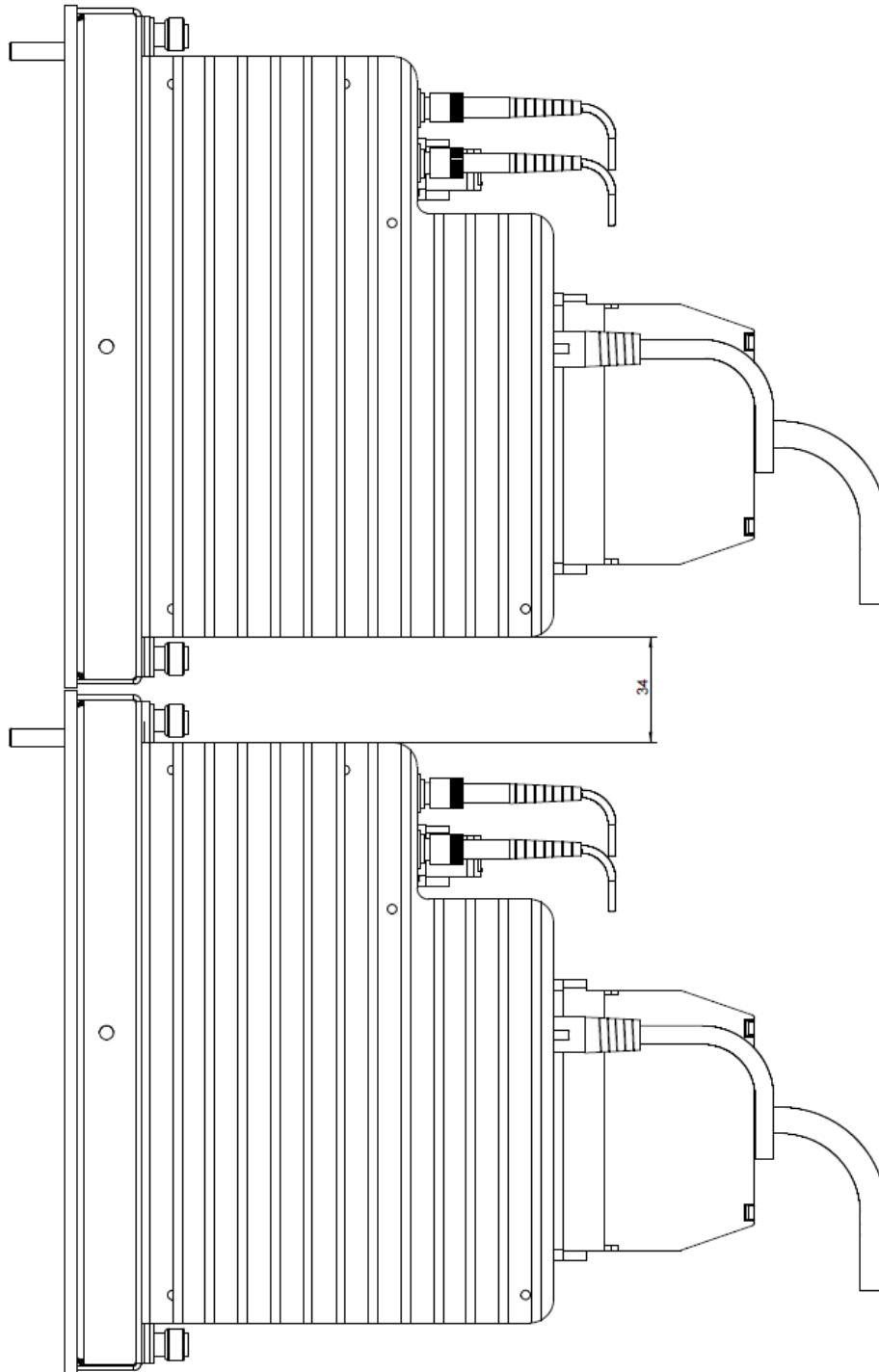
### ibaPADU-S-CM



Dimensions in mm

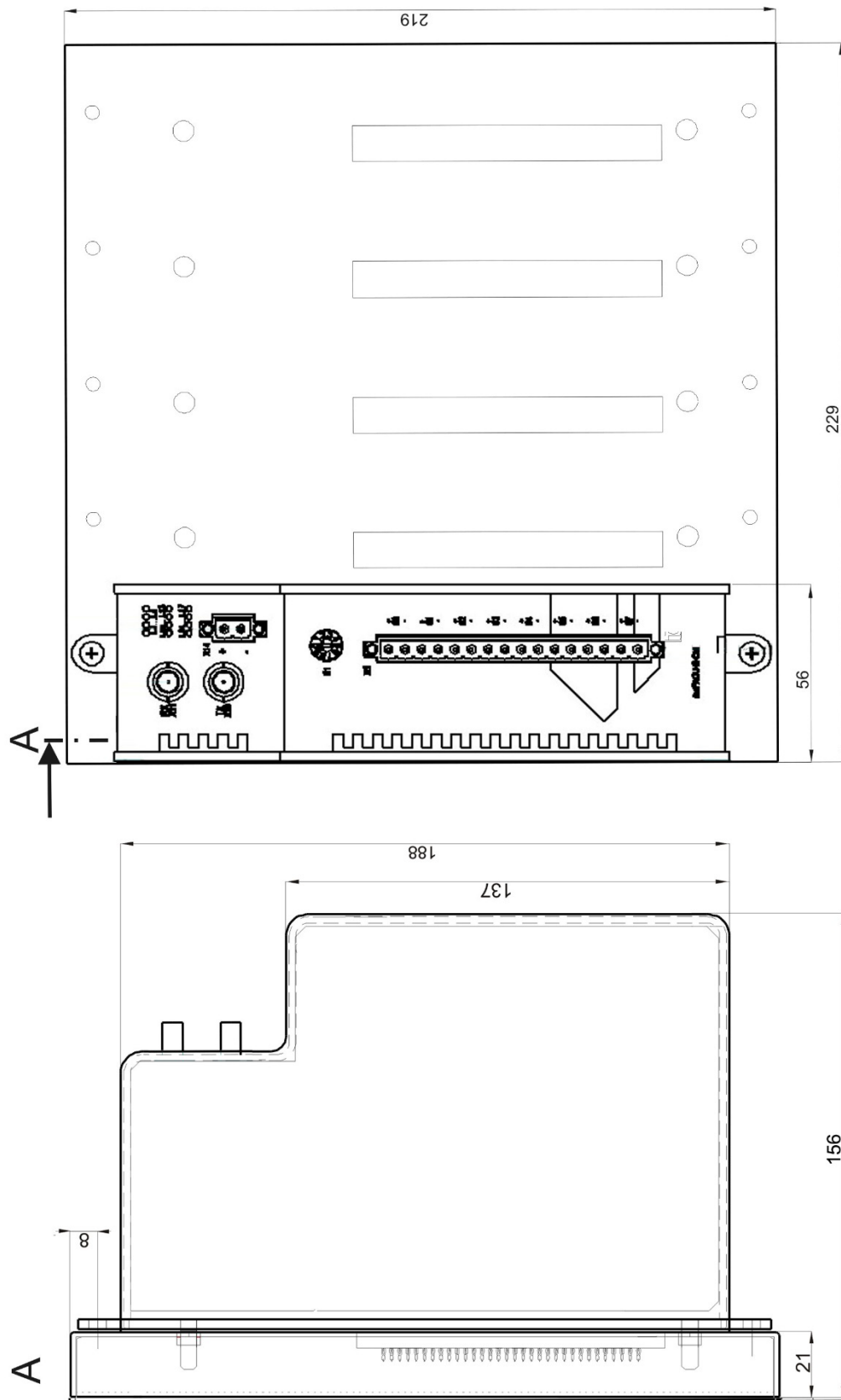


Dimensions ibaPADU-S-CM with cables (Dimensions in mm)

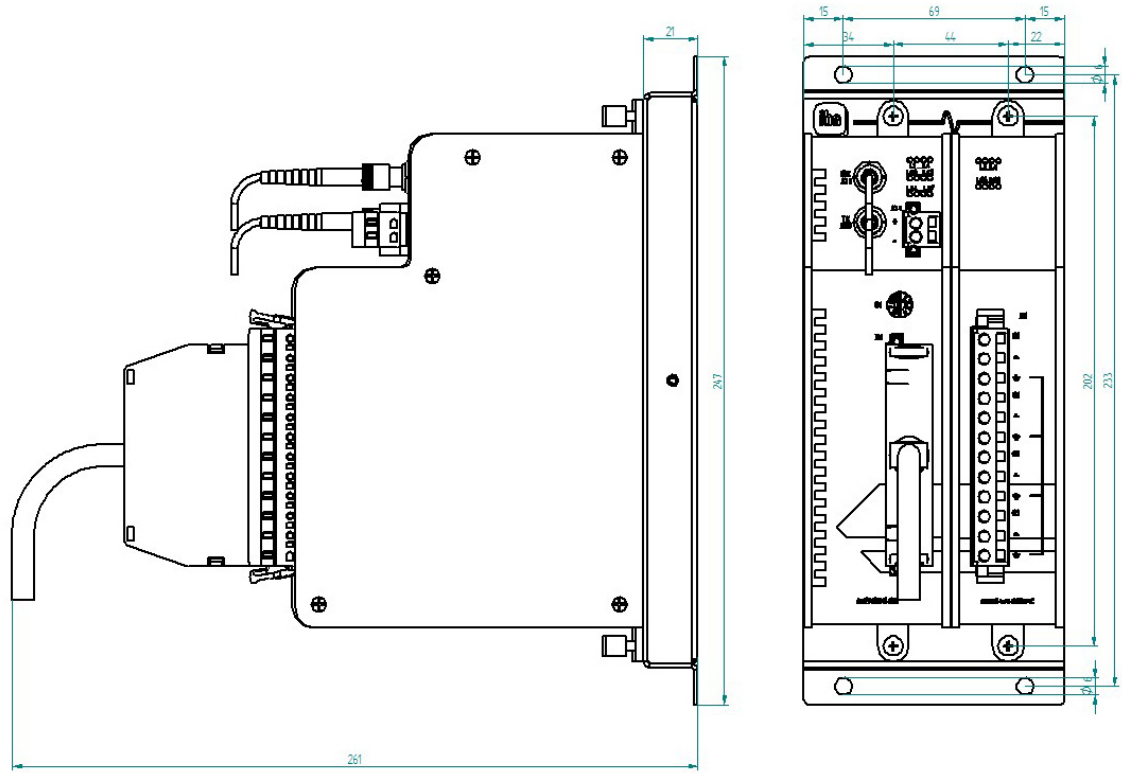
**Distance between 2 iba modular systems**

Min. distance between 2 iba modular systems (Dimensions in mm)

## ibaPADU-S-CM and backplane



Dimensions in mm




Dimensions ibaPADU-S-B1S with modules (Dimensions in mm)

## 11.5 Connection diagram


### 11.5.1 Pin assignment voltage supply X14

Pin	Connection
1	+ 24 V
2	0 V



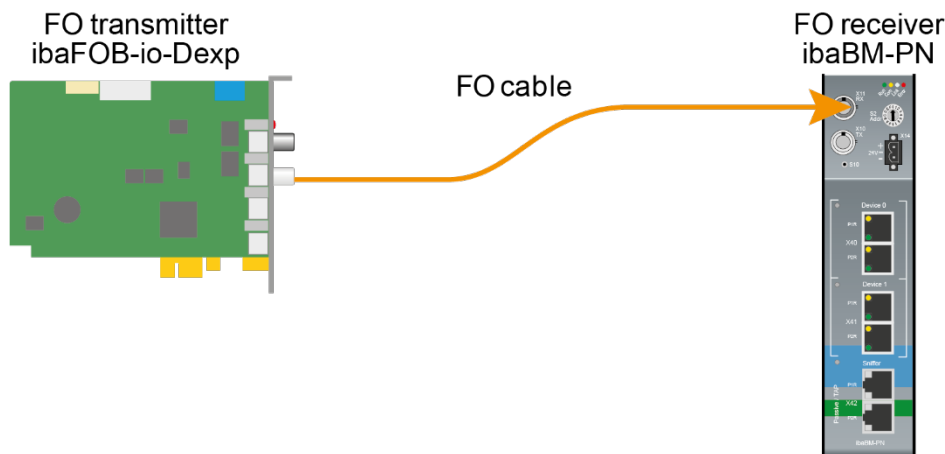
### 11.5.2 Pin assignment digital inputs X5

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 -



## 11.6 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  $\mu\text{m}$ . 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 $\mu\text{m}$	Min.	Max.
62.5/125	-16 dBm	-9 dBm

### Specification ibaBM-PN:

Sensitivity of FO receiving interface		
FO cable in $\mu\text{m}$	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 $\mu\text{m}$
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.



## 12 Accessories

### 12.1 Backplane panels

#### 12.1.1 ibaPADU-S-B4S

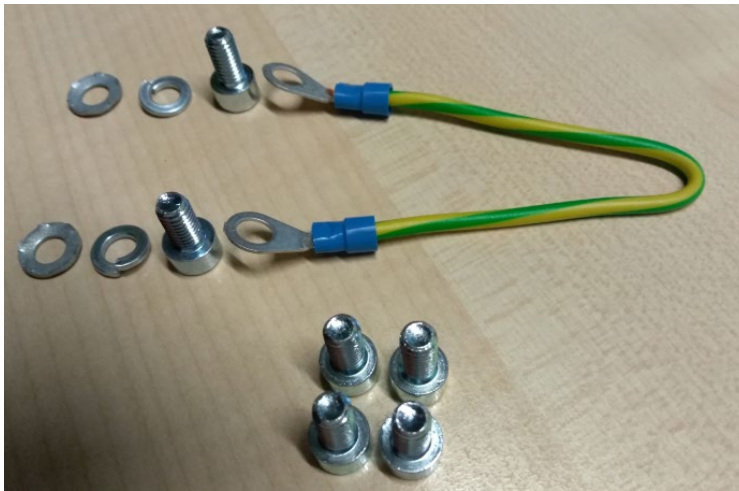
Backplane panel for mounting 1 central unit and up to 4 I/O modules.



##### 12.1.1.1 Scope of delivery

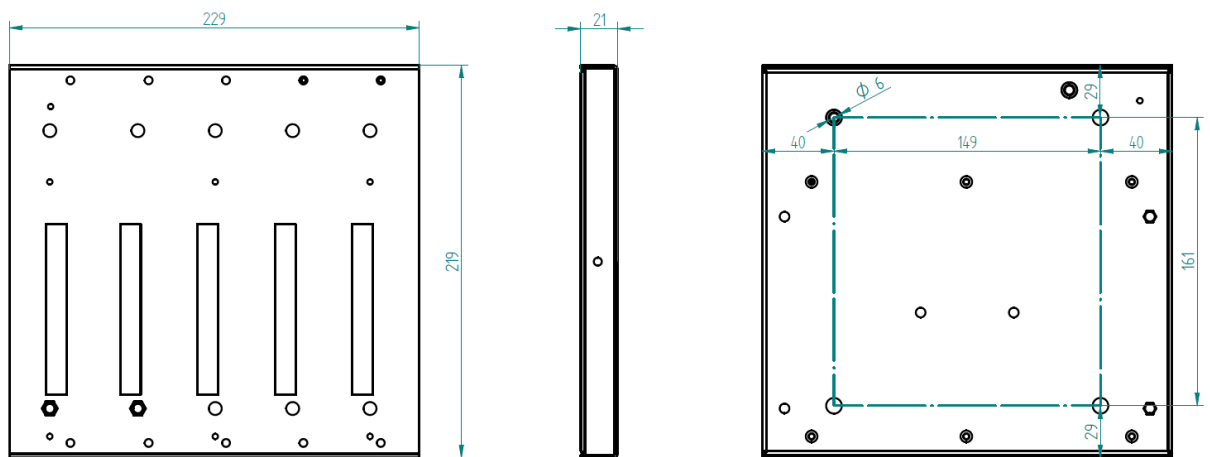
- ☐ Backplane panel
- ☐ Assembly kit



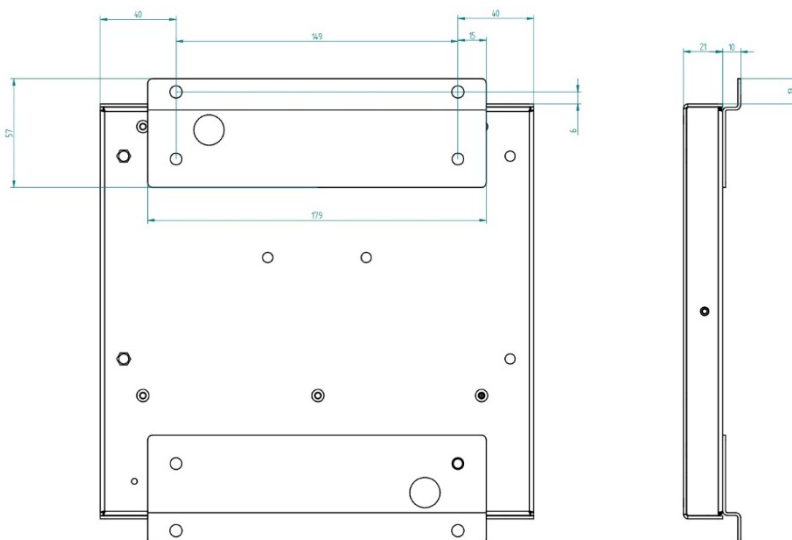


Assembly kit

### 12.1.1.2 Dimensions



Dimensions ibaPADU-S-B4S (dimensions in mm)



Dimensions ibaPADU-S-B4S with mounting angles (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. packing	0.66 kg / 0.85 kg

### 12.1.2 ibaPADU-S-B1S

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

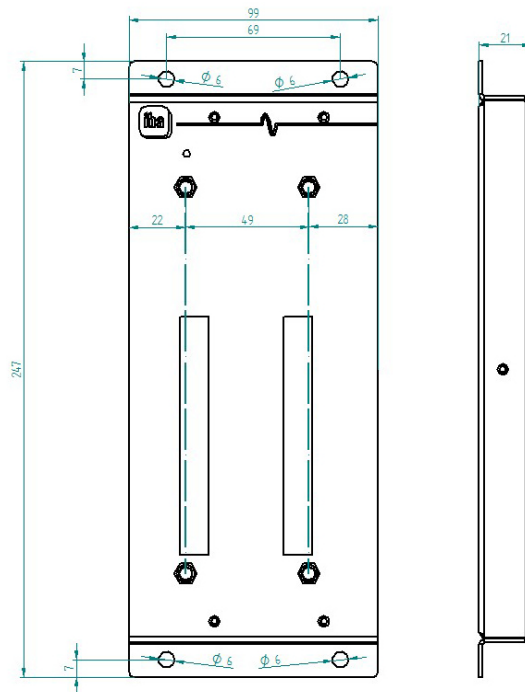


#### 12.1.2.1 Scope of delivery

- ☐ Backplane panel
- ☐ Assembly kit



### 12.1.2.2 Dimensions



Dimensions in mm

### 12.1.2.3 Grounding

See chapter 12.1.1.3

### 12.1.2.4 Technical data

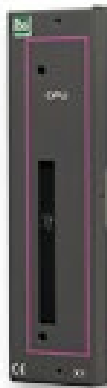
Short description	
Product name	ibaPADU-S-B1S
Description	Backplane panel for 1 central unit and 1 I/O module from the iba modular system; with mounting angles
Order number	10.124002
Interface central unit	
Number	1
Connection type	Female header, pole number 3 x 32
Slot	X1
Interface I/O module	
Number	1
Connection type	Female header, pole number 3 x 32
Slot	X2
Supply	
Power supply	none

<b>Mounting</b>	
Housing	4 through holes M6
Assembly kit	-
Grounding	1 thread M6, rear side
Assembly kit	enclosed
<b>Design</b>	
Dimensions (width x height x depth)	99 mm x 247 mm x 21 mm
Weight / incl. packing	0.32 kg / 0.43 kg

## 12.2 Mounting system for central unit

### 12.2.1 ibaPADU-S-B

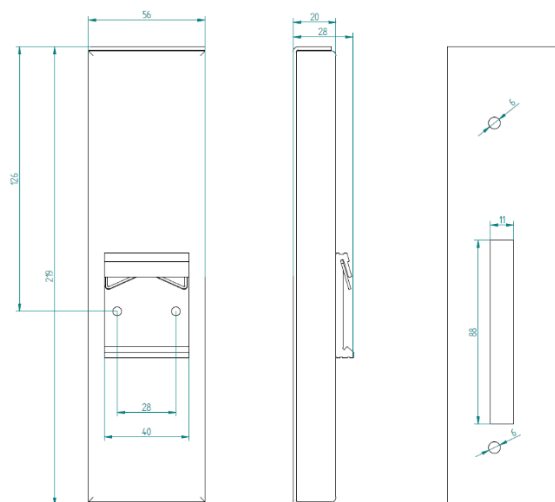
Mounting panel with DIN rail clip for 1 central unit (without I/O modules).



#### 12.2.1.1 Scope of delivery

- ☐ Mounting panel

#### 12.2.1.2 Dimensions



Dimensions in mm

### 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. packing	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

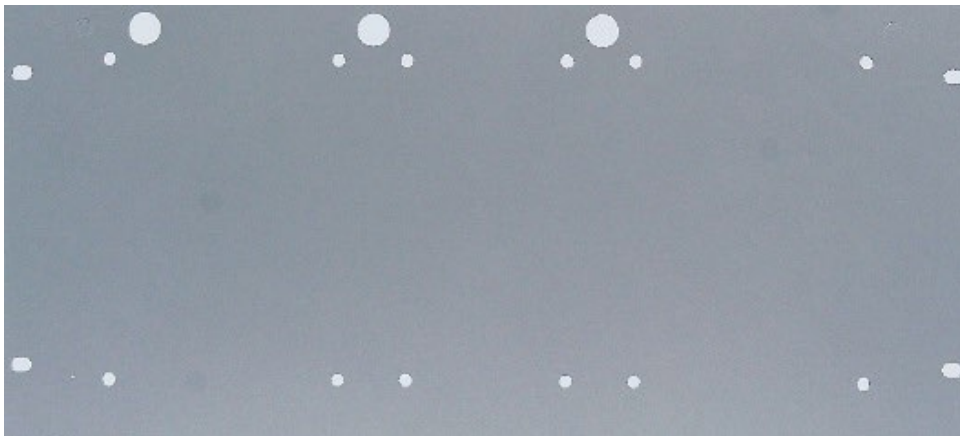
W x h x d: 179 mm x 57 mm x 10 mm

### 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. packing	0.091 kg / 0.092 kg

### 12.3.2 Mounting panel 19"

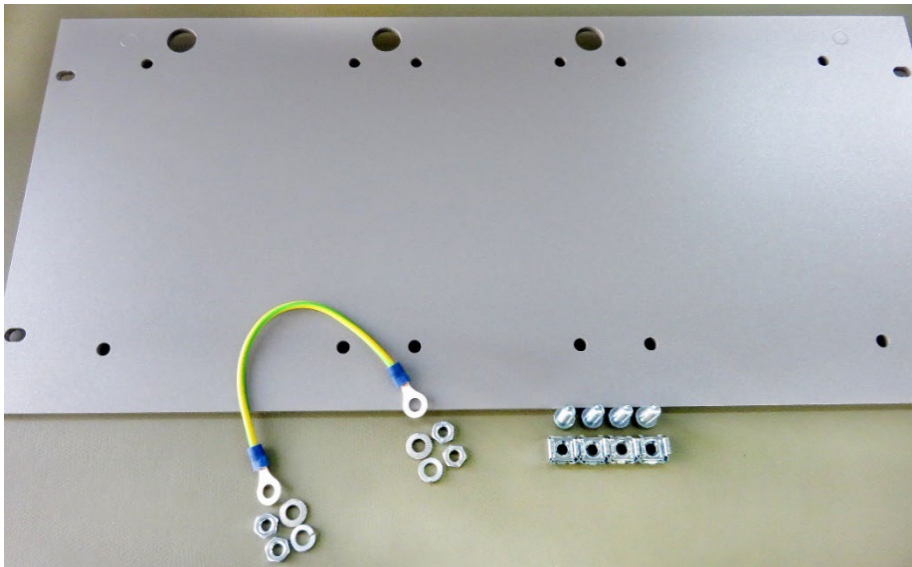
Mounting panel (483 mm/19") for up to 2 ibaPADU-S-B4S backplane panels.



#### 12.3.2.1 Scope of delivery

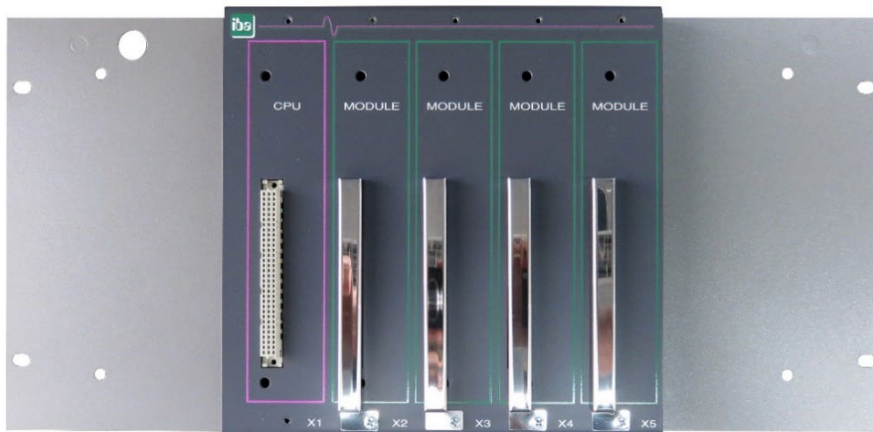
- ☐ Mounting panel
- ☐ Assembly kit



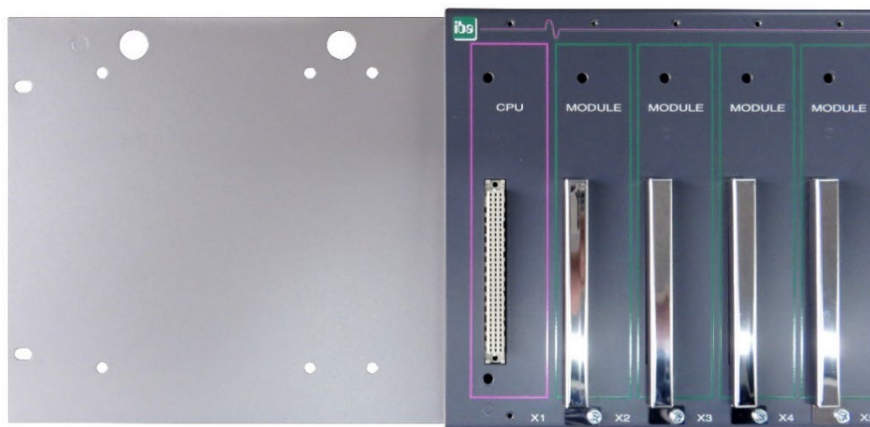


### 12.3.2.2 Mounting backplane panel

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

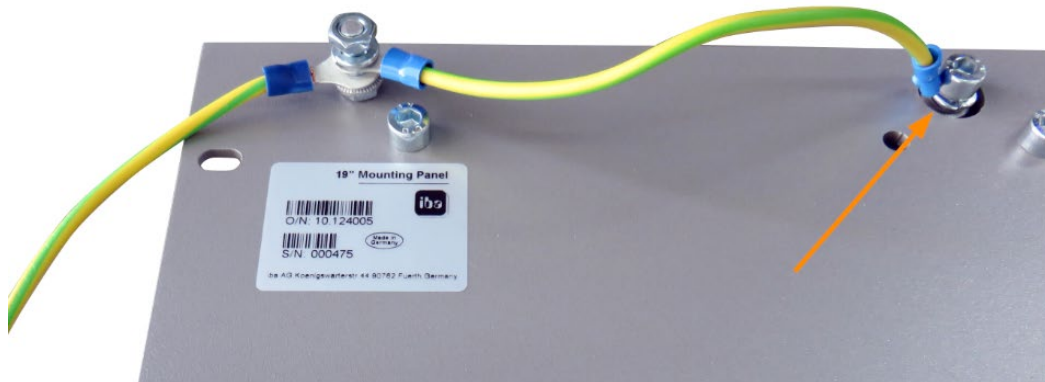
[illegible]

### 12.3.2.4 Grounding

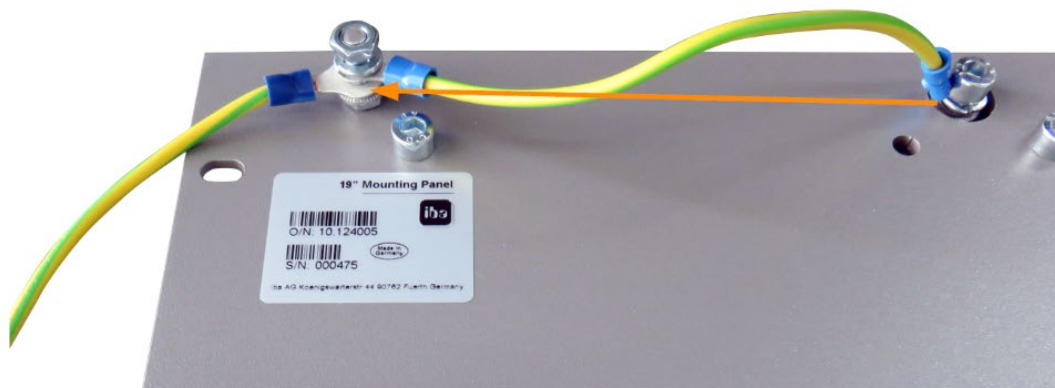
#### Variation 1:

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

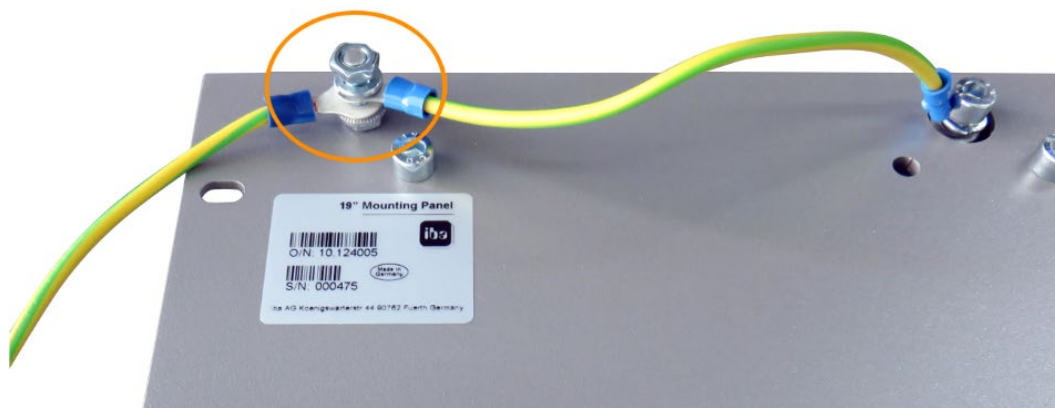
After the backplane panel is mounted on the 19" mounting panel, the backplane panel must be grounded via the mounting panel. Screw the grounding cable on the back of the mounting panel to the backplane panel. Use the screw connection as described in chapter 12.1.1.3.



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.



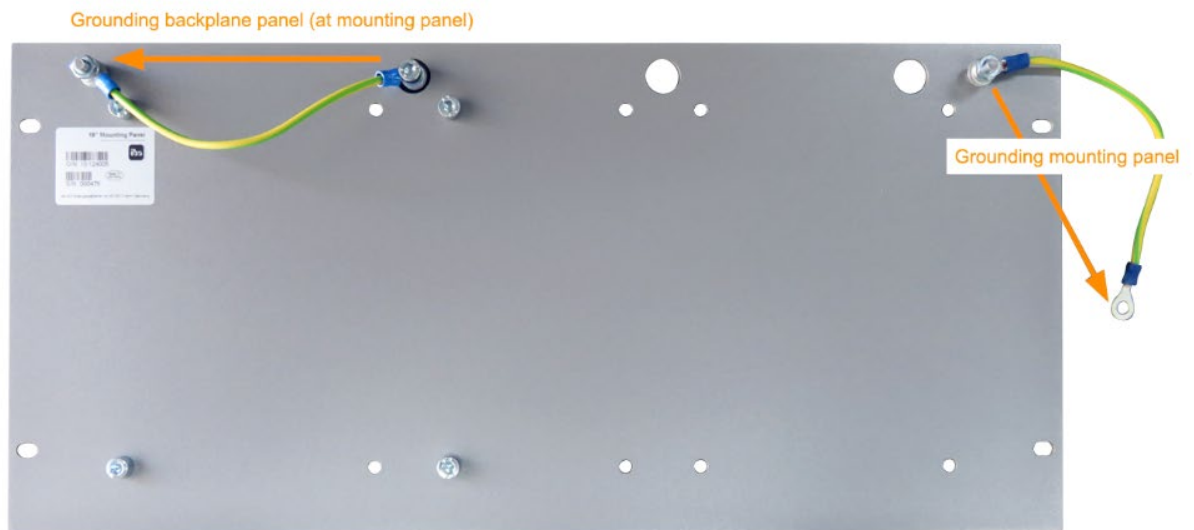
Both grounding cables are attached to the threaded bolt as shown.



**Variation 2:**

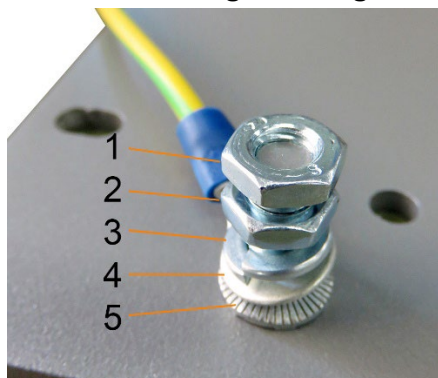
One backplane panel and grounding of the mounting panel are **not on the same side**.

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. packing	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


### 16 Pin RM 5.08 Terminal block WAGO

Order number	52.000023	

### 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/cable

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		Add-on module (4 outputs)
- for PCI slot (long)	11.116201	For all ibaFOB-D cards as output module or for mirroring the inputs
- for rackline slot (short)	11.116200	
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 fiber optic 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

## 12.6 iba software

Product	Order no.	Remark
		Online data acquisition system ibaPDA, license examples:
ibaPDA-1024	30.771024	For up to 1024 signals
ibaPDA-2048	30.772048	For up to 2048 signals
ibaLogic-V5 embedded		Online signal processing ibaLogic-V5 license already existing on ibaPADU-S-IT-2x16 for 64 inputs/outputs and DatFileWrite license
ibaAnalyzer	33.010000	Offline- and online analysis software with free license if used to analyze *.dat files generated by licensed iba software.

For further accessories, please see our online catalog at [www.iba-ag.com](http://www.iba-ag.com).

## 13 Appendix

### 13.1 FO configuration using 32Mbit (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 IO modules are installed.

The fixed order in the FO configuration can be shifted with a configurable 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 systems 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 IO modules used with ibaPADU-S-IT-05 can also be used with the new central unit ibaPADU-S-CM, an upgrade has to be installed on the 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 a FTP connection to the device proceed as follows:

1. Connect the device to the PC via an USB cable.  
The USB interface is located at the bottom of the device. A USB cable of A to B type 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 delivered with the device in this directory:  
\\02\_iba\_Hardware\\ibaPADU-S-CM\\USB\_Driver
3. After having installed successfully, an additional network connection is available with the device name „IBA AG USB Remote NDIS Network Device“.
4. 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 subnetmask 255.255.255.0.

**Example:**

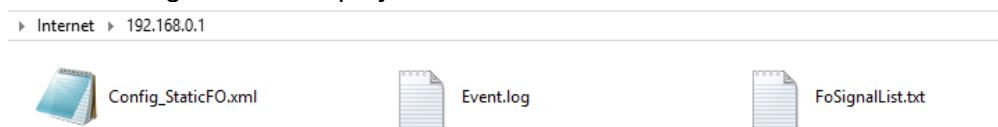
IP: 192.168.0.2  
SubNet: 255.255.255.0

5. Now, you can establish a 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:**

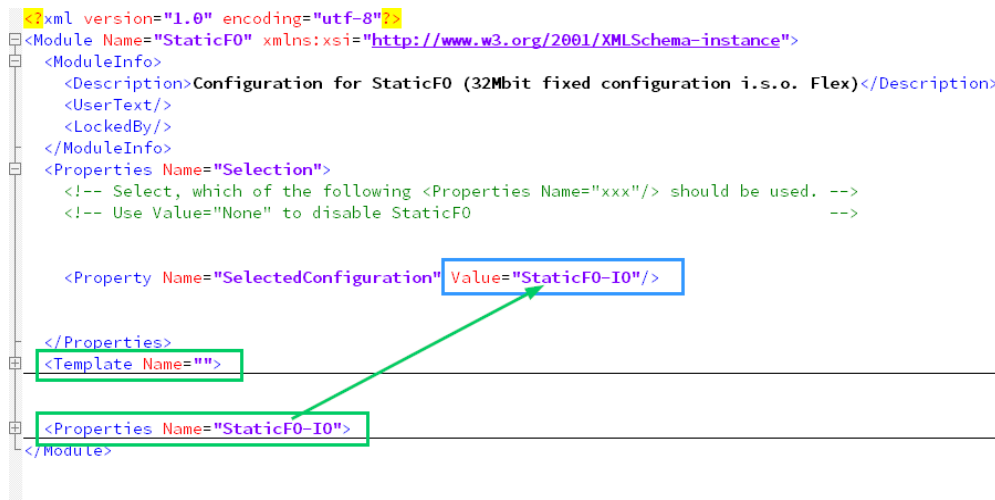


6. The following files are displayed in the file window:



### 13.1.2 Configuration of the ibaNet protocol 32Mbit

Copy the file "Config\_StaticFO.xml" to your computer and open the file with an editor.



```

<?xml version="1.0" encoding="utf-8"?>
<Module Name="StaticFO" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <ModuleInfo>
    <Description>Configuration for StaticFO (32Mbit fixed configuration i.s.o. Flex)</Description>
    <UserText/>
    <LockedBy/>
  </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-IO"/>

  </Properties>
  <Template Name="">

  <Properties Name="StaticFO-IO">
</Module>

```

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>

<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.

```
<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_AI_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="
</Properties>

<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"/>
```

3. After that, configure the different properties:

#### Description of the 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"/>

The following items must be observed:

Allowed values: 0 ... FO\_Signals-1 (e.g. Int64: 0 ... 63)

Digital input and outputs must be a multiple of 32

In INT mode, analog inputs and outputs must be a multiple of 2.

❑ <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
X1_DI04	1	D44	0xC4 12

❑ <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 ibaMS32xDI-24V and ibaMS16xDIO-24V (see also chapter 7.5.2).

Permitted values: 0 ... 65535 µs, 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 IN1 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_Offset" Value="32"/>
  <Property Name="FO_OutDI_Offset" Value="32"/>
  <Property Name="HF_Compatibility" Value="false"/>
  <Property Name="Use_Output_StatusSignals" Value="false"/>
  <Property Name="Use_Output_ControlSignals" Value="false"/>
  <Property Name="Debounce_Delay_Time_32xDI_16xDIO" Value="0" Unit="us"/>
</Properties>
</Template>
</Properties>
```

- 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.

► Internet ► 192.168.0.1



Config\_StaticFO.xml



Err\_Config\_StaticFO.xml

You find a description of analyzing the error in chapter 13.1.6.

### **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.

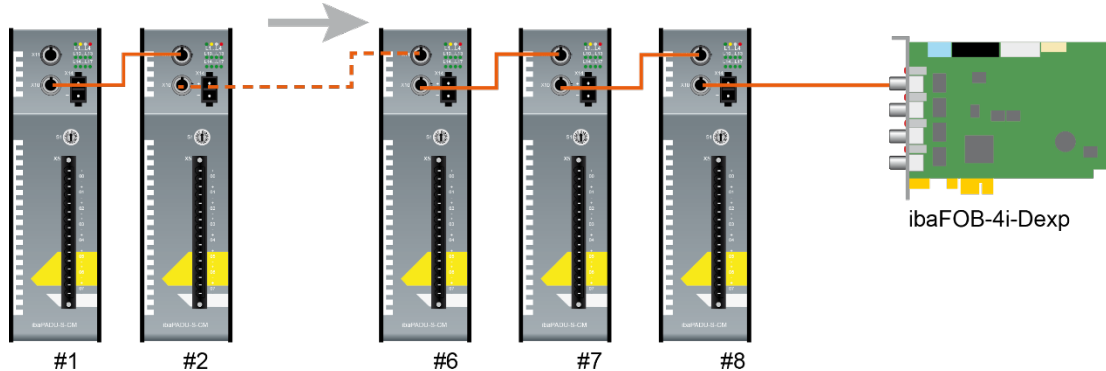
#### **13.1.3.3 No grid frequency signals**

The signals for measuring the grid 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 DI in the modules) ***
Signal|Len|Fiber optic|PDA setting|
|bit|Signal|Address|bit|
-----+-----+-----+-----+

```

The region “Fiber optic settings” indicates that the ibaNet protocol 32Mbit is set here.

The mapping of the IO signals and the FO configuration is shown in the signal list. The signals are grouped by 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 occurs 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_A0_Offset" Value="0"/>
<Property Name="FO_IN_D0_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.

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## 15 Support and contact

### Support

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### Note

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

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