



# ibaPADU-S-IT-2x16

Central unit for the iba modular system

Manual

Issue 2.0

Measurement Systems for Industry and Energy

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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
2.0	08-2023	FO cable, scope of delivery			

## Contents

<b>1</b>	<b>About this manual .....</b>	<b>6</b>
1.1	Target group .....	7
1.2	Notations .....	7
1.3	Used symbols .....	8
<b>2</b>	<b>Introduction .....</b>	<b>9</b>
<b>3</b>	<b>Scope of delivery .....</b>	<b>9</b>
<b>4</b>	<b>Safety instructions .....</b>	<b>10</b>
4.1	Intended use .....	10
4.2	Special safety instructions .....	10
<b>5</b>	<b>System Requirements .....</b>	<b>11</b>
5.1	Hardware .....	11
5.2	Software .....	11
5.3	ibaPADU-S-IT-2x16 .....	11
<b>6</b>	<b>Mounting, Connecting, Dismounting .....</b>	<b>12</b>
6.1	Mounting .....	12
6.2	Dismounting .....	12
<b>7</b>	<b>Device description .....</b>	<b>13</b>
7.1	Views .....	13
7.2	Indicating elements .....	14
7.2.1	Operating status .....	14
7.2.2	LEDs L5 ... L8 .....	14
7.2.3	Indicators digital inputs L10 ... L17 .....	15
7.3	Operating elements .....	15
7.3.1	ON/OFF switch S11 .....	15
7.3.2	Rotary switches S1 and S2 .....	15
7.3.3	System function pushbutton S10 .....	16
7.4	Communication interfaces .....	16
7.4.1	Fiber optic connections X10 and X11 .....	16
7.4.2	Network interface X22 .....	16
7.5	Digital inputs X5 .....	16
7.5.1	Connection diagram / Pin assignment .....	16
7.5.2	Debounce filters .....	17
7.6	Voltage supply .....	19
7.6.1	Voltage supply X14 .....	19
7.6.2	Buffer voltage X30 .....	19
<b>8</b>	<b>System integration .....</b>	<b>20</b>
8.1	Application examples .....	20
8.1.1	Measuring system with ibaPDA .....	20
8.1.2	Measuring system with ibaPDA and ibaLogic-V5 .....	20
8.1.3	Standalone systems with ibaLogic-V5 .....	21
8.1.4	ibaPADU-S-IT-2x16 in hierarchical automation systems .....	21
8.2	FO cascading .....	21

8.3	Supported ibaNet transfer protocols.....	22
<b>9</b>	<b>Initial start-up.....</b>	<b>23</b>
9.1	Default settings.....	23
9.1.1	User accounts.....	23
9.1.2	Network parameters.....	23
9.1.3	Host name .....	23
9.1.4	Reset to default settings .....	24
9.2	Network settings .....	24
9.2.1	Establish communication to the device via the network.....	24
9.2.2	Establishing communication to the device via FO cable.....	26
9.2.3	Network settings on the web interface .....	27
9.2.4	Network settings directly on the device .....	27
9.3	Time settings .....	30
9.3.1	System time.....	30
9.3.2	Time synchronization of the local ibaPADU-S-IT-2x16 system .....	31
9.4	Make settings on the website.....	33
9.4.1	Accessing the website .....	33
9.4.2	Website structure.....	35
<b>10</b>	<b>Updates .....</b>	<b>42</b>
10.1	Update via web interface .....	42
10.2	Update via ibaPDA .....	43
10.3	Auto-update of the modules.....	43
<b>11</b>	<b>iba applications .....</b>	<b>45</b>
11.1	ibaLogic-V5.....	45
11.1.1	Configuring ibaPADU-S-IT-2x16 as platform .....	45
11.1.2	Automatic update of the ibaLogic-V5 version .....	48
11.1.3	Configuring signals .....	49
11.1.4	DAT_FILE_WRITE function block .....	55
11.1.5	Configuring the debounce filter .....	57
11.1.6	Saving the ibaLogic-V5 program on runtime .....	58
11.1.7	Deleting an ibaLogic-V5 program in ibaPADU-S-IT-2x16 .....	59
11.2	ibaPDA .....	60
11.2.1	Configuration in the I/O Manager .....	60
11.2.2	PADU-S – General tab.....	62
11.2.3	PADU-S – Diagnostics tab .....	63
11.2.4	PADU-S – Analog tab.....	64
11.2.5	PADU-S – Digital tab.....	65
11.2.6	ibaPADU-S-IT-2x16 – General tab .....	65
11.2.7	ibaPADU-S-IT-2x16 – Digital tab .....	66
11.2.8	Diagnostics signals .....	67
<b>12</b>	<b>Technical Data .....</b>	<b>70</b>
12.1	Main data.....	70
12.2	Interfaces.....	71
12.3	Digital inputs .....	72

12.4	Dimensions .....	73
12.5	Connection diagram .....	77
12.5.1	Pin assignment voltage supply X14 .....	77
12.5.2	Pin assignment digital inputs X5 .....	77
12.6	Example for FO budget calculation .....	78
<b>13</b>	<b>Accessories .....</b>	<b>80</b>
13.1	Backplane panels .....	80
13.1.1	ibaPADU-S-B4S .....	80
13.1.2	ibaPADU-S-B1S .....	83
13.2	Mounting system for central unit .....	85
13.2.1	ibaPADU-S-B .....	85
13.3	Mounting systems for ibaPADU-S-B4S .....	87
13.3.1	Mounting angles .....	87
13.3.2	Mounting panel 19" .....	88
13.3.3	Module carrier .....	93
13.4	Terminal blocks .....	94
13.5	FO cards .....	95
13.6	iba software .....	95
<b>14</b>	<b>Appendix .....</b>	<b>96</b>
14.1	Acronyms .....	96
14.2	Index .....	97
<b>15</b>	<b>Support and contact .....</b>	<b>98</b>

# 1 About this manual

In this manual, you learn a lot about the design of the ibaPADU-S-IT-2x16 device and how to use and operate it. You can find a general description 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

The manuals of the ibaPADU-S-IT-2x16 central units and ibaPADU-S-CM contain the following information:

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

### ❑ Modules

The manuals for the single modules contain specific information about the module. This information can be:

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

## 1.1 Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded 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 <i>Logic diagram</i>
Call of menu command	<i>Step 1 – Step 2 – Step 3 – Step x</i> Example: Select menu <i>Logic diagram – Add – New logic diagram</i>
Keys	<Key name> Example: <Alt>; <F1>
Press keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	„File name“, „Path“ Example: „Test.doc“

## 1.3 Used symbols

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



### **⚠ DANGER**

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

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

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



### **⚠ WARNING**

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



### **⚠ CAUTION**

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



### **Note**

A note specifies special requirements or actions to be observed.



### **Tip**

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



### **Other documentation**

Reference to additional documentation or further reading.



## 2 Introduction

The modular concept 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-IT-2x16 CPU offers 8 digital inputs.

ibaPADU-S-IT-2x16 is a fast CPU for fast applications in the fields of measurement technology, signal processing and controls. When equipped with the appropriate input/output modules and combined with the ibaPDA or ibaLogic-V5 software products, ibaPADU-S-IT-2x16 can be used for several applications. The range of applications includes:

- ☐ Capturing of measuring signals with and without pre-processing
- ☐ Condition Monitoring
- ☐ Data logger (Transient Fault Recorder)
- ☐ Noise recognition and excentricity analysis
- ☐ Signal management
- ☐ Control
- ☐ Fast drive and position control

Due to the integrated processor, a RAM and the Windows Embedded Compact 7 operating system, ibaLogic-V5 applications can be loaded into the device as compiled runtime version. With these types of applications, the measuring signals can be pre-processed in the device and then transmitted to the ibaPDA system.

An ibaPADU-S-IT-2x16 system with input/output modules and an ibaLogic-V5 application can locally control processes and machines, either as a separate control unit connected to a master control or independently.

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-IT-2x16 device
- ☐ Covering caps for FO cables, USB and Ethernet
- ☐ 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 Intended use

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

- ☐ Measurement data acquisition
- ☐ Automation of industrial plants
- ☐ Applications with iba products (ibaPDA, ibaLogic-V5 etc.)

The device must only be used as specified in the technical data in chapter 12.

### 4.2 Special safety instructions



#### **⚠ WARNING**

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



#### **⚠ CAUTION**

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

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



#### **⚠ WARNING**

Modules and CPU must NOT be attached or detached to/from the rack under voltage!  
Switch off ibaPADU-S-IT-2x16 or disconnect power supply before inserting or removing the modules.



#### **Important note**

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



#### **⚠ CAUTION**

Make sure that the cooling fins have sufficient ventilation!



#### **Note**

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

## 5 System Requirements

### 5.1 Hardware

#### For operation

- ☐ Power supply 24 V DC  $\pm 10\%$ , 3 A (fully equipped)
- ☐ Backplane unit, e.g. ibaPADU-B4S (see chap. 13, „Accessories and related products“)

#### For device parametrization and 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 V3.00 build 187 (D2)):
  - 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) and/or Ethernet cable

### 5.2 Software

- ☐ ibaPDA beginning with version 6.37.3
- ☐ ibaLogic beginning with version 5.0.3



#### Note

An ibaLogic-V5 embedded version is running on an ibaPADU-S-IT-2x16 device by default. The license is included in delivery.

### 5.3 ibaPADU-S-IT-2x16

- ☐ Firmware beginning with version v02.14.017
- ☐ 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. Otherwise, plugging or unplugging the connectors for the inputs/outputs can cause damage.



A description of how to attach the grounding can be found in chapter 13 "Accessories" for the different mounting systems:

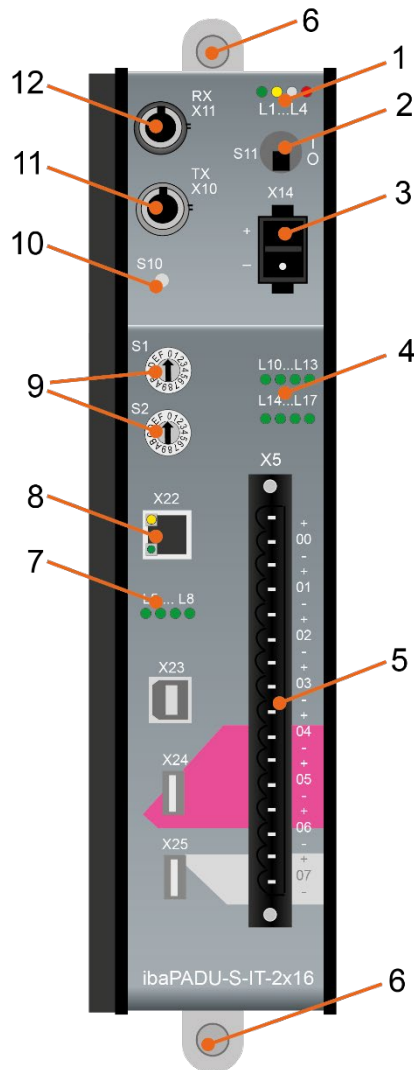
- ☐ Mounting with backplane panels, chapter 13.1
- ☐ Mounting system for central unit only, chapter 13.2
- ☐ Mounting systems for ibaPADU-S-B4S, chapter 13.3

### 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

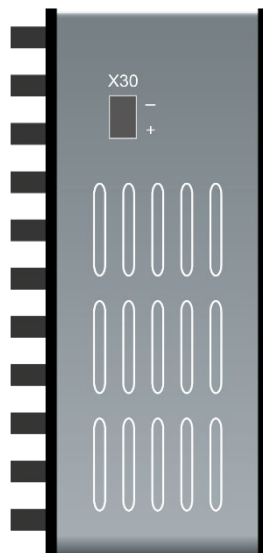
### 7.1 Views



- 1 Operating status indicators L1 ... L4
- 2 On/off switch S11
- 3 Connector for power supply 24 V X14
- 4 Indicators digital inputs L10 ... L17
- 5 Connection for digital inputs X5
- 6 Fixing screws
- 7 Indicators L5 ... L8
- 8 Network interface X22
- 9 Rotary switches S1, S2
- 10 System function push button S10
- 11 Connection FO output (TX) X10
- 12 Connection FO input (RX) X11

X23 for service purposes only

X24, X25 USB host interfaces for future functions



X30 Buffer voltage connector DC (9 V...15 V)

## 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 Green	Off	Down, no power supply, hardware error, controller stopped
	Flashing (0.5 Hz / 2 s)	Ready for operation Deviations in the flashing period point out overload or booting of the device. Booting can take up to 90 s.
	Fast flashing (ca. 10 Hz / 0.1 s)	System programming mode Firmware update active
	On	Controller overloaded
L2 Yellow	Off	ibaLogic PMAC (Programmable Measurement and Automation Controller, runtime system) not started
	Flashing	ibaLogic PMAC started and program is running
	On	ibaLogic PMAC started
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	Hardware error

### 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.

### 7.2.2 LEDs L5 ... L8

The LEDs L5 ... L8 have the following functions:

- ☐ Status indication when setting the network parameters via the rotary switches S1 and S2. For further information, please see chapter 9.2.4 „Network settings directly on the device“
- ☐ Status and progress indication when installing an update, see chapter 10 „Update“.

### 7.2.3 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 ON/OFF switch S11

Position	Status	Description
I	On	Device is switched on
0	Off	Device is switched off

By switching the device off and on again, the supply voltage is disconnected and reconnected and the device is rebooted.

### 7.3.2 Rotary switches S1 and S2

The rotary switch S1 is used to set both the ibaNet protocol and the device addresses in the FO network:

- ❑ Position „0“:  
all previous ibaNet protocols (except 32Mbit Flex), only in cooperation with ibaLogic
- ❑ Position „1“ - „F“:  
ibaNet 32Mbit Flex; the position of the switch defines the device address.

➤ For further information see chapter 8.2 “FO cascading”.

- ❑ Both rotary switches S1 and S2 can also be used to set different parameters, e.g. network addresses, subnet mask, default gateway, reset to default settings.

For further information, see chapters

- 9.1.4 “Set back to default settings”
- 9.2.4 “Network settings directly on the device”
- 11.1.7 “Deleting an ibaLogic-V5 program in ibaPADU-S-IT-2x16”

### 7.3.3 System function pushbutton S10

The system function pushbutton S10 is needed for the settings that are made directly on the device. For further information, please see chapters

- 9.1.4 “Set back to default settings“
- 9.2.4 “Network settings directly on the device“
- 11.1.7 “Deleting an ibaLogic-V5 program in ibaPADU-S-IT-2x16“

## 7.4 Communication interfaces

### 7.4.1 Fiber optic connections X10 and X11

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

Process data between ibaPADU-S-IT-2x16 and the connected iba systems are transferred via FO cables. Using the 32Mbit Flex transfer protocol, also configuration data can be transferred via FO cable.

#### 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 12.6.

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 "Technical data" 12.2 under "ibaNet interface".

### 7.4.2 Network interface X22

You can integrate the device into an Ethernet network via the X22 network interface.

- For further information, please see chapter 9.2.1 „Establish communication to the device via the network“

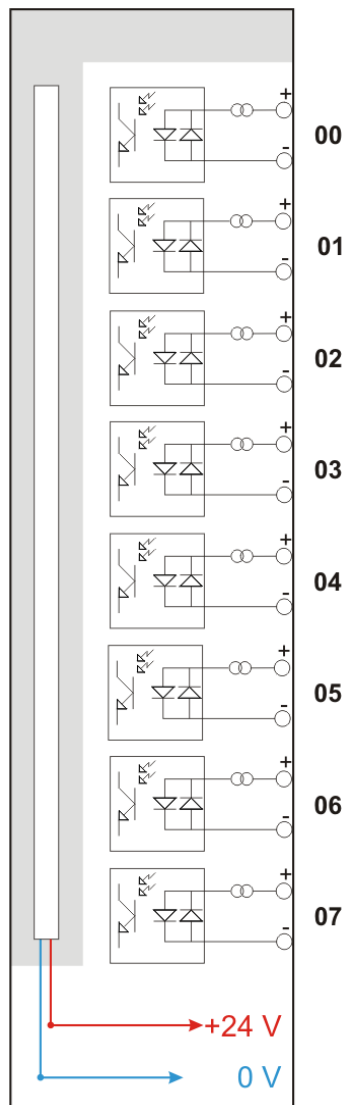
## 7.5 Digital inputs X5

### 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.

- See chapter 12 „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“

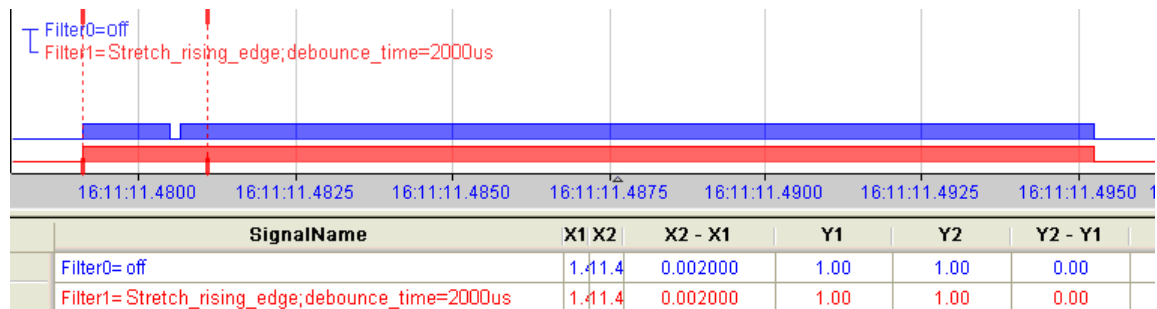
For each filter, a debounce time has to be defined in  $\mu\text{s}$ . This debounce time can have a value between  $[1\mu\text{s} \dots 65535\mu\text{s}]$ .

#### Off

The measured input signal is transferred without filtering.

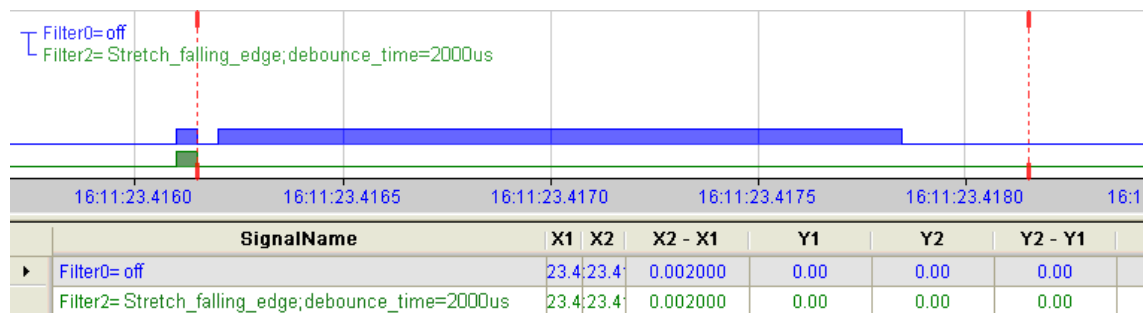
### „Stretch rising edge“

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.



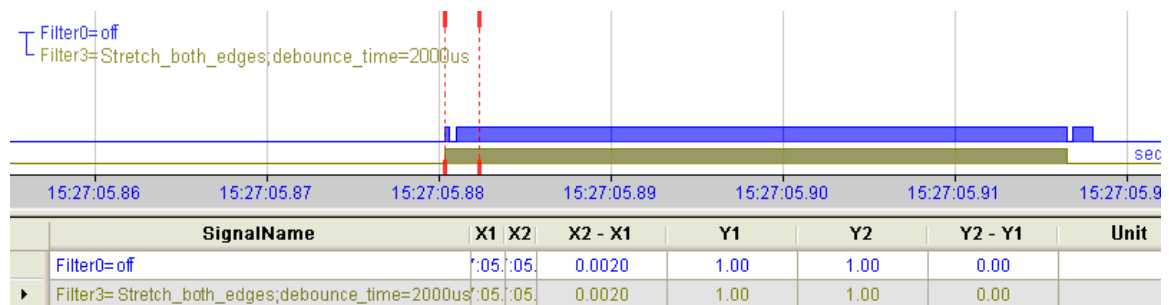
### „Stretch falling edge“

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.



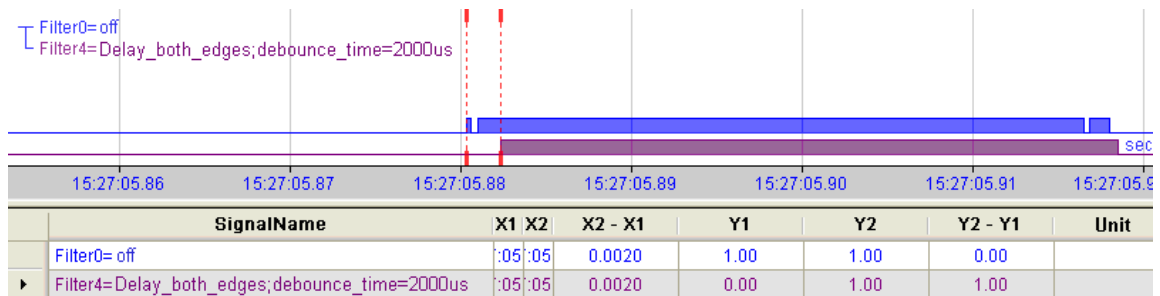
### „Stretch both edges“

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

### 7.6.1 Voltage supply X14

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



Only connect the device to an external voltage supply 24 V DC ( $\pm 10\%$  unregulated)!  
Pay attention to the correct polarity!

### 7.6.2 Buffer voltage X30

The connection of a buffer voltage is supported at the X30 connector (bottom side). The following device functions can be buffered when disconnected from power supply:

- ☐ Time
- ☐ FO line: incoming ibaNet telegrams are transmitted, the FO line is not interrupted.

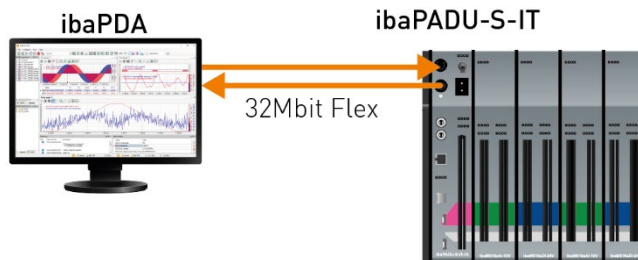
For this purpose, a buffer voltage of typ. 12 V DC (9 V ...15 V) is applied at the X30 connector. In case of buffering, the current consumption is approx. 70 mA at 12 V.

## 8 System integration

### 8.1 Application examples

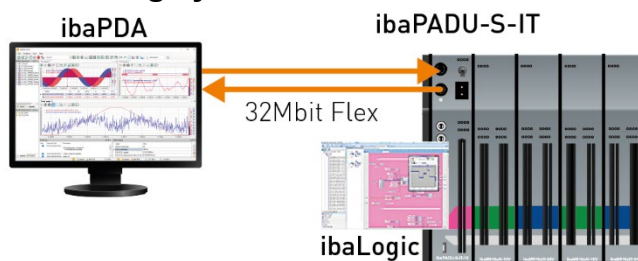
The figures below show examples of ibaPADU-S-IT-2x16 combined with ibaPDA and ibaLogic-V5.

#### 8.1.1 Measuring system with ibaPDA



- ☐ Pure measuring application (acquiring, recording, analyzing)
- ☐ Recording the signals with ibaPDA

#### 8.1.2 Measuring system with ibaPDA and ibaLogic-V5

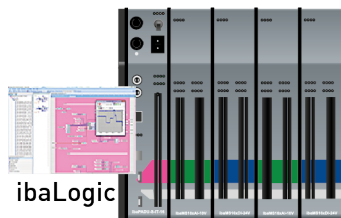


Modular measuring system with intelligent pre-processing

- ☐ Pre-processing of signals with ibaLogic-V5 (e.g. filtering of disturbances in the signal)
- ☐ Parameter data calculation from raw data
- ☐ Recording of all signals in ibaPDA:
  - Raw signals from the I/O modules
  - Pre-processed signals from ibaLogic-V5
- ☐ Further possible applications: controlling with parallel data measurement

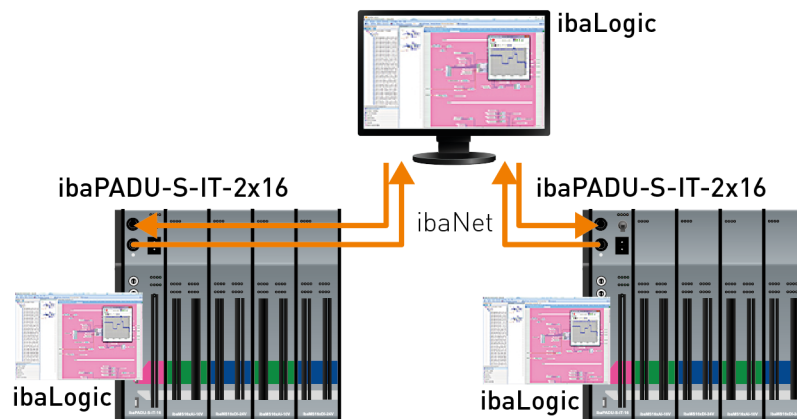
### 8.1.3 Standalone systems with ibaLogic-V5

ibaPADU-S-IT



- ☐ Freely programmable modular system for fast controls

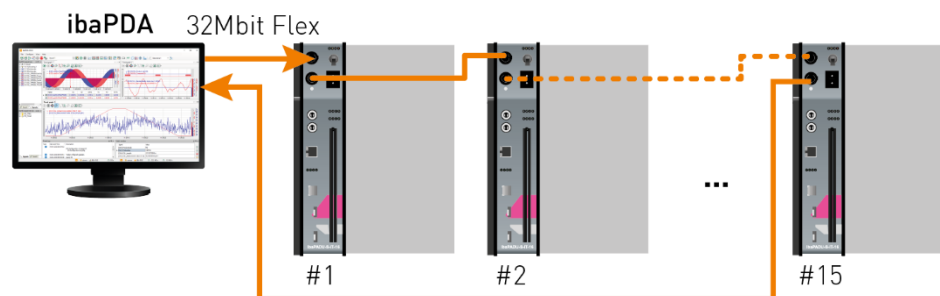
### 8.1.4 ibaPADU-S-IT-2x16 in hierarchical automation systems



- ☐ Master control program on the ibaLogic PC
- ☐ Fast local control
- ☐ Fast deterministic communication via ibaNet to the central computer

## 8.2 FO cascading

It is possible to connect up to 15 modular systems in a ring topology with 32Mbit Flex.



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

A cascade can be formed with all devices that support the ibaNNet 32Mbit Flex protocol.

### 8.3 Supported ibaNNet transfer protocols

Protocol ibaNet	Position of the rotary switch S1	Min. telegram cycle (Tcycl)	Max. signal sampling fre- quency	Direction of communica- tion x-directional	Max. data volume (in bytes)	Max. number of partici- pants in a FO link
3Mbit	0 <sup>1</sup>	1 ms	1 kHz	uni	136 B (64 Integer-, 64 binary values)	8
32Mbit 50µs	0 <sup>1</sup>	50 µs	20 kHz	uni	144 B (64 Integer-, 64 binary values)	1
32Mbit 100µs	0 <sup>1</sup>	100 µs	10 kHz	uni	288 B (128 Integer, 128 binary values) or (64 Real-, 64 binary values)	1
32Mbit 500µs	0 <sup>1</sup>	500 µs	2 kHz	uni	1152 B (512 Integer-, 512 bi- nary values) or (256 Real-, 256 binary values)	1
32Mbit 1000µs	0 <sup>1</sup>	1 ms	1 kHz	uni	2304 B (1024 Integer-, 1024 binary values) or (512 Real-, 512 binary values)	1
32Mbit Flex	1 ... F	Min. 25 µs	Max. 40 kHz	bi	64 B at 25 µs Tcycl 3113 B at 1 ms Tcycl	15

<sup>1</sup> Only in combination with ibaLogic-V5

## 9 Initial start-up

### 9.1 Default settings

As default settings, 2 user accounts and network parameters are pre-defined. As an administrator, you can change these settings. You can also set back the changed values to default settings.

➔ See chapter 9.1.4 “Set back to default settings”.

#### 9.1.1 User accounts

2 accounts (2 users) are set up for the device as a factory default.

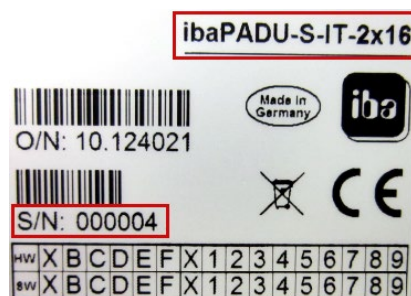
User	Password	Rights
padu	1234	Viewing the web tabs without system settings No access to „passwords“, „update“ and „ibaLogic“
admin	1234	Changing passwords Displaying and changing network settings Displaying and changing system time Installing updates Loading and starting ibaLogic-V5 runtime version

#### 9.1.2 Network parameters

Interfaces		Default setting
Ethernet network (X22)	Fixed IP address	192.168.1.1
	DHCP	inactive
	Subnet mask	255.255.255.0
	Standard gateway	0.0.0.0

#### 9.1.3 Host name

You can find the necessary data on the name plate. The default host name is made up of the device type and the serial number.



#### Example:

Device type: ibaPADU-S-IT-2x16

Serial number: 000004

➔ Host name: S-IT2x16-000004

### 9.1.4 Reset to default settings

If you have changed the network settings or the passwords, and want to reset them to default values, proceed as follows:

1. Switch off the device.
2. Position the rotary switches S1 to „6“ and S2 to „9“.
3. Push the system function push button S10, hold it (firmly to the stop) and switch on the device again.
4. The system is booting. Wait until the green LED L1 starts flashing rapidly. This can take some time.
5. Release the system function push button S10.
6. After that, the device automatically restarts.
7. Now, position the S1 rotary switch back to its initial state and S2 back to „0“.

After rebooting, all user defined settings are deleted and set back to the default settings.

## 9.2 Network settings

The device is operated via a web interface. The websites are used to define passwords, configure network settings and time behavior and to install updates.

➤ See chapter 9.4 „Make settings on the website“.

This chapter describes how to set up a network connection via the following interfaces:

- ☐ Network interface (X22)
- ☐ FO cable (only with ibanet 32Mbit Flex)
- ☐ Directly on the device

### 9.2.1 Establish communication to the device via the network



#### Tip

We recommend this connection if the device is used in combination with ibaLogic-V5.



#### Note

When DHCP is enabled, please use the host name for accessing the websites. If DHCP is not enabled (default settings), use the fixed IP address for addressing the device.

The network connection is set as default to the IP address 192.168.1.1. Since the default setting probably does not match the existing network, you need to change the IP address or switch the device to DHCP. Ask the network administrator for an IP address.

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

1. Connect the PC and the device with a network cable, either directly or via a switch or hub. PC and device must participate in the same network.



2. Assign the network interface of the computer to the same subnet address as the device and assign a suitable IP address via „Control panel – Network connections“, e.g. 192.168.1.2.

**Note**

The IP address must not be 192.168.1.1, as this is the address of ibaPADU-S-IT-2x16. Use this IP address for accessing the websites.

3. Start a web browser on the PC and insert the IP address of the device in the URL: 192.168.1.1

The device can also be run with a DHCP protocol, i.e. a DHCP server automatically assigns an IP address.

**Important note**

The device can be operated with a DHCP protocol only in networks with a DHCP server. When delivered, DHCP protocol is not enabled.

When DHCP is enabled, proceed as follows:

1. Connect the PC and the device with a network cable to a hub, switch or router. The DHCP server must be in the same network.
2. Switch on the device.  
If the LED L1 flashes regularly, then the device is ready for operation. This can take up to 90 s.
3. The DHCP server automatically assigns an IP address to the device.
4. Start a web browser on the PC and insert the host name of the device into the URL: e.g. S-IT2x16-000004

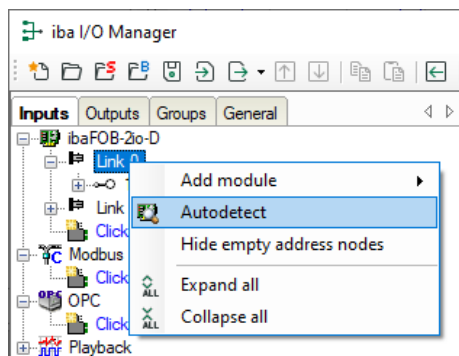
## 9.2.2 Establishing communication to the device via FO cable



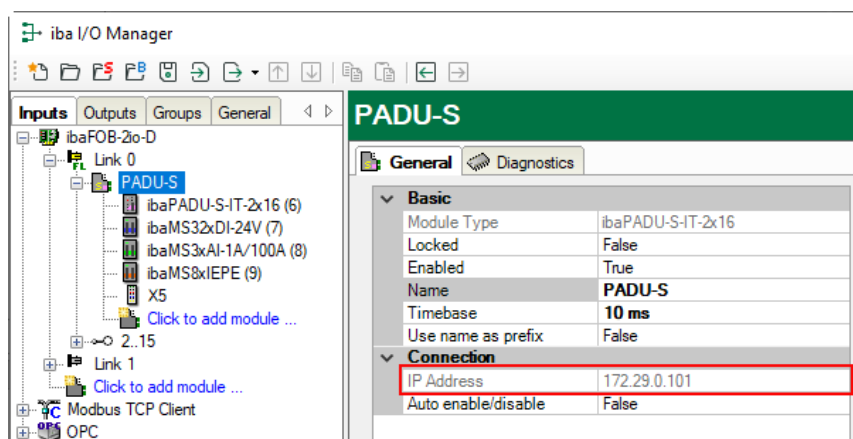
### Tip

We recommend this connection if the device has a 32Mbit Flex FO connection to ibaPDA.

1. Start ibaPDA and open the I/O Manager.
  - ➔ See chapter 11.2.1 “Configuration in the I/O Manager”
2. Start “Autodetect” of the FO link, which the ibaPADU-S system is located on. Click with the right mouse button on the link of the FOB-D card in the tree.



3. Now, the “PADU-S” module opens. The “General” tab displays the IP address with which the device can be reached via FO cable e.g. 172.29.1.101.



4. Start a web browser on the PC and insert the IP address into the URL.

### 9.2.3 Network settings on the web interface



#### Important note

If you do not get access to the website under Windows 7 despite a connection is established, change the security settings.

See note in chapter 9.4.1 "Accessing the website".

1. Start a web browser on the PC and insert the IP address or the host name of the device into the address line (see last chapter).  
The website of the ibaPADU-S system is shown.
  2. Choose the "network" tab.
  3. Change the network settings so that they match the network addresses. Enable DHCP or assign the device an IP address that is unique in the network.
  4. Apply these settings by clicking on <submit>.
- See chapter 9.4.2.5 "'network" tab"

### 9.2.4 Network settings directly on the device

The IP address can be set by means of the S1 and S2 rotary switches and the S10 push button. There are 2 possibilities:

- activate the IP address you have entered last
- set a new fixed IP address

The network address consists of 4 parts, the so called octets, calculated from hex values.

One LED L5 to L8 flashes to indicate which octet you are currently setting.

Address example	192.	168.	1.	1
Octet	1	2	3	4
LED	L5	L6	L7	L8

Procedure for activating the last entered IP address

1. Switch off the device by pressing S11.
2. Switch the rotary switches S1 to „F“ and S2 to „E“.
3. Push the S10 push button and keep it pressed (firmly up to the stop point) and then switch on the device again.
4. Wait until the green LED L1 starts flashing rapidly. This can take some time. Now, the last IP address is active.
5. Release the S10 push button.
6. Switch the device off and on again.

Procedure for setting a new fixed address:


1. Switch off the device by pressing S11.
2. Switch the rotary switches S1 to „F“ and S2 to „E“.
3. Push the S10 push button and keep it pressed (firmly up to the stop point) and then switch on the device again.
4. Wait for the green LED L1 to flash fast. This can take some time. Now, the programming mode is active.
5. Release the S10 push button.
6. The red LED of the octet to be set is flashing.
7. With S1 and S2, you set a value in hex. Please take the values from the table below.
8. Confirm the value by pressing S10.


When the value is applied, the LED of the octet lights up constantly and the next one flashes.


Hex values for setting the network address:


	S2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
S1																	
0		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2		32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3		48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4		64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
5		80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
6		96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
7		112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8		128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9		144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A		160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B		176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C		192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D		208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E		224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F		240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

In the following example, the network address 192.168.1.1 is set for the network interface X22:

- L5 ... L8  


1. L5 flashing  
 Position S1 to „C“ and S2 to „0“ and then press S10.  
 1. Octet number „192“ is set.
- L5 ... L8  


2. L5 lighted, L6 flashing:  
 Position S1 to „A“ and S2 to „8“ and then press S10.  
 2. Octet number „168“ is set.
- L5 ... L8  


3. L6 lighted, L7 flashing:  
 Position S1 to „0“ and S2 to „1“ and then press S10.  
 3. Octet number „1“ is set.
- L5 ... L8  


4. L7 lighted, L8 flashing:  
 Position S1 to „0“ and S2 to „1“ and then press S10.  
 4. Octet „1“ is set.
5. The LEDs L5 to L8 turn off. The address is saved.
6. As soon as LED L5 starts flashing again, the subnet mask can be set in the same way. After that, the same is true for the Gateway.

If you don't want to enter a Gateway, just finish after the subnet mask setting (LED 5 starts flashing again) and wait for approx. 60 seconds.



#### Important note

If you abort the input while entering the IP address or while entering the subnet mask (wait for approx. 60 seconds), then the default IP address will be set (192.168.1.1/255.255.255.0).



#### Important note

Finally, position the S1 rotary switch to the initial position and S2 to „0“.

#### Enabling DHCP protocol

1. Switch off the device with the S11 switch (0 position).
2. Position the S1 rotary switch to „F“ and the S2 rotary switch to „F“.
3. Push the S10 push button and keep it pressed (firmly up to the stop point) and switch the device on again with the S11 switch (position I).
4. Wait until the L1 LED starts flashing rapidly. This can take some time.
5. Release the S10 system function push button.



#### Important note

At last, please position the S1 rotary switch on its initial position and S2 on „0“. The device has to be switched off and on again.

## 9.3 Time settings

The time settings can only be made via the website.



### Important note

ibaPADU-S-IT-2x16 cannot store the time without external buffer voltage, if no supply voltage is connected to X14.

If the time should be buffered, refer to chapter 7.6.2 “Buffer voltage X30”.

The screenshot shows the 'time' configuration page. At the top, there are tabs: info, firmware, passwords, network, time (selected), update, digital inputs, ibaLogic, and notes. Under 'Select timezone:', a dropdown menu is open showing various time zones. The selected time zone is '(GMT+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna'. Below this, it shows 'W. Europe Standard Time' and 'effective time: W. Europe Standard Time'. There is a checkbox for 'Enable automatic DST' and a 'Set Timezone' button. Below this, there are four radio button options for time setting: 'Set local time', 'Set system time (UTC)' (which is selected), 'Obtain Systemtime from NTP-Server', and 'Obtain system time from external signal'. Each option has associated input fields for Date (YYYY-MM-DD) and Time (HH:MM:SS). The 'Obtain system time from external signal' option has additional fields for input channel, clock polarity, clock format, offset from UTC, and additional offset for DST. At the bottom, there is a 'Set Method' button.

Please choose the time zone from a list and apply the choice by clicking on <Set Timezone>.

Then, choose one of the time method, see system time and time synchronization.

In case you want summer and winter time always to be set automatically, please mark the “Enable automatic DST” option. Apply the settings by clicking on <Set Timezone>.

### 9.3.1 System time

You can choose between two system times:

- ☐ “Set local time”  
Manually setting the local time
- ☐ “Set system time (UTC)”  
Set the UTC time (Universal Time Coordinated).

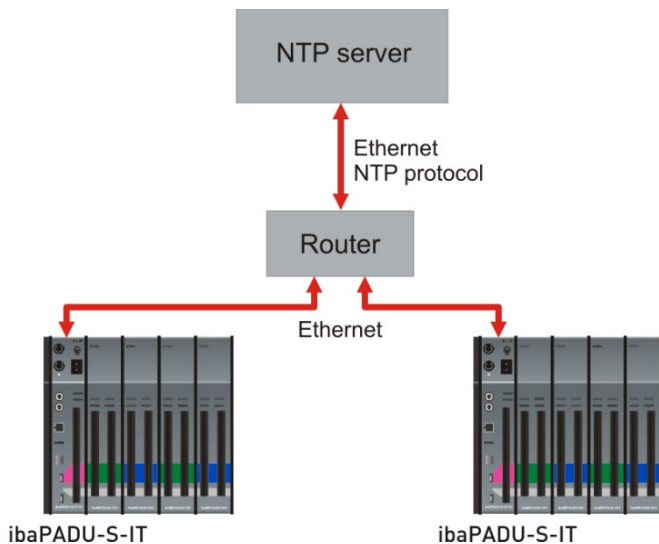
### 9.3.2 Time synchronization of the local ibaPADU-S-IT-2x16 system

ibaPADU-S-IT-2x16 offers two possibilities for synchronizing the local time:

- ☐ NTP protocol
- ☐ DCF77

#### NTP protocol

You can set the ibaPADU-S-IT-2x16 internal system time via the NTP protocol, provided that an Ethernet connection (X22) is established to the Internet or a local NTP server.



1. Access the ibaPADU-S system website via the browser.
2. Choose the "time" tab.
3. Choose "Obtain Systemtime from NTP-Server" and enter the IP address of the NTP server you want to use.

<input checked="" type="radio"/> Obtain Systemtime from NTP-Server	Server:	<input type="text" value="130.149.17.160"/>
--	---------	---

(The IP address for an NTP server shown here is only an example).

If you want to reach an NTP server on the Internet and have configured a static IP address in the "network" tab, you also have to enter a static gateway.

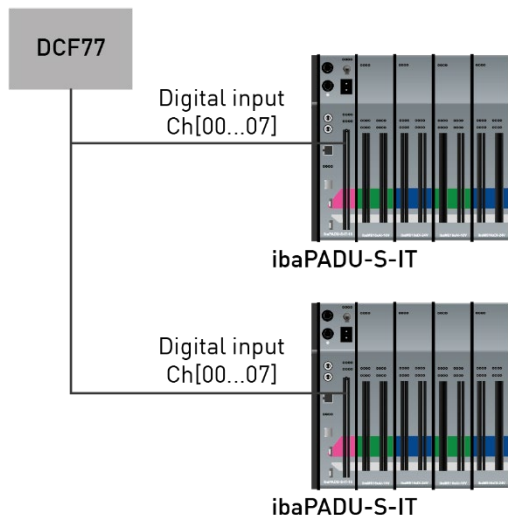
If you have enabled DHCP in the "network" tab, you can also enter the host name of the NTP server in the "Server" field.

4. Apply the settings by clicking on <Set Method>.

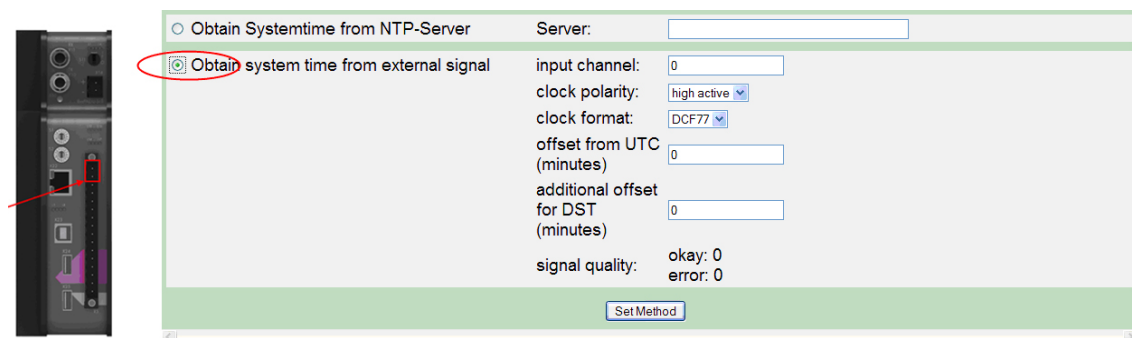
If the NTP server is immediately available, the time is also synchronized immediately. If necessary, the web interface must be reloaded once (F5).

## DCF77

The ibaPADU-S-IT-2x16 internal system time can be synchronized to an external DCF77 clock. The DCF77 signal is fed in via any of the digital input channels.



1. Access the ibaPADU-S-system website via the browser.
2. Choose the “time” tab.
3. Choose “Obtain system time from external signal”.
4. Then, make the following settings:
  - “Input Channel”  
Channel number of the ibaPADU-S-IT-2x16 digital input channel to which the time signal is connected.
  - “clock polarity”  
Choose the value of the digital input signal that corresponds to the active state.
  - “clock format”  
Default „DCF77“
  - “offset from UTC (minutes)”  
Enter the time difference between the DCF clock and the UTC in minutes.
  - “additional offset for DST (minutes)”  
Enter the additional daylight saving time offset of the DCF77 clock in minutes.
5. Apply the settings by clicking on <Set Method>.



Under “signal quality”, you can see if the signal quality is sufficient. Faulty bits and correct bits are counted. You can use this display as help for positioning and installing the DCF77 receiver.





### Important note

This chapter describes how to synchronize the local time of an ibaPADU-S-IT-2x16 system.



### Other documentation

Moreover, an additionally connected ibaPDA measuring system can be synchronized via any digital input (e.g. ibaPADU-S-IT-2x16 or a digital input module), please refer to ibaPDA manual.

## 9.4 Make settings on the website

The website offers functions for diagnostics and settings of the device like passwords, network settings, time settings, firmware update.

### 9.4.1 Accessing the website

1. Start a web browser on the PC.
2. Enter the URL into the address line (depending on the type of physical connection):

When connection established via ...	Then address (URL) ...	See also chapter ...
Ethernet TCP/IP interface (fixed IP address)	e.g. http://192.168.1.1 (factory default)	9.1.2
Ethernet TCP/IP interface (DHCP)	e.g. S-IT2x16-000004	9.1.3
FO cable ibaNet 32Mbit Flex	e.g. http://172.29.1.101	9.2.2, step 3



## Important note

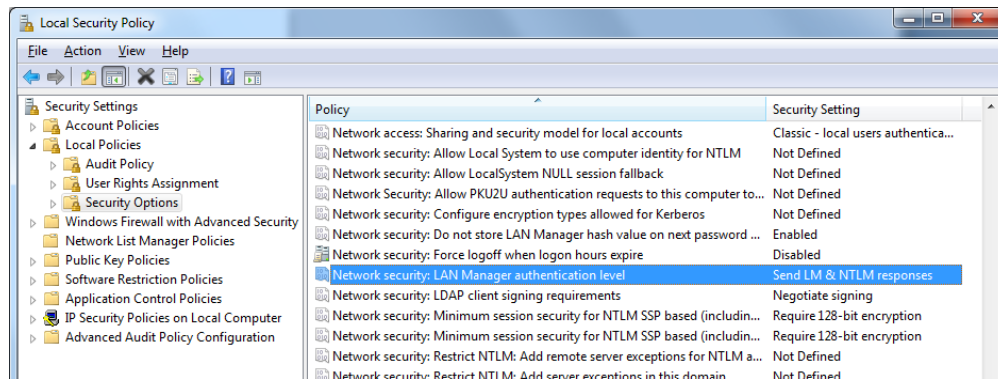
### Access problems with the website

When working with recent Windows versions (beginning with Windows 7) you might not get access to the website although a connection is established. Check/change in the Windows security settings the following parameters:

Path: Control panel – Administrative tools – Local Security Policy – Local Policies – Security options

Parameters: Network security: LAN Manager authentication level

Value: **"Send LM & NTLM responses"**



## Other documentation

There is a module specific website for each I/O module. These are described in the manuals for the single modules.

The start page is displayed. On the start page, you can see the CPU and the plugged modules.



The start page allows you to access interactively the websites of the device and the modules. When clicking on the figure of the device or the modules, the websites are opened.

## 9.4.2 Website structure

The website contains the following tabs:

Tab	Functions	padu	admin
info	Displaying general information about the device	X	X
firmware	Displaying current firmware	X	X
eventlog	Displaying system events	-	X
passwords	Displaying passwords and possibility to change them	-	X
network	Displaying network settings and changing them	Displaying	Changing
time	Displaying system time and changing it	Displaying	Changing
backup	Creating or restoring a backup of the system	-	X
update	Installing updates	-	X
digital inputs	Displaying technical data for digital inputs	X	X
ibaLogic	Displaying the ibaLogic-V5 runtime version and configuring the starting behavior, starting PMAC	-	X
notes	Entering notes	X	X

When clicking on a tab, you are asked to enter a valid user name and a password.

Depending on whether you are logged in as user "admin" or "padu", you have access to different tabs and setting options.

### 9.4.2.1 “Info“ tab

On the “info“ tab, general information about the device or the modules is displayed. The values in the "info" tab cannot be changed, but are for information only.

#### Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs
Serial number: 000061								
Hardware version: A0								
Firmware version: E3								
Processing unit								
Clock rate: 1600 MHz								
Installed Memory: 2048 MB								
Used Memory: 153 MB								
Network connectivity								
Optical: Baudrates available: 32, 3.3 Mbit/s								
Ethernet: 100 Mbit/s								
USB Host: 2.0								

There are three information groups on this page:

- ☐ Product code and serial number identify the device. If you need support, hard- and software versions of the device may be helpful.
- ☐ Under “Processing unit“, you find information about the system cycle and RAM.
- ☐ Under "Network connectivity" you find the current transfer rates of the ibaNet (Optical) and Ethernet interfaces.

### 9.4.2.2 “firmware” tab

On the “firmware” tab, you can find information about the current firmware version.

Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs	ibaLogic	notes
Overall release										
Release version		V02.09.001								
OS kernel										
Build version		D0								
Code name		Lola								
Release date		2014-12-03								
Application System Interface library										
Release date		2014-12-9								
Release time		10:28:51								



#### Note

The “Overall release version” refers to the whole ibaPADU-S system, including the modules. When you get and install a new version, the CPU and all modules are updated.

If you need support, please tell us the “Overall release version”.

### 9.4.2.3 “eventlog” tab

On the “eventlog” tab, all system events like e.g. updates are recorded. With the <clear eventlog> button, you can delete the entries.

Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs	ibaLogic	notes
<pre>[2015-01-22 08:20:21 # Update] Update started [2015-01-22 08:23:08 # Update] Update done ===== (Re)Start Device ===== [2015-01-22 08:25:12 # signal copy machine] New configuration for fiber optic ===== (Re)Start Device ===== [2015-01-23 00:07:01 # signal copy machine] New configuration for fiber optic [2015-01-23 00:39:24 # Update] Update started [2015-01-23 00:41:46 # Update] Update done ===== (Re)Start Device ===== [2015-01-23 00:44:08 # signal copy machine] New configuration for fiber optic ===== (Re)Start Device ===== [2015-01-23 00:51:52 # signal copy machine] New configuration for fiber optic [2015-01-23 00:53:31 # Update] Update started [2015-01-23 00:55:56 # Update] Update done ===== (Re)Start Device ===== [2015-01-23 00:58:13 # signal copy machine] New configuration for fiber optic ===== (Re)Start Device ===== [2015-01-23 00:59:40 # signal copy machine] New configuration for fiber optic nly for resource</pre>										
										clear eventlog

### 9.4.2.4 “passwords” tab

On the “passwords” tab, you can change passwords as “admin”.

The default settings for user and passwords are as follows:

User	Password
padu	1234
admin	1234

Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs	ibaLogic	notes
------	----------	----------	-----------	---------	------	--------	--------	----------------	----------	-------

Set Passwords:

Username	old password	new password	retype new password	
padu	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="change"/>
admin	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="change"/>

1. If you want to change a password, please enter it into the fields. For safety purposes, please enter the old password once and the new password twice.
2. Finally, click on <change>  
The changes are applied now.

#### 9.4.2.5 „network“ tab

On this tab, you can make as administrator changes in the network settings.

Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs
------	----------	----------	-----------	---------	------	--------	--------	----------------

Configuration of Network Interfaces:  Device to activate settings

WINS Devicename:

X22: RJ45	Enable DHCP	<input type="checkbox"/>	
	Static IP Address	<input type="text" value="10.1.41.125"/>	
	Static Subnet Mask	<input type="text" value="255.255.255.0"/>	
	Static Default Gateway	<input type="text" value="0.0.0.0"/>	
	Static WINS Server	<input type="text" value="0.0.0.0"/>	
	MAC address	<input type="text" value="00:30:64:28:3D:68"/>	
		<input type="button" value="submit"/> <input type="button" value="reset entries"/>	
Fiberoptic	Static IP Address	<input type="text" value="172.xx.0.101"/>	(xx will be set according to PC/PDA address translation settings)
	Static Subnet Mask	<input type="text" value="255.255.255.0"/>	
Server settings	FTP enable	<input checked="" type="checkbox"/>	<input type="button" value="set"/>
	Telnet enable	<input checked="" type="checkbox"/>	

You can adapt all network settings.

##### ☐ WINS Devicename

Here, you find the default host name. With this host name, you can access the device in the web browser. You can also give meaningful names from a technological point of view that have some relation to the installation or the process. Click the <change name> button to apply the entered name.

##### ☐ Enable DHCP

When there is a DHCP server in the network, you can enable DHCP by ticking the box. When the device registers in the network, it gets automatically an IP address.

##### ☐ IP Address, Subnet Mask, Default Gateway, WINS Server, MAC address

If you want to assign a fixed network address to the device, please ask the network administrator for these parameters and enter them here. To apply the changed network settings, click the <submit> button and then restart the device with the <Restart> button.

With the <reset entries> button you can reset the settings to the last valid settings.

If a static WINS server address is entered for name resolution, this is only used for name resolution in the local network, in contrast to the address transmitted by the DHCP/DNS server.

The MAC address of the device cannot be changed.

#### ☐ Fiberoptic

The fixed IP address is displayed here that is used to address the device via fiber optics. It can not be changed.

#### ☐ Server settings

Here, it is possible to enable or disable the access to the device via FTP or Telnet by ticking the box. In the default setting, the access via FTP and/or Telnet is enabled. If you change the setting, the new setting is only applied by a click on the <set> button.

### 9.4.2.6 “time” tab

On the “time” tab, you can change the time settings as “admin”.

➤ Description, see chapter 9.3 "Time settings"

### 9.4.2.7 „backup“ tab

On the „backup“ tab, you can create or restore a backup of the system.

#### Module 0 : ibaPADU-S-IT-2x16

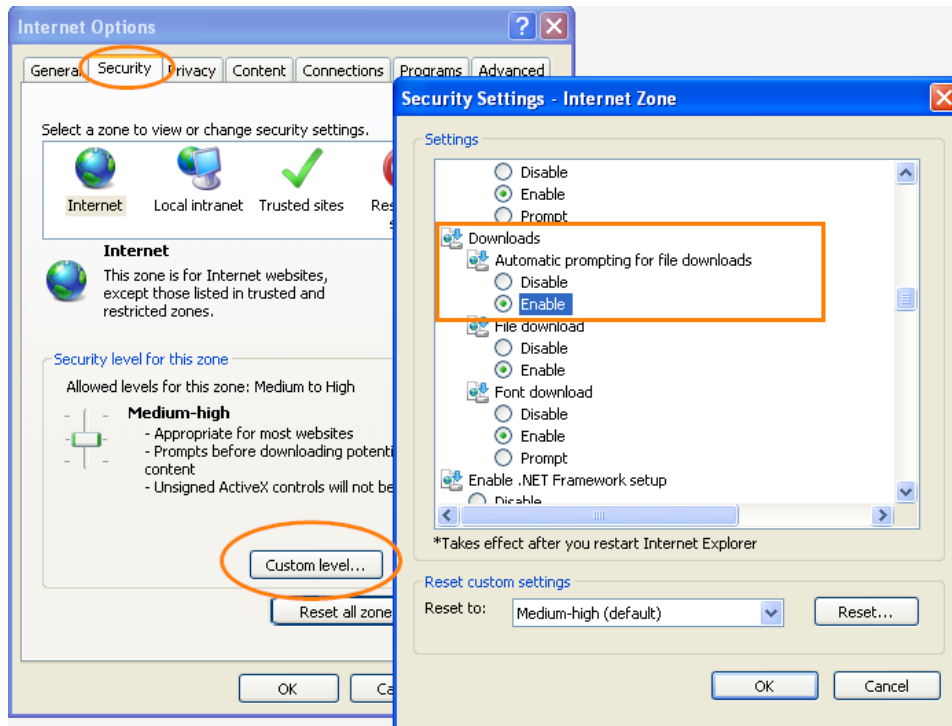
- ☐ Backup: With <Start Backup> button, you may start a backup of the system. Select your desired file location and assign an arbitrary name, the file extension is always “\*.iba”.
- ☐ Restore Backup: A click on the <Browse> button opens the file browser. Select the backup file you want to restore and click on <Start Restore>.
- ☐ Restart device: A click on the <Restart> button reboots the device.

**Note**

After having restored a backup, a restart of the device is required. The device can be restarted by clicking the <Reset> button or by switching the device off and on.

When using Internet Explorer 7 or earlier, the following security settings in IE are necessary, so that the backup function can be used.

Select under *Extras – Internet Options – Security* and click on <Custom level>. The “Security Settings” window will open. Select the radio button “Enable” under *User authentication – Downloads – Automatic prompting for file downloads*.



#### 9.4.2.8 “update“ tab

In the "update" tab, you can only transfer and execute updates of the device software (firmware) to the device as the "admin" user.

➔ For a detailed description, see chapter 10.1 "Update via web interface".

### 9.4.2.9 “digital inputs“ tab

On the “digital inputs“ tab, you get information about the digital inputs integrated in the device. You cannot make any settings on this tab.

Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs
Process-IO								
digital input channels	8							
design	isolated channels							
nominal input voltage	+/- 24			V DC				
maximum input voltage	+/- 60			V DC				
logical 0 threshold	> -6 ... < +6			V DC				
logical 1 threshold	< -10 ... > +10			V DC				
input current	1			mA				
sampling rate	max. 40			kHz				
frequency range	0 ... 20			kHz				

### 9.4.2.10 “ibaLogic“ tab

On the “ibaLogic“ tab, you can only do the following as “admin“:

- ☐ Check, which version of the ibaLogic-V5 runtime (PMAC) runs on the device
- ☐ Start/stop PMAC manually
- ☐ Configure the automatic starting behavior of the ibaLogic-V5 program

Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs	ibaLogic
Installed version:	5.5.2.0			-					
Running:	no			<div>start</div>					
Autostart:	disabled			<div>enable</div>					
Autostart image:	disabled			<div>enable</div>					

- ☐ Installed version  
Currently installed version of the ibaLogic-V5 runtime system (PMAC)
- ☐ Running  
Status of the ibaLogic-V5 runtime system (PMAC)  
 <start>:           starting PMAC  
 <stop>:           stopping PMAC
- ☐ Autostart  
Displaying if the PMAC is started automatically after having switched on the device.  
 <enable>:       activating autostart  
 <disable>:      deactivating autostart
- ☐ Autostart image  
Displaying if an ibaLogic-V5 program is stored on ibaPADU-S-IT-2x16, which can be started automatically triggered by autostart of the PMAC.

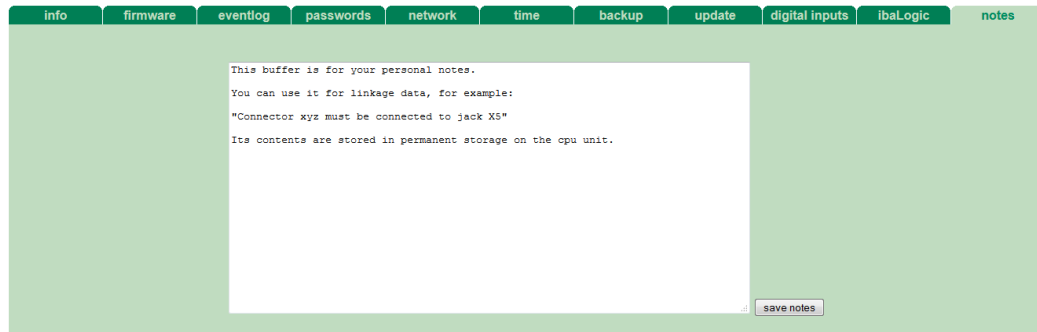


### 9.4.2.11 “notes” tab

On the “notes” tab, you can enter notes, e.g. for notes on wiring or on recording of changes.

By clicking on <save notes>, the notes are permanently stored in the device.

Module 0 : ibaPADU-S-IT-2x16



## 10 Updates

An update can be installed in two different ways:

- ☐ Web interface
- ☐ ibaPDA

No matter which of the both ways you choose to install an update,

- ☐ LED L1 starts flashing fast and
- ☐ the progress of the update is shown by the LEDs L5 ... L8.

Starting with L5, the LEDs flash orange one after the other and then all 4 LEDs flash green slowly in the same cycle. Now the update is completed and the device is restarted automatically.

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

However, if all four LEDs flash red, an error occurred during the update process. Should the system behave abnormally after a reboot, please contact the iba support team.

### CAUTION

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



### Important note

When updating the ibaPADU-S system, a possible autostart of the ibaLogic-V5 PMAC is deactivated and the existing ibaLogic-V5 application deleted. Furthermore, an update of the ibaLogic-V5 software (ibaLogic Clients) might be necessary.

### 10.1 Update via web interface

- ☐ Start the ibaPADU-S-IT-2x16 website in your browser.
- ☐ On the “update” tab, click on the <Browse...> button and choose the <padusit2x16\_v[xx.yy.zzz].iba> update file.
- ☐ By clicking on <Start Update>, you start the update.

#### Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update
<p><b>Note:</b> any ibaLogic application will be aborted on updating firmware.  ibaLogic might not be compatible to the new firmware release after update  and therefore might not run properly.  An update of ibaLogic might be required.</p>							
Install firmware:		Durchsuchen...		Start Update			
Restart device:		Restart					

- ☐ After the update, ibaPADU-S-IT-2x16 reboots automatically.
- ☐ The update is completed, when the LED L1 is flashing slowly and regularly.

## 10.2 Update via ibaPDA

- ❑ Open the ibaPDA I/O Manager and choose the PADU-S module in the module tree.
- ❑ Click the <Write firmware> button on the "Diagnostics" tab and select the "padu-sit2x16\_v[xx.yy.zzz].iba" update file.
- ❑ Click <OK> to start the update.

Slot	Type	Hardware version	Firmware version	FPGA version	Serial number
X1	ibaPADU-S-IT-2x16	A0	E2	v00.38.9523	29
X2	ibaMS16xAI-10V	B0	E0	v02.05.0039	999010
X3	ibaMS8xICP	A5	E0	v01.05.0009	60
X4	ibaMS4xUCO	A0	E0	v01.02.0025	5
X5	ibaMS3xAI-1A/100A	B0	E0	v02.04.0015	1000

Buttons: Write firmware, Reset to factory defaults

- ❑ After the update, ibaPADU-S-IT-2x16 reboots automatically.
- ❑ The update is completed, when the LED L1 is flashing slowly and regularly.

## 10.3 Auto-update of the modules

After having mounted the modules and switched on the voltage of the central unit, ibaPADU-S-IT-2x16 detects the modules and checks the firmware version.

ibaPADU-S-IT-2x16 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. You can find the "overall release version" on the ibaPADU-S-IT-2x16 website and in ibaPDA:

- ❑ Website, „firmware“ tab, see chapter 9.4.2.2, "firmware" tab.

### Module 0 : ibaPADU-S-IT-2x16

Overall release

Release version: V02.10.001

OS kernel

Build version: D0

- ❑ ibaPDA, "Diagnostics" tab (here, referred to as Firmware version)

S-IT2x16-000029

Version information

Hardware version: A0

Firmware version: v02.10.001

When the firmware version of a module does not match the "overall release version" of the central unit, ibaPADU-S-IT-2x16 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 green LED L1 is flashing regularly and none of the LEDs L5 ... L8 is on, the device can be used again.

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

---



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**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 outlined in red on the web interface.

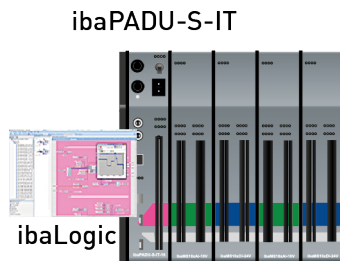
In this case, a new update file has to be installed for the "overall release version". If you want to get the current update file, please contact the iba support.

---

## 11 iba applications

### 11.1 ibaLogic-V5

You can use ibaPADU-S-IT-2x16 – in cooperation with ibaLogic-V5 – for the following applications: individual signal processing, control applications or stand-alone applications. ibaLogic-V5 programs can be loaded in the device as runtime versions and run there autonomously.



#### General procedure:

- ☐ Configure ibaPADU-S-IT-2x16 as platform
- ☐ Configure signals as inputs and outputs
- ☐ Configure the evaluations in the program designer
- ☐ Save the project on ibaPADU-S-IT-2x16. There, it can run autonomously without server/client.



#### Note

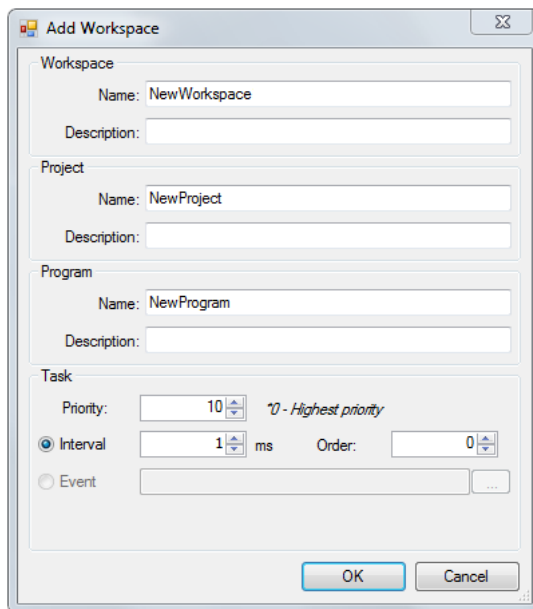
Saving the project on the platform ensures, that the autostart function of the loaded ibaLogic-V5 is activated on ibaPADU-S-IT-2x16.

#### 11.1.1 Configuring ibaPADU-S-IT-2x16 as platform

Switch on the ibaLogic PC and start the ibaLogic-V5-Server and the ibaLogic-V5-Client.

Establish a connection between ibaPADU-S-IT-2x16 and the ibaLogic PC via Ethernet TCP/IP (network interface X22) and switch on the device.

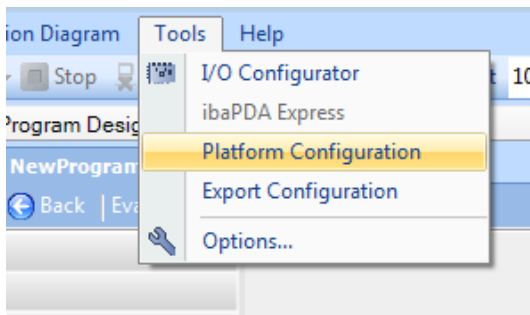
Create a new workspace or a new project in the ibaLogic-V5 Client in the *File – New* menu.



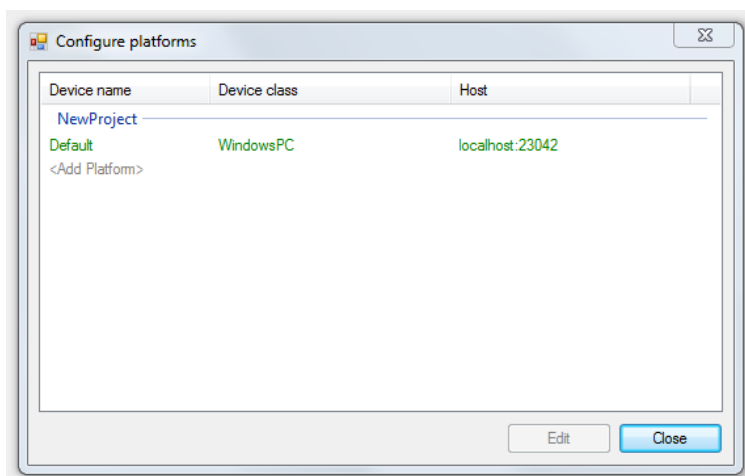
Assign names and descriptions of workspace, project and program and specify the priority, an interval as well as the order for the task.

If there are other projects in this workspace, you need to “activate” the new project.

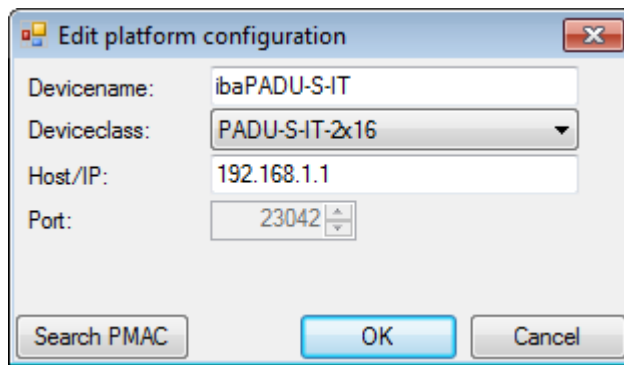
Configure ibaPADU-S-IT-2x16 as platform via the *Tools – Platform Configuration* menu.



For creating or configuring a platform, please click in the dialog under the project name on <New item> or on the platform.



Please, click on the <Edit> button. The “Edit platform configuration” dialog is shown.



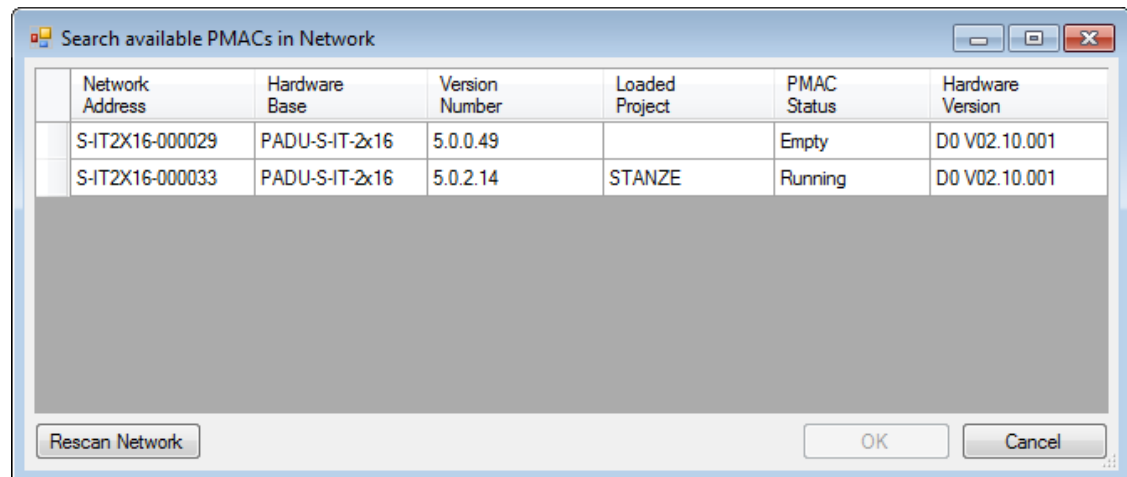
Choose the PADU-S-IT-2x16 device class and enter the device name or the IP address of the ibaPADU-S-IT-2x16 device, the ibaLogic-V5 program is to run on.

Apply the name or the IP address by clicking on <OK>.

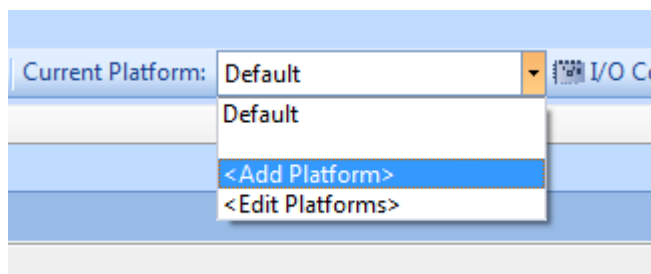


### Tip

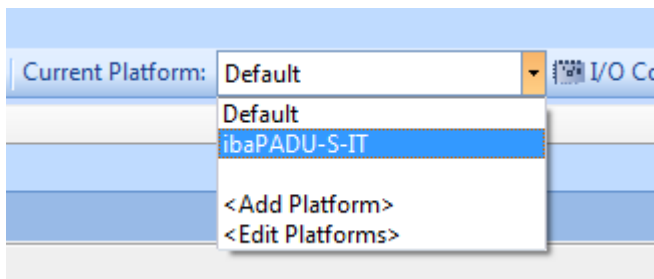
With a click on <Search PMAC> the ibaPADU-S-IT-2x16 devices available in the network are displayed.



An alternative way for creating a platform is to open the *Current Platform* dropdown menu and select "Add platform".

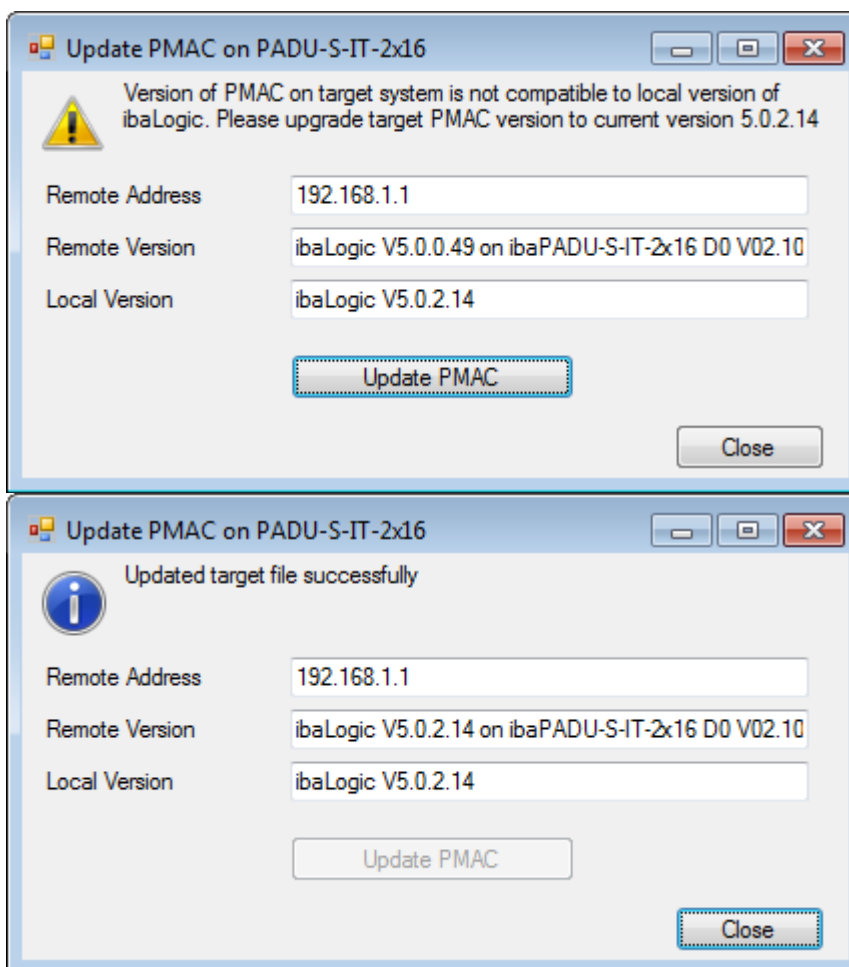


If ibaPADU-S-IT-2x16 is configured as platform, yet, you can choose the platform via the dropdown box in the menu line.



### 11.1.2 Automatic update of the ibaLogic-V5 version

The application verifies when configuring an ibaPADU-S-IT-2x16 platform or starting an ibaLogic-V5 program, whether the ibaLogic-V5 runtime version of ibaPADU-S-IT-2x16 is compatible to the local ibaLogic-V5 version. If not, an automatic update of ibaPADU-S-IT-2x16 is offered.

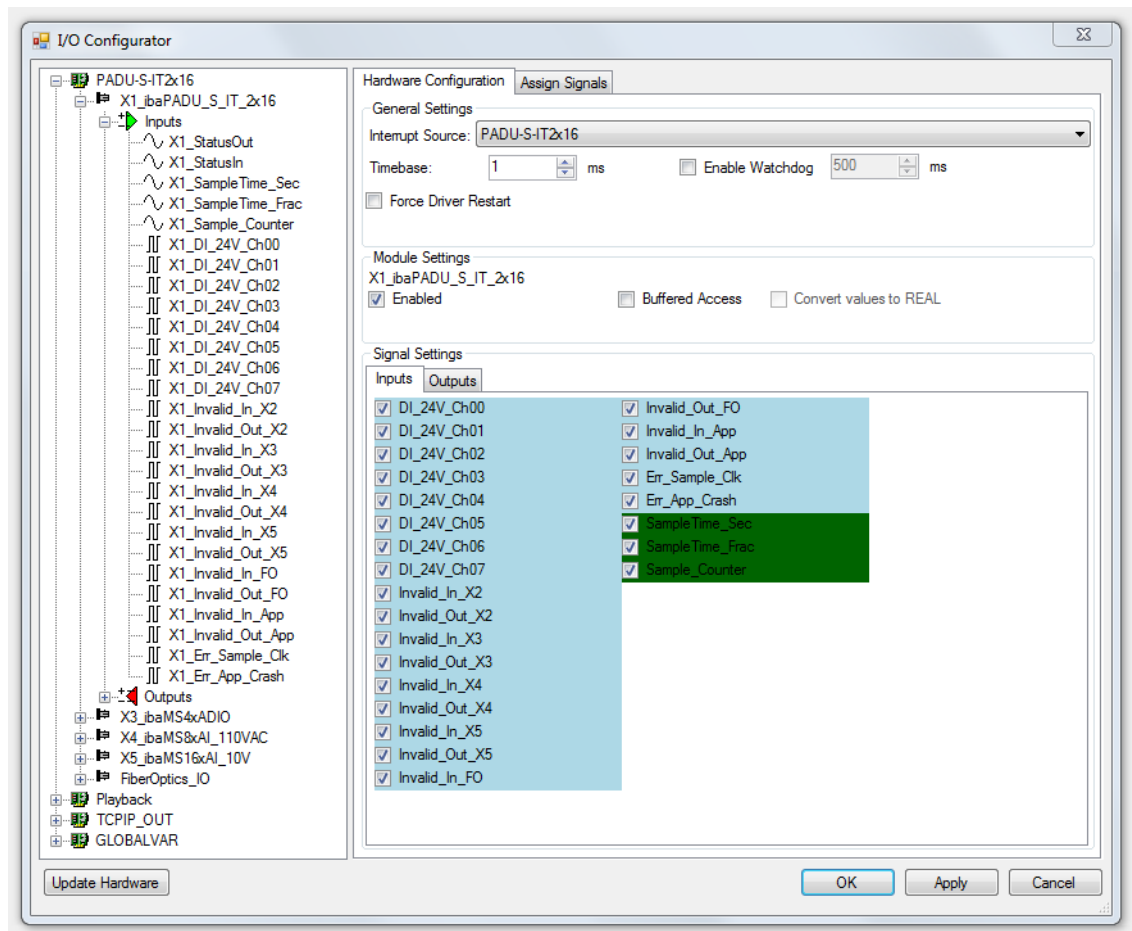




### 11.1.3 Configuring signals

Open the I/O Configurator in the *Tools – I/O Configurator* menu. Here, you can make all configuration settings for the IO signals.

First, click on the <Update Hardware> button. ibaLogic-V5 then detects all available modules.



If you mark a module in the tree structure on the left, you can configure the hardware and assign the signals.

On the “Hardware Configuration” tab, you can make the settings for ibaLogic-V5 and all available resources.

If ibaPADU-S-IT-2x16 is configured as platform, only ibaPADU-S-IT-2x16 is offered as interrupt source.

Under “timebase“, you set the smallest possible cycle time. The “Enable Watchdog“ function is not released for ibaPADU-S-IT-2x16, yet.

The “Force Driver Restart” function is not needed for jbaPADU-S-IT-2x16.



## Other documentation

For a detailed description of the settings, please see ibaLogic-V5 manual.

Under “Module Settings“, ibaPADU-S-IT-2x16 is always activated.

If “Buffered Access” is enabled, the imported values are buffered and supplied to the program as arrays. The smallest possible interval of ibaLogic-V5 is 1 ms. If you want to

measure signal values with sampling rates smaller than 1 ms, you need to record the signal values “buffered”.



### Note

You need to apply the “Buffered Access” by clicking on the <Apply> button. Only then, you will see additional signals in the signal tree that can be configured as output or input resources.

In the “Signal Settings” field, you can choose the input signals for the chosen module on the “Input” tab and the output signals on the “Output” tab by ticking the boxes.

The chosen signals have to be applied by clicking on the <Apply> button. The signals then appear in the signal tree on the left and can be assigned. Additionally, you can access further signals in the signal tree, e.g. SampleTime.



### Note

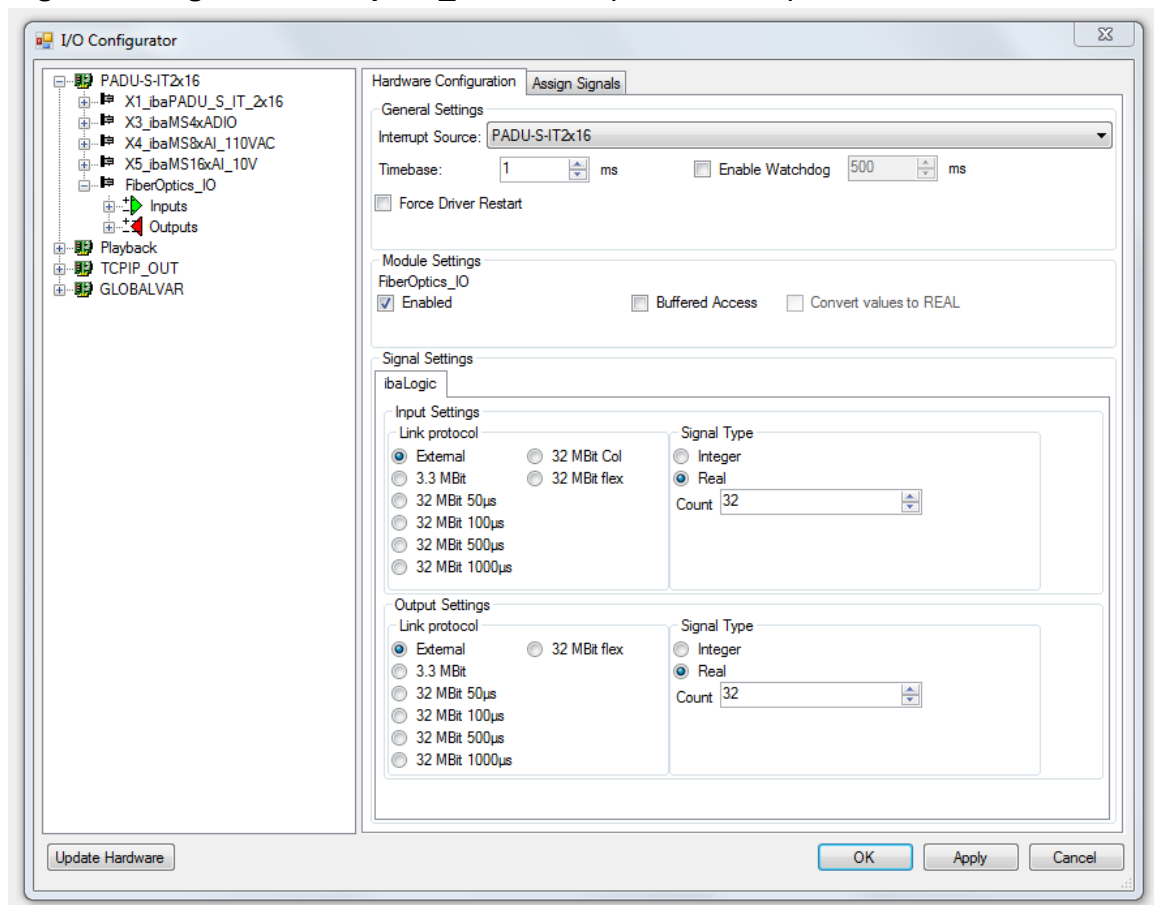
ibaLogic changes the configuration of the ibaPADU-S system during signal configuration when clicking the <Apply> button. Hence, an ibaPDA system which is connected in parallel may be affected.

The meaning of the signals:

Signal	Meaning
<b>Inputs</b>	
DI_24V_Ch[00...07]	Digital input signals of ibaPADU-S-IT-2x16
StatusIn	Status information about the plugged input module (for output module without function): 0 = Module not initialized 1 = Module running >1 = Mistake (e.g. module cannot be initialized)
StatusOut	Status information about the plugged module (for input module without function): 0 = Module not initialized 1 = Module running >1 = Mistake (e.g. module cannot be initialized)
SampleTime_Sec	Time period since system start in seconds
SampleTime_Frac	Fractions of this second (1 s = 4,294,967,295 fractions)
Sample_Counter	Sample counter
Invalid_In_X[2..5] Invalid_Out_X[2..5] Invalid_In_FO Invalid_Out_FO Invalid_In_App Invalid_Out_App Err_Sample_Clk Err_App_Crash	Status signals for service purposes

Signal	Meaning
<b>Outputs</b>	
DebType_Ch[00...07]	Debounce filter for the single digital signal
DebTime_Ch[00...07]	Debounce time for the single digital signal
SampleTime	Sample time, especially for buffered access and 32Mbit link protocol
<b>Additional input signals for buffered access</b>	
BufferFillCount	Counter, when buffer is filled
BufferOverrun	Counter for buffer overrun
DI_24V_Ch[00...07]_buf	Input buffer of digital input signals
Invalid_In_X[2..5]_buf Invalid_Out_X[2..5]_buf Invalid_In_FO_buf Invalid_Out_FO_buf Invalid_In_App_buf Invalid_Out_App_buf Err_Sample_Clk_buf Err_App_Crash_buf	Input buffer for the corresponding status signals
<b>Additional output signals for buffered access</b>	
BufferSize	Buffersize
SubSampling	Subsampling of the signals

### Signal Settings for FiberOptics\_IO module (FO interface)



In the FiberOptics\_IO module, you can define which FO transfer protocol ibaPADU-S-IT-2x16 uses for receiving and sending data. It depends on the FO protocol of the modules, which link protocol is needed. If combined with ibaPDA, “External” must be chosen. In this case, the FiberOptics\_IO module of ibaPADU-S-IT-2x16 is displayed as virtual ibaPADU-S module in ibaPDA. This is also the default setting. If “External” is chosen as setting for the input, “External” is also the only option that can be chosen as setting for the output. This is the only possible combination.

Without ibaPDA, the 3.3Mbit and 32Mbit protocols can be combined in any way for input and output.

The “32Mbit Col” protocol is only required when an ibaBM-COL-8i-o device is used at the FO input.

The 32Mbit Flex setting does not have a function, yet, and cannot be chosen.

In the Signal Type field, you can define the signal type and the number of signals. When this setting has been applied, (with <Apply>), you see the signals in the signal tree on the left under FiberOptics\_IO as inputs or outputs. Depending on the FO protocol, there is a maximum number of signals:

Link protocol	Max. number of signals	Rotary switch S1
External	1024 Integer or 512 Real	1 - F
3.3Mbit	64 Integer + 64 Digital	0
32Mbit 50µs	64 Integer + 64 Digital	0
32Mbit 100µs	128 Integer + 128 Digital or 64 Real + 64 Digital	0
32Mbit 500µs	512 Integer + 512 Digital or 256 Real + 256 Digital	0
32Mbit 1000µs	1024 Integer + 1024 Digital or 512 Real + 512 Digital	0
32Mbit Col	8x 3.3Mbit – input links (see above) Any combination of Real and Integer links	0



#### Important note

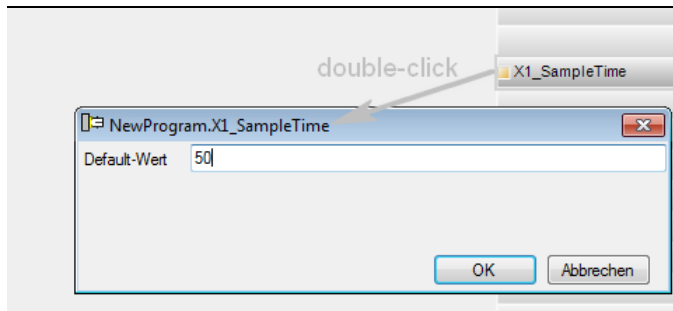
For the “External” Link protocol, the S1 switch needs to be positioned at 1-F. For all other settings S1 = 0.



#### Important note

When using the 32Mbit link protocol, iba recommends to configure the selected 32Mbit timebase additionally with the SampleTime output to ensure a cycle-synchronous transmission via FO.

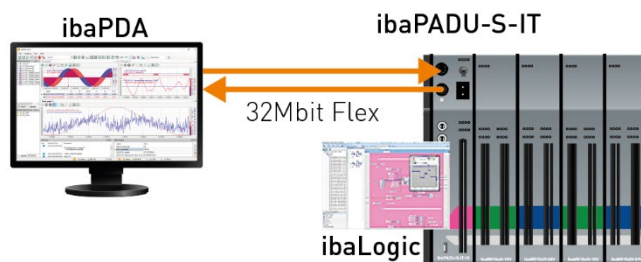
Example 32Mbit 50µs:



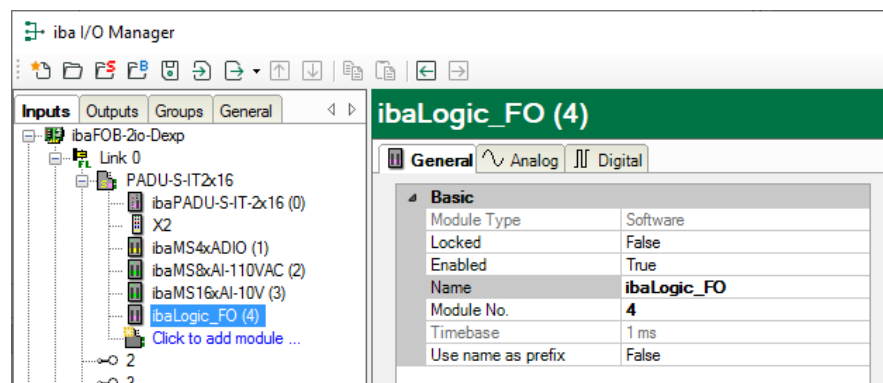
If faster sampling is required in comparison to fiber optic transmission, e. g. for a buffered acquisition of the IO signals, the difference between the two cycle times must not become too large.

For example, with a link protocol set to "32Mbit 1000µs" and a "X1\_SampleTime" of 50 µs, there are system-related delays in fiber optic transmission.

### Use with ibaPDA:

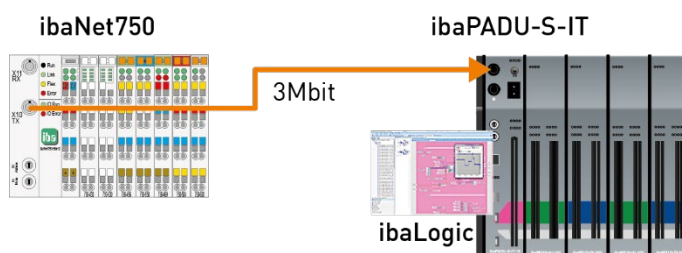


In the example above, "External" has to be chosen as FO protocol for input and output. The communication between ibaPADU-S-IT-2x16 and ibaPDA is done in the 32Mbit Flex mode.

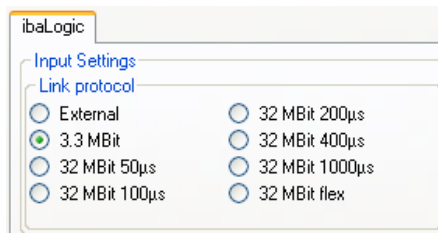


ibaLogic-V5 as module in ibaPDA

### Use with ibaNet750:



In the second example, the ibaNet750 I/O system is coupled to the ibaPADU-S system via 3Mbit. On the input side, you need to choose 3.3 Mbit as FO protocol. For this example, we did not configure an output. S1 needs to be positioned at 0.



## Stand-alone system with ibaLogic-V5:

ibaPADU-S-IT



When ibaPADU-S-IT-2x16 is used as stand-alone system with ibaLogic-V5 runtime, the measured values may be saved in iba measuring files by means of a DAT\_FILE\_WRITE (DFW) function block, see chapter 11.1.4 “DAT\_FILE\_WRITE function block”.

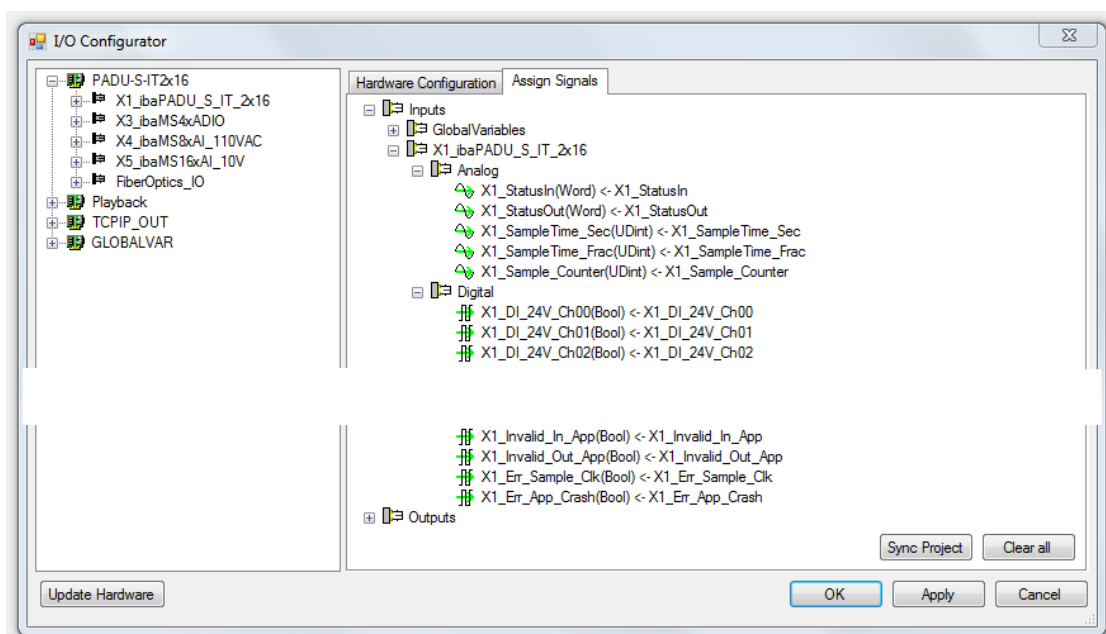


### Note

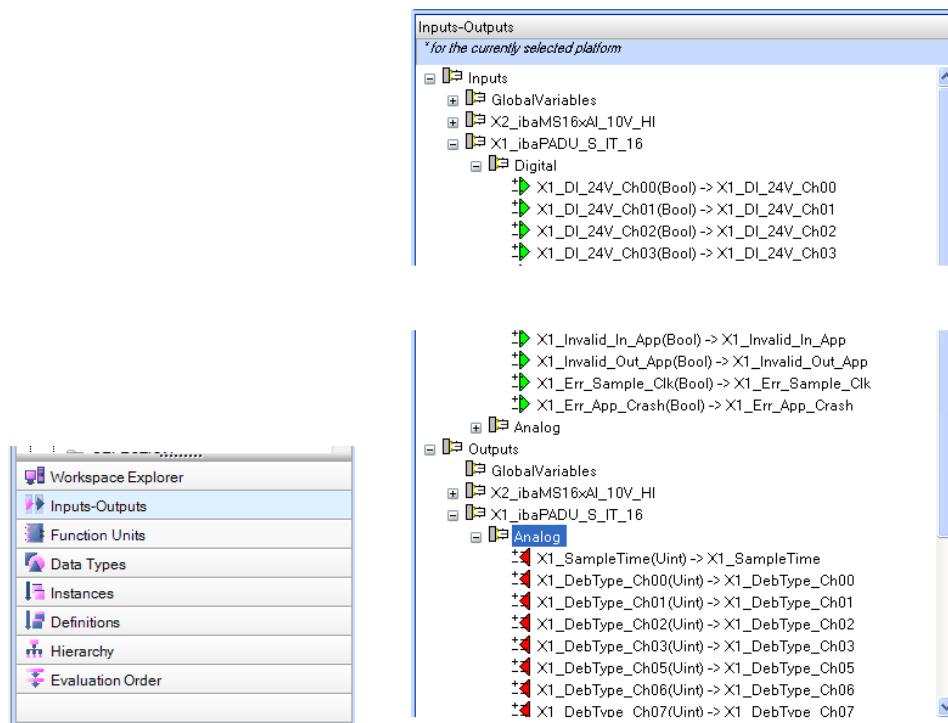
After having done all signal settings, and before doing the “Assign signal” option, you always need to apply the signal settings by clicking on the “Apply” button.

## Assigning signals

After having defined the signals, the physical inputs and outputs have to be assigned to the virtual signals in ibaLogic-V5. Please, mark the modules in the signal tree and drag them to the “Assign signal” tab while keeping the mouse button pressed.



By clicking on the <Apply> button, you get access to the signals in the “Inputs - Outputs” area for further configuration.



In the program designer, you can define the evaluations or pre-processings and load the project into the “Programmable Measurement and Automation Controller” (PMAC) on the ibaPADU-S-IT-2x16 CPU.



### Other documentation

For a detailed description of the program designer and further information on processing, please refer to the ibaLogic-V5 manual.

## 11.1.4 DAT\_FILE\_WRITE function block

Using a DAT\_FILE\_WRITE (DFW) function block data can be stored in the RAM or Flash memory of ibaPADU-S-IT-2x16. For this purpose the DFW function block has to be configured accordingly.



### Other documentation

For a detailed description of the DFW function block and the usage please refer to the ibaLogic-V5 manual.

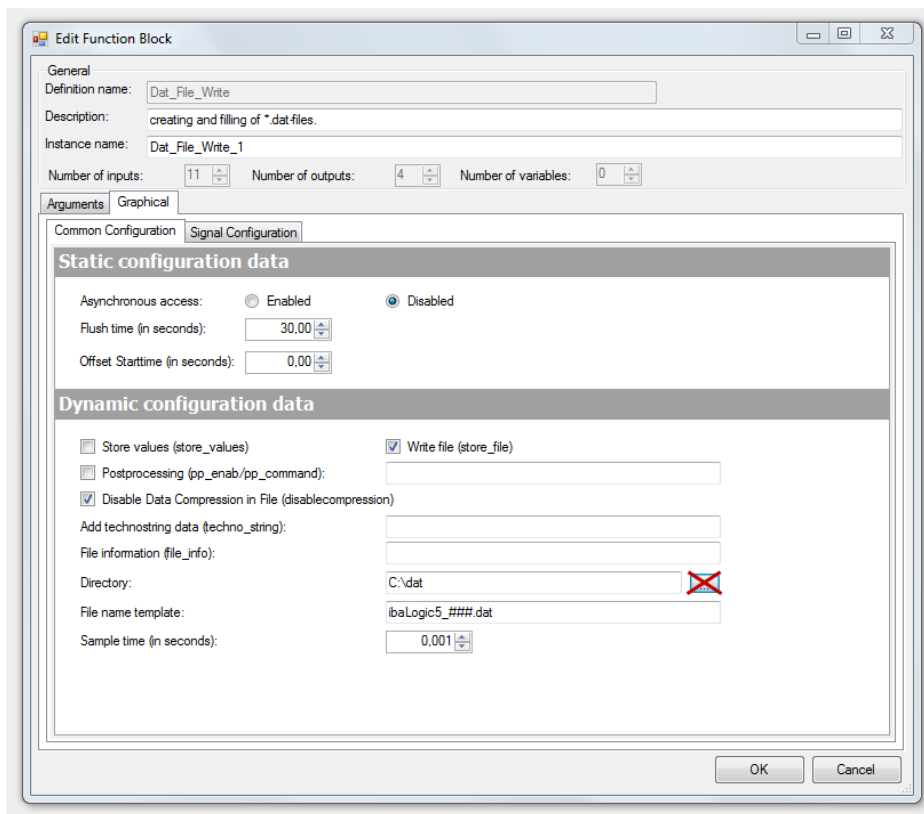


### Important note

It is required to specify a file path in the function block.

The default setting in the directory field is “C:\dat” (RAM drive). Further subdirectories can freely be configured.

The Windows file browser button (right to the „Directory“ field) must not be used.



The measuring files can be stored either on the RAM (Random Access Memory, RAM drive) or the flash memory (solid state drive) of the device. Both memory devices differ in size, access and how they are addressed.

The access to both memory devices is solely possible via the Ethernet TCP/IP interface X22.

#### RAM:

Path in the „Directory“ field: **C:\dat** (default setting)

The RAM is preferably intended for the acquisition of time sensitive and fast signals, usually for triggered recordings.

The memory size of the RAM is limited to 128 MB. Therefore it is recommended downloading promptly the measuring files using ibaDatCoordinator (“Move” job).

Access to the RAM (e. g. with ibaDatCoordinator):

\\<IP address or hostname of ibaPADU-S-IT>\RamDisk\dat

User: padu

Password: 1234 (default)



#### Important note

When the device is switched off, all measuring files are deleted in the RAM.

#### Flash memory:

Path in the „Directory“ field: **D:\**

The flash memory is preferably intended for the acquisition of not time sensitive and slow signals, usually for continuous recordings.



The flash memory provides with 110 GB sufficient memory size.

Access to the flash memory:

\\<IP address or hostname of ibaPADU-S-IT>\FlashDisk\

User: padu

Password: 1234 (default)



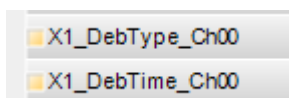
### Important note

If time sensitive and fast signals are stored on the flash memory (solid state drive), it may occur that very low data of the signal trends is sporadically lost, caused by the operating system.

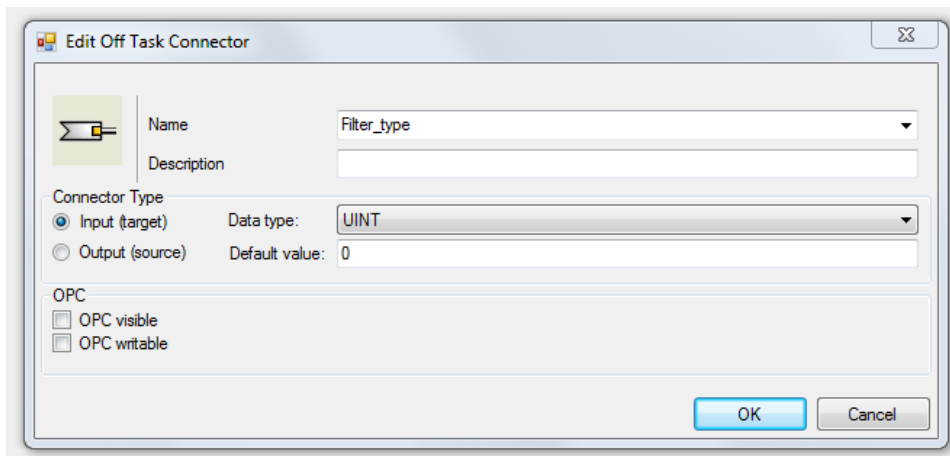
## 11.1.5 Configuring the debounce filter

If you want to use debounce filters, these are made as configuration output and configured as Off-task connector (OTC) or function block.

First, drag the output signals defined in the I/O configurator to the margin of the programming surface, in this example “X1\_DebType\_Ch00” und “X1\_DebTime\_Ch00” for the digital input 0.



Create a new Off-task connector in the programming window, assign a meaningful name to the connector, e.g. “Filter type” and choose “Input” and Data type “UINT” under the Connector type option.



Meaning of the default values for the debounce filter:

- 0 Debounce filter switched off
- 1 Stretch rising edge
- 2 Stretch falling edge
- 3 Stretch both edges
- 4 Delay both edges

➤ You find the explanations of the settings in chapter 7.5.2 “Debounce filter”.

Now, connect the OTC and the signal on the margin of the programming surface.

Create a new OTC, assign a meaningful name, e.g. debounce time and choose “Input” as type. Enter the debounce time in  $\mu\text{s}$  in the “Default value” field. The value can be 65535 at max.

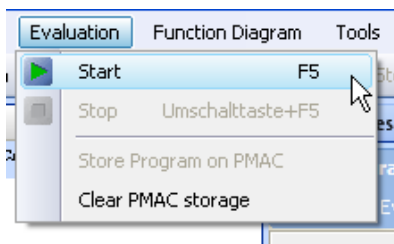
Now, connect the OTC and the signal on the margin of the programming surface.



### 11.1.6 Saving the ibaLogic-V5 program on runtime

In contrast to common automation systems, ibaLogic-V5 runs „Compiling“ and „Loading“ in the background.

Choose „Evaluation - Start“

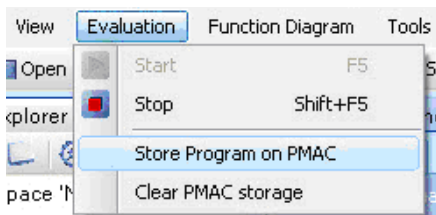


The following operations are completed:

- ☐ The project is compiled.
- ☐ The program is started.
- ☐ The background color of the programming field in the client changes to pink.
- ☐ In the toolbar of the programming window, the evaluation time is shown.
- ☐ All value pads in the visible area are shown and supplied with current values.
- ☐ Now, the program is in the online mode.

Mistakes that are made during compiling, loading etc. are shown in the event window. You can find the event window below the programming field. You can hide this window or position it anywhere on the screen.

Now, choose „Evaluation – Store program on PMAC “.



You can shut down the ibaLogic PC and even remove it while PMAC is still running. After rebooting and starting server and client, the client automatically connects to the running PMAC in online mode.

If Autostart is enabled on the „ibaLogic“ tab of the ibaPADU-S-IT-2x16 website, the ibaLogic-V5 program is started automatically after you have switched on the device.

## Module 0 : ibaPADU-S-IT-2x16

info	firmware	eventlog	passwords	network	time	backup	update	digital inputs	ibaLogic
Installed version:	5.5.2.0			-					
Running:	no			start					
Autostart:	enabled			disable					
Autostart image:	enabled			disable					

### 11.1.7 Deleting an ibaLogic-V5 program in ibaPADU-S-IT-2x16

If you want to delete an ibaLogic-V5 program from the device, please proceed as follows:

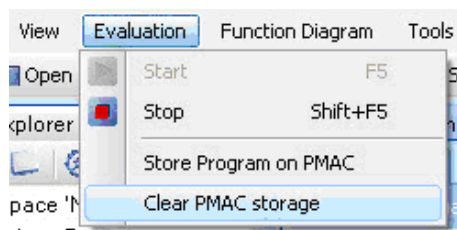
1. Switch off the device
2. Position the S1 rotary switch to „F“ and the S2 rotary switch to „C“.
3. Press the system function push button S10 and keep it pressed (firmly up to the stop point) and switch on the device again.
4. Wait for the green LED L1 to flash rapidly. This can take some time. The ibaLogic-V5 program is deleted.
5. Release the S10 system function push button.



#### Important note

Finally, position the S1 rotary switch on its initial position and S2 on „0“. Now, the device has to be switched off and on again.

Alternatively, choose in ibaLogic-V5 „Evaluation – Clear PMAC storage“.



## 11.2 ibaPDA

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



### Important note

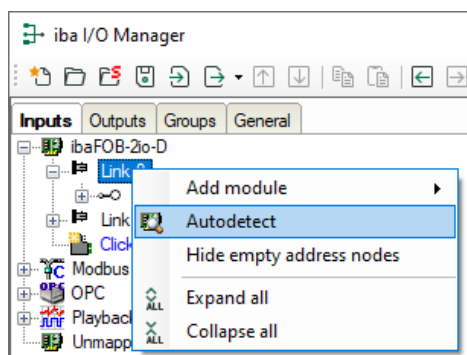
If the ibaLogic-V5 runtime system is active in ibaPADU-S-IT-2x16 for preprocessing the signals, please note that no configuration is possible in ibaPDA anymore, since ibaLogic-V5 takes over the configuration in parallel operation. ibaPDA can only receive the signals as they are configured in ibaLogic-V5 (timebase, debounce filter, filter, etc.).

In that case, the timebase is 100 µs, unless the timebase is configured explicitly via the output "SampleTime" and independent from the timebase configured in the I/O Configurator.

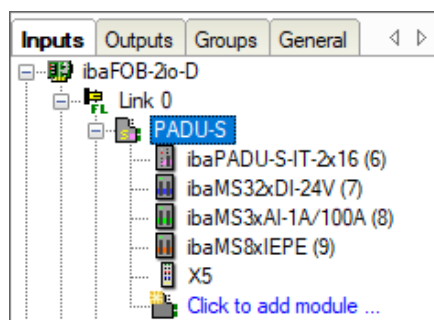
### 11.2.1 Configuration in the I/O Manager

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

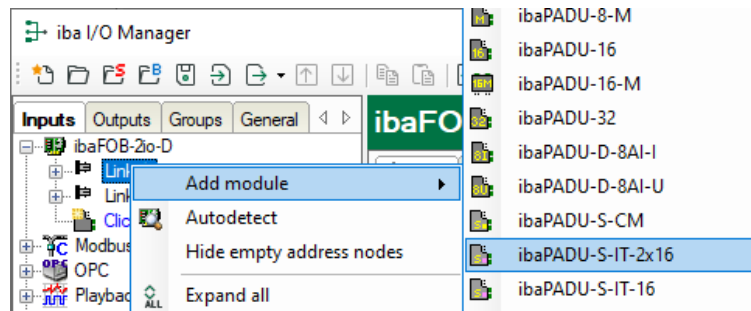
1. Look in the I/O Manager for the link of the FOB-D card, ibaPADU-S-IT-2x16 is connected to. Click with the right mouse button on the link. The submenu is opened. Choose "Autodetect".



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



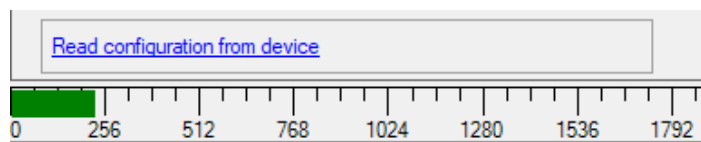
2. If ibaPDA does not detect the device automatically, you can add the device manually.
3. Click with the right mouse button on the connection (Link) of the ibaFOB-io-D card, the device is connected to.
4. Choose "Add module". The list of the available modules is displayed. Choose "ibaPADU-S-IT-2x16".



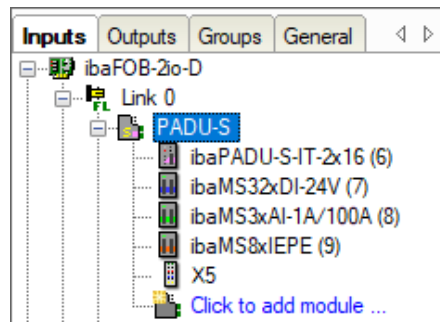
Now, the device is shown in the module tree.

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 “Read configuration from device” in the “General” tab.

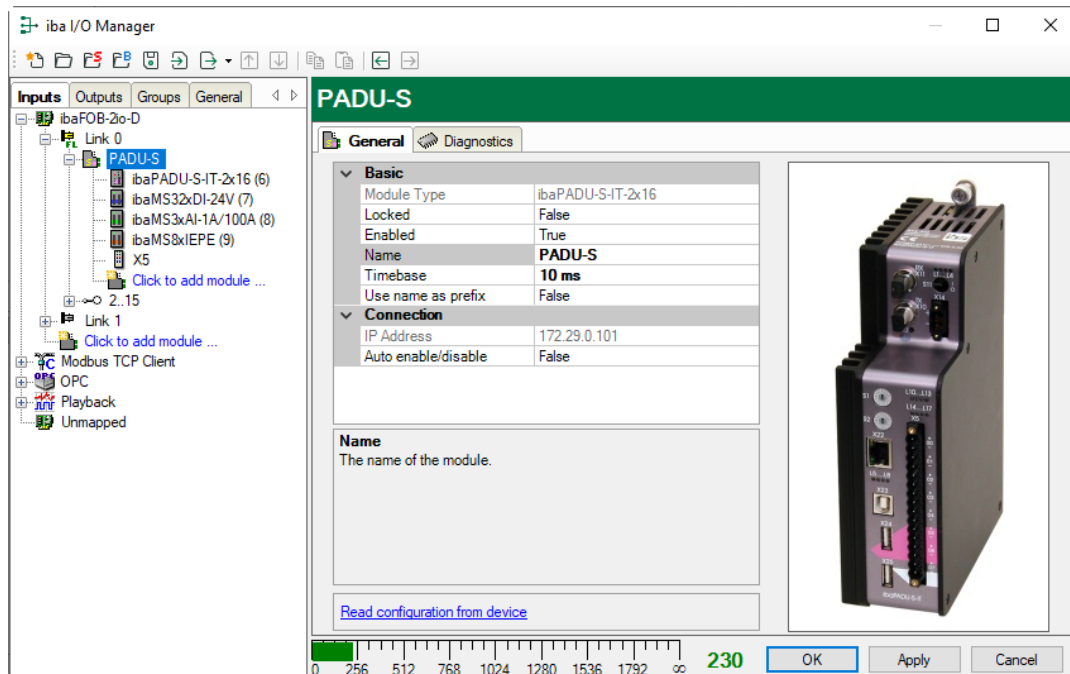


The connected modules are detected automatically and displayed in the module tree.



6. Configure ibaPADU-S-IT-2x16 and the modules (e.g. assign a name, debouncing, etc.) (see chapter 11.2.2 „PADU-S – General tab“ ff.).
7. Click on <Apply> or <OK>, for applying a new configuration.

## 11.2.2 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-IT-2x16 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-IT-2x16 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 saved most recently from the device.

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

### 11.2.3 PADU-S – Diagnostics tab

**S-IT2x16-000029**

General Analog Digital **Diagnostics**

Version information

Hardware version:  Firmware version:

Slot	Type	Hardware version	Firmware version	FPGA version	Serial number
X1	ibaPADU-S-IT-2x16	A0	E2	v00.38.9523	29
X2	ibaMS16xAI-10V	B0	E0	v02.05.0039	999010
X3	ibaMS8xICP	A5	E0	v01.05.0009	60
X4	ibaMS4xUCO	A0	E0	v01.02.0025	5
X5	ibaMS3xAI-1A/100A	B0	E0	v02.04.0015	1000

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 „padu-sit2x16\_v[xx.yy.zzz].iba“ in the browser and start the update with <OK>.



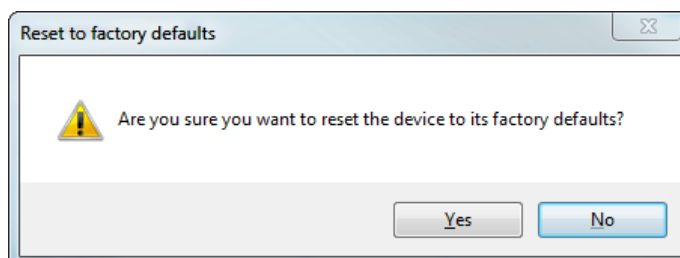
#### Important note

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

➔ See chapter 10.2 "Update via ibaPDA"

#### ☐ Reset to factory defaults

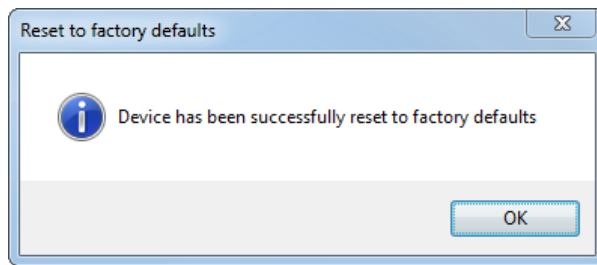
Using this button all settings are reset to factory defaults after having confirmed the following request with <Yes>.



#### Note

The function "Reset to factory defaults" does not apply to the reset of network settings or passwords as described in chapter 9.1.4. Network settings and passwords remain stored.

After the reset the following message appears and the device will be automatically re-initialized with the deleted I/O settings.



After that carry out an "Autodetection" as described in chapter 11.2.1.

#### 11.2.4 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.

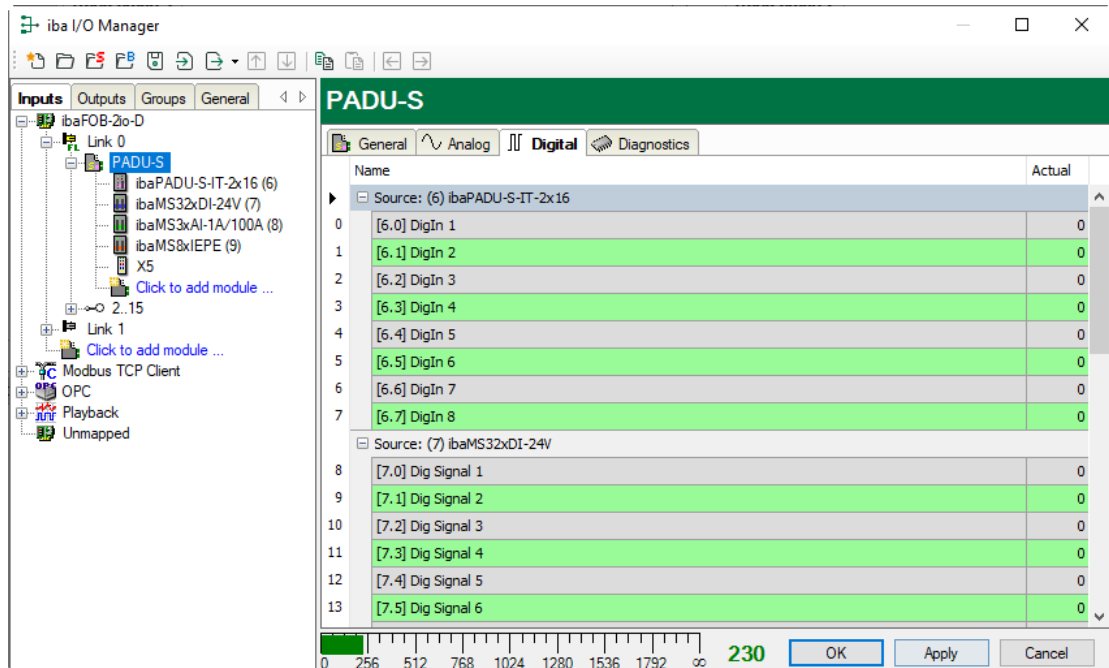
 The screenshot shows the "iba I/O Manager" application window. On the left is a tree view under "Inputs" showing a hierarchy: "Link 0" -> "PADU-S" -> "ibaPADU-S-IT-2x16 (6)" -> "ibaMS32xDI-24V (7)" -> "ibaMS3xAI-1A/100A (8)" -> "ibaMS8xIEPE (9)". The "PADU-S" module is selected. The main area shows the "PADU-S" configuration with tabs for "General", "Analog", "Digital", and "Diagnostics". The "Analog" tab is active, displaying a table of analog signals. The table has columns for "Name", "DataType", and "Actual". The signals are grouped by source: "Source: (8) ibaMS3xAI-1A/100A" and "Source: (9) ibaMS8xIEPE". The "Actual" column shows values of 0 for all signals. At the bottom, there is a scale bar from 0 to 230 with a current value of 230 displayed.
 

Name	DataType	Actual
Source: (8) ibaMS3xAI-1A/100A		
[8:0] Kanal 0: 6,25A max	INT	0
[8:1] Kanal 1: 6,25A max	INT	0
[8:2] Kanal 2: 6,25A max	INT	0
Source: (9) ibaMS8xIEPE		
[9:0] Signal 1	DINT	0
[9:1] Signal 2	DINT	0
[9:2] Signal 3	DINT	0
[9:3] Signal 4	DINT	0
[9:4] Signal 5	DINT	0
[9:5] Signal 6	DINT	0
[9:6] Signal 7	DINT	0
[9:7] Signal 8	DINT	0

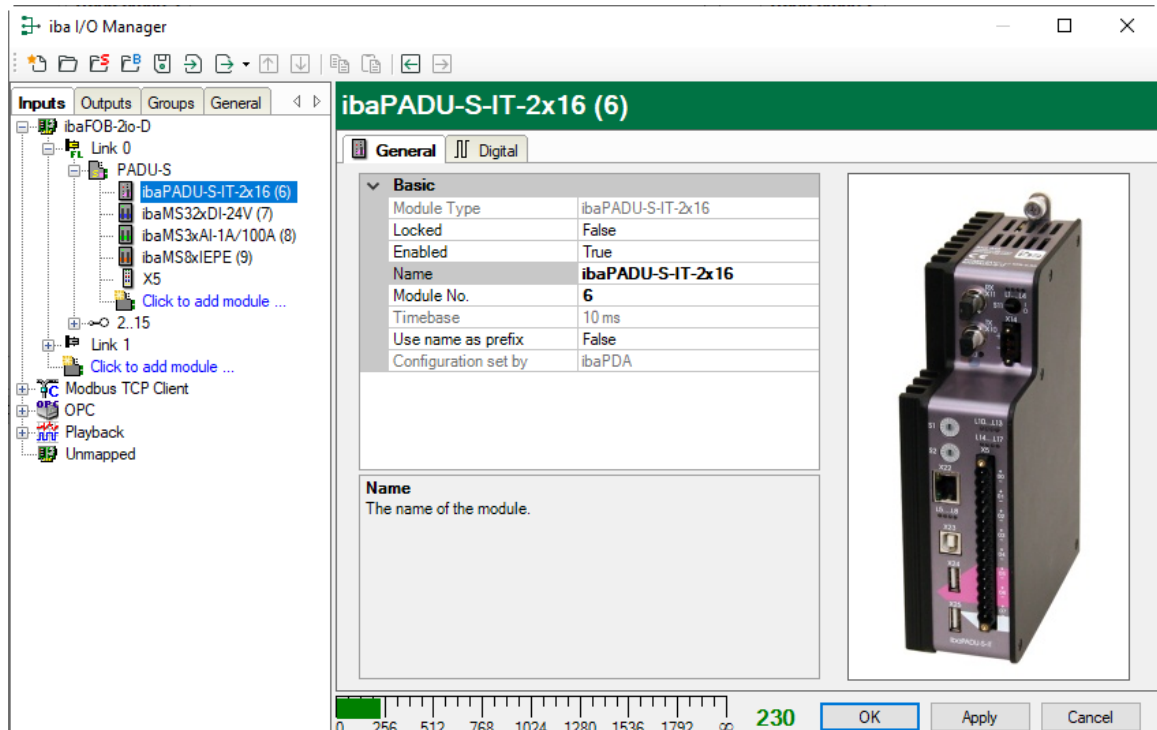


### 11.2.5 PADU-S – Digital tab

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.



### 11.2.6 ibaPADU-S-IT-2x16 – General tab



#### Basic settings

❑ Module Type, Locked, Enabled, Name, Timebase  
see chapter 11.2.2 "PADU-S – General tab"

❑ Module No.

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

### ❑ Configuration set by

This item is only visible when ibaPADU-S-IT-2x16 is used as central unit. When an embedded application has been started on ibaPADU-S-IT-2x16 (e. g. ibaLogic), then ibaPDA cannot modify the configuration of the modules and signals. In this case the configuration is set by the embedded application. The following entries can be displayed:

#### ▪ ibaPDA

Configuration set by	ibaPDA
----------------------	--------

When ibaPDA is displayed, an embedded application has not been started and the configuration can be set by ibaPDA.

#### ▪ Embedded application

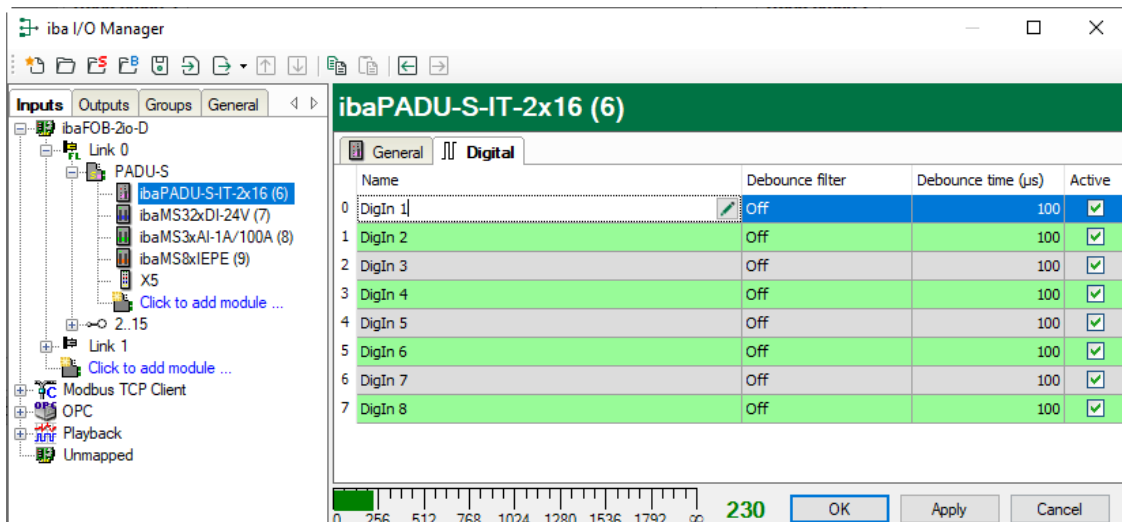
Configuration set by	Embedded application
Import signal names	False

When embedded application is displayed, the configuration of the modules and signals is set by the embedded application on the device. In this case it is possible to import user-defined signal names, which are configured in the embedded application, provided that the embedded application supports this function (Import signal names: True).


The modules and signals configured by the embedded application cannot be configured in ibaPDA, they are displayed in gray in the respective fields.

The configuration is read by ibaPDA and used for the acquisition. Modules and signals which are not displayed in gray can be used in ibaPDA.

## 11.2.7 ibaPADU-S-IT-2x16 – Digital tab

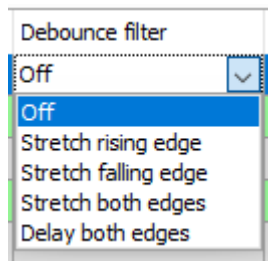


### ❑ Name

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 chapter. 7.5.2 „Debounce filters“.

☐ Debounce time (µs)

Here, you can define the debounce time in µs

☐ Active

Enabling/disabling the signal

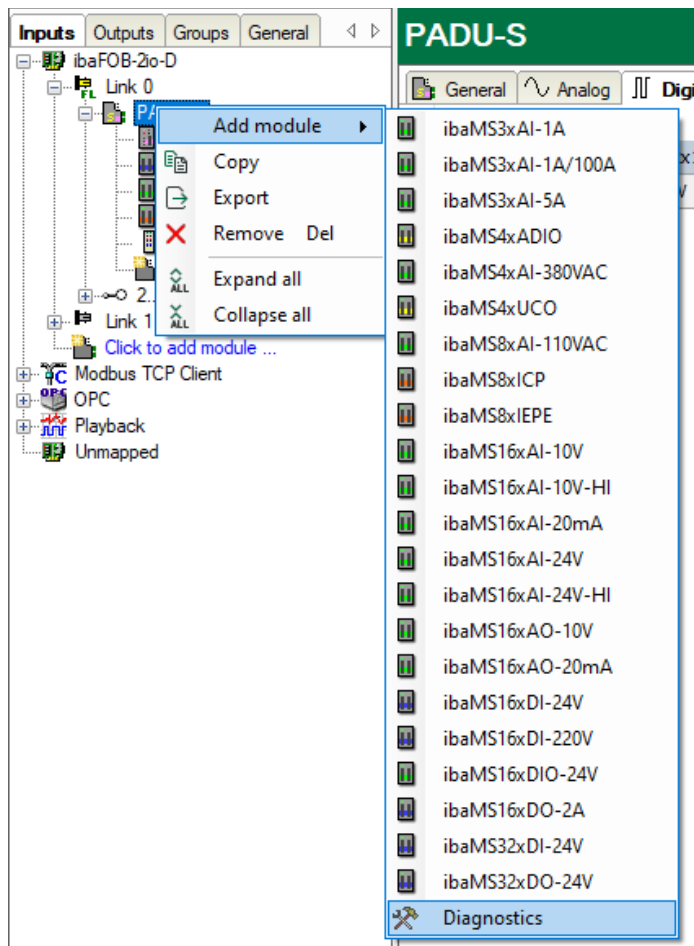


### Note

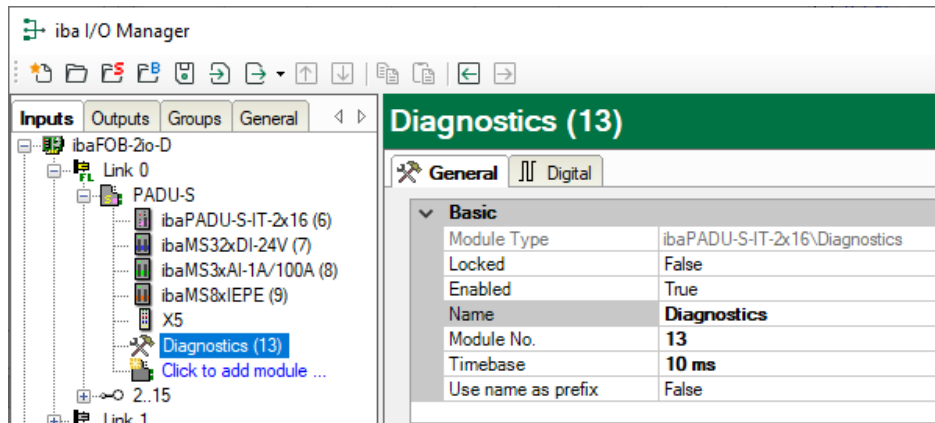
Configure the plugged analog and digital I/O modules. For a detailed description, please refer to the module manuals.

## 11.2.8 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.



### 11.2.8.1 Diagnostics – General tab

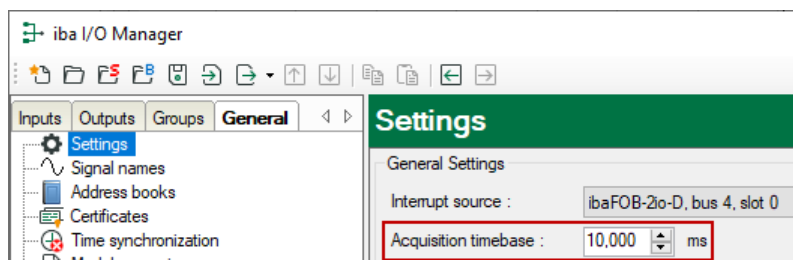


#### Basic settings

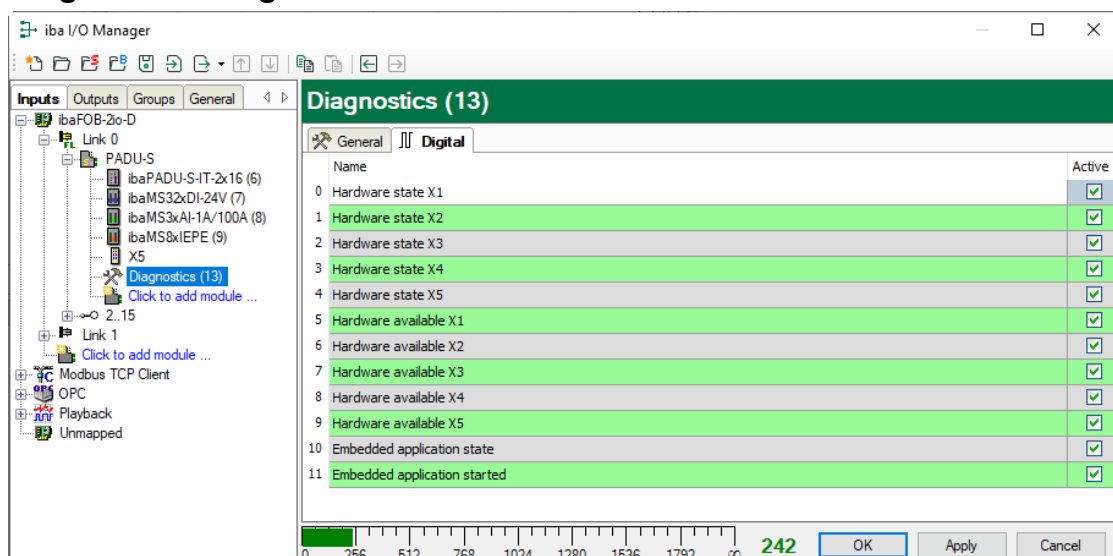
☐ Module Type, Locked, Enabled, Name, Module No., Use name as prefix  
see chapter 11.2.2 “PADU-S – General tab”

☐ 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.



### 11.2.8.2 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	Indicates whether the embedded application is currently available.
Embedded application started	Indicates whether an embedded application, e.g. ibaLogic-V5, has been started (once). When the embedded application is finished properly, the signal will change to FALSE again.

## 12 Technical Data

### 12.1 Main data

<b>Short description</b>	
Name	ibaPADU-S-IT-2x16
Description	CPU for control applications
Order number	10.124021
<b>Processor unit</b>	
Processor	1.6 GHz Atom processor, dual core CPU
Operating system	Windows Embedded Compact 7
Main memory	2 GB
Flash memory	Solid State RAMDrive 110 GB
RAM	RAM drive 128 MB
Clock (RTC)	Unbuffered; optional external buffering via X30 synchronization via DCF77 (digital input) or NTP
<b>Supply</b>	
Power supply	24 V DC $\pm$ 10 % not stabilized, 1 A (without I/O modules), 3 A (with I/O modules)
Power consumption max.	20 W for ibaPADU-S-IT-2x16
<b>Operating and indicating elements</b>	
Indicators (LEDs)	4 LEDs for operating status of the device 8 LEDs for status of the digital inputs 4 LEDs for customized applications
<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
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>2</sup>	255,939 hours / 29 years
Dimensions (width x height x depth)	2.20 in x 8.43 in x 5.83 in (56 mm x 214 mm x 148 mm) with backplane panel: 9.02 in x 8.62 in x 6.14 in (229 mm x 219 mm x 156 mm)

<sup>2</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).

Weight / incl. packaging and documentation	2.4 lbs (1.1 kg) / 3.3 lbs (1.5 kg)
--	-------------------------------------

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

**Unique Identifier:** 10.124021 ibaPADU-S-IT-2x16  
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.

## 12.2 Interfaces

ibaNet interface			
Number	1		
Design	Fiber optic cable		
ibaNet protocol	32Mbit Flex (bidirectional)	32Mbit 50µs / 100µs / 500µs / 1000µs	3Mbit
Data transmission rate	32 Mbit/s	32 Mbit/s	3.3 Mbit/s
Sampling rate	Up to 40 kHz, freely adjustable	20 kHz / 10 kHz 2 kHz / 1 kHz	1 kHz
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. 12.6		
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>3</sup>	100/140 µm FO cable	-33.2 dBm to -26.7 dBm	

<sup>3</sup> Data for other FO cable diameters not specified

Temperature range	-40 °F to 185 °F (-40 °C to 85 °C)
<b>Further interfaces</b>	
Ethernet	10/100 Mbit/s
USB	2x host, 1x device for service purposes

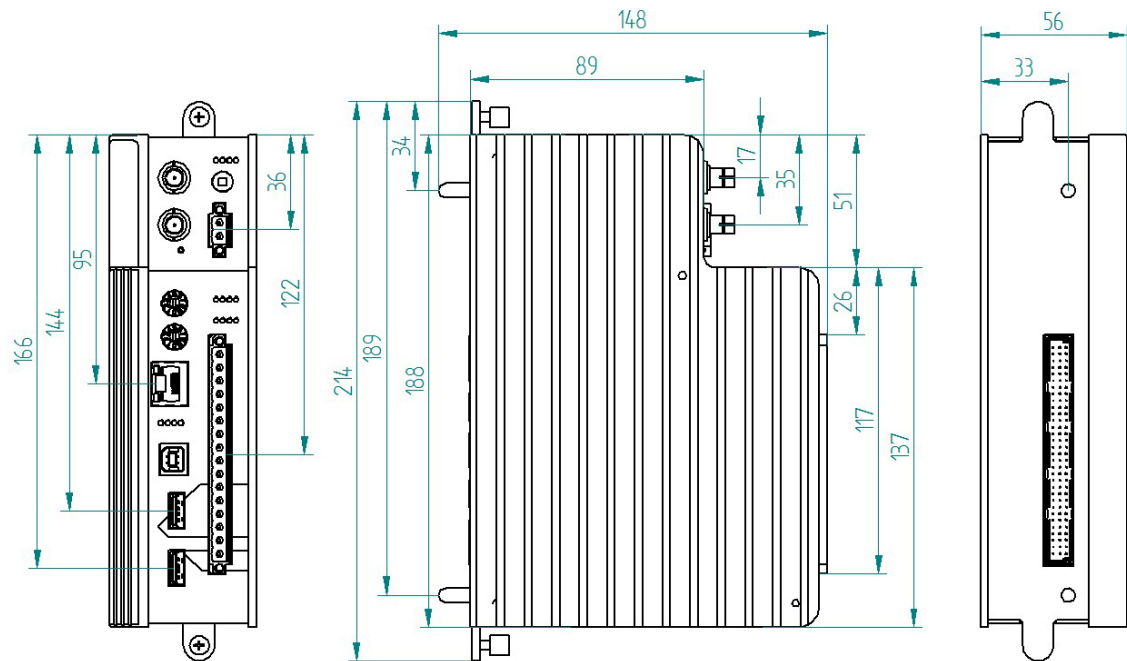
## 12.3 Digital inputs

<b>Digital inputs</b>	
Number	8
Design	Electrically 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
Connector type	16-pin connector; clamp-type terminal (0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> ), screw connection, included in delivery

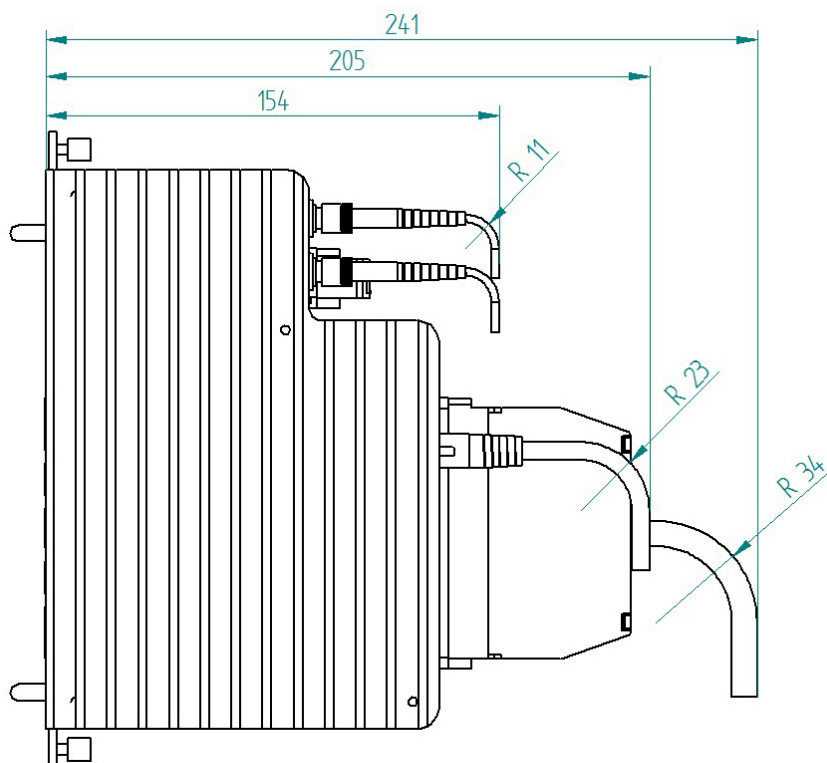


## 12.4 Dimensions

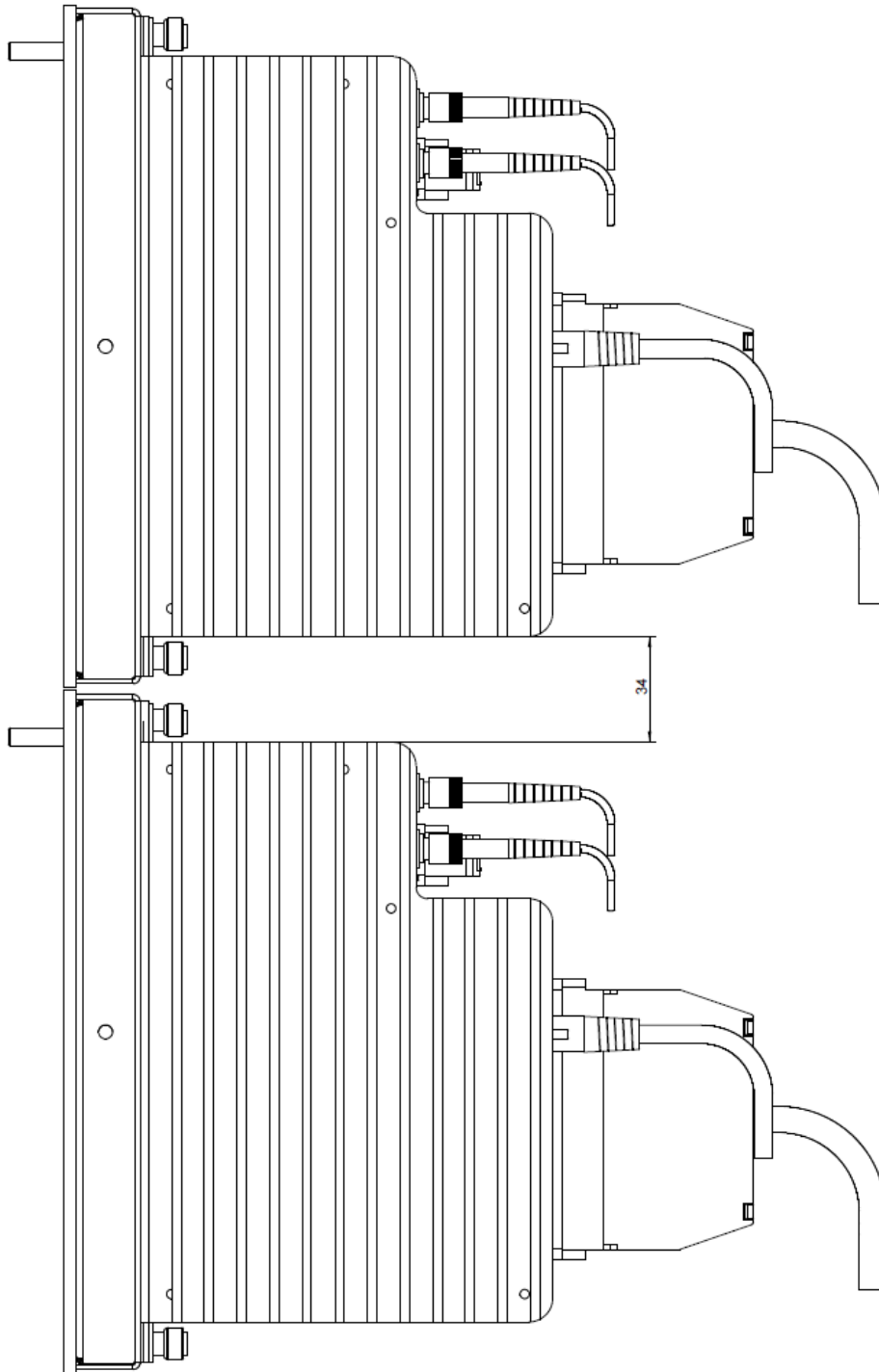
### ibaPADU-S-IT-2x16



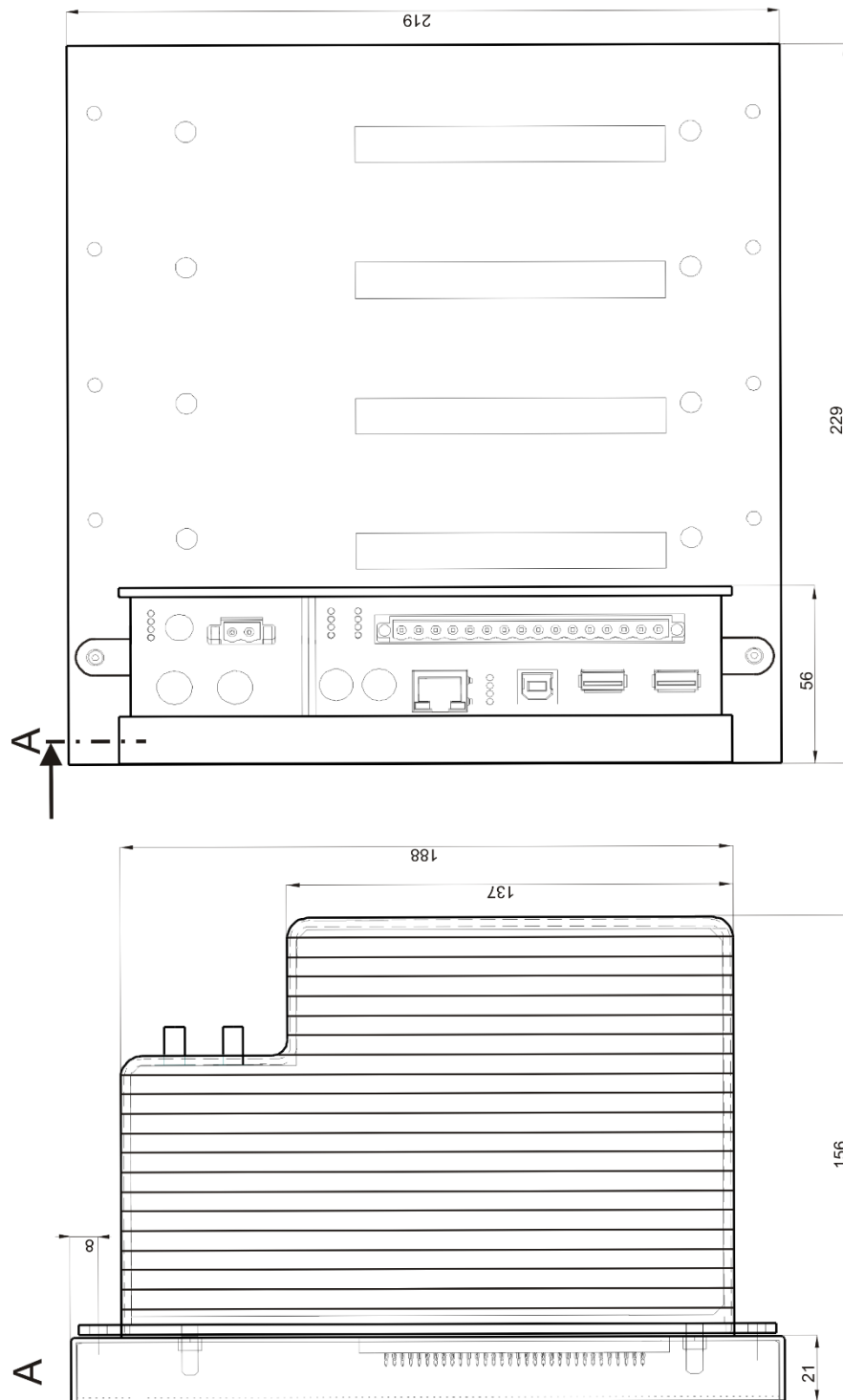
Dimensions in mm



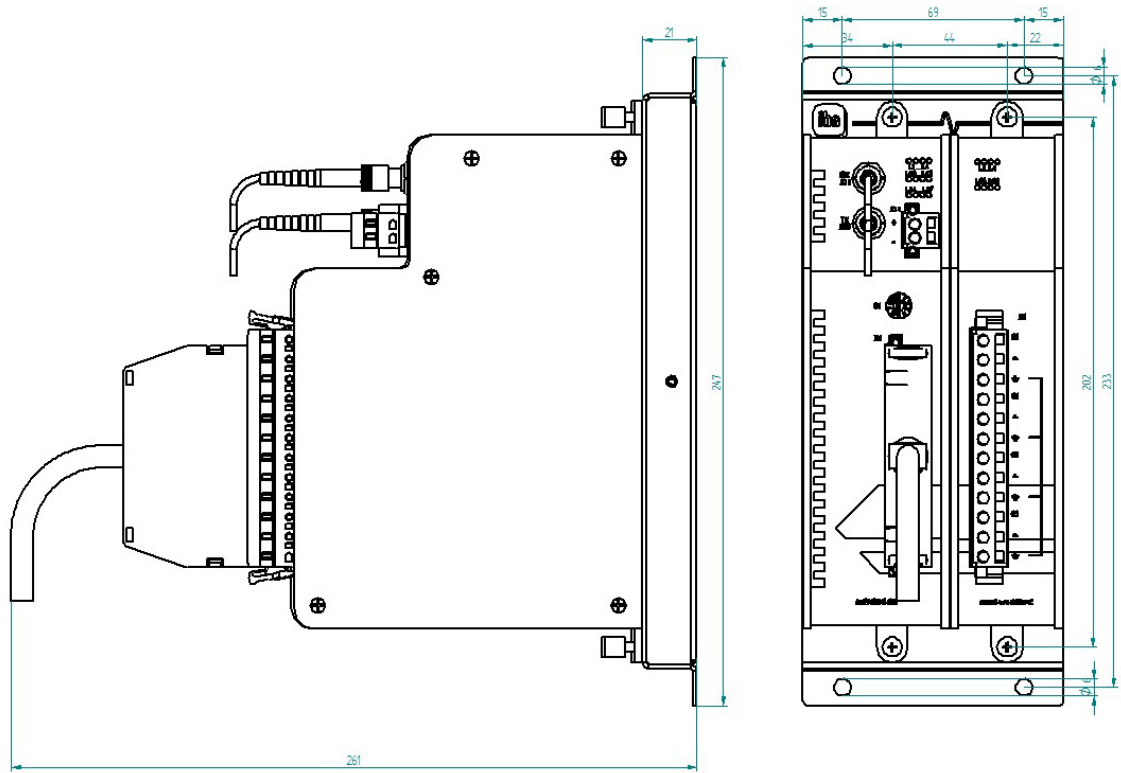
ibaPADU-S-IT-2x16 with cables (dimensions in mm)

**Min. distance between 2 ibaPADU-S-IT-2x16 systems**

Dimensions in mm

**ibaPADU-S-IT-2x16 and backplane**

Dimensions in mm



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

## 12.5 Connection diagram

### 12.5.1 Pin assignment voltage supply X14

Pin	Connection
1	+ 24 V
2	0 V



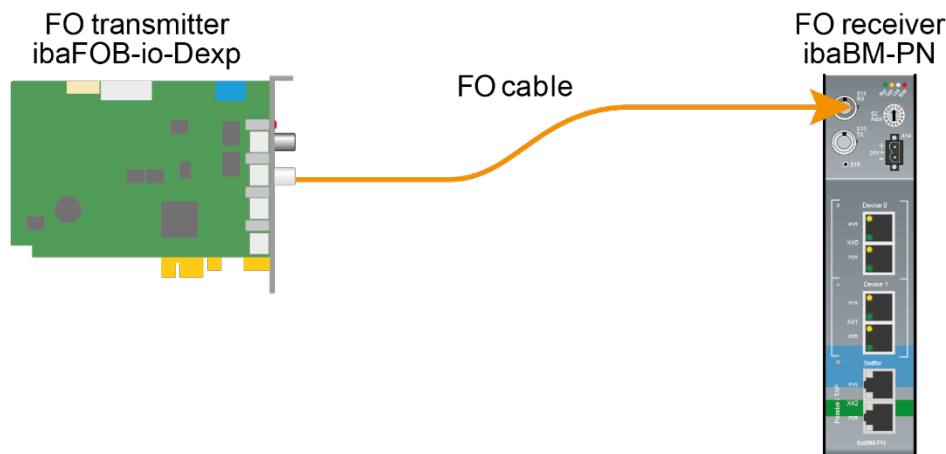
### 12.5.2 Pin assignment digital inputs X5

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 -



## 12.6 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.

## 13 Accessories

### 13.1 Backplane panels

#### 13.1.1 ibaPADU-S-B4S

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



##### 13.1.1.1 Scope of delivery

- ☐ Backplane panel
- ☐ Assembly kit

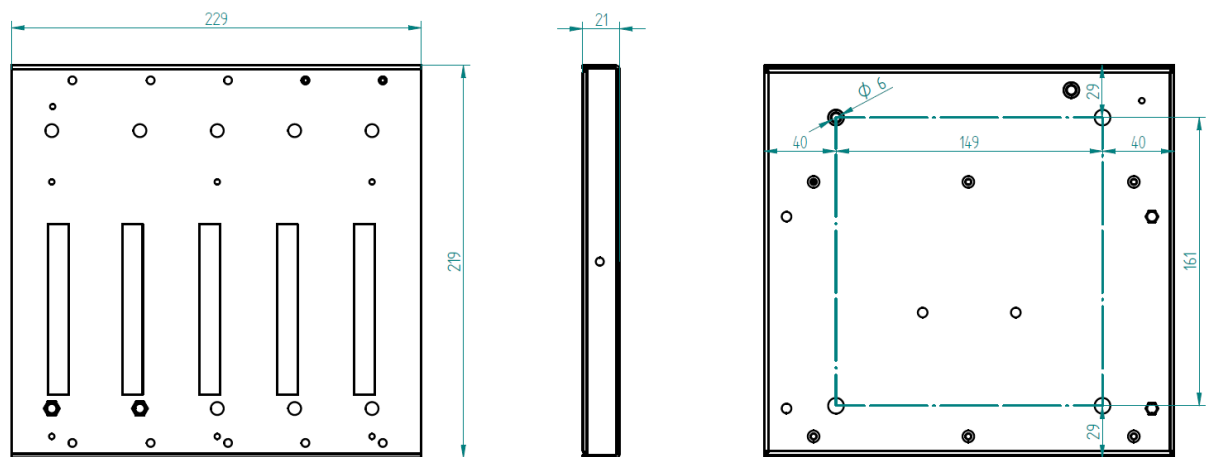




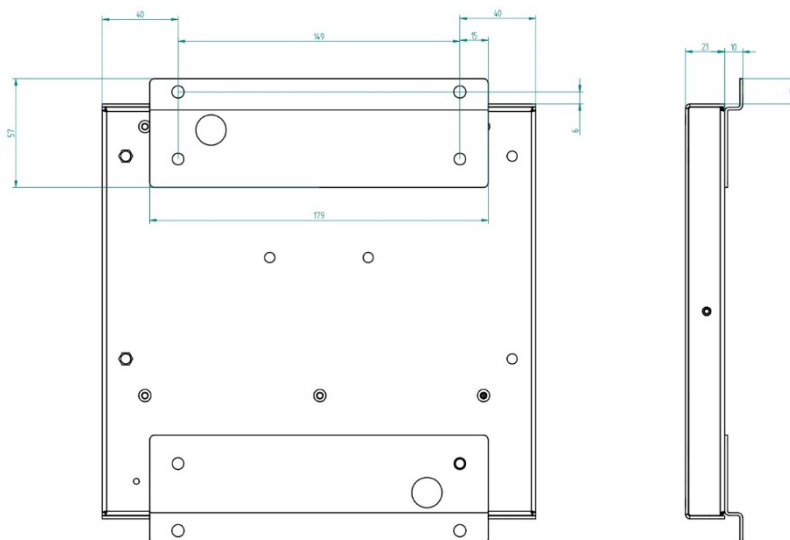


Assembly kit

### 13.1.1.2 Dimensions



Dimensions in mm



Dimensions ibapadu-S-B4S with mounting angles (dimensions in mm)

### 13.1.1.3 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

### 13.1.1.4 Technical data

Short description	
Product name	ibaPADU-S-B4S
Description	Backplane panel for 1 central unit and up to 4 I/O modules from the iba modular system
Order number	10.124000
Interface central unit	
Number	1
Connection type	Female header, pole number 3 x 32
Slot	X1
Interface I/O modules	
Number	4
Connection type	Female header, pole number 3 x 32
Slot	X2 - X5
Supply	
Power supply	none
Mounting	
Housing	4 thread M6, rear side
Assembly kit	enclosed
Grounding	1 thread M6, rear side
Assembly kit	enclosed
Design	
Dimensions (width x height x depth)	229 mm x 219 mm x 21 mm
Weight / incl. packaging	0.66 kg / 0.85 kg

### 13.1.2 ibaPADU-S-B1S

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

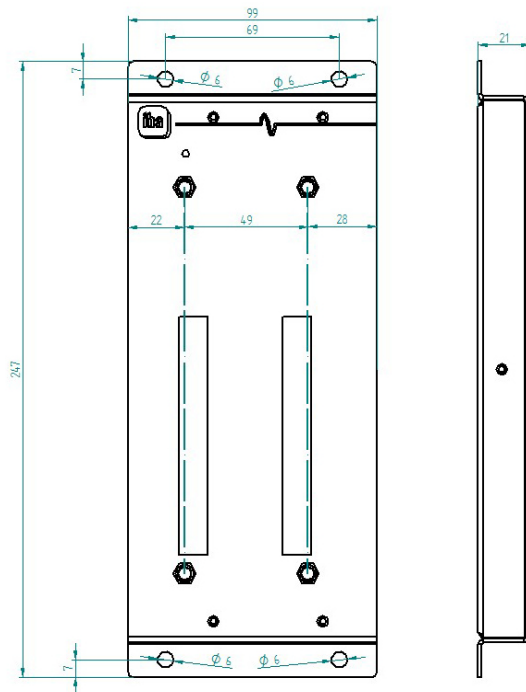


#### 13.1.2.1 Scope of delivery

- ☐ Backplane panel
- ☐ Assembly kit



### 13.1.2.2 Dimensions



Dimensions in mm

### 13.1.2.3 Grounding

See chapter 13.1.1.3

### 13.1.2.4 Technical data

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

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

## 13.2 Mounting system for central unit

### 13.2.1 ibaPADU-S-B

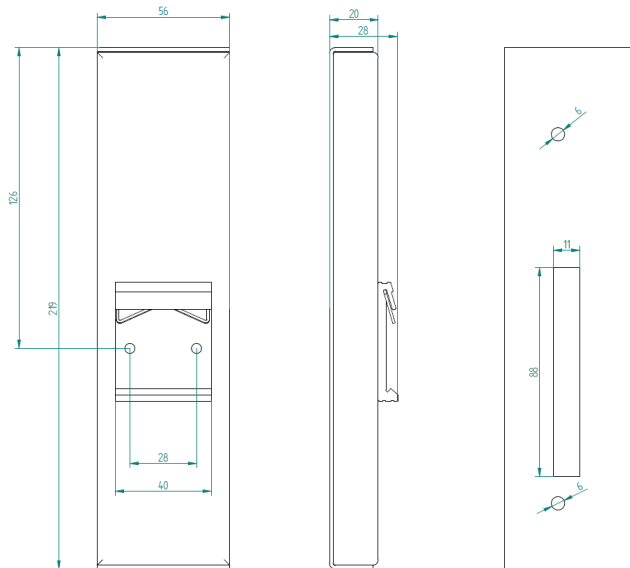
Mounting panel with DIN rail clip for 1 central unit (without I/O modules).



#### 13.2.1.1 Scope of delivery

- ☐ Mounting panel

### 13.2.1.2 Dimensions



Dimensions in mm

### 13.2.1.3 Grounding

The grounding must be done via the DIN rail.

### 13.2.1.4 Technical data

Short description	
Product name	ibaPADU-S-B
Description	Mounting panel for 1 central unit from the iba modular system; with DIN rail clip
Order number	10.124001
Mounting	
Panel	on DIN rail according to EN 50022 (TS 35, DIN Rail 35)
Assembly kit	-
Grounding	via DIN rail
Assembly kit	-
Design	
Dimensions (width x height x depth)	56 mm x 219 mm x 28 mm
Weight / incl. packaging	0.17 kg / 0.26 kg

## 13.3 Mounting systems for ibaPADU-S-B4S

### 13.3.1 Mounting angles

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

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



#### 13.3.1.1 Scope of delivery

- 2 pieces mounting angles (1 set)

#### 13.3.1.2 Dimensions

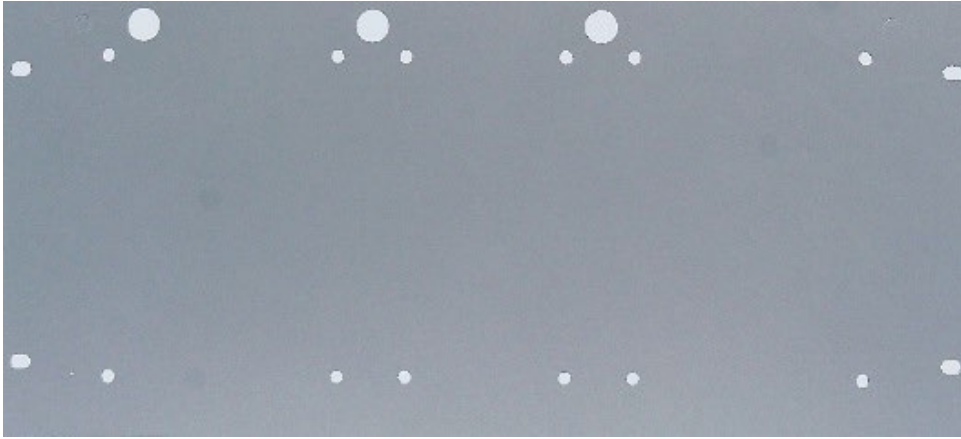
W x h x d: 179 mm x 57 mm x 10 mm

#### 13.3.1.3 Technical data

Short description	
Product name	Mounting angles for iba modular system
Description	1 set (2 pieces) mounting angles, matching for backplane panel ibaPADU-S-B4S, for a front side mounting of the backplane
Order number	10.124006
Mounting	
Angle	4 through holes M6
Assembly kit	-
Design	
Dimensions (width x height x depth)	179 mm x 57 mm x 10 mm
Weight / incl. packaging	0.091 kg / 0.092 kg

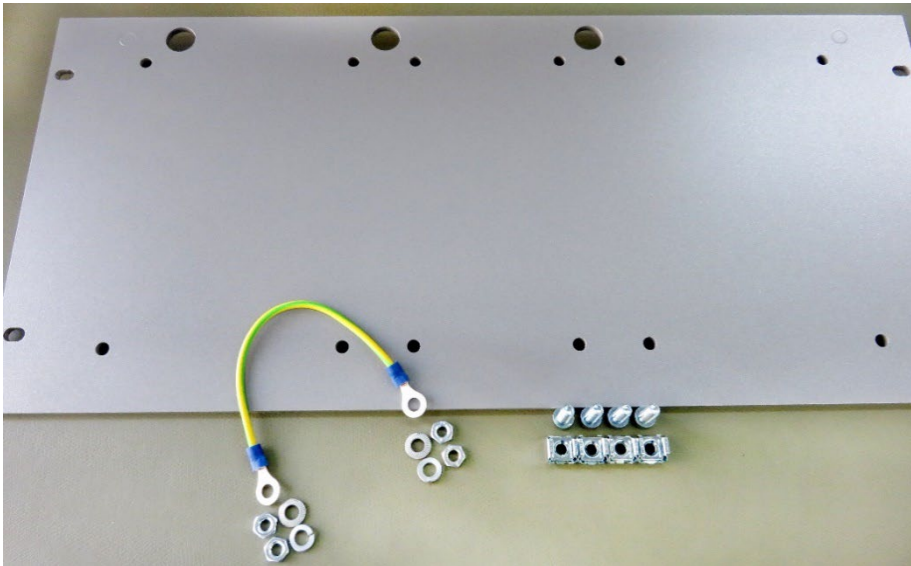
### 13.3.2 Mounting panel 19"

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



#### 13.3.2.1 Scope of delivery

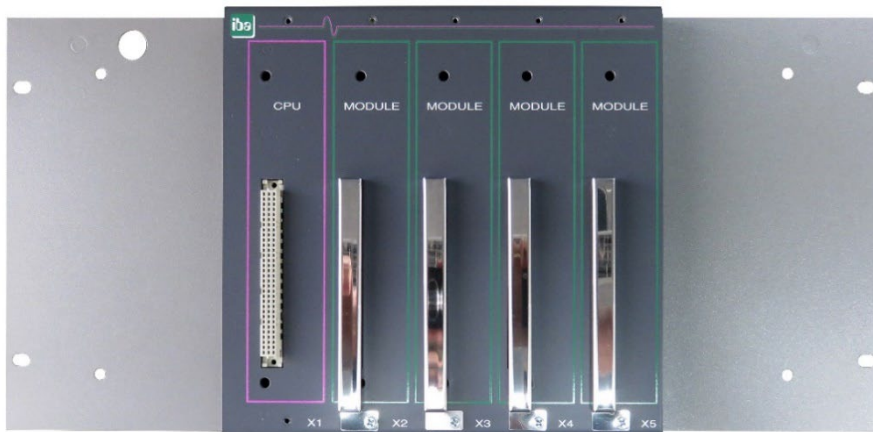
- ☐ Mounting panel
- ☐ Assembly kit



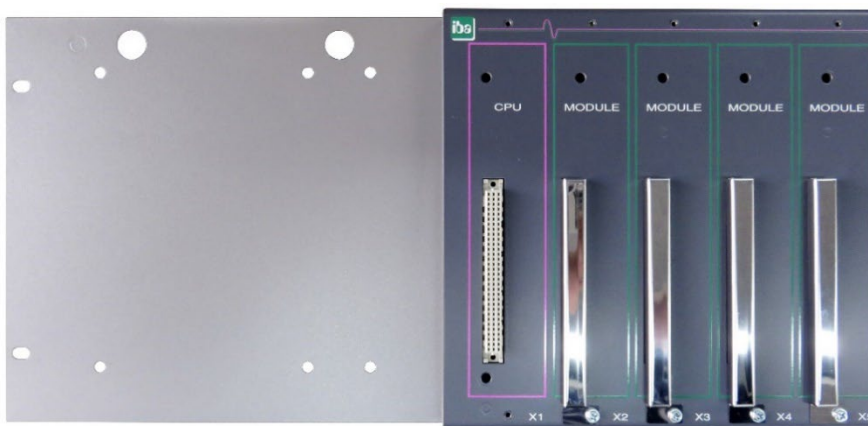


### 13.3.2.2 Mounting backplane panel

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

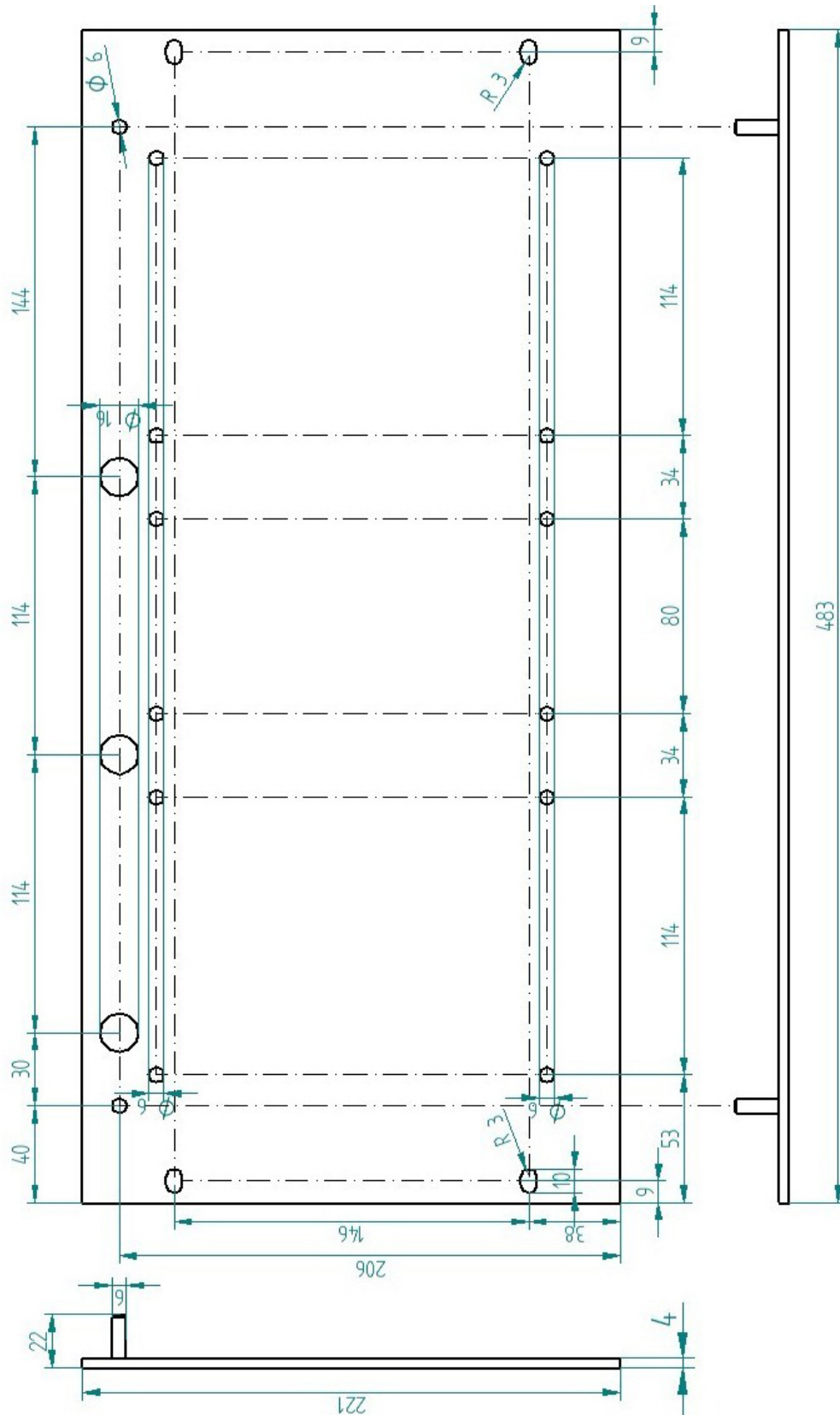


Mounting centered



Mounting on the right

### 13.3.2.3 Dimensions



Dimensions in mm

### 13.3.2.4 Grounding

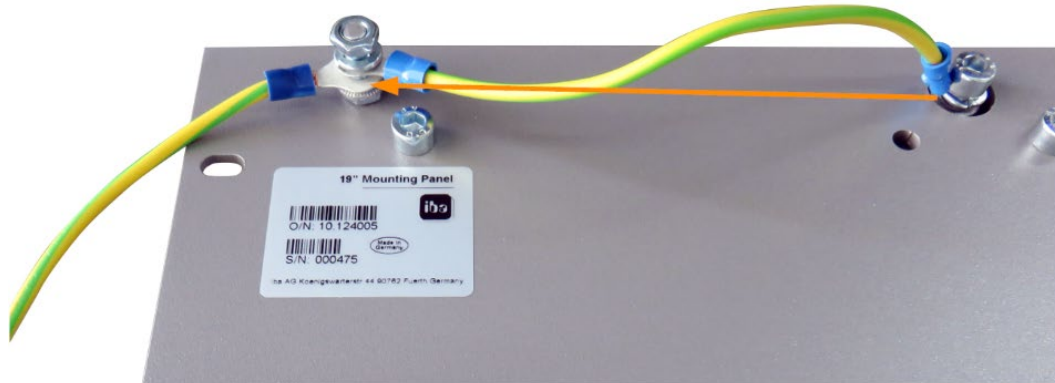
#### Variation 1:

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

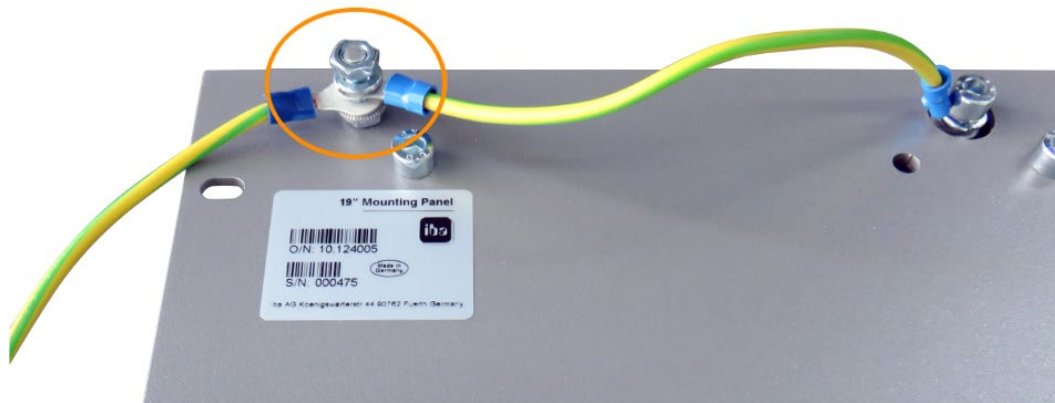
After the backplane panel is mounted on the 19" mounting panel, the backplane panel must be grounded via the mounting panel. Screw the grounding cable on the back of the mounting panel to the backplane panel. Use the screw connection as described in chapter 13.1.1.3.



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.



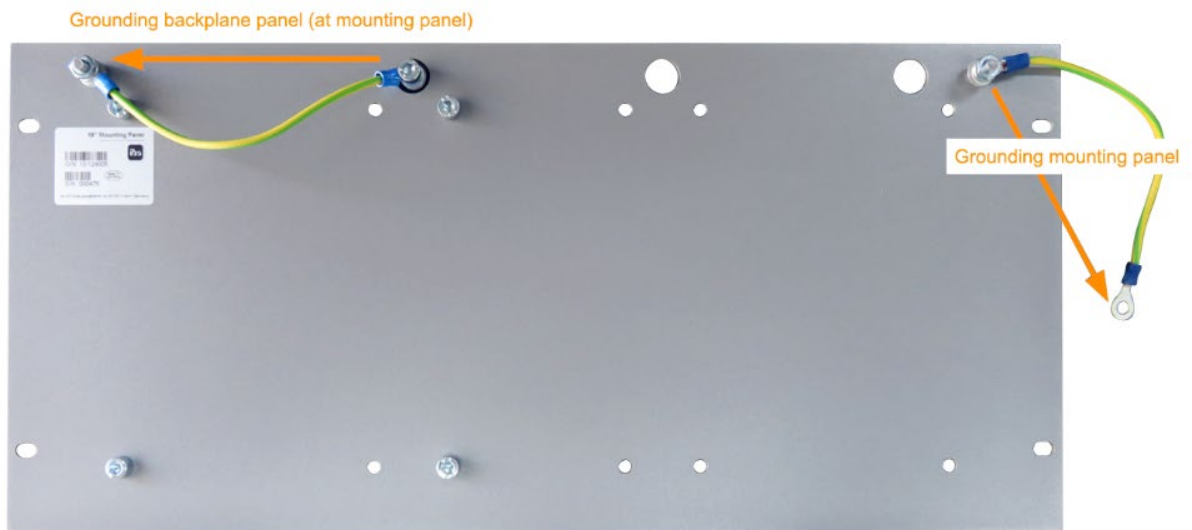
Both grounding cables are attached to the threaded bolt as shown.



**Variation 2:**

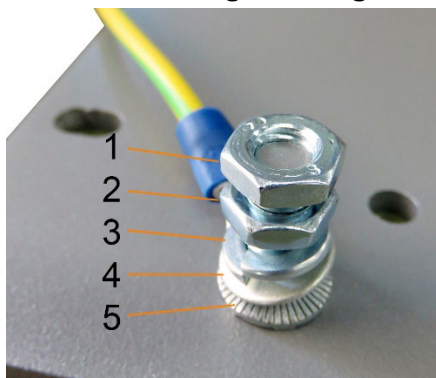
One backplane panel and grounding of the mounting panel are **not on the same side**.

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

### 13.3.2.5 Technical data

Short description	
Product name	Mounting panel 19" for iba modular system
Description	Mounting panel (483 mm/19") for up to 2 ibaPADU-S-B4S backplane panels
Order number	10.124005
Mounting	
Panel	4 through holes
Assembly kit	enclosed
Grounding	2 threaded bolts M6, rear side
Assembly kit	enclosed
Design	
Height units (HU)	5
Dimensions (width x height x depth)	483 mm x 221 mm x 22 mm
Weight / incl. packaging	1.2 kg / 1.4 kg

### 13.3.3 Module carrier

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



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

#### 13.3.3.1 Scope of delivery

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

### 13.3.3.2 Dimensions

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

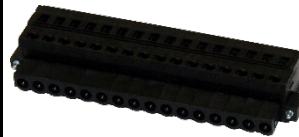
### 13.3.3.3 Technical data

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

## 13.4 Terminal blocks

### 16 pin RM 5.08 terminal block WAGO

Order number	52.000023
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### 12 pin RM 3.81 terminal block PHOENIX

Order number	52.000024
--------------	-----------



### 2 pin RM 5.08 terminal block WAGO

Order number	52.000022
--------------	-----------



### 13.5 FO cards/cables

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

### 13.6 iba software

Product	Order no.	Remark
ibaPDA-1024	30.771024	Online data acquisition system ibaPDA, license examples: For up to 1024 signals For up to 2048 signals
ibaPDA-2048	30.772048	
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).

## **14 Appendix**

### **14.1 Acronyms**

DHCP	Dynamic Host Configuration Protocol
DST	Daylight Saving Time
FO	Fiber Optics
GMT	Greenwich Mean Time
NTP	Network Time Protocol
PMAC	Programmable Measurement and Automation Controller
RTC	Real Clock Time
TCP/IP	Transmission Control Protocol / Internet Protocol
UTC	Universal Time Coordinated
WINS	Windows Internet Name Service



## 14.2 Index

### B

Backplane 13

### C

Communication to the device via FO cable 27  
Communication to the device via the network 25

### D

DCF77 33  
Debounce filter 18  
    configuration in ibaLogic 57  
    configuration in ibaPDA 66  
Default settings 24  
    set back to 25  
DHCP protocol 26  
    enable on Website 38  
    enabling on the device 30  
Digital inputs  
    configuration in ibaPDA 66  
Display 15

### F

Firmware 37  
FO cables 17  
FO input card 12  
FO transfer protocol  
    in ibaLogic 51  
    overview 23

### G

Ground terminal 13

### H

Host name 24

### I

I/O Manager 60  
ibaLogic 40, 45  
    assigning signals 54  
    configuring signals 49  
    ibaPADU-S-IT-16 as platform 45  
    signal settings for FO interface 51  
ibaLogic-program  
    deleting 16, 17, 59  
    saving on runtime 58  
ibaPDA  
    Configuration in the I/O Manager 60  
IP address  
    setting directly on the device 28  
    setting on Website 39  
    via FO 39, 62

### N

Network connection 17  
    via network interface 25  
Network parameters 24

Network settings 25  
    directly on the device 15, 16, 17, 28  
    on the Web interface 28  
    Website 38

### Notes

entering notes 41  
NTP protocol 32

### O

Off-task connector 57  
Operating status 15

### P

Passwords  
    change 37  
Pin assignment  
    digital inputs 17  
PMAC  
    start/stop 40  
    status 40  
    Update 40  
Power supply 12

### R

Rotary switches 16

### S

Status of digital inputs 16  
System events  
    eventlog 37  
System function push button 17  
System time 31

### T

Time settings 31  
    system time 31  
    time synchronization 32  
    time zone 31  
Timebase  
    in ibaPDA 62

### U

Update 42  
    modules 43  
    via ibaPDA 43, 63  
    via Web interface 40, 42  
User accounts 24

### V

Voltage supply 20

### W

Website 34  
    access 34  
    structure 36  
WINS Devicename 38

## 15 Support and contact

### Support

Phone: +49 911 97282-14

Fax: +49 911 97282-33

E-Mail: [support@iba-ag.com](mailto:support@iba-ag.com)



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### Note

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

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**[www.iba-ag.com](http://www.iba-ag.com)**