

# ibaPADU-S-IT-16

Central unit for the ibaPADU-S family



## Manual

Issue 1.11

Measurement and Automation Systems



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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
1.11	01-2021	FCC declaration			

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# 1 About this manual

In this manual, you learn a lot about the design of the ibaPADU-S-IT-16 device and how to use and operate it. You can find a general description of the systems of the ibaPADU-S family 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 ibaPADU-S family is part of the CD that is included in delivery.

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The documentation of the ibaPADU-S family comprises the following manuals:

❑ **Central units**

The manuals of the ibaPADU-S-IT-16 central units and ibaPADU-S-CM contain the following information:

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

❑ **Modules**

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

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

## 1.1 Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded to as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her specialist training, knowledge and experience and knowledge of the standard regulations.

## 1.2 Notations

In this manual, the following notations are used:

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

## 1.3 Used symbols

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

---

### **DANGER**

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

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

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

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### **WARNING**

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

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### **CAUTION**

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

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#### **Note**

A note specifies special requirements or actions to be observed.

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#### **Important note**

Note if some special features must be observed, for example exceptions from the rule.

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#### **Tip**

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

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#### **Other documentation**

Reference to additional documentation or further reading.

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## 2 Introduction

The modular concept of the ibaPADU-S device family is designed on the basis of a backplane. You can plug on this backplane not only the CPU, but also up to 4 input/output modules. The ibaPADU-S-IT-16 CPU offers 8 digital inputs.

ibaPADU-S-IT-16 is a fast CPU for fast applications in the fields of measurement technology, signal processing and controls. When equipped with the right input/output modules and combined with the ibaPDA or ibaLogic software products, ibaPADU-S-IT-16 can be used for several applications. The range of applications is as follows:

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

Due to the integrated processor, a RAM and the Windows CE operating system, ibaLogic 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-16 system with input/output modules and an ibaLogic 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.

This manual applies to ibaPADU-S-IT-16 beginning with Firmware version V02.05.001.

### 3 Scope of delivery

After having unpacked the delivery, please check it for completeness and have a look if the parts might be damaged.

The scope of delivery comprises:

- ☐ ibaPADU-S-IT-16 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)
- ☐ Manual (German and English)
- ☐ DVD "iba Software & Manuals"

## 4 Safety instructions

### 4.1 Proper use

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

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

The device is only to be applied as shown in the Technical Data in Chapter 12.

### 4.2 Special safety instructions

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#### 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!

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#### WARNING

Modules and CPU must NOT be attached or detached to/from the rack under voltage!  
Switch off ibaPADU-S-IT-16 or disconnect power supply before attaching/detaching the modules.

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#### **Important note**

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

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#### CAUTION

Make sure that the cooling fins get optimal ventilation!

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#### **Note**

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

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## 5 System Requirements

### 5.1 Hardware

#### For operation

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

#### For parametrization of the device and for measuring:

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

For further information about PC equipment, please see

<http://www.iba-ag.com>.

- ☐ An FO input card of the ibaFOB-D type (Firmware version beginning with V2.00 build 170):
  - 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 (for Notebooks)
- ☐ FO cable (bidirectional) and/or Ethernet cable

### 5.2 Software

- ☐ ibaPDA-V6 beginning with version 6.30.0
- ☐ ibaLogic-V4 beginning with version 4.2.2



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#### Note

The license for ibaLogic-V4 in connection with the ibaPADU-S-IT-16 runtime system is supplied with ibaPADU-S-IT-16 and does not need to be ordered separately.

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## 6 Mounting, Connecting, Dismounting

### CAUTION

Works on the device must NOT be done when it is under voltage!

### 6.1 Mounting

1. Mount the backplane on an appropriate construction.
2. Connect the ground terminal.
3. Attach the device to the left slot.  
Please take into account that the guiding bolts on the rear side of the device have to be inserted into the corresponding holes on the backplane.
4. Press the device firmly against the backplane and secure it with the fixing screws.



#### Important note

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



Figure 1: Mounting the device

### 6.2 Dismounting

1. Switch off the device.
2. Remove all cables.
3. Hold tight the device and remove the both fixing screws on the upper and the lower side of the device.
4. Pull the device straight from the backplane.

## 7 Device description

### 7.1 Views

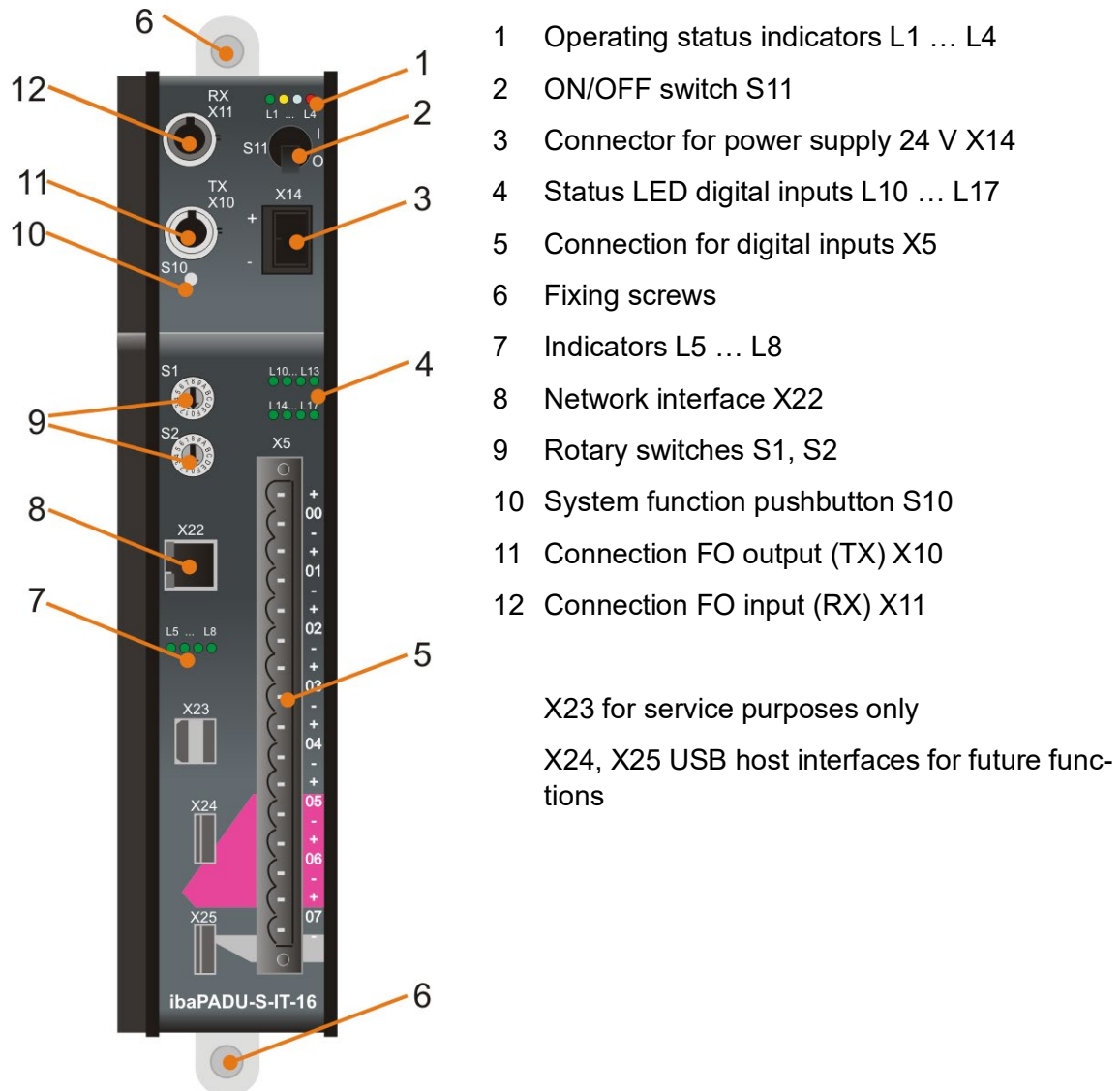


Figure 2: Front view

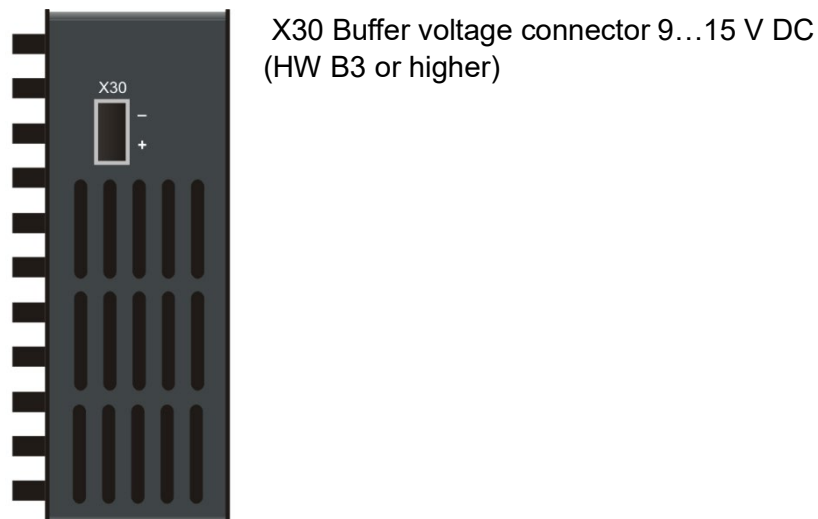


Figure 3: Bottom view

## 7.2 Indicator elements

### 7.2.1 Operating status

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

LED	Status	Description
L1 Green	Flashing (0.5 Hz, every 2 s)	Device is working Deviations in the flashing period point out overload or booting of the device. Booting can take up to 90 s.
	On or Off	Controller halted, device „crashed“, device 100 % processor load (constantly on)
	Fast flashing (about. 10 Hz, every 100 ms)	System programming mode Update mode (v02.06.001 or higher)
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 reception on RX
	Flashing	FO reception existing, FO protocol detected, but does not match the internally defined FO protocol
	On	FO reception OK
L4 Red	Off	Normal status, no faults
	Flashing	Disturbance, applications internal to the device do not run.
	On	Device failure (during start up)



#### 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 Status of digital inputs L10 ... L17

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

LED	Status	Description
L10 ... L17	On	Input is true, Signal ok, logical 1
	Off	Input is false, no signal, logical 0

➤ 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	Switched on, voltage applied
0	Off	Switched off, no voltage applied

When switching off the device and then on again, the supply voltage is switched off and on and the device is rebooted.

### 7.3.2 Rotary switches S1 and S2

With the S1 rotary switch, you can define the iba-FO-transfer protocol and the cascading 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 within the cascade.

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

- ❑ With the two rotary switches S1 and S2, you can define different parameters like e.g. network addresses, subnet mask, default gateway, resetting values to default values.

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 program in ibaPADU-S-IT”



### 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 program in ibaPADU-S-IT"

## 7.4 Communication interfaces

### 7.4.1 Connections FO cables X10 and X11

Process data between ibaPADU-S-IT-16 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.

Connection	Description
X10 output (TX)	FO send interface
X11 input (RX)	FO receive interface

### 7.4.2 Network connection X22

Via the X22 network connection, you can integrate the device into an Ethernet network.

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

- See chapter 12 „Technical Data“

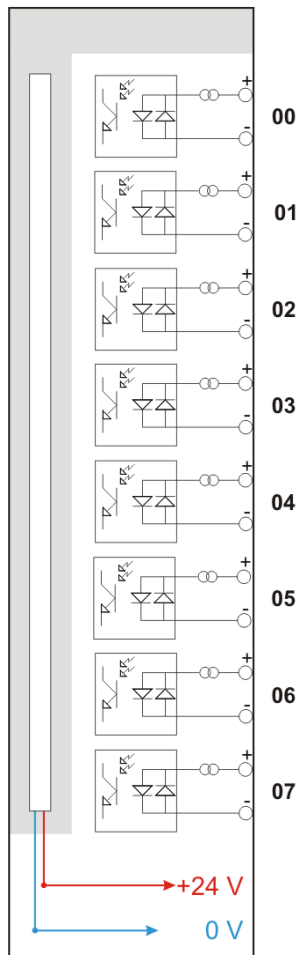


Figure 4: Connection diagram for digital inputs X5

### 7.5.2 Debounce filters

For the digital inputs, there are four debounce filters for each. These can be chosen and configured for each signal independently. You have got the following filters at your disposal:

- ☐ „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.

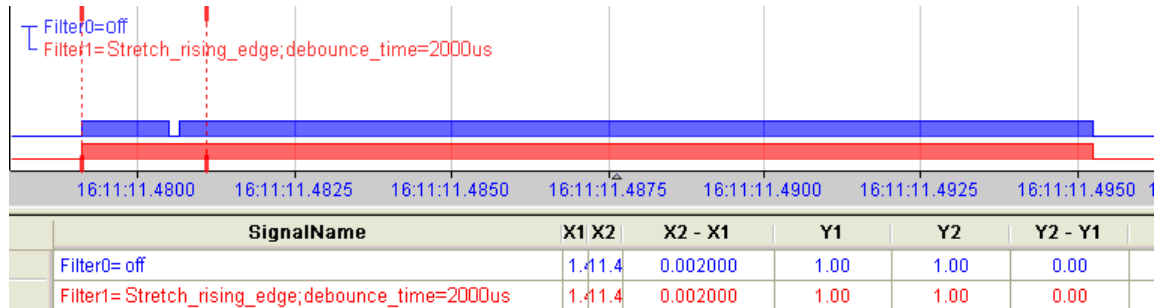


Figure 5: Debounce filter: „Stretch rising edge“

### „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.

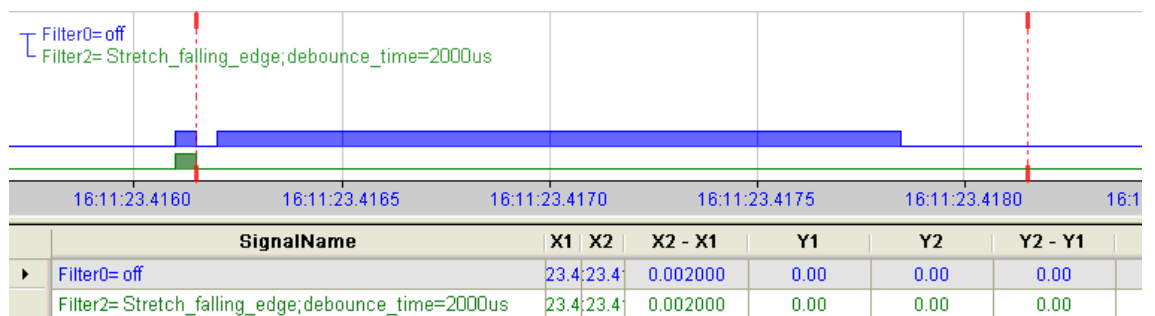


Figure 6: Debounce filter: „Stretch falling edge“

### „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.

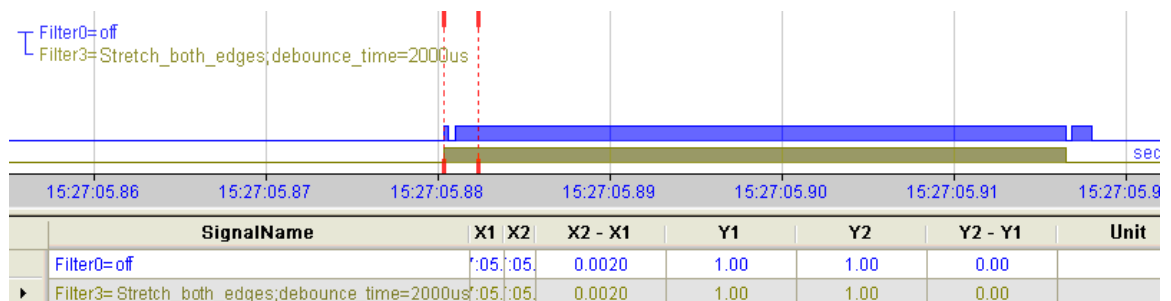


Figure 7: Debounce filter: „Stretch both edges“

### „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.

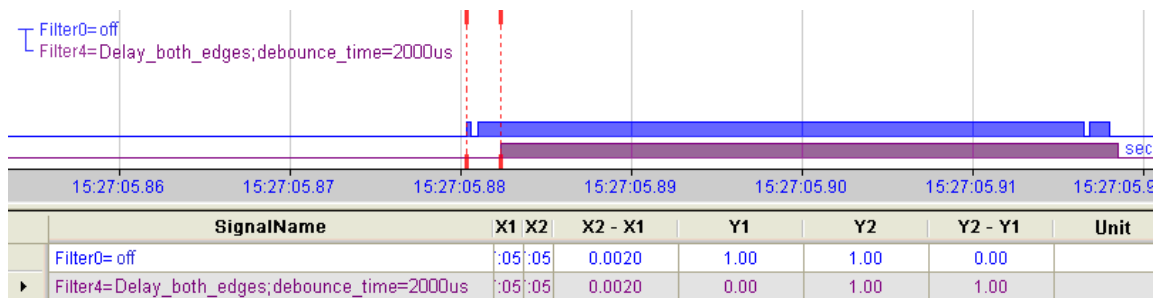


Figure 8: Debounce filter: „Delay both edges“

## 7.6 Voltage supply

### 7.6.1 Voltage supply X14

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

#### **CAUTION**

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

Pay attention to polarity!

### 7.6.2 Buffer voltage X30

The connection of a buffer voltage is supported with hardware version B3 and software version 02.06.001 or higher. The following functions can be buffered in case of a power failure:

- ☐ 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...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-16 combined with ibaPDA and ibaLogic.

#### 8.1.1 Measuring systems with ibaPDA

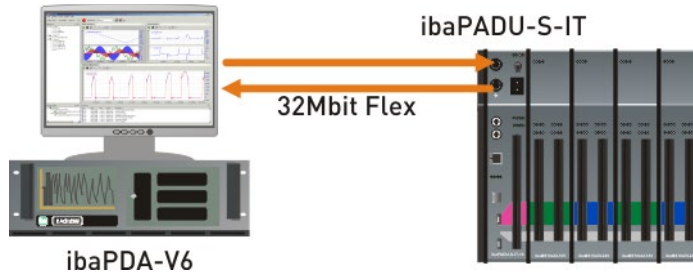


Figure 9: Measuring system with ibaPDA

- Pure measuring applications (capturing, recording, analyzing)
- Recording the signals with ibaPDA

#### 8.1.2 Measuring system with ibaPDA and ibaLogic

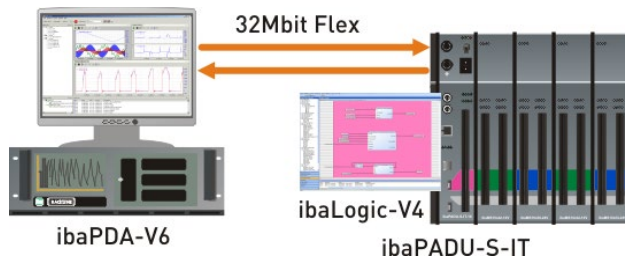


Figure 10: Modular measuring system with intelligent pre-processing

- Pre-processing of signals with ibaLogic (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
- Further possible applications: controlling with measuring in parallel
-

### 8.1.3 Standalone systems with ibaLogic

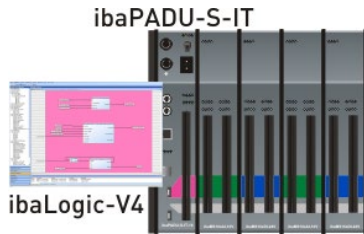


Figure 11: Stand alone system with ibaLogic runtime

- Freely programmable modular system for fast controls

### 8.1.4 ibaPADU-S-IT-16 in hierarchical automation systems

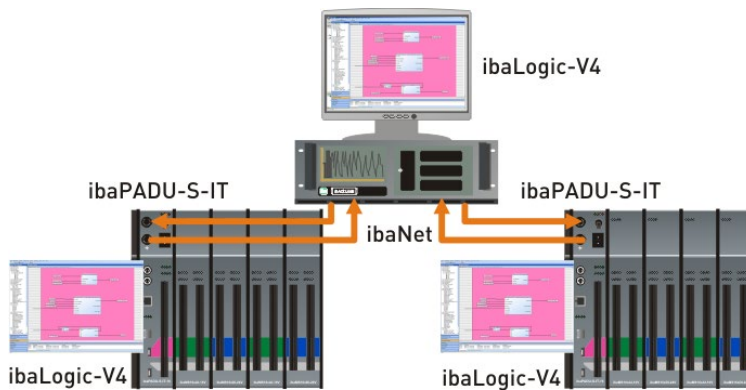


Figure 12: Modular measuring system as fast local controller

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

## 8.2 FO cascading

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

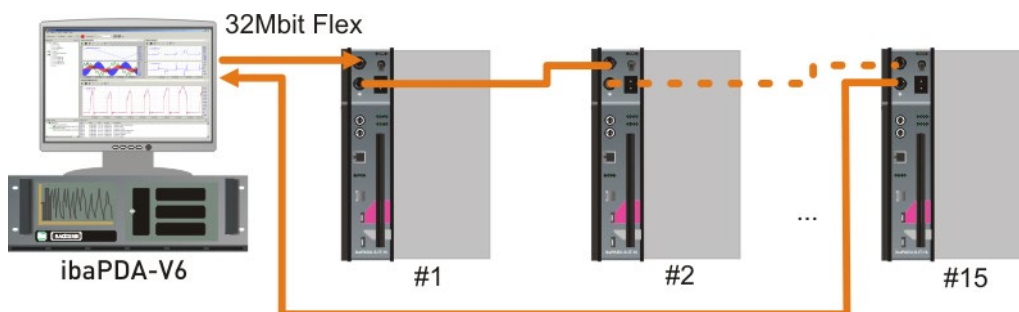


Figure 13: Ring topology with ibaPADU-S-IT-16

The devices are addressed via the S1 rotary switch

Device number in the cascade	Position of rotary switch S1
1 <sup>st</sup> device	1
2 <sup>nd</sup> device	2
⋮	⋮
14 <sup>th</sup> device	E
15 <sup>th</sup> device	F

■

A cascade can be formed with all devices that support the ibaNNet 32Mbit Flex protocol. At the moment, these are the following devices:

- ibaBM-DDCS
- ibaBM-eCAT
- ibaBM-SiLink
- ibaPADU-S-CM
- ibaPADU-S-IT-16

### 8.3 Supported ibaNNet transfer protocols

Protocol	Position of the rotary switch S1	Min. telegram cycle (T <sub>cycl</sub> )	Max. signal sampling frequency	Direction of communication x-directional	Max. data volume (in bytes)	Max. number of participants in FO ring topology
ibaNet 3Mbit	0 <sup>1</sup>	1 ms	1 kHz	uni	136 B (64 Integer-, 64 binary values)	8
ibaNet 32Mbit 50µs	0 <sup>1</sup>	50 µs	20 kHz	uni	144 B (64 Integer-, 64 binary values)	1
ibaNet 32Mbit 100µs	0 <sup>1</sup>	100 µs	10 kHz	uni	288 B (128 Integer-, 128 binary values)	1
ibaNet 32Mbit 1000µs	0 <sup>1</sup>	1 ms	1 kHz	uni	2304B (1024 Integer-, 1024 binary values) or (512 Real-, 512 binary values)	1
ibaNet 32Mbit Flex	1 ... F	Min. 25 µs	Max. 40 kHz	bi	72B at 25µs T <sub>cycl</sub> 3147B at 1ms T <sub>cycl</sub>	15

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

## 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

For the device, 2 accounts (2 users) are set up as default.

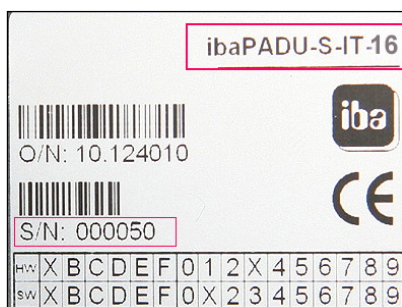
User	Password	Rights
padu	1234	Viewing the Web tabs without system settings No access to „passwords“, „update“ and „ibaLogic“
admin	1234	Changing passwords Displaying and changing network settings Displaying and changing system time Installing updates Loading and starting ibaLogic runtime version

#### 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-16  
 Serial number: 000050  
 → Host name: S-IT-16-000050

Figure 14: Name plate



### 9.1.4 Set back to default settings

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

1. Switch off the device.
2. Position the rotary switches S1 on „6“ and S2 on „9“.
3. Push the system function pushbutton S10, hold it (firmly up 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 S10 system function pushbutton.
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 Webpages allow you to define passwords, configure network settings and time behavior and to install updates.

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

In this chapter, we describe 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.



#### Note

When DHCP is activated, please use the host name for accessing the Websites. If DHCP is not activated (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. As this setting probably does not match the 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 to the network interface of the PC the same subnet address as to the device and assign an 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-16. 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, no DHCP protocol is activated.

---

When DHCP is activated, please proceed as follows:

1. Connect the PC and the device with a network cable to a hub, switch or router. The DHCP server needs to be in the same network.
2. Switch on the device.  
When the L1 LED is flashing consistently, the device is ready for use. 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-IT-16-000050

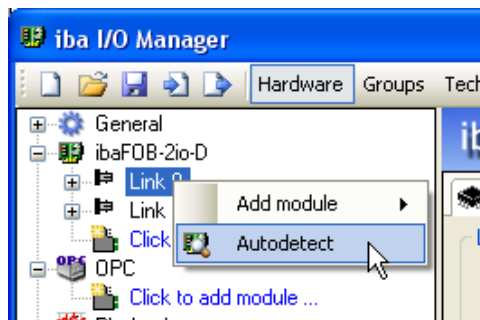
## 9.2.2 Establishing communication to the device via FO cable



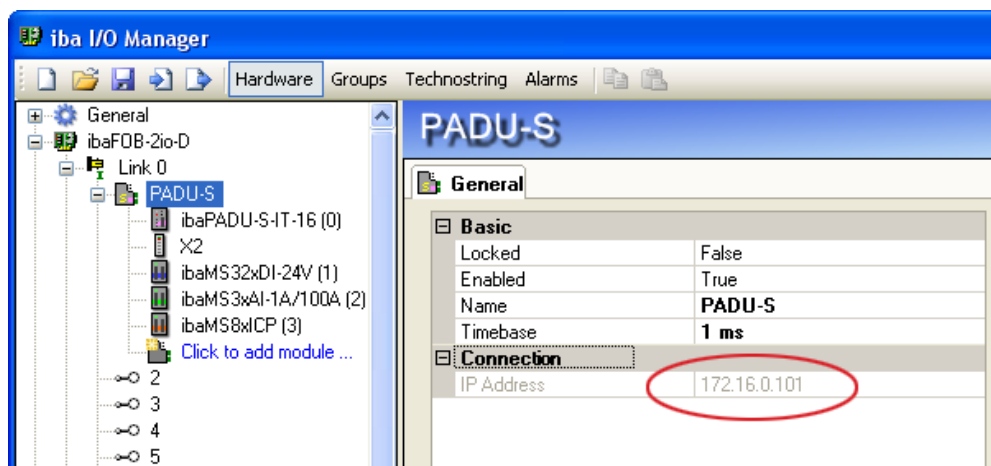
### Tip

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. On the “General” tab, the IP address is shown by which the device can be reached via FO cable e.g. 172.16.0.101.



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, please 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. Please change the network settings in a way, that they match the network addresses.  
Activate DHCP or assign to the device an IP address that can be recognized precisely 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 pushbutton. 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 by means of Hex values.

The LEDs L5...L8 show by flashing, which octet you are 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 pushbutton 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 last IP address is active.
5. Release the S10 pushbutton.
6. Switch off and on the device.

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 pushbutton 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 pushbutton.
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 LEDs of the octet are lighting constantly and the next LED is flashing.


	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


Table 1: Hex values for setting the network address

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 on „C“ and S2 on „0“ and then press S10.  
 1. Octet number „192“ is set.
- L5 ... L8  


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


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


4. L7 lighting up, L8 flashing:  
 Position S1 on „0“ and S2 on „1“ and then press S10.  
 4. Octet „1“ is set.
5. The LEDs L5 ... L8 are not lighting up or flashing any more. The address is saved.
6. As soon as LED L5 is beginning to flash 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 begins to flash 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

Position the S1 rotary switch on the initial position and S2 on „0“.

#### Enabling DHCP protocol

1. Switch off the device with the S11 switch (0 position).
2. Position the S1 rotary switch on „F“ and the S2 rotary switch on „F“.
3. Press the S10 system function pushbutton and hold it pressed (firmly up to the stop point) and switch on the device 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 pushbutton.

**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

You can make the time settings only on the Website.



### Important note

ibaPADU-S-IT-16 cannot store the time without external buffer voltage. If no supply voltage is connected to X14 or the device is switched off with the S11 switch, the device will lose the current time and restart with a default value.

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

Figure 15: Time settings

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-16 system

ibaPADU-S-IT-16 offers two possibilities for synchronizing the local time:

- ☐ NTP protocol
- ☐ DCF77

#### NTP protocol

You can set the ibaPADU-S-IT-16 internal system time via the NTP protocol, provided that an Ethernet connection (X22) is established to the Internet or a local NTP server.

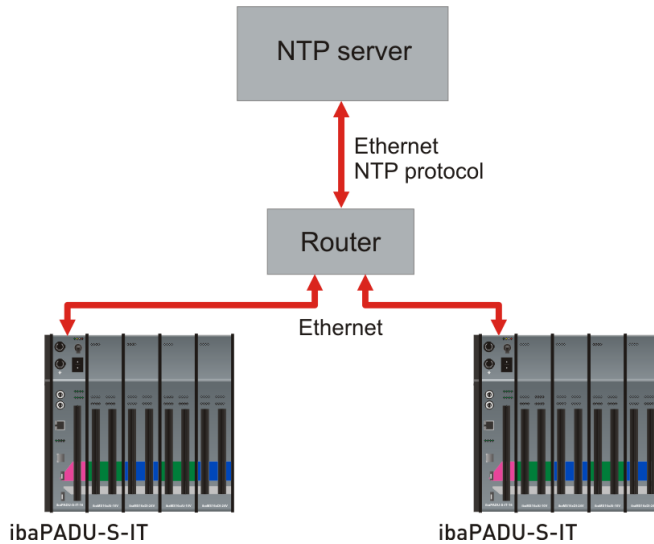


Figure 16: Time synchronization with NTP protocol

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"/>
--	---------	---

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

## DCF77

The ibaPADU-S-IT-16 internal system time can be synchronized on an external DCF77-clock. The DCF77 signal is fed in via any of the digital input channels.

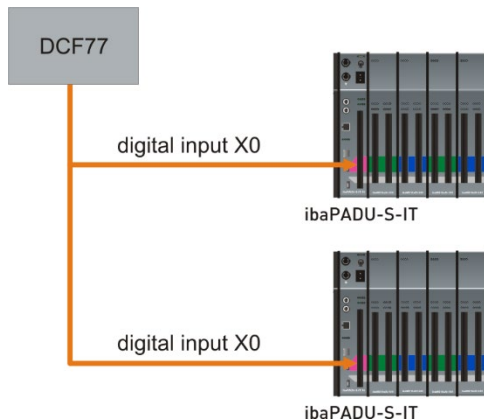


Figure 17: Setting the time by using DCF77 signal

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-16 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>.

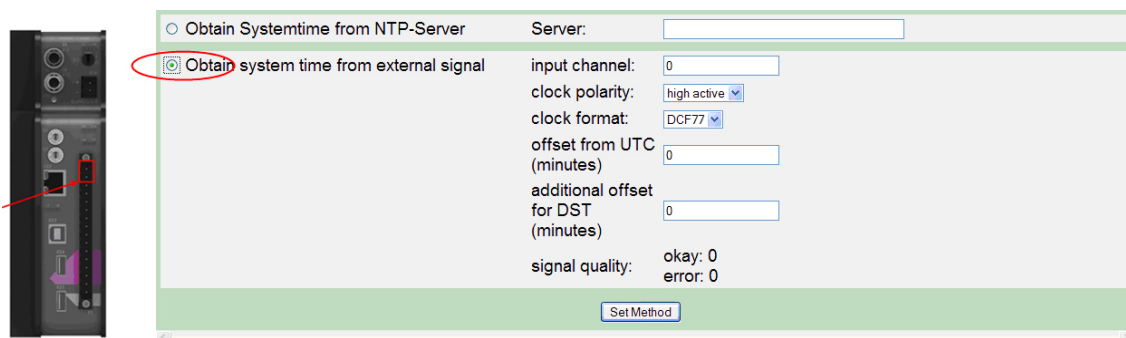


Figure 18: Time settings

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.



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**Important note**

This chapter describes how to synchronize the local time of an ibaPADU-S-IT-16 system.

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**Other documentation**

Moreover, an additionally connected ibaPDA measuring system can be synchronized via any digital input (e.g. ibaPADU-S-IT-16 or a digital input module), please refer to ibaPDA-V6 manual.

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## 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 Webbrowser 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) ...
Ethernet TCP/IP interface (DHCP)	e.g. S-IT-16-000050
Ethernet TCP/IP interface (fixed IP address)	e.g. http://192.168.1.1
FO cable ibaNet 32Mbit Flex	e.g. http://172.16.0.101



## Important note

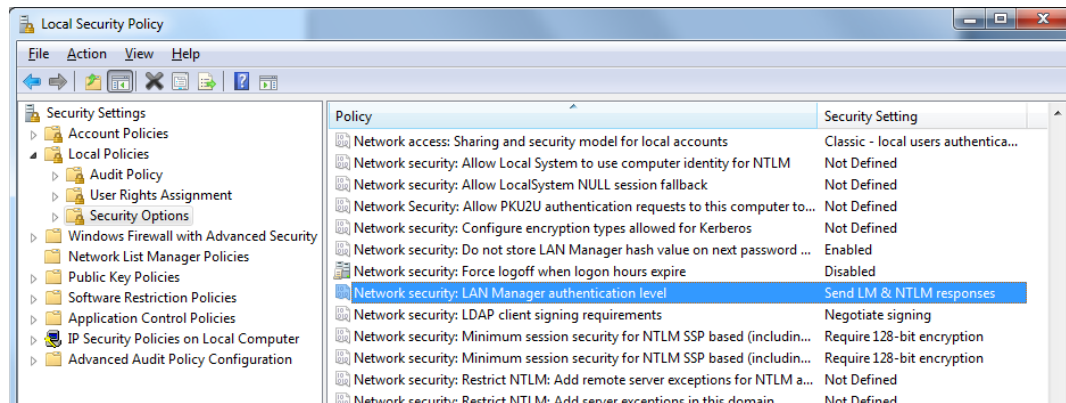
### ibaPADU-S using Windows 7, Windows Vista, Windows Server 2008

When working under Windows 7, Windows Vista or Windows Server 2008, you might not get access to the Webpage 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"**



You will find the registry entry on the „ibaPADU-S Modular“ CD.



## 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.



Figure 19: Start page

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
update	Installing updates	-	X
digital inputs	Displaying technical data for digital inputs	X	X
ibaLogic	Displaying the ibaLogic 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.

You have got access to the tabs and settings, depending if you are logged in as “admin” or “padu”.

#### 9.4.2.1 “Info” tab

On the “info” tab, general information about the device or the modules is displayed. You cannot change the values on the “info” tab.

Module 0 : ibaPADU-S-IT-16

info	firmware	passwords	network	time	update	digital inputs	ibaLogic	notes
Serial number: 000050								
Hardware version: A6								
Software version: D1								
Processing unit								
Clock rate: 1600 MHz								
Installed Memory: 512 MB								
Used Memory: 30 MB								
Network connectivity								
Optical: Baudrates available: 32, 3.3 Mbit/s								
Ethernet: 100 Mbit/s								
USB Host: 2.0								

Figure 20: “info” tab

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.

[illegible]

Figure 21: “firmware” tab



## 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-16

info

firmware

eventlog

passwords

network

time

update

digital inputs

ibaLogic

notes

```

===== (Re)Start Device =====
[Update] Update started
[Update] Update done
===== (Re)Start Device =====
===== (Re)Start Device =====
[Update] Update started
[Update] Update done
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====
[Update] Update started
[Update] Update done
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====
===== (Re)Start Device =====

```

clear event log

Figure 22: “eventlog” tab

#### 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

Figure 23: “passwords” tab

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. Then, please 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-16

Figure 24: “network” tab

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 Webbrowser. You can also give meaningful names from a technological point of view

that have some relation to the installation or the process. Click on the <change name> button, for applying the name you have entered.

☐ **Enable DHCP**

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

☐ **IP Address, Subnet Mask, Default Gateway**

If you want to assign a fixed network address to the device, please ask the network administrator for these parameters and enter them. For applying the changed network settings, please click on the <submit> button. If you have made a mistake when typing the address, please click on the <reset entries> button. The settings are reset to the last valid version.

☐ **Fiberoptic**

Here, the fixed IP address is shown, the FO connection addresses the device with. This address cannot 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. This function is available with firmware version v02.05.002 or higher.

#### **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 “update“ tab**

On the “update“ tab, you can only as “admin“ transfer updates of the device software (Firmware) to the device and execute it.

➤ For a detailed description, please see chapter 10.1 "Update via Web Interface".

#### **9.4.2.8 “digital inputs“ tab**

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



Module 0 : ibaPADU-S-IT-16

info	firmware	eventlog	passwords	network	time	update	digital inputs	ibaLogic	notes
Process-IO									
digital input channels	8								
grouping	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					
sample rate	max. 40			kHz					
frequency range	0 ... 20			kHz					

Figure 25: “digital inputs” tab

#### 9.4.2.9 “ibaLogic” tab

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

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

Module 0 : ibaPADU-S-IT-16

info	firmware	eventlog	passwords	network	time	update	digital inputs	ibaLogic
Installed version:	4.2.2.0			update...				
Running:	no			start				
Autostart:	disabled			enable				
Persistent Image:	not present							

Figure 26: “ibaLogic” tab

- ☐ Installed version  
Currently installed version of the ibaLogic runtime system (PMAC)  
<update...>: installing update
- ☐ Running  
Status of the ibaLogic 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
- ☐ Persistent Image  
Displaying if an ibaLogic program is stored on ibaPADU-S-IT-16, which can be started automatically triggered by autostart of the PMAC.

#### 9.4.2.10 “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 on the device.

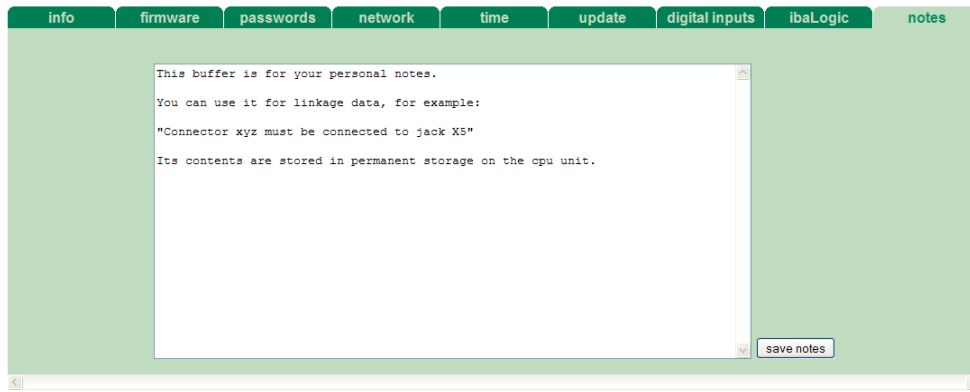


Figure 27: “notes” tab

## 10 Updates

An update can be installed in two different ways:

- ☐ Web interface ibaPADU-S-IT-16 (also see chapter 9.4.2.7 “update“ tab)
- ☐ ibaPDA beginning with version 6.27.0

No matter which of the both ways you choose to install an update: the progress of the update is shown by the LEDs L5 ... L8. Beginning with L5, the LEDs are flashing one after another, at first in orange and then in green and at a slower rate. When the update is finished, the device is rebooted.



Please 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 PMAC is deactivated and the existing ibaLogic application deleted. Furthermore, an update of the ibaLogic-V4 software (ibaLogic Clients) might be necessary.

### 10.1 Update via Web Interface

- ☐ Start the ibaPADU-S-IT-16 Website in your browser.
- ☐ On the “update“ tab, click on the <Browse...> button and choose the <padusit\_v[xx.yy.zzz].iba> update file.
- ☐ By clicking on <Start Update>, you start the update.

#### Module 0 : ibaPADU-S-IT-16

Figure 28: Update via Web interface

## 10.2 Update via ibaPDA

- ☐ Open the ibaPDA I/O Manager and choose the PADU-S module in the tree structure.
- ☐ On the “Diagnostics” tab, click on the <Write firmware> button and choose the “padusit\_v[xx.yy.zzz].iba” update file.
- ☐ You start the update by clicking on <OK>

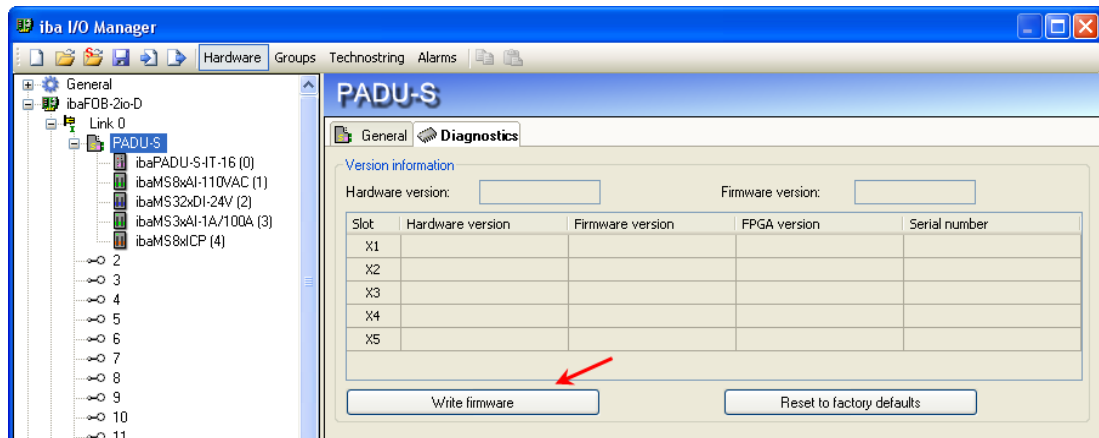


Figure 29: Update via ibaPDA

## 10.3 Updating the modules

After having mounted the modules and applied the voltage to the central unit, ibaPADU-S-IT-16 detects the modules and checks the software version.

ibaPADU-S-IT-16 has a so called “overall release version”. This version contains the current software version of the central unit as well as the software versions of the modules. You can find the “overall release version” on the ibaPADU-S-IT-16 Website on the „firmware“ tab, see chapter 9.4.2.2, “firmware“ tab”.

When the software version of a module does not match the “overall release version” of the central unit, ibaPADU-S-IT-16 does an automatic up- or downgrade of the module. Thereafter, the module is ready to be used.



### Important note

After the update, ibaPADU-S-IT-16 reboots. This can take up to 5 minutes. As soon as the green system LED L1 is flashing regularly and none of the LEDs L5 ... L8 is on, the device can be used again.



### Important note

The “overall release version” contains all modules developed up to the date of release of this firmware and the corresponding software 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. You will also find it on the “ibaPADU-S Modular” CD-ROM, included in delivery of the module.

## 11 iba applications

### 11.1 ibaLogic-V4

You can use ibaPADU-S-IT-16 – in cooperation with ibaLogic – for the following applications: individual signal processing, control applications or stand-alone applications. ibaLogic programs can be loaded in the device as runtime versions and run there autonomously.

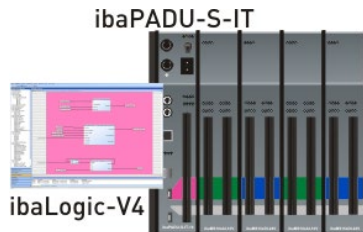


Figure 30: Example ibaPADU-S-IT-16 as standalone system with ibaLogic runtime

#### General procedure:

- ☐ Configure ibaPADU-S-IT-16 as platform
- ☐ Configure signals as inputs and outputs
- ☐ Configure the evaluations in the program designer
- ☐ Save the project on ibaPADU-S-IT-16. There, it can run autonomously without server/client.



#### Note

Saving the project on the platform ensures, that the autostart function of the loaded ibaLogic is activated on ibaPADU-S-IT-16.

#### 11.1.1 Configuring ibaPADU-S-IT-16 as platform

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

Establish a connection between ibaPADU-S-IT-16 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 Client in the „File – New“ menu.

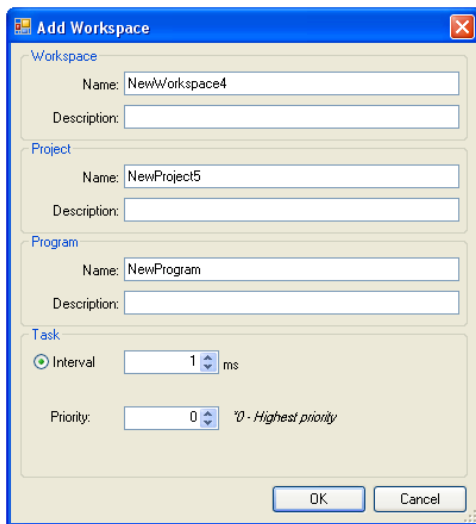


Figure 31: Add workspace in ibaLogic

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

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

Configure ibaPADU-S-IT-16 as platform via the “Tools – Platform configuration” menu.

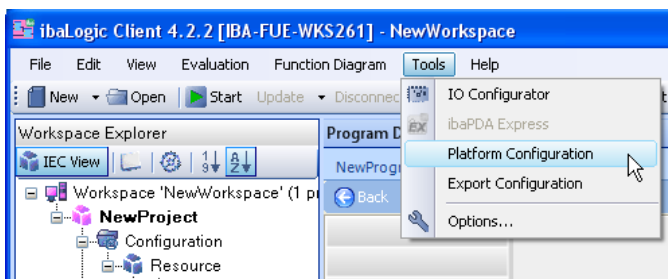


Figure 32: Start platform configuration

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

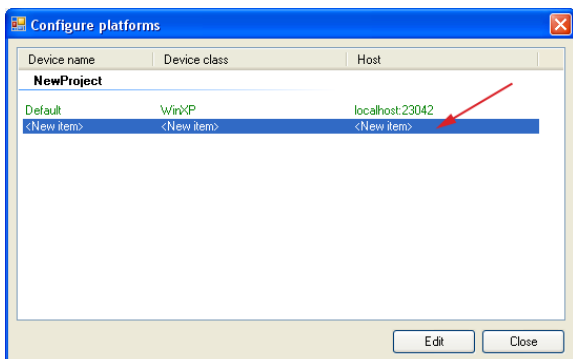


Figure 33: Configuring a new platform

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

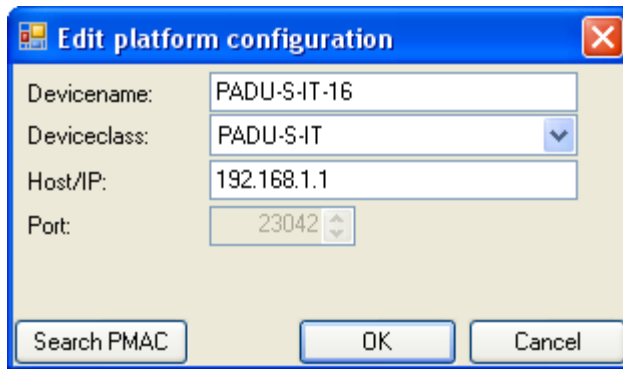


Figure 34: Edit platform configuration

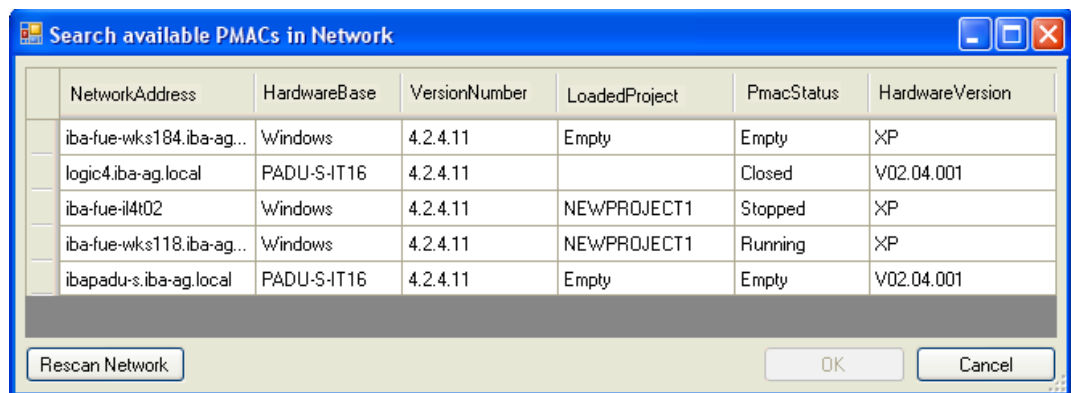
Choose the PADU-S-IT-16 device class and enter the host name or the IP address of the ibaPADU-S-IT-16 device, the ibaLogic program is to run on.

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

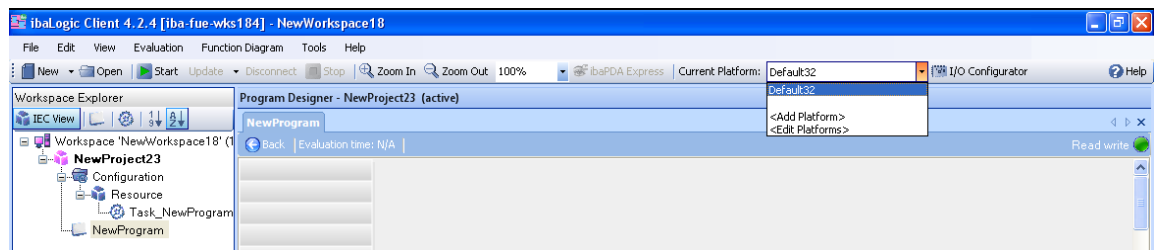


### Tip

With a click on <Search PMAC> the ibaPADU-S-IT-16 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-16 is configured as platform, yet, you can choose the platform via the dropdown box in the menu line.

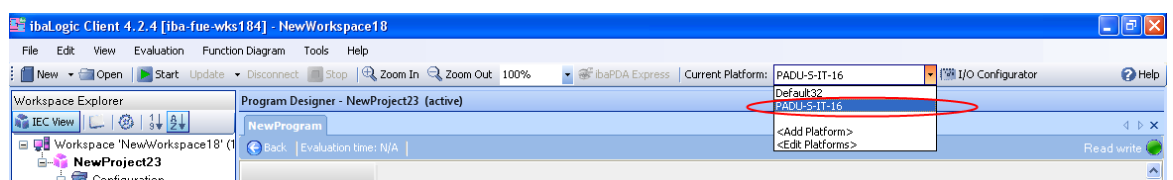
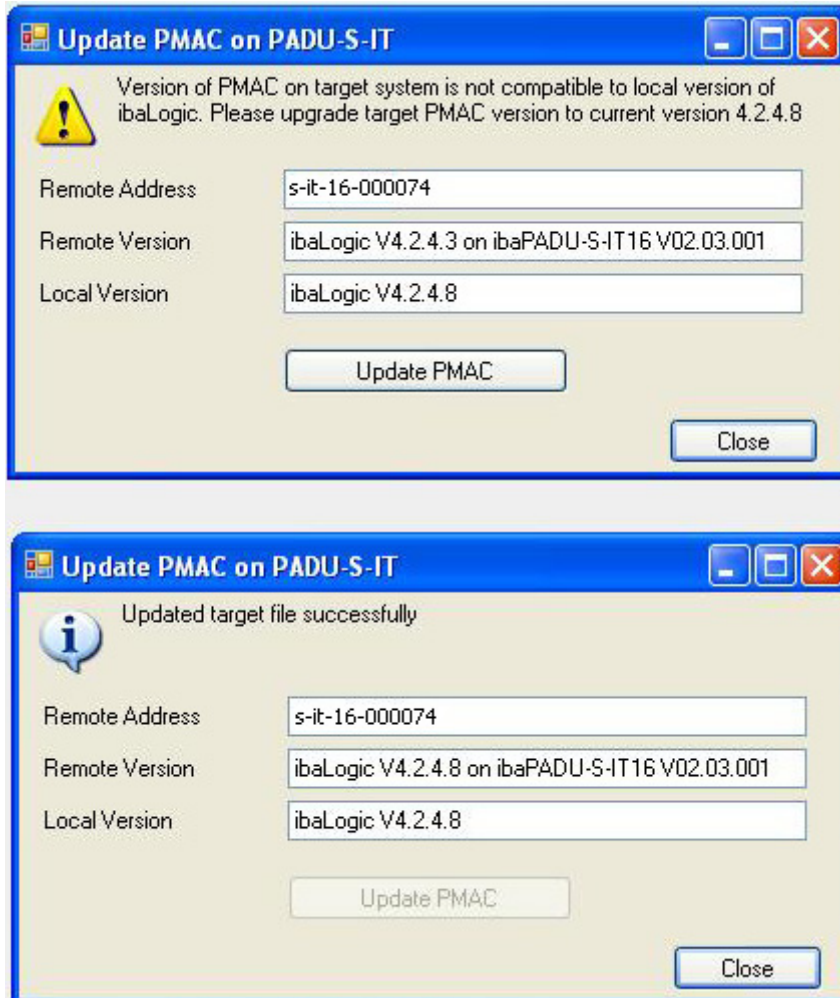


Figure 35: Choose platform in the menu line

### 11.1.2 Automatic update of the ibaLogic version

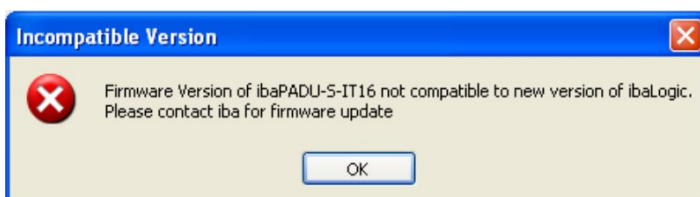
Beginning with ibaLogic V4.2.4, the application verifies when configuring an ibaPADU-S-IT-16 platform or starting an ibaLogic program, whether the ibaLogic runtime version of ibaPADU-S-IT-16 is compatible to the ibaLogic version. If not, you are asked automatically to update the ibaPADU-S-IT-16.



#### Important note

An automatic update of the ibaLogic runtime on ibaPADU-S-IT-16 requires a release version beginning with v02.04.001 of ibaPADU-S-IT-16.

With an ibaPADU-S-IT-16 version lower than v02.04.001, it will also be displayed, if it is necessary to update the firmware of ibaPADU-S-IT-16. Please contact the iba support.





### 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 then detects all available modules.

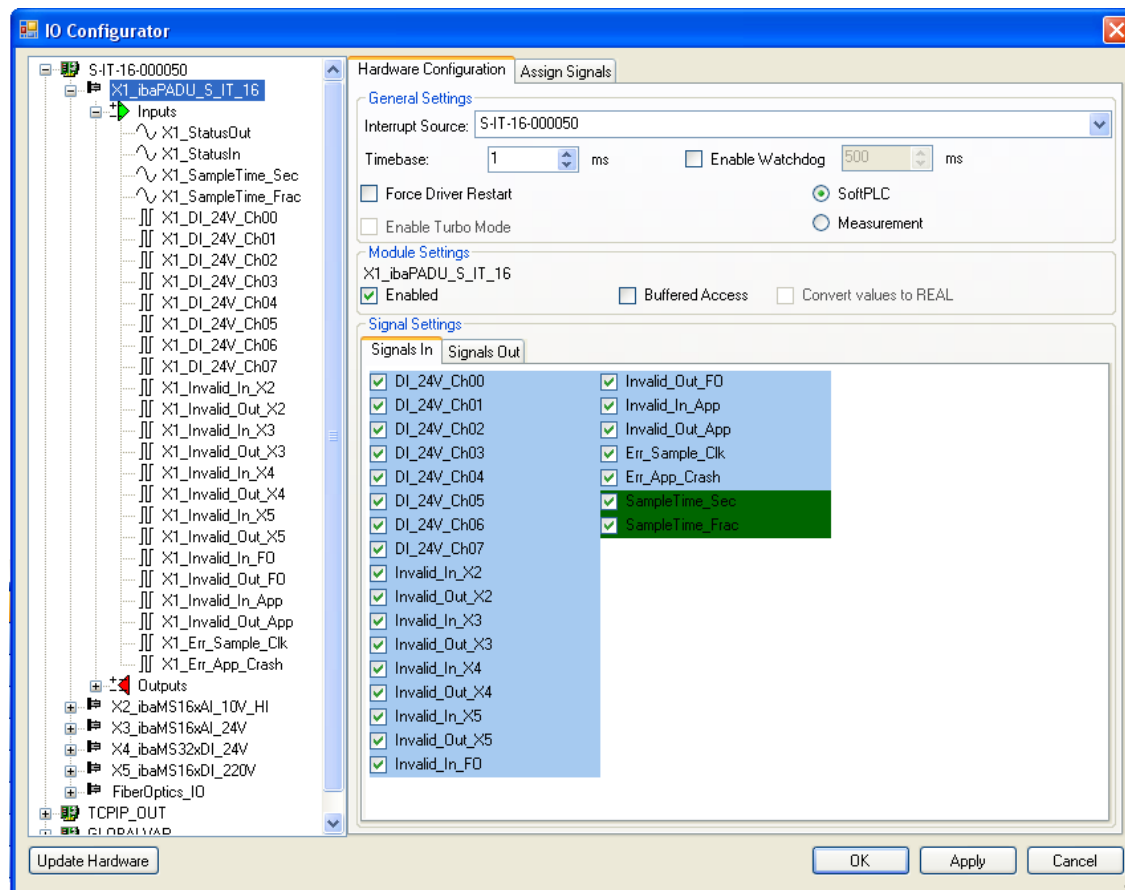


Figure 36: „Inputs“ in the hardware configuration

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 and all available resources.

If ibaPADU-S-IT-16 is configured as platform, it is offered as Interrupt source only for ibaPADU-S-IT-16.

Under “time base”, you set the smallest possible cycle time. The “Enable Watchdog” function is not released for ibaPADU-S-IT-16, yet.

The “Force Driver Restart” function, is not needed for ibaPADU-S-IT-16.

If „SoftPLC“ is enabled, the last current value is processed. If „Measurement“ is enabled, the last value, that has not been processed, yet, is taken.



#### Other documentation

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

Under “Module Settings“, ibaPADU-S-IT-16 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 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. Sample Time.

The meaning of the signals:

Signal	Meaning
<b>Inputs</b>	
DI_24V_Ch[00...07]	Digital input signals of ibaPADU-S-IT-16
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)
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
<b>Outputs</b>	
DebType_Ch[00...07]	Debounce filter for digital signals
DebTime_Ch[00...07]	Debounce time for the single digital signal
SampleTime	Sample time for buffered access
<b>Additional signals for buffered access</b>	
SampleTime_Sec	Time period since system start in seconds

SampleTime_Frac	Fractions of this second (1 s = 4,294,967,295 fractions)
BufferFillCount	Counter, when buffer is filled
BufferOverrun	Counter for Buffer-overrun
<b>Additional output signals for buffered access</b>	
BufferSize	Buffersize
SubSampling	Subsampling of the signals

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

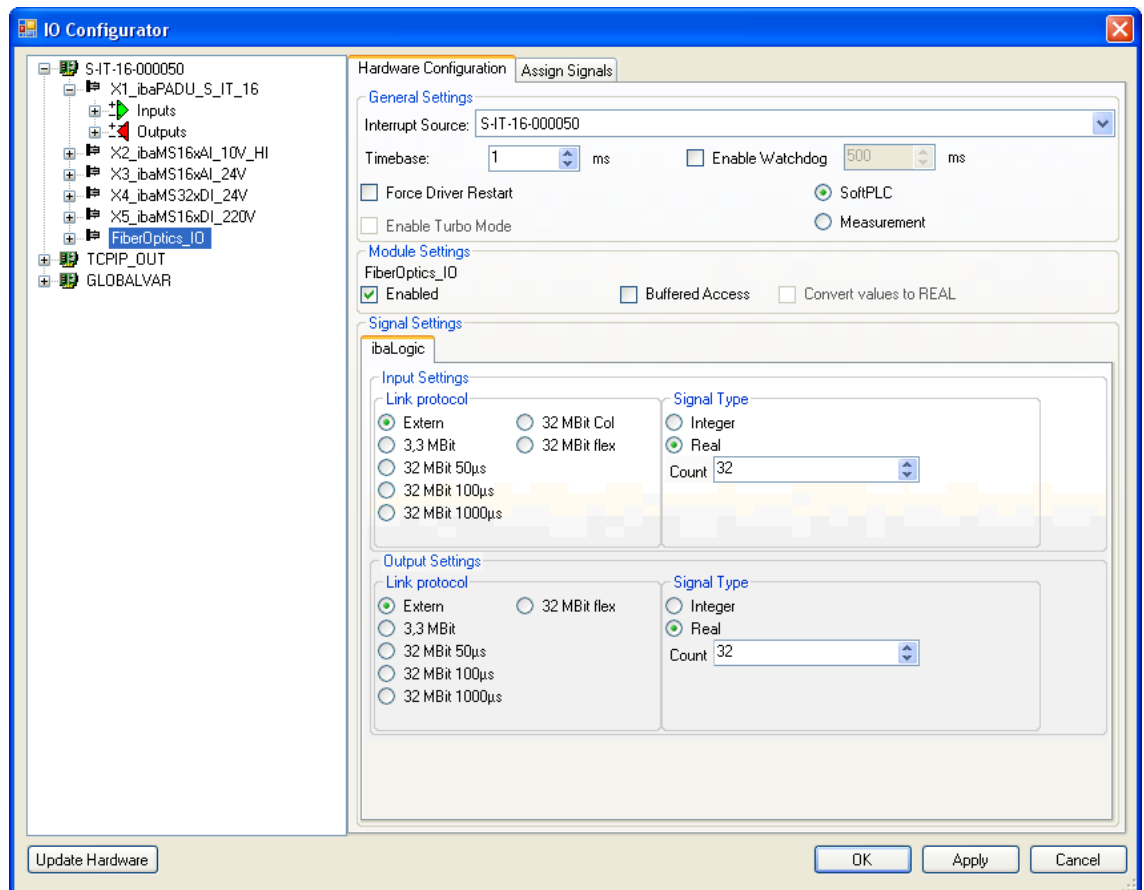


Figure 37: FO interface in the hardware configuration

In the FiberOptics\_IO module, you can define which FO transfer protocol ibaPADU-S-IT-16 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-16 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 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 on 1-F. For all other settings S1 = 0.

#### Use with ibaPDA:

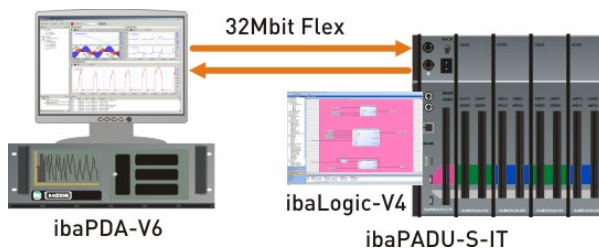


Figure 38: Modular measuring system with intelligent pre-processing

In the example above, “External” has to be chosen as FO protocol for input and output. The communication between ibaPADU-S-IT-16 and ibaPDA is done in the 32Mbit Flex mode.

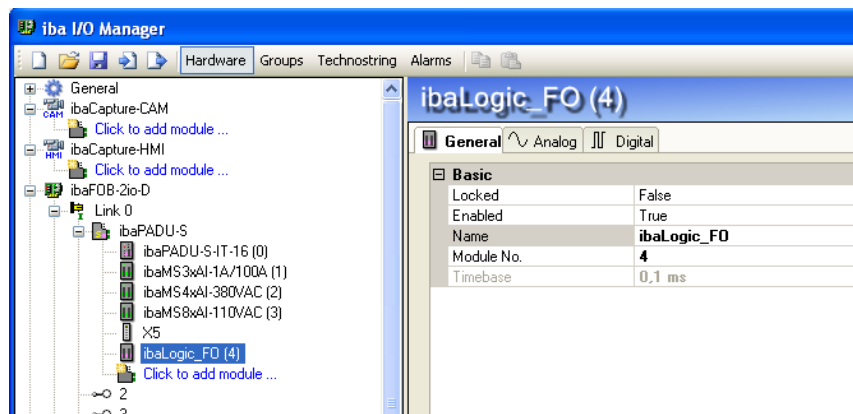


Figure 39: ibaLogic as module in ibaPDA

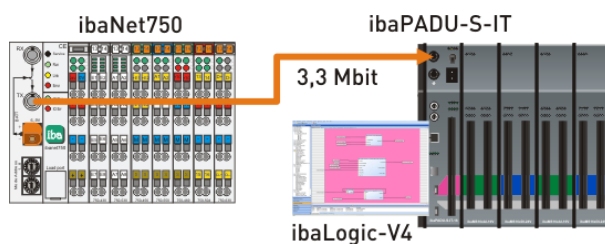
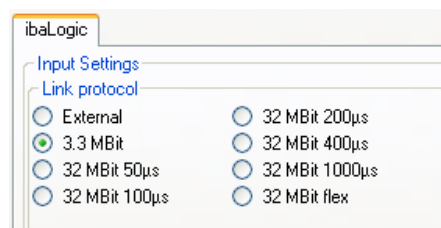
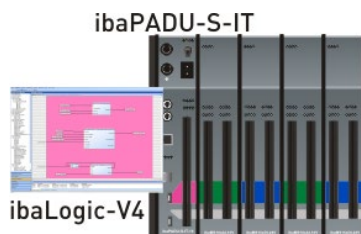
**Use with ibaNet750:**

Figure 40: Coupling of a modular I/O system to ibaPADU-S-IT-16

In the second example, the ibaNet750 I/O system is coupled to the iba-PADU-S system via 3.3Mbit. 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 on 0.

**Stand-alone system with ibaLogic-V4:**

When ibaPADU-S-IT-16 is used as stand-alone system with ibaLogic 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. Please, mark the modules in the signal tree and drag them to the “Assign signal” tab while keeping the mouse button pressed.

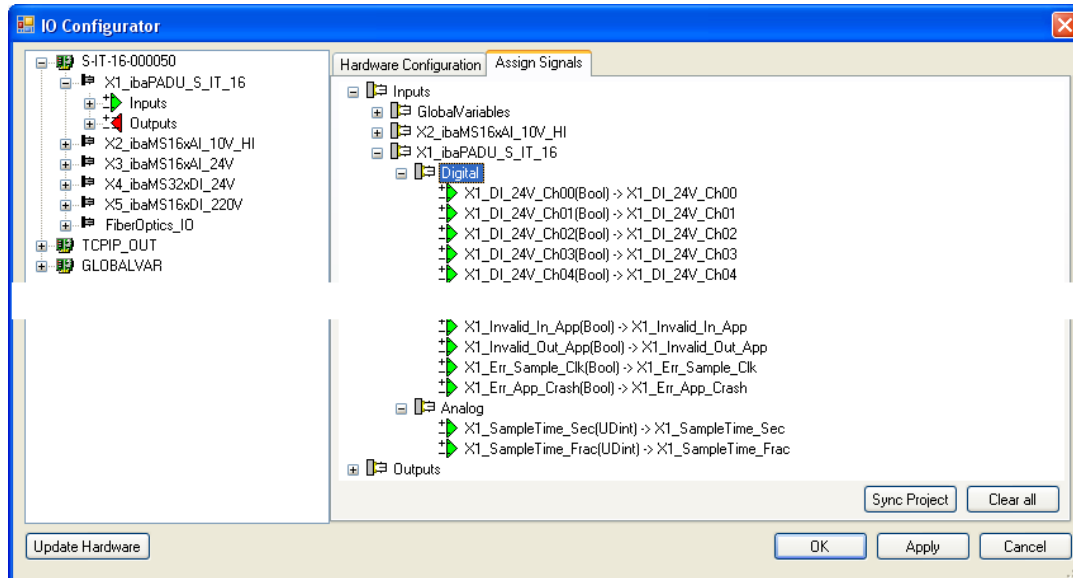


Figure 41: Assign signals

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

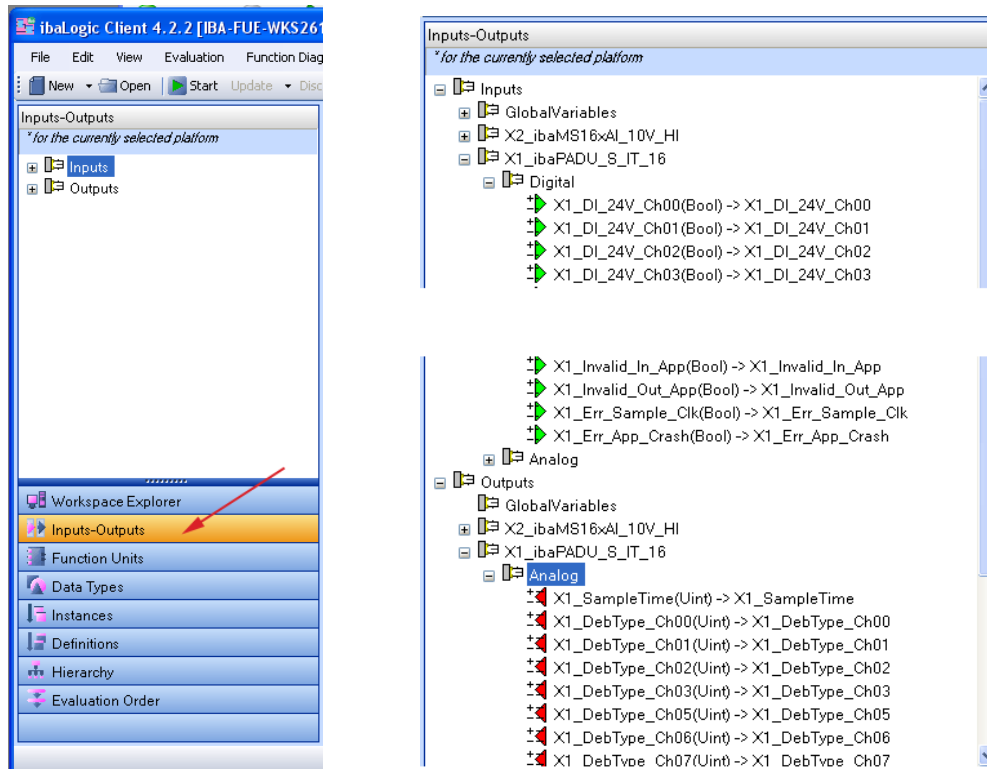


Figure 42: Signals as inputs and outputs

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-16 CPU.



### Other documentation

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

#### 11.1.4 DAT\_FILE\_WRITE function block

Using a DAT\_FILE\_WRITE (DFW) function block data can be stored in the local memory of ibaPADU-S-IT-16. 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-V4 manual.

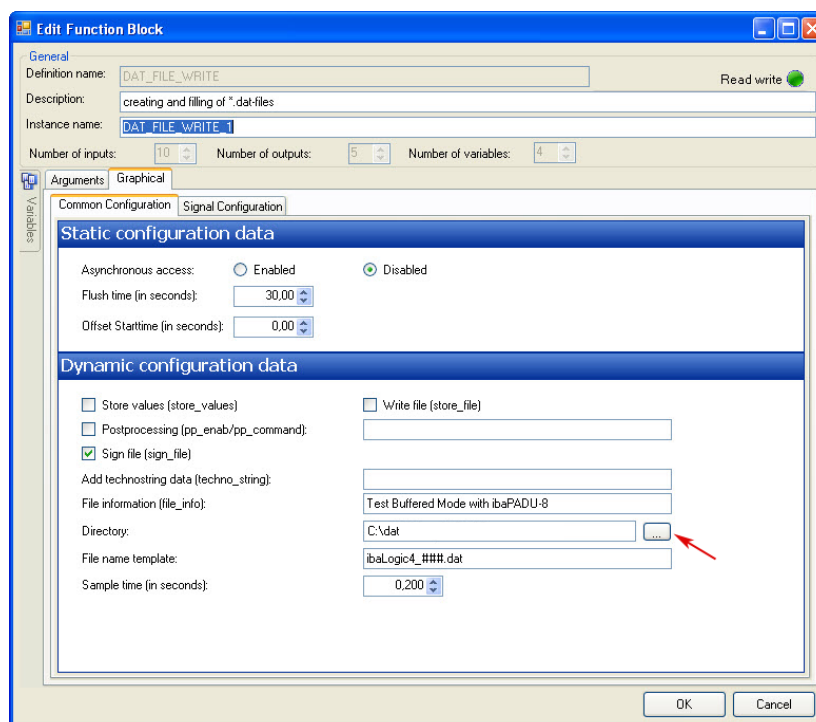


### Important note

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

The default setting in the directory field is "C:\dat". Further subdirectories can freely be configured.

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



The measuring files saved on ibaPADU-S-IT-16 can be downloaded manually or by means of the ibaDatCoordinator software.

In order to access the data with ibaDatCoordinator, a file path must be specified within the application:

\\<IP or hostname of ibaPADU-S-IT>\RamDisk (and optional “\dat”, if it was configured so in the function block DAT\_FILE\_WRITE of ibaLogic project with the default directory = C:\dat (starting with ibaLogic-V4\_v4.2.4)), e.g. \\ibapadu-s\dat.



### Note

This access is solely possible via the Ethernet TCP/IP interface X22.

## 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.

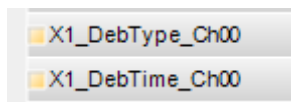


Figure 43: Output signal on the margin of the programming surface

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.

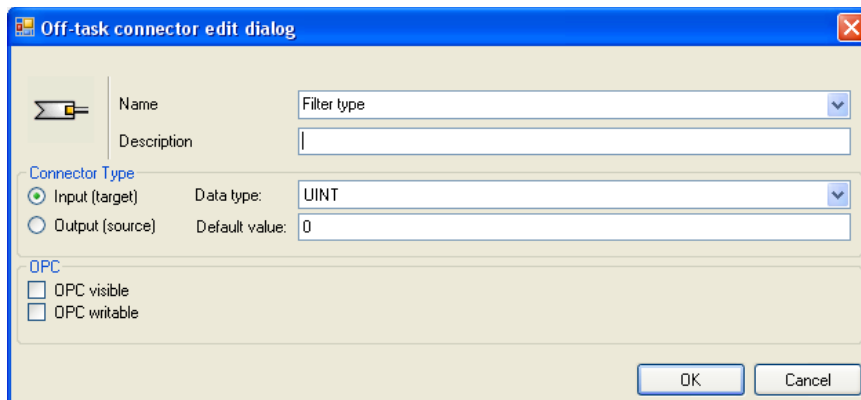


Figure 44: Editing Off-task connector

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.



Figure 45: Connecting Off-task connector

### 11.1.6 Saving the ibaLogic program on runtime

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

Choose „Evaluation - Start“

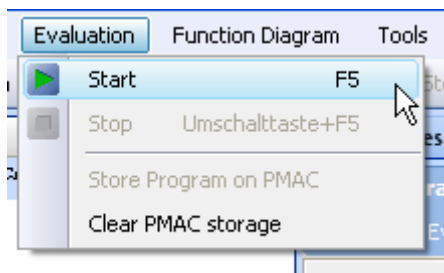


Figure 46: Compiling the program

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 “.

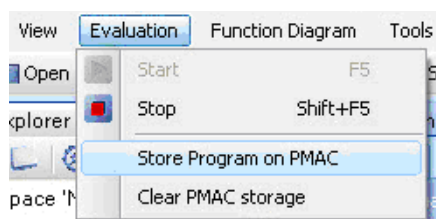


Figure 47: Storing program on PMAC

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-16 Website, the ibaLogic program is started automatically after you have switched on the device.

#### Module 0 : ibaPADU-S-IT-16

info	firmware	eventlog	passwords	network	time	update	digital inputs	ibaLogic
Installed version:	4.2.2.0			update...				
Running:	yes			stop				
Autostart:	enabled			disable				
Persistent Image:	present							

Figure 48: Autostart enabled

### 11.1.7 Deleting an ibaLogic program in ibaPADU-S-IT-16

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

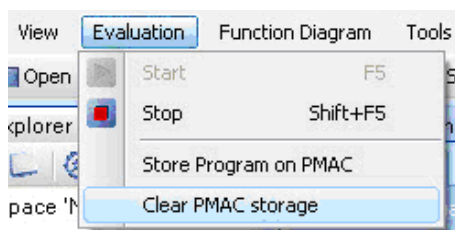
1. Switch off the device
2. Position the S1 rotary switch on „F“ and the S2 rotary switch on „C“.
3. Press the system function pushbutton S10 and keep it pressed (firmly up to the stop point) and switch on the device again.
4. Wait for the green LED L1 to flash rapidly. This can take some time. The ibaLogic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



#### 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 „Evaluation – Clear PMAC storage“.



## 11.2 ibaPDA-V6

With ibaPDA-V6, you can configure, capture and record the analog and digital signals of the connected modules.



### Important note

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



### Important note

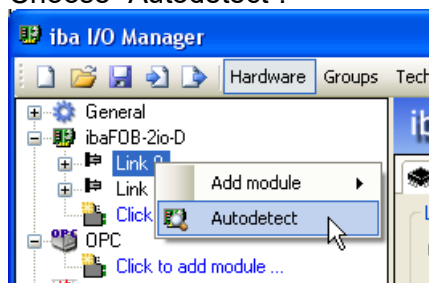
If in ibaPADU-S-IT-16, the ibaLogic runtime system for pre-processing the signals is enabled, you need to pay attention that all settings and ibaPDA and ibaLogic fit each other. The following parameters have to be considered:

- ibaLogic-V4: Sampling time of the buffered input signals,  
ibaPDA-V6: Time base for the PADU-S module
- ibaLogic-V4: Configuration of the debounce filter (filter type, debounce filter)  
ibaPDA-V6: Configuration of the debounce filter
- ibaLogic-V4: FO protocol (external)  
ibaPDA-V6: FO protocol (32Mbit Flex)  
ibaPADU-S-IT-16: Switch position S1 ≥ 1

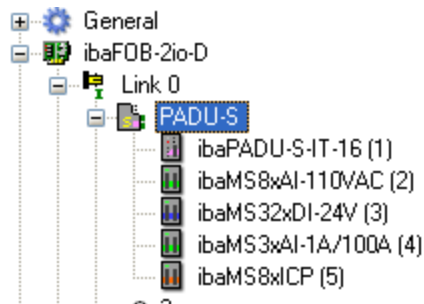
### 11.2.1 Configuration in the I/O Manager

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

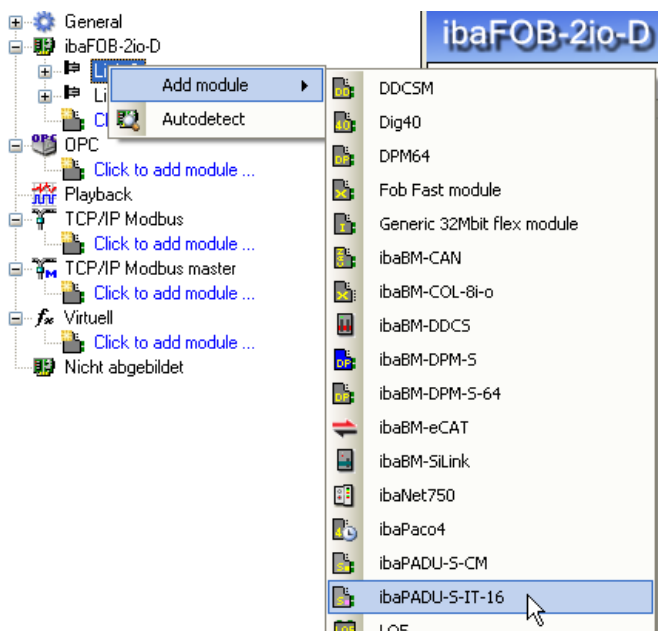
1. Look in the I/O Manager for the link of the FOB-D card, ibaPADU-S-IT-16 is connected to. Click with the right mouse button on the link. The submenu is opened. Choose "Autodetect".



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



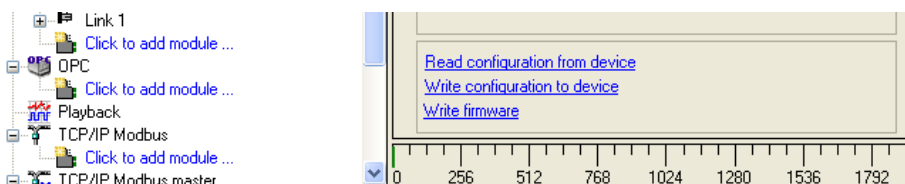
2. If ibaPDA does not detect the device automatically, you can add the device manually.
3. Click with the right mouse button on the connection (Link) of the ibaFOB-io-D card, the device is connected to.
4. Choose “Add module“. The list of the available modules is displayed. Choose “ibaPADU-S-IT-16“.



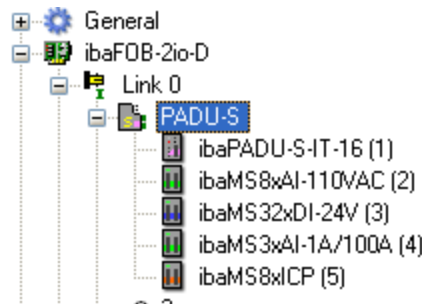
Now, the device is shown in the module tree.

Drag the device to the address that is set on the device with the S1 rotary switch (Link 1 – 15 under the device), while keeping the right mouse button pressed:  
Position 1 – F corresponds to address 1 – 15.

5. Click on the “General” tab on “Read configuration from device“.



The connected modules are detected automatically and shown in the signal tree.



6. Configure ibaPADU-S-IT-16 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

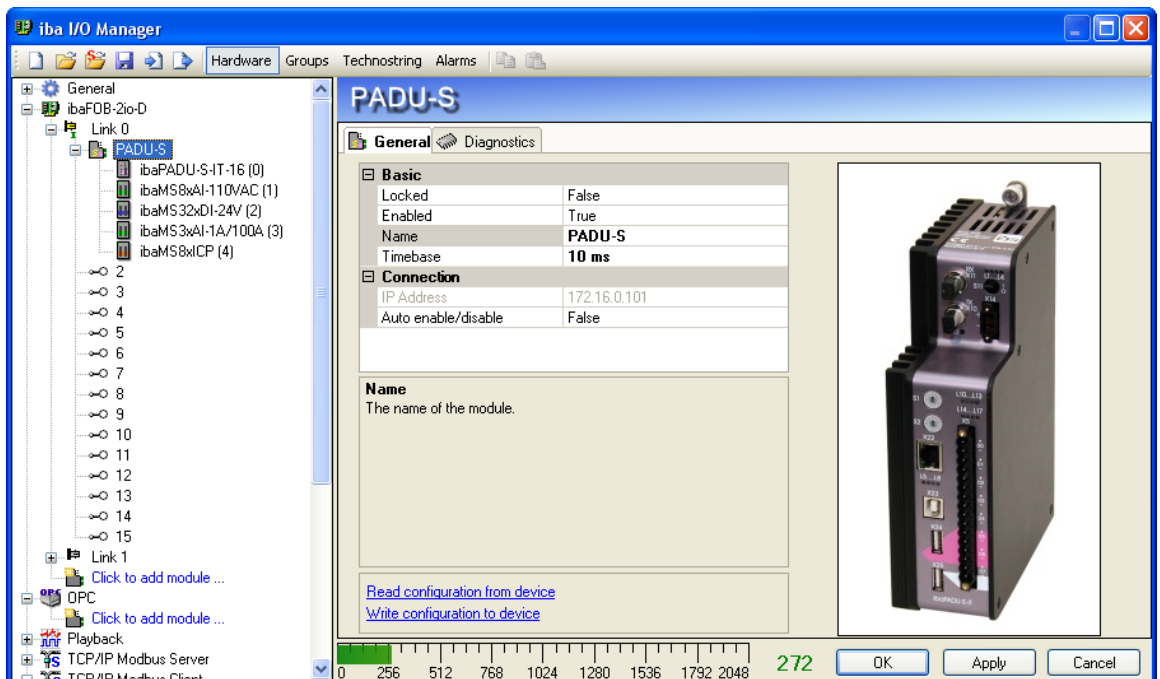


Figure 49: PADU-S module – “General” tab

### Basic settings

- ☐ Locked  
A locked module can only be changed by an authorized user.
- ☐ Enabled  
Data capturing for this module is enabled.
- ☐ Name  
You can enter a name for the module.
- ☐ Timebase  
Specifies the time base for data capturing that is used for ibaPADU-S-IT-16 and the connected modules.

## Connection

### ☐ IP address

The IP address or the host name of the ibaPADU-S-IT-16 device (only for information).

### ☐ Auto enable/disable

When this option is enabled and ibaPDA cannot connect to this device during the start of the acquisition then it will disable this module and start the acquisition without it. During the acquisition it will try to reconnect to the device. When it succeeds it will automatically restart the acquisition with this module enabled. If this option is not enabled then ibaPDA won't start the acquisition when it cannot connect to the device.

## More functions

### ☐ Read configuration from device

Reads the configuration that has been stored last from the device

### ☐ Write configuration to device

Writes the current configuration to the device

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

## 11.2.3 PADU-S – Diagnostics tab

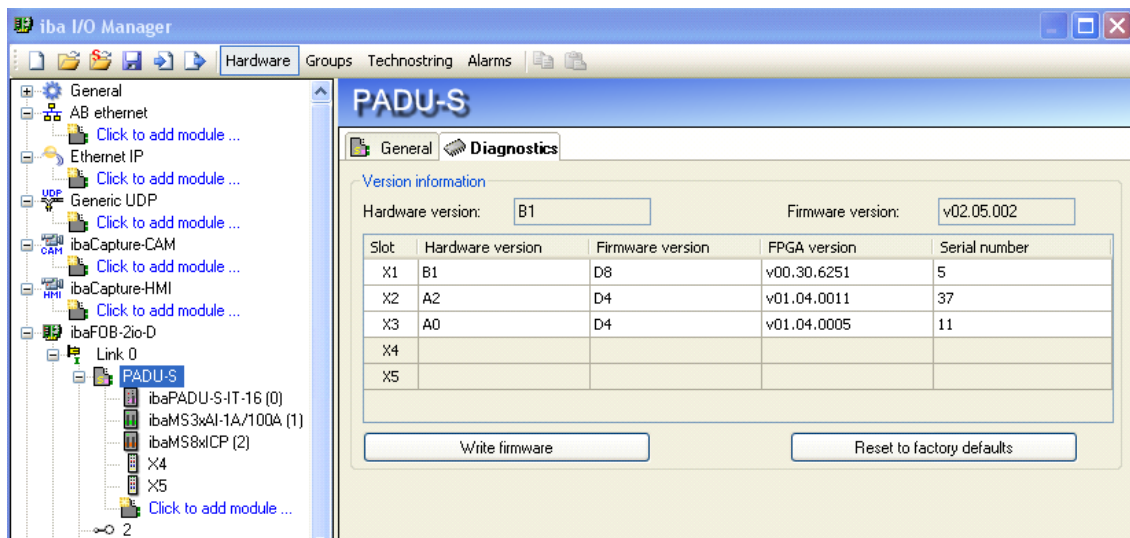


Figure 50: PADU-S module – “Diagnostics” tab

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

### ☐ Write firmware

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



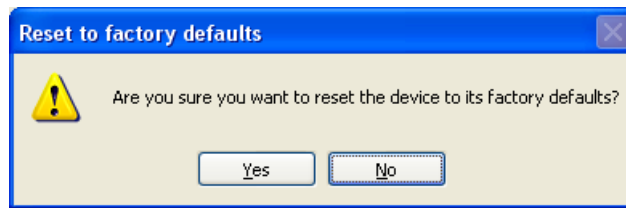
## Important note

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**

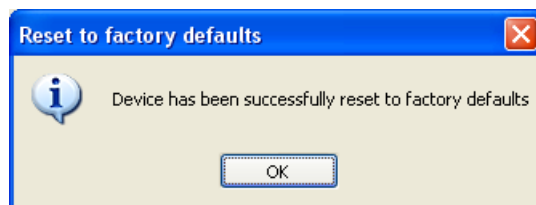
Using this button all I/O settings that are made for this module with ibaPDA will be deleted after having confirmed the following request with <Yes>.



**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 appears when signal capturing with the analog input modules has been started.

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

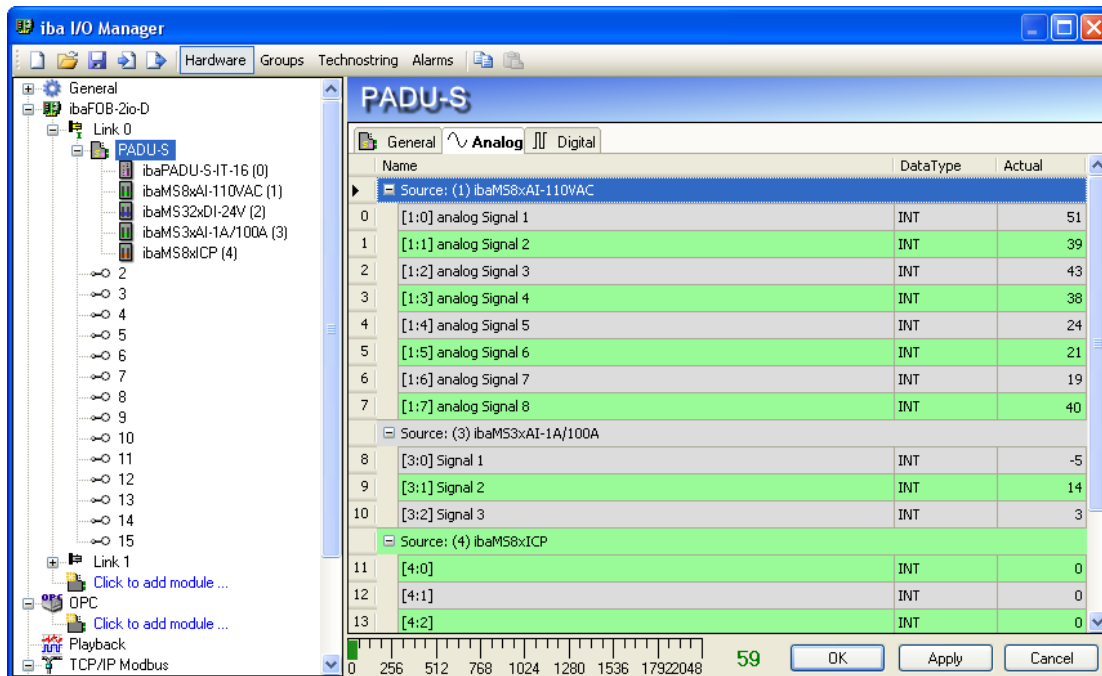


Figure 51: PADU-S module – “Analog” tab

### 11.2.5 PADU-S – Digital tab

The “Digital” tab appears when signal capturing with the digital input modules has been started. In the list, you can see the configured digital signals and the current values.

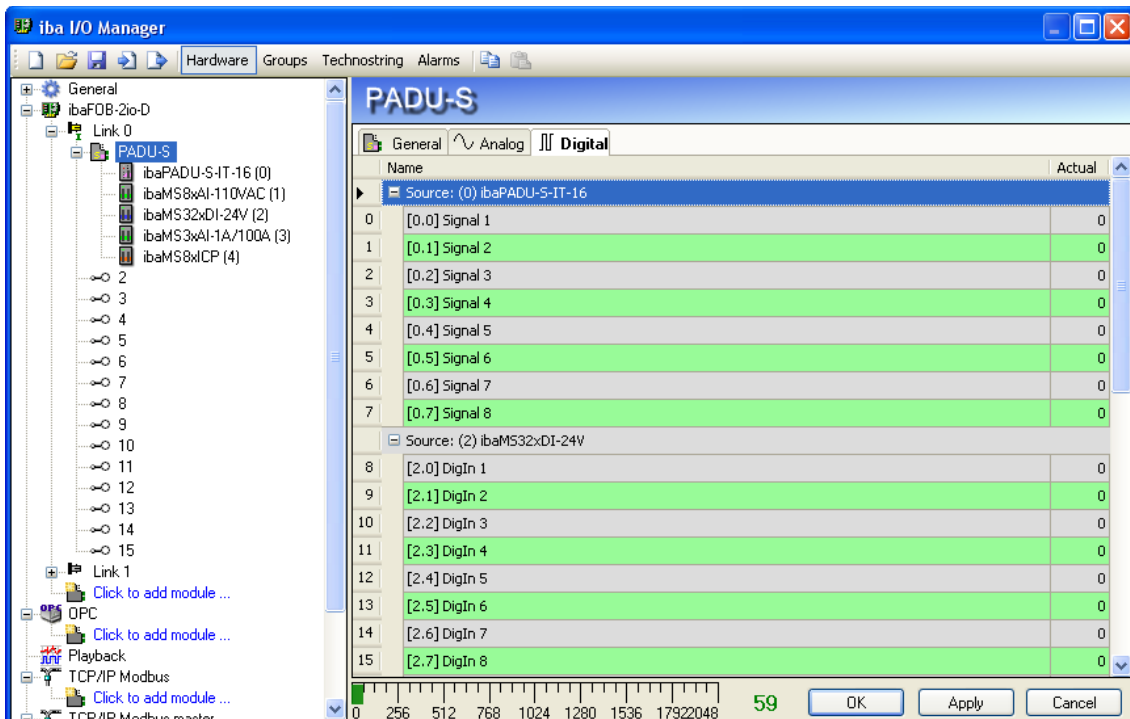


Figure 52: PADU-S module – “Digital” tab



### 11.2.6 ibaPADU-S-IT-16 – General tab

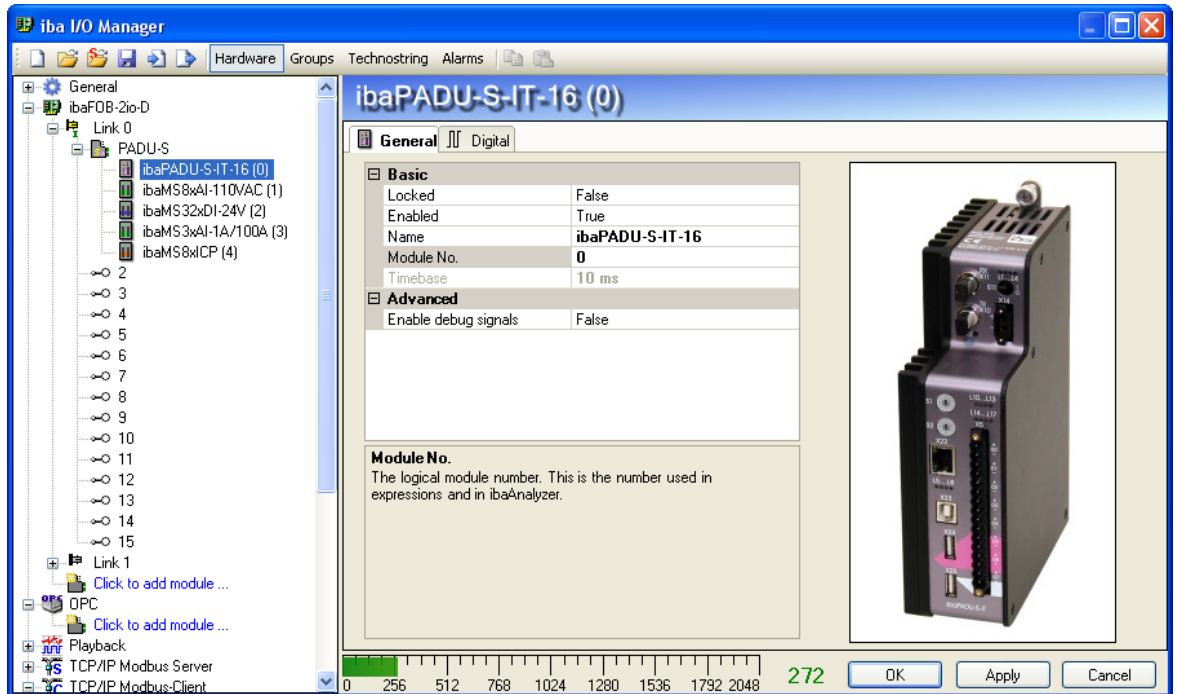


Figure 53: ibaPADU-S-IT-16 module – “General” tab

#### Basic settings

- ☐ Locked, Enabled, Name, Timebase  
see chapter 11.2.2 “PADU-S – General tab”
- ☐ Module No.  
Logical module number for clearly referencing the signals, e.g. when printing and for ibaAnalyzer.

#### Advanced

- ☐ Enable debug signals
  - False no debug signals enabled
  - True debug signals enabled

#### Debug signals

If debug signals are enabled, additional signals are displayed in the digital tab, like status information about the modules, the fiber optic interface and the software.

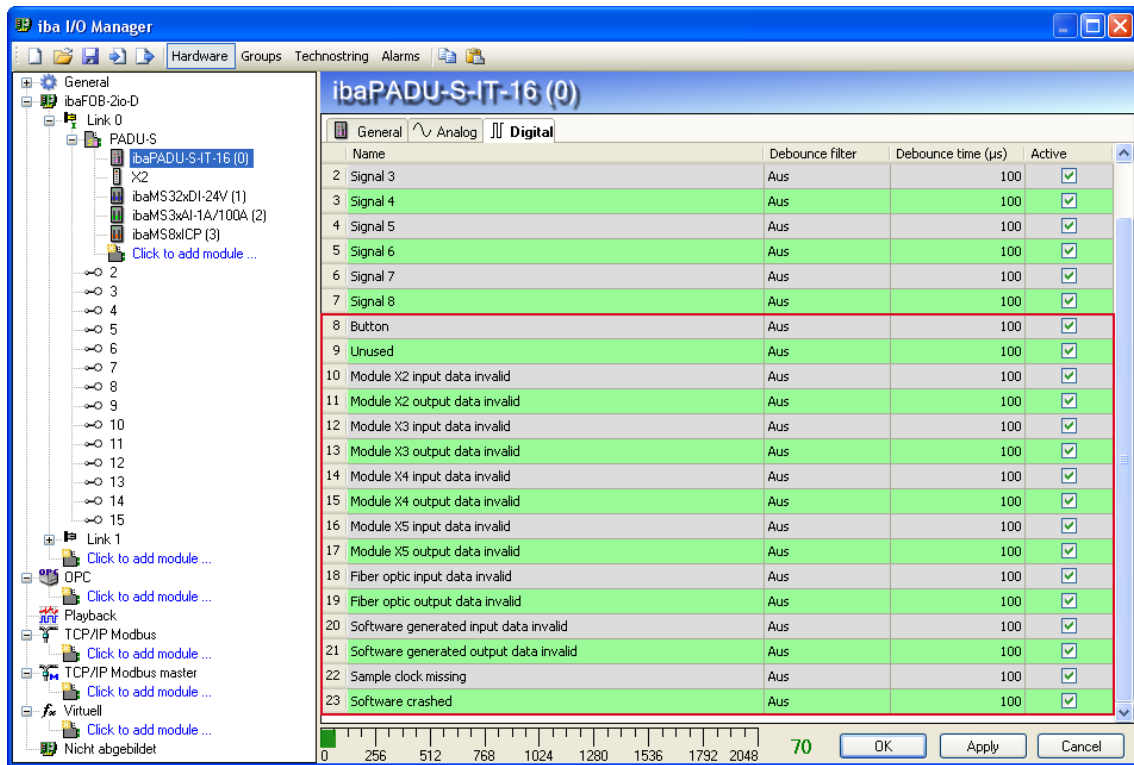


Figure 54: ibaPADU-S-IT-16 module – Debug signals in the „Digital“ tab

Analog debug signals are displayed in the analog tab:

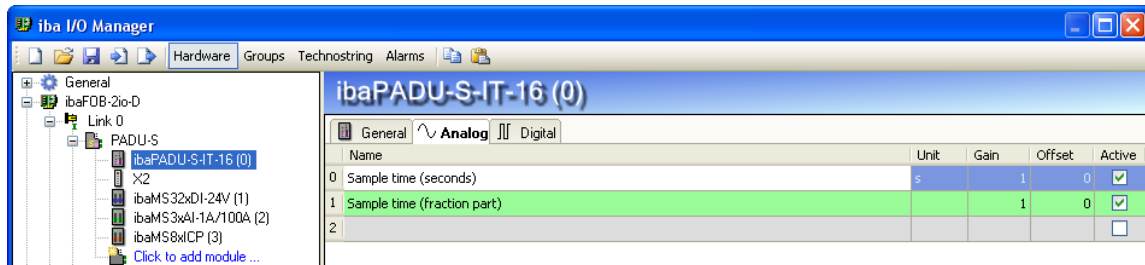


Figure 55: ibaPADU-S-IT-16 module – Debug signals in the „Analog“ tab

Signal	Meaning
<b>Analog</b>	
Sample time (seconds)	Time period since system start in seconds
Sample time (fraction part)	Fractions of this second (1 s = 4,294,967,295 fractions)
<b>Digital</b>	
All digital signals	Status signals for service purposes

## 11.2.7 ibaPADU-S-IT-16 – Digital tab

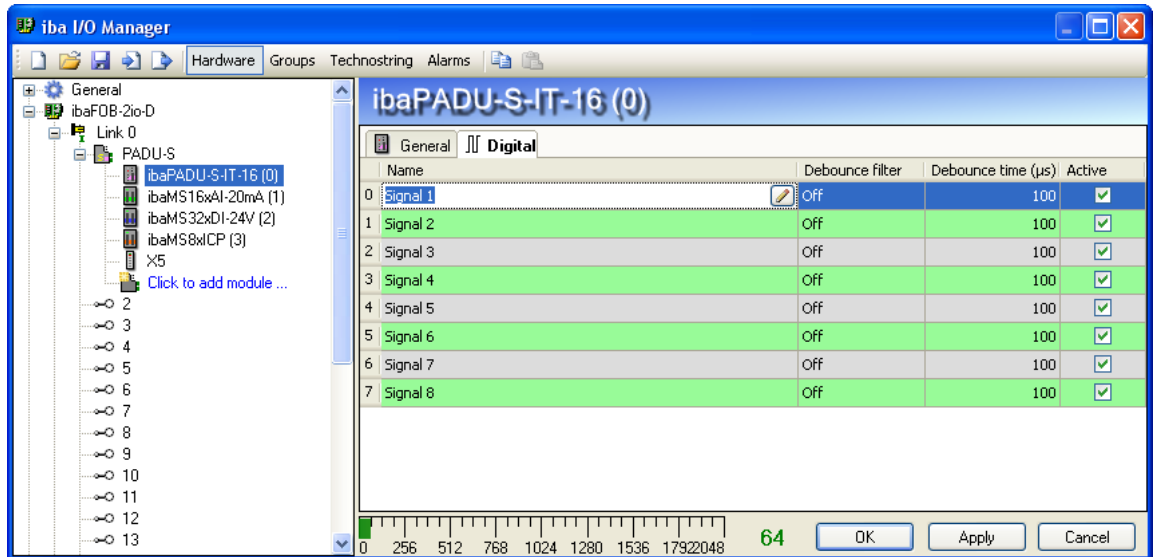



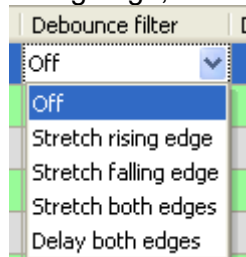
Figure 56: ibaPADU-S-IT-16 module – “Digital” tab

### ☐ Name

Here, you can enter a name for the signal and two additional comments (click on the  icon in the Name field).

### ☐ Debounce filter

In the dropdown menu, you can choose the operating mode for the debounce filter. You have got the following settings at your disposal: 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

### ☐ Enable

Enabling/disabling the signal



### Note

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

## 12 Technical Data

### 12.1 Main data

<b>Short description</b>	
Name	ibaPADU-S-IT-16
Description	Central unit for ibaPADU-S family
Order number	10.124012
<b>Processor unit</b>	
Processor	1.6 GHz Atom processor, single CPU
Operating system	Windows CE® 5.0
RAM	512 MB
Clock	Not buffered / optional external buffering via X30 Can be synchronized via DCF77 (Digital input) or NTP
<b>Supply and indicator elements</b>	
Voltage supply	24 V DC ± 10 % not stabilized, 1 A (without I/O modules), 3 A (with I/O modules)
Power consumption	Max. 20 W for ibaPADU-S-IT-16
Indicators	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>	
Cooling	Passive
Operating temperature	32 °F ... 122 °F (0 °C ... 50 °C)
Storage and transport temperature	-13 °F ... 158 °F (-25 °C ... 70 °C)
Installation position	Vertical, plugged into backplane bus
Installation height	Up to 6562 ft (2000 m)
Humidity class acc. to DIN 40040	F, no condensation
Protection class	IP20
Certification/Standards	CE FCC part 15 class A
<b>Dimensions and weight</b>	
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 installation rack: 9.02 in x 8.62 in x 6.14 in (229 mm x 219 mm x 156 mm)
Weight (incl. packaging and documentation)	3.3 lb (1.5 kg)

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

**Unique Identifier:** 10.124012 ibaPADU-S-IT-16

**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

Interfaces	
ibaNet	3Mbit, 32Mbit, 32Mbit Flex  2x ST Lean connectors, FO (50/125 µm and 62.5/125 µm) for RX/TX  max. cable length 500 m (32Mbit); 2000 m (3Mbit)
Ethernet	10/100 Mbit/s
USB	2x host, 1x device for service purposes

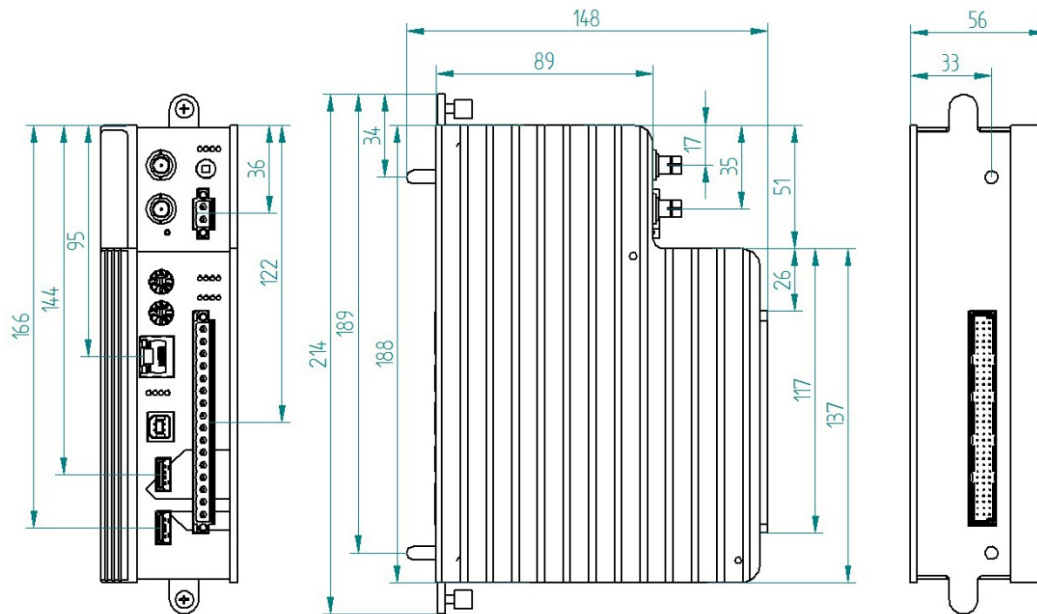
## 12.3 Digital inputs

Digital inputs	
Number	8
Design	Electrically isolated, protected against reverse polarity, single ended  Debounce filter, 4 different settings can be chosen
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
Sampling rate	Up to 40 kHz, can be chosen freely
Delay	Typ. 10 µs
Electrical isolation	

Channel-channel	2.5 kV AC
Channel-housing	2.5 kV AC
Connection technology	16-pin connector, connector with cage-clamp terminals (0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> ), can be screwed, included in delivery

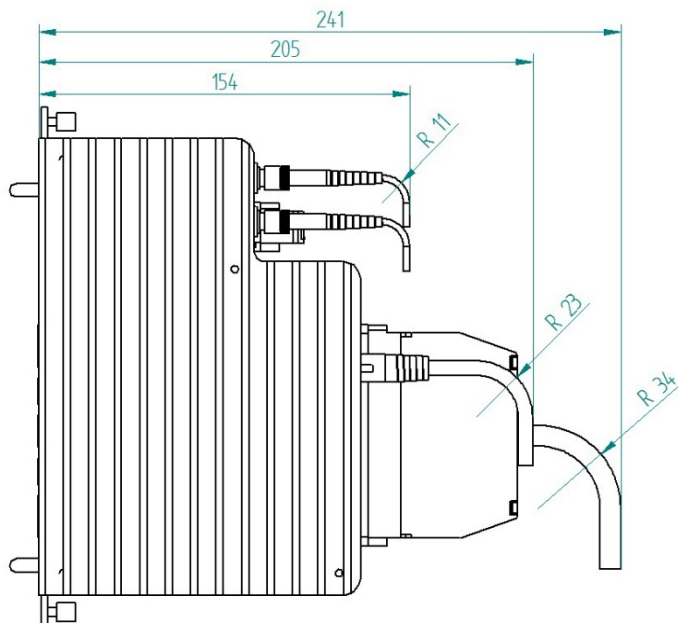
## 12.4 Dimensions

ibaPADU-S-IT-16



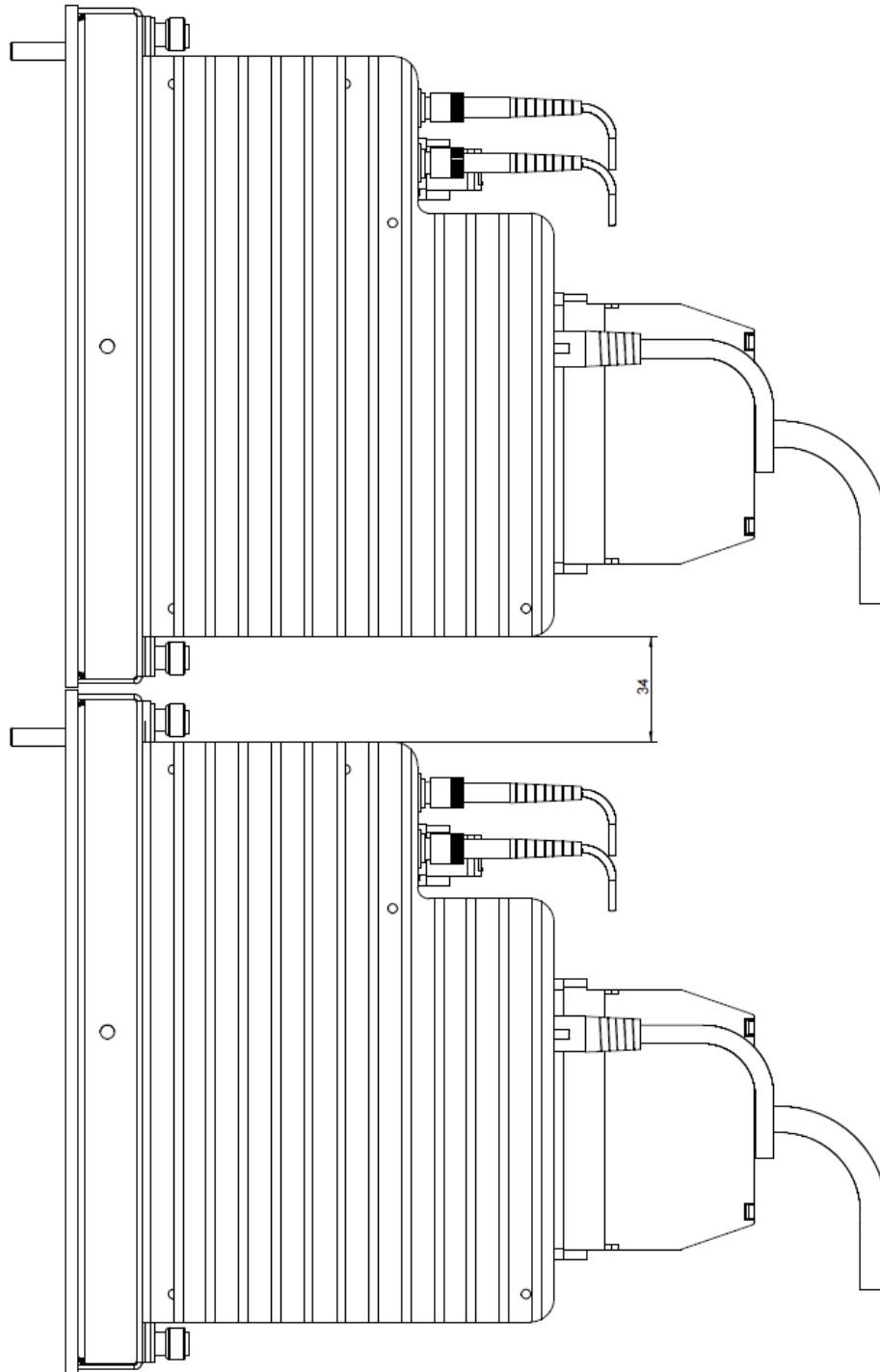
(Dimensions in mm)

Figure 57: Dimensions ibaPADU-S-IT-16



(Dimensions in mm)

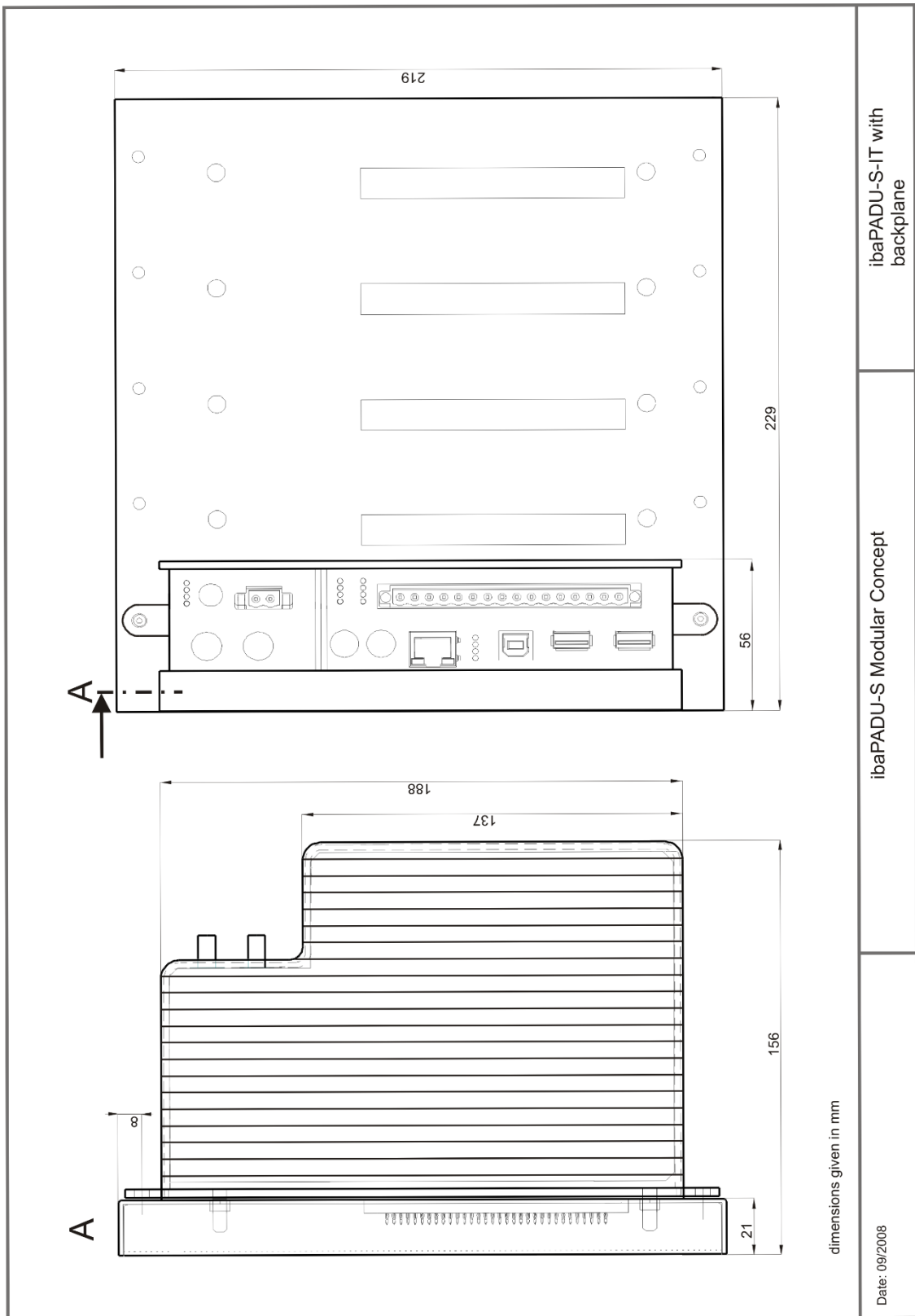
Figure 58: Dimensions ibaPADU-S-IT-16 with cables

**Distance between 2 ibaPADU-S-IT-16 systems**

(Dimensions in mm)

Figure 59: Min. distance between 2 ibaPADU-S-IT-16 systems

## ibaPADU-S-IT-16 and backplane

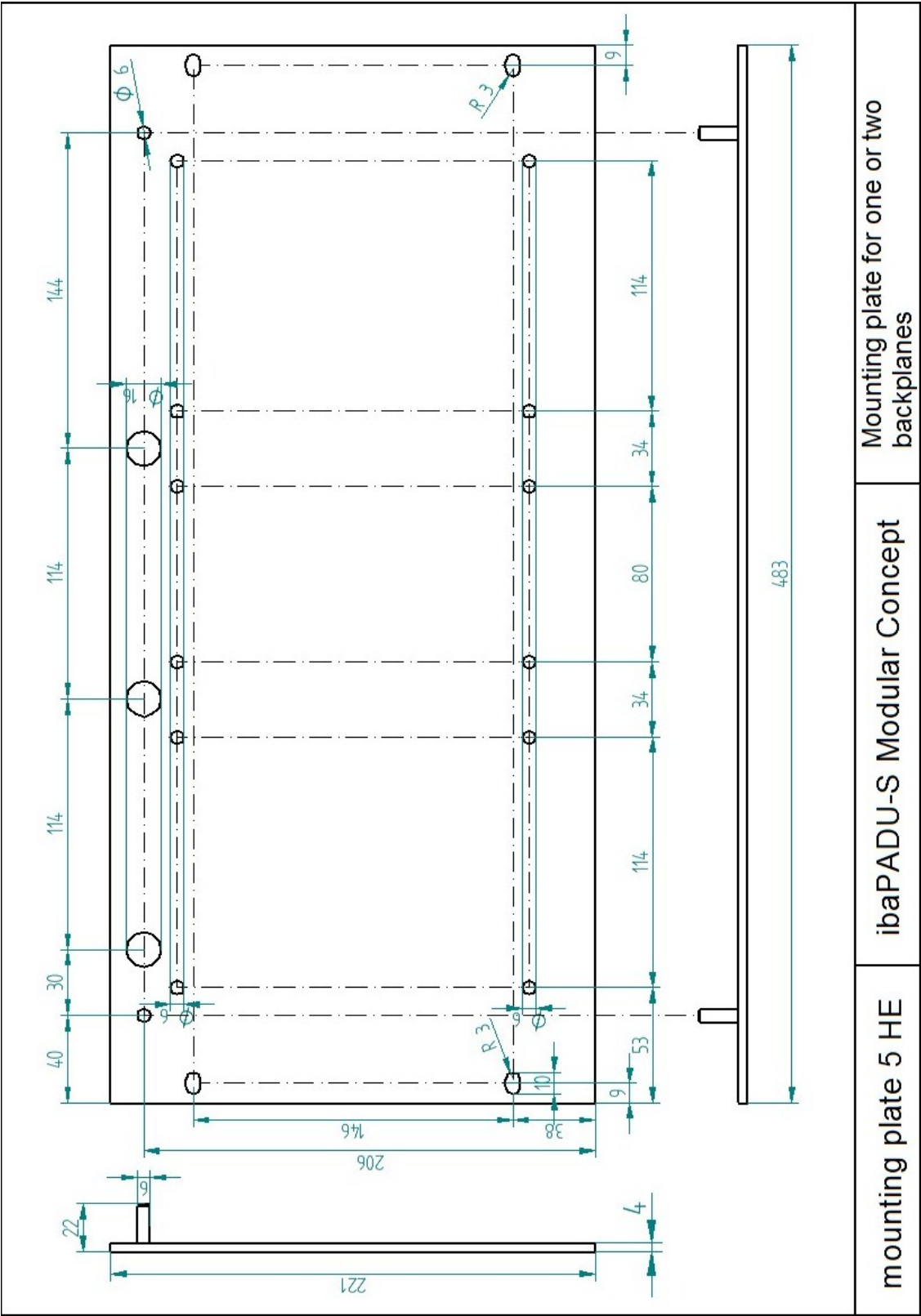


(Dimensions in mm)

Figure 60: Dimensions ibaPADU-S-IT-16 with backplane



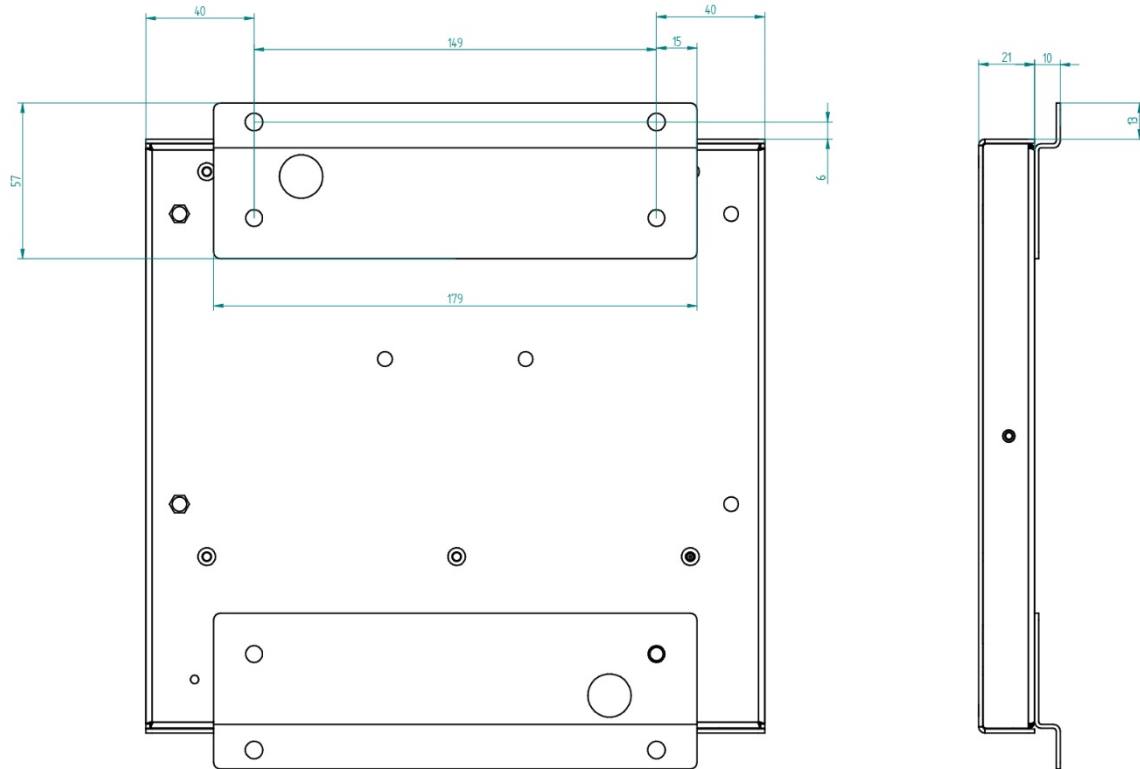
Mounting plate



(Dimensions in mm)

Figure 61: Dimensions of mounting plate

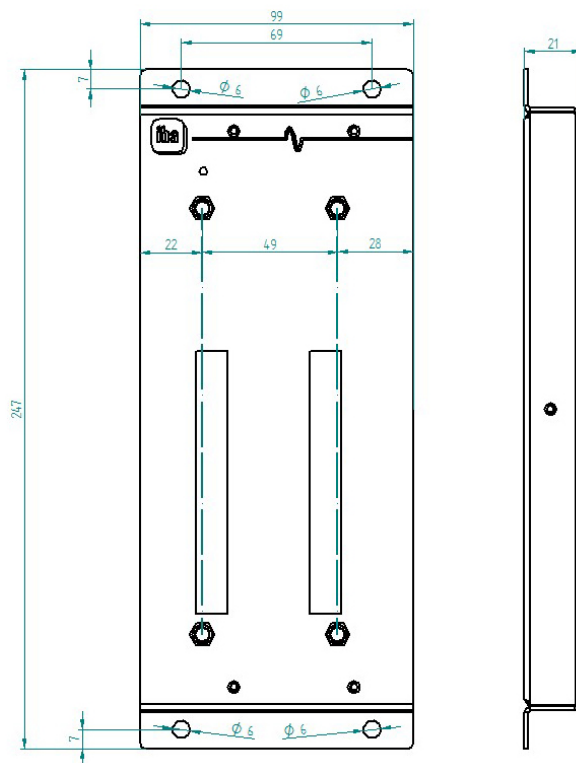
### Backplane ibaPADU-S-B4S with mounting angles



(Dimensions in mm)

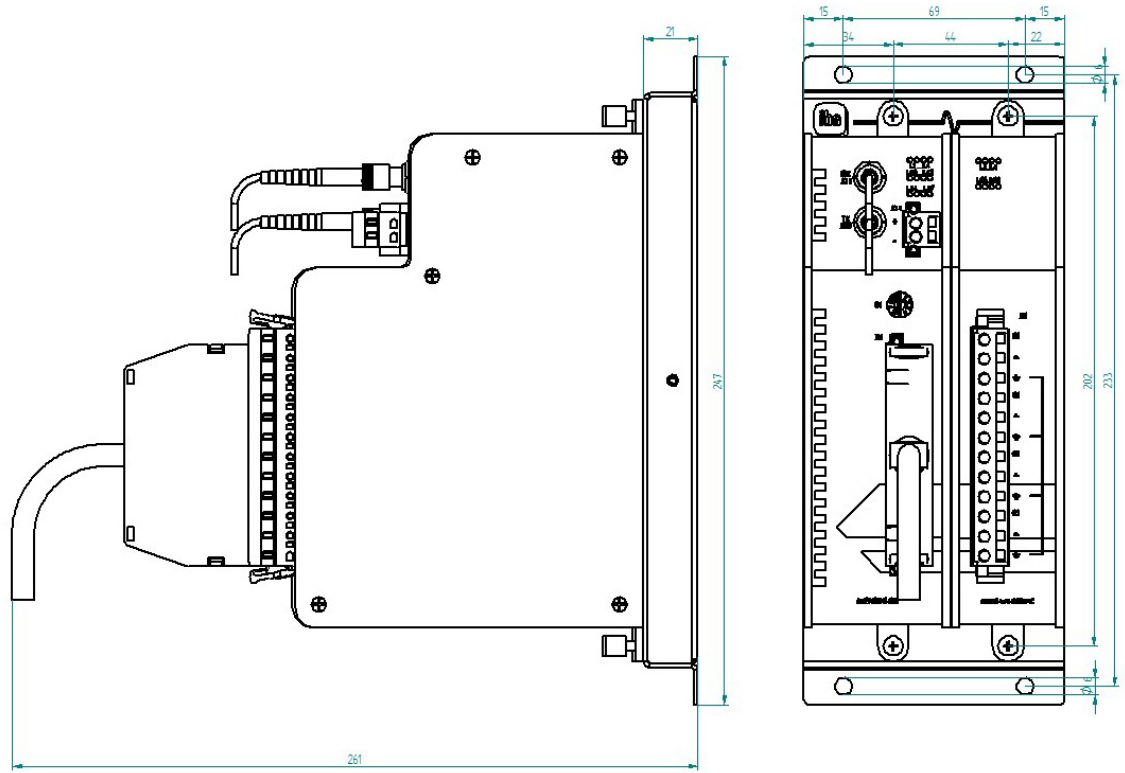
Figure 62: Dimensions mounting angles with ibaPADU-S-B4S

### Backplane ibaPADU-S-B1S for one central unit and one module



(Dimensions in mm)

Figure 63: Dimensions ibaPADU-S-B1S




(Dimensions in mm)

Figure 64: Dimensions ibaPADU-S-B1S with modules

## 12.5 Connection diagram


### 12.5.1 Pin assignment voltage supply 24 V (X14)

:X14 Pin...	Connection
1	+ 24 V DC, voltage supply
2	0 V



### 12.5.2 Pin assignment digital inputs (X5)

: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 -



## 13 Accessories and related products

### Backplane

#### ibaPADU-S-B4S

Order number	10.124000
--------------	-----------

Backplane (can be mounted on the backside) for 1 ibaPADU-S-IT-16 and up to 4 I/O modules

w x h x d: 9.02 in x 8.62 in x 1.06 in  
(229 mm x 219 mm x 27 mm)

Installation equipment included in delivery

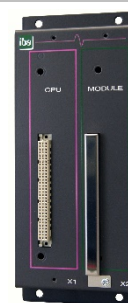


#### ibaPADU-S-B1S

Order number	10.124002
--------------	-----------

Backplane with mounting angle for 1 ibaPADU-S-IT-16 with 1 I/O module

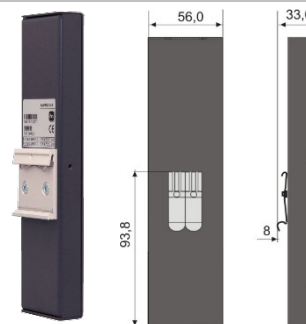
w x h x d: 3.91 in x 9.72 in x 1.06 in  
(99.2 mm x 247 mm x 27 mm)



#### ibaPADU-S-B

Order number	10.124001
--------------	-----------

Backplane with DIN rail clip for 1 ibaPADU-S-IT-16 (without I/O modules)



### Mounting systems

#### Set of mounting angles for PADU-S modular

Order number	10.124006
--------------	-----------

2 x for mounting 1 ibaPADU-S-B4S (10.124000)

1 set (2 pieces) is necessary for 1 backplane

w x h x d: 2.24 in x 7.05 in x 0.4 in  
(57 mm x 179 mm x 10 mm)



**Mounting panel 19" for PADU-S modular**

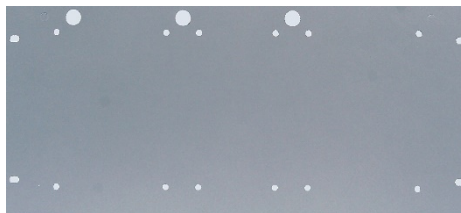
Order number	10.124005
--------------	-----------

Mounting panel (483 mm/19") for two backplanes
--

Mounting 1 ibaPADU-S-IT-16 centered or
--

2 ibaPADU-S-IT-16 left and right
----------------------------------

Installation equipment included in delivery
---

**Module Carrier for ibaPADU-S modular system**

Order number	10.124007
--------------	-----------

Module carrier for a backplane with modules
---

**Terminal block****16 Pin RM 5.08 Terminal block WAGO**

Order number	52.000023
--------------	-----------

**12 Pin RM 3.81 Terminal block PHOENIX**

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

**2 Pin RM 5.08 Terminal block WAGO**

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



**FO cards**

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
iba FO/p2-5	50.102050	5 m Duplex FO cable for connecting an ibaPADU-S-IT-16 module

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



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## 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)



---

#### Note

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

---

### Contact

#### Headquarters

iba AG  
Koenigswarterstr. 44  
90762 Fuerth  
Germany  
Phone: +49 911 97282-0  
Fax: +49 911 97282-33  
Email: [iba@iba-ag.com](mailto:iba@iba-ag.com)  
Contact: Mr. Harald Opel

#### Regional and Worldwide

For contact data of your regional iba office or representative please refer to our Website [www.iba-ag.com](http://www.iba-ag.com).