ibaPADU-16-M

Modular Parallel A/D Converter Unit for High Speed Measurement

Manual

Issue 2.1

Measurement and Automation Systems

iba

Manufacturer

iba AG

Koenigswarterstr. 44

90762 Fuerth

Germany

Contacts

Main office	+49 911 97282-0
Fax	+49 911 97282-33
Support	+49 911 97282-14
Engineering	+49 911 97282-13

E-mail: iba@iba-ag.com

Web: www.iba-ag.com

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

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

Protection note

Windows® is a label and registered trademark of the Microsoft Corporation. Other product and company names mentioned in this manual can be labels or registered trademarks of the corresponding owners.

Certification

The device is certified according to the European standards and directives. This device corresponds to the general safety and health requirements. Further international customary standards and directives have been observed.

Version	Date	Revision	Chapter /	Author	Version HW/FW
V2.1	02/01/11	F mode (daisy chain) Power supply (Techn. Data) Configuring with ibaPDA	7.2 12.1 10	st	

Table of contents

1   About this manual

This manual describes the construction, the use and the operation of the device ibaPADU-16-M.

1.1   Target group

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

He or she must have the following qualifications:

❑   Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.

❑   Trained in the proper care and use of protective equipment in accordance with established safety procedures.

❑   Trained in rendering first aid.

1.2   Designations

The following designations are used in this manual:

Action	Designations
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> + <Strg>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	„File name", „Path" Example: „Test.doc"

1.3   Symbols used

If safety instructions or other information 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 iba 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 indicates special requirements or actions to be observed.

Important information

Information that a special indication has to be observed, e.g. exceptions from the general rule.

Tip

Tip or example which serves as helpful information or a trick to facilitate the work.

Other documentation

Reference to supplementary documentation or further literature.

2 Safety instructions

2.1 Designated use

The device is electrical equipment. It may be used only in the following applications:

❏ Automation of industrial systems

❏ Measurement data logging and analysis

❏ Applications of ibaSoftware products (ibaPDA, ibaLogic etc.)

The device may not be operated in mains supply circuits!

2.2 Important Information

Important note

The information in this manual does not purpose to cover all details or variations in equipment, or to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, please contact iba office.

Further, the contents of this manual shall not become a part of, nor modify, any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of iba.

The warranty contained in the contract between the parties is the sole warranty of iba.

Any statements contained herein do not create new warranties nor modify the existing warranty.

⚠ WARNING

Electrical equipment has components which are at dangerous voltage levels.

If these instructions are not strictly adhered to, this can result in severe bodily injury and material damage.

Only appropriately qualified personnel may work on this equipment or in its vicinity.

These personnel must be completely knowledgeable about all the warnings and service measures according to this User Manual.

The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.

⚠ CAUTION

This board contains components which can be destroyed by electrostatic discharge. Prior to touching any electronics board, your body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. bare metal cabinet components, socket protective conductor contact).

⚠ WARNING

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instructions can result in severe personal injury or property damage. It is especially important that the warning information in all of the relevant Operating Instructions is strictly observed.

Note

Please clean device only with a dry cloth.

3   Introduction

3.1   Description

The device ibaPADU-16-M (Parallel Analog Digital Units) is especially designed for high speed data acquisition and control purposes for up to 25 kHz sampling rate per channel. The ibaPADU-16-M consists of 2 fully independent modules called Module A and Module B which operate similar to an ibaPADU-8-M device.

The device can be factory configured for a variety of measuring purposes from low voltage to power line voltages and currents with the following components:

❑ ibaPADU-16-M basic device, with Product Safety specification according to EN 61010-1 (CAT II)

❑ Analog sub modules (single channel modules with different input types), up to 16 modules may be operated.

❑ Binary input sub modules (8-channel modules for different input types), up to two modules can be used

❑ Up to 4 rugged HARTING connectors depending to the used analog input types and the amount of channels.

The device is housed in a rugged 19" rack mount chassis. All connectors are located in the rear. The front panel holds the status LEDs and mode switches.

3.2   Applications

The devices are ideally suited for the following applications:

❑ Power Line Monitoring (Transient Fault Recorder)

❑ Machine Condition Monitoring

❑ Predictive Maintenance (i. e. Bearing Monitoring and Fault detection)

❑ Commissioning

To guarantee a good dynamic range or SNR ration of the signals every A/D channel is equipped with its own A/D converter and signal conditioning circuitry.

In M mode (see chapter 7.1 "M Mode"), the full device (Module A and B) uses 2 bi-directional inputs/outputs from an ibaFOB-4i/4o card. The fiber optic port output definition is 100% compatible to ibaPADU-8-ICP and ibaPADU-8-M. .

In F mode (see chapter 7.2 "F Mode") up to 4 ibaPADU-16-M devices are cascadable on the fiber optic links.

4   Contents of Delivery

The following components are part of this delivery:

❑ ibaPADU-16-M device

❑ Power cord

❑ Phoenix connectors for digital inputs

❑ HARTING connector parts (hood with straight cable outlet, female insert)
   Number of connectors and the types of inserts will vary based on the types of mod-
   ules ordered for the ibaPADU-16-M.

   For ±10 V inputs: 72 pin female insert
   For ≥ 110 V ~ inputs: 40 pin female insert
   For current inputs: socket inserts with 4 switching contact

Note

Cable gland and pins are NOT part of delivery and should be chosen by the user ac-
cording to the required cable type.

❑ Calibration protocols

❑ Manual

❑ Device configuration sheet

5   System Requirements

5.1   Software

- ❑ ibaScope
- ❑ ibaPDA-V6

5.2   Hardware

One of the following fibre optic boards:

- ❑ ibaFOB-io-S (only for one module)
- ❑ ibaFOB-4i-S and ibaFOB-4o,
- ❑ ibaFOB-io-D or ibaFOB-io-Dexp (only for one module)
- ❑ ibaFOB-2io-D or ibaFOB-2io-Dexp
- ❑ ibaFOB-4i-D or ibaFOB-4i-Dexp and ibaFOB-4o

6   Mounting and Dismounting

6.1   Mounting

1.   Fix the device with the 4 front panel screws into the cubicle.

2.   Once fixed, connect the power supply to the termination shown on the device.

3.   Connect all HARTING and Phoenix connectors in the rear of the device.

4.   Finally, connect fiber-optic cables to the TX/RX ports as shown on the device so that the fiber-optic ring is completed.

6.2   Dismounting

1.   Disconnect all external connections from the device.

2.   Unscrew the 4 front panel screws (and the additional rear holding if present) while holding the device securely.

3.   Remove device from cubicle.

⚠ CAUTION

Disconnect all analog and digital input connectors before operating the V.24 Service port!

6.3   Modules exchange

The device must be opened if modules are to be changed.

⚠ DANGER

The device may be opened ONLY by qualified personnel!

Remove power supply and ALL measuring cables before opening device!

To avoid electric shock always connect the device to earth ground.

⚠ CAUTION

To avoid electrostatic discharge which may destroy the device change modules in a protected ESD environment only! Ignoring the ESD precautions void the warranty!

1.   Turn the 2 fast mounting screws a ¼ turn counterclockwise.

2.   Pull the cover in direction of the front panel.

3.   Dismount/mount the module (-s) by opening/closing the fixation screw. Counting order for the modules is front left (channel 0) to right (channel 7) with front view.

4.   Pull the cover back into it fitting and turn the 2 screws a ¼ turn clockwise.

7   System Topologies and Addressing

There are 2 modes that can be set by an ibaPADU-16-M device. These modes can be mixed within one device and within one PC.

❑ M Mode: Mode switch in position 0
Sample rate up to 25 kHz
No daisy chain possible
Synchronous mode

❑ F Mode: Mode switch all positions between 1 and 8
Sample rate up to 1 kHz
Daisy chain possible
Asynchronous mode

7.1   M Mode

The ibaPADU-16-M device needs two bi-directional fiber optic connections (ring topology) for proper operation.

The ibaPADU-16-M is directly connected to the ibaFOB-4i/4o (S or D) fiber optic ports. 8 devices are allowed per PC with a sampling rate of 25 kHz.

Note

Cascading of devices is not allowed.

Signal distribution: Optical output signals cannot be multiplied (with ibaBM-FOX-i-3o device).

Synchronization of different links: All device samples are fully synchronized with ns accuracy.

7.2   F Mode

The ibaPADU-16-M device needs only 2 simple fiber optic connections per device to the FOB card. The device mode switch must be set to one of the positions between 1 and 8. No synchronous monitoring or recording of input signals. Set to F mode up to 4 ibaPADU-16-M devices are cascadable on the fiber optic links.

The maximal sample rate is 1 kHz. The number of devices per PC is limited only by the number of slots for the FOB boards.

Note

Addressing: One address represents 8 analog and 8 digital channels. In a cascade of devices each device must have a unique address. One device (2 modules) occupy 2 address areas.

Mixing of different ibaPADU device types (ibaPADU-16-M in F Mode, ibaPADU-8, iba-PADU-32, ibaNet750) within a fiber optic link cascade is allowed.

Signal distribution: All optical output signals may be multiplied with an ibaBM-FOX-i-3o device.

Synchronization of different links: The accuracy of the acquisition is 1 ms.

7.3   Process Monitoring Topology Example (Simultaneous sampling)

Figure 1 depicts a possible topology for process monitoring of 16 simultaneous sampled signals, e.g. for drive control monitoring with a combination of one ibaFOB-4i- and one ibaFOB-4o card. Each ibaFOB link can support 1 out of 2 ibaPADU-16-M links. Up to 32 (analog and digital) channels can be sampled continuously using this topology (with one ibaFOB-4i-/-4o). For continuous process monitoring, multiplex operation of the device network is not required. All devices must have the address switch to 0 (M Mode). A maximum of 128 analog plus 128 binary signals may be sampled like this (with 4 ibaFOB-4i/-4o). For the required PCI slots iba provides a special PC series (ibaRackline PCs).
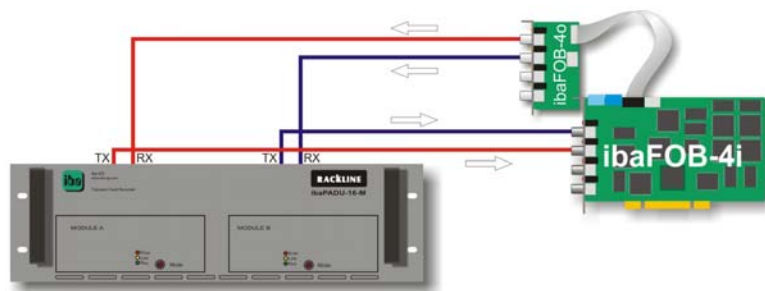

Figure 1:   System Topology for Process Monitoring

It is possible to couple other process signals using other input devices from iba, if the corresponding interface is available.

Example 2: ibaPADU-16-M devices in continuous measuring mode (multiple PCs)

Topology: Transient Fault Recorder (TFR)

Devices are organized in *n*- rings (one device fully connected needs 2 rings = max 2 devices per ibaFOB-4i-/-4o-S or -D.

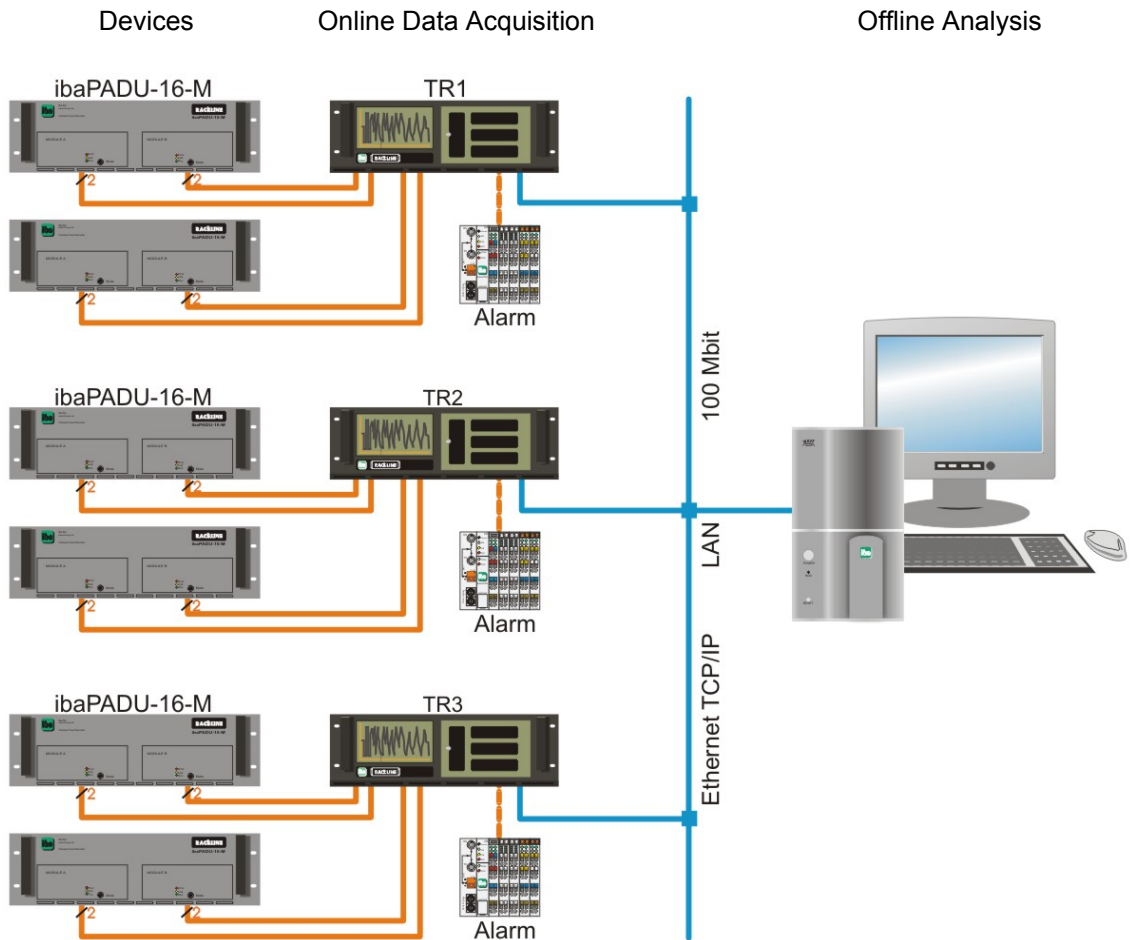All devices must have the address switch on position 0 (M mode).

Figure 2 :   System Topology for Signal Monitoring with multiple PCs

8   Product Properties

The ibaPADU-16-M device has the following properties:

❑ Power supply (type 115 V /230 V AC 50 Hz /60 Hz and 110/220 V DC ±20 %)

❑ Rugged mechanical and electrically shielded metal case (19 " rack mount) with 3 HE (5.20 in/132 mm)

❑ Device contains 2 fully independent 8 + 8 channel sub devices with individual processors and fiber optic communication links (Module A and B)

Each sub device has:

❑ 3 LEDs (Run, Link, Error)

❑ A fiber optic input and output to transmit the signals or for daisy chaining of multiple devices in F mode.

❑ 8 slots for 1- 8 analog inputs 16 bits (depending on the used analog sub modules), galvanically isolated against each other and against digital ground

❑ 1 slot for 8 binary inputs (different types available), galvanically isolated against each other and against digital ground

❑ Service ports for (later) firmware updates

❑ Shielded connector(-s) (HARTING connector for analog inputs)

❑ Sampling rate can be programmed for the device by program; f_{max} is 25 kHz

❑ Mode switch

8.1   Sub modules

The data acquisition sub modules can be plugged into the module slots (connectors). Max. 16 channels can be operated within a device. Grouping is done logically and for different signal types.

Protection measures require that high voltages and lower voltages are not to be mixed within a single connector. The design of the ibaPADU-16-M supports this feature (refer to connectors). Normally AC currents and voltages are measured in groups of 4. Mixing of different modules within a device is allowed in accordance to the requirements of these groups.

The device is configured and manufactured according to the selected modules. For adding or replacing a module the device cover must be opened.

↗   For more information see chapter „ Technical Data and Environmental Conditions "

8.1.1   Analog Inputs ±10 V DC

Inputs for DC ±10 V are used to measure analog signals of the control system and the DC protection.

Inputs scalable to physical dimensions (2pt. SW scaling)

Max. 16 inputs are represented within the HARTING connector X5. No signal mixes with other types of signals are allowed within X5. X5 is always available at the device while the other connectors are mounted only if the appropriate modules are there.

8.1.2   Analog Inputs 110 V AC, 220 V AC, 380 V AC

These inputs transform these values into ±10 V DC ranges of the measuring circuitry and are designed for the direct connection of the voltage transducers.

Each 4 of these inputs are represented within one HARTING input connector in groups of 4 inputs. That means if only 4 of these inputs were selected only 1 HARTING connector is present for these inputs.

8.1.3   Analog Inputs 1A AC, 5A AC, 1A AC/100A DC (100 A for 1 sec)

These inputs are to be designed to accept the signal of the current converter and transform this signal into the DC ±10 V range of the measuring circuitry. The contained DC current part within the signal is also to be measured.

Every 4 of these inputs are represented within one HARTING input connector in groups of 4 inputs. These connectors in addition short-circuit the current line if connector is pulled out (disconnected) to protect the connected current transducers. That means too if only 4 of these inputs were selected only 1 HARTING connector is present for these.

8.1.4   Digital Inputs 8DI 24V, 8DI 110V, 8 DI 220V

There are two different input modules available with 8 channels each. 2 modules can be used at the same time. 8 channels are represented within one Phoenix connector.
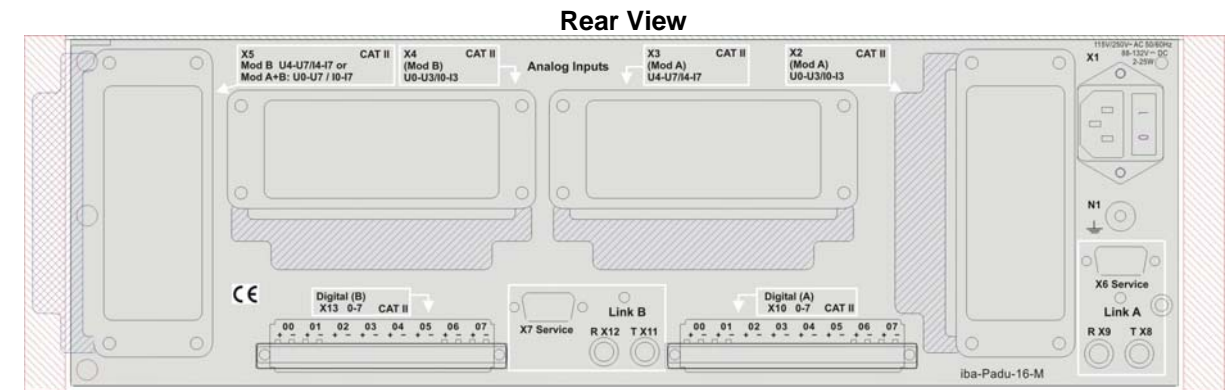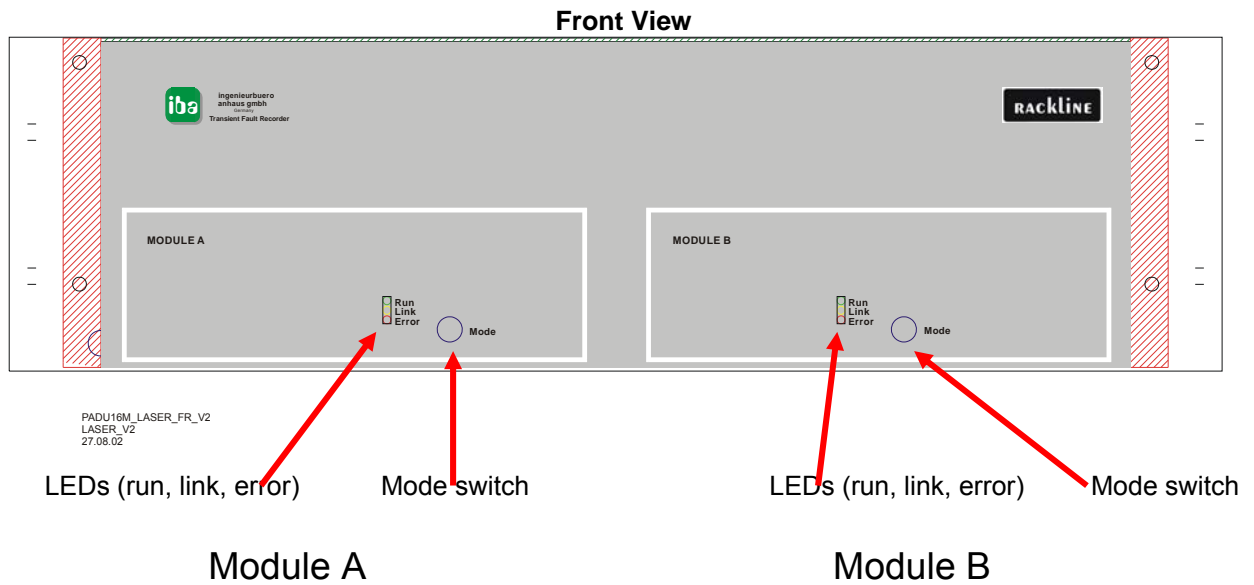
8.1.5   Other Modules

Due to the modularity of the device other modules can be designed on request (As ICP, Speed Pulse counters etc. are to be designed for other applications too – please contact iba for more information).

8.1.6   Module System Settings

The following table shows the values that have to be set by the software as signal input range:

Module Name	1st Input Range	2nd Input Range
ibaMX-1-AI ±10V	± 10 V	-
ibaMX-1-AI 110VAC	± 312 V	-
ibaMX-1-AI 220VAC	± 624 V	-
ibaMX-1-AI 380 VAC	± 1074 V	-
ibaMX-1-AI 5A	± 15 A	-
ibaMX-1-AI 1A	± 3 A	-
ibaMX-1-AI 1/100A (2 x ADC)	± 6.25 A	± 100 A

8.2   Device Interfaces and Characteristics, Connectors

Front View

PADU16M_LASER_FR_V2
LASER_V2
27.08.02

LEDs (run, link, error)   Mode switch   LEDs (run, link, error)   Mode switch

Module A   Module B

Rear View

Analog inputs: Binary inputs

X2: High Voltage/current inputs ModA 0..3   X10: Binary inputs ModA 0..7

X3: High Voltage/current inputs ModA 4..7   X13: Binary inputs ModB 0..7

X4: High Voltage/current inputs ModB 0..3   X6/X7: Service ports for ModA + ModB

X5: High Voltage/current inputs ModB 4..7   X8, X9, X11, X12 FO connectors

   or   X1 Power supply (DC or AC)

   low voltage inputs (max 24 V) instead of
   high voltage/current inputs

8.3   Power supply connector X1

A standard AC 250 V/10 A cord cable for
the power supply is included in delivery.

Length: 6.5 ft (2 m)

8.4   Fiber Optic Inputs (X8 and X11) and Outputs (X9 and X12)

The 2 connectors (ST type) for each module serve to connect the device to the fiber optic bus.

8.5   Device Mode Setting with Switches S1 and S2

Each half of the device has its own mode switch: Set switch to mode 0 for "M mode" operation or mode 1 to 8 for "F mode" operation.

8.6   Analog Connector Pinning (X2-X5)

Note

In case of request for spare parts for HARTING connectors please contact the support of iba AG.

Different connector terminals are used (depends on the input signals):

|	
X5: Input ±10 V Low voltage input terminal. All low voltage inputs are wired herein - each signal with +; -; shield optional. This connector is always present.	
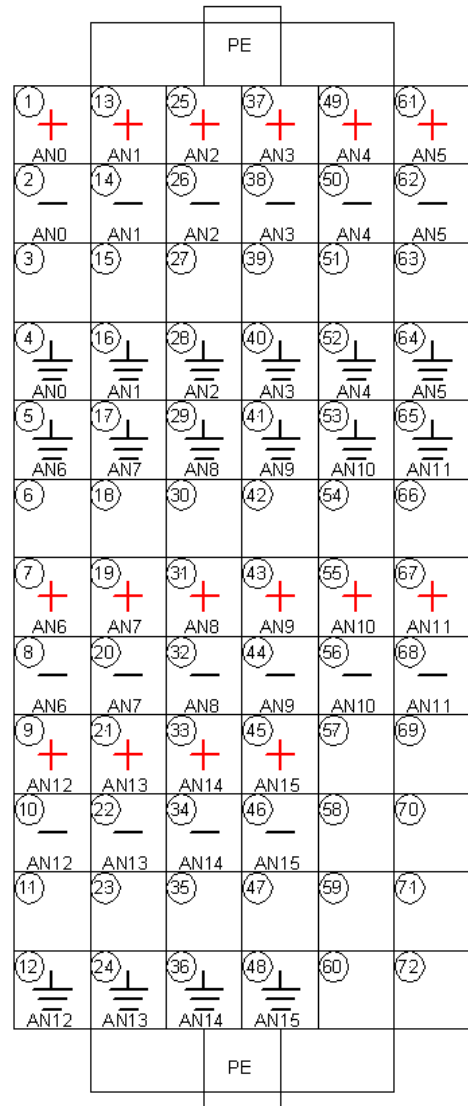
Xn: Input 110 V (250 V)/
     380 V (1074 V) (or High Voltage)

110 V (250 V)/380 V (1074 V) input terminal.

Max 4 signals per terminal. This connector is present only if high voltage input modules were chosen – in groups of 4.

This terminal may be used for 4 X2, X3, X4 and X5. (n = 2 to 5)

Xn: Input 1 A to 100 A

Current input terminals.

(Which short circuit the signal pins whenever the jack is disconnected.)

Max. 4 signals per terminal. This connector is present only if current input modules were chosen – in groups of 4.

This terminal may be used for X2, X3, X4 and X5 (n = 2 to 5)
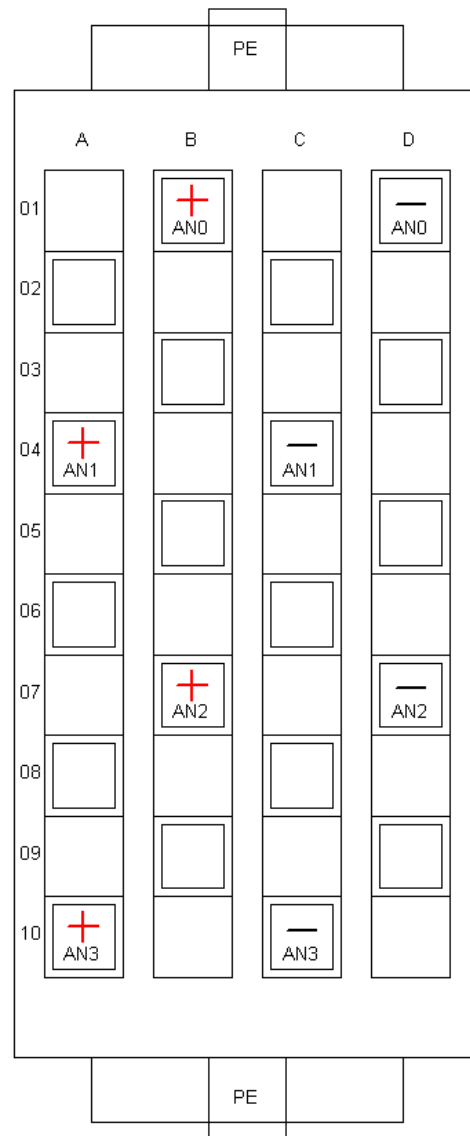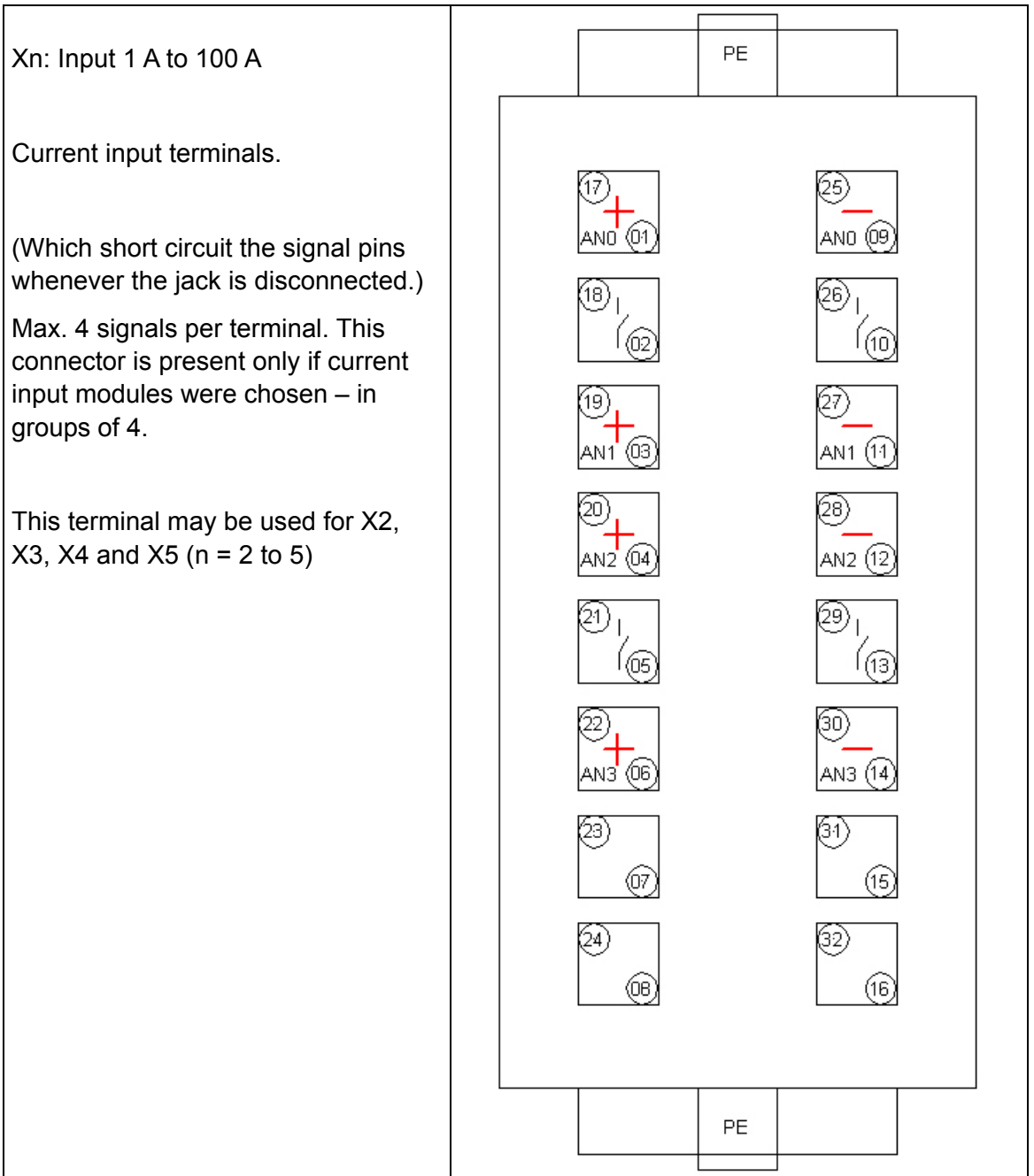
8.7   Binary Connector Pinning X10 and X13

Pin		Binary inputs Descr
1		BE00 +
2		BE00 -
3		BE01 +
4		BE01 -
5		BE02 +
6		BE02 -
7		BE03 +
8		BE03 -
9		BE04 +
10		BE04 -
11		BE05 +
12		BE05 -
13		BE06 +
14		BE06 -
15		BE07 +
16		BE07 -

Note

Standard type for binary signals connectors are Phoenix spring loaded terminal blocks.

Screw type terminal blocks are available on request.

8.8   LED Indicators (for Modules A and B) Run, Link and Error

LED	Status	Description
L1: Run (green)	Blinking Off	Power is on and device is ready for operation Insufficient power or device failure
L2: Link (yellow)	On	Device is working in F mode; unidirectional communication is ok
	Blinking Off	Device is working in M mode; bidirectional communication is ok Fiber-optic ring or connection is inactive or defective
L3: Error (red)	On Off	Device error Device is ready for operation, automatically resets when error condition ends

8.9   Service Interfaces X6 and X7

Two 9-pin D-SUB ports, found on the rear side of the device, may be used to load new firmware for the device. New firmware is loaded via a V.24 interface definition by means of an appropriate adapter.

Please contact iba regarding loading new firmware.

Important note

In normal operation mode the V.24 cable must not be connected.

8.10   Shield Connector N1 for Physical Earth

Proper connection of cable shielding to the device should be ensured. The shield connector found on the rear side of the device should be properly connected to earth (4 mm²).

⚠ CAUTION

Connect analog shields on one cable side only to avoid ground loops!

You must connect the ground connector N1!

Always ground the device to ensure proper shielding!

9   Programmable Settings of the I/O-Modules

All modules have the same interface (connectors and for parameterization). The parameterization functionality is normalized. That means even if the individual settings are different, all modules will have the same interface for the same function (i.e. low pass edge frequency is set with ONE parameter containing the edge frequency in Hz).

9.1   Sampling Rate

The sampling rate can be programmed via the FOB interface in steps of 100 nanoseconds from 40 μs (25 kHz) to 2 ms (500 Hz) in M mode and in steps of 1 ms from 1 ms (1 kHz) to 10 ms (100 Hz) in F mode. The chosen sample rate is then common for all channels, analog and digital. Each channel has an individual ADC circuit to ensure very accurate phase matching between channels.

9.2   Analog Modules

9.2.1   Input Gain

Input gain is set to 0 dB (= gain factor 1). Confirmation of setting by responding of device to the FOB Card is given.

9.2.2   Programmable Low Pass Filter

A programmable 72 dB 6-pole low pass filter is implemented on each channel. Commands sent from the ibaFOB are used to set this filter frequency. The device will respond with his "real" settings to ensure proper calculation.

| Specification		Example	
Range	Accuracy	Reference	Actual Value
100 Hz to 250 Hz	1 %	126	126.3
250 Hz to 500 Hz	1 %	270	270.3
500 Hz to 1000 Hz	1 %	990	990.1
1000 Hz to 10,000 Hz	10 %	3750	3773.6
10,000 Hz to 25,000 Hz	10 %	21,500	22,222

Note

The programmable digital filter produces modulation component frequencies with < 72 dB of the maximum signal strength. Therefore, the analysis software should take this into account.
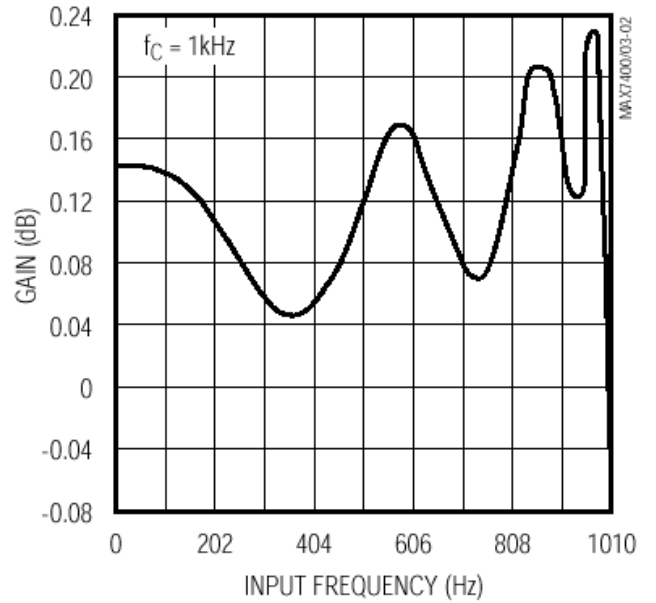
You may reduce this influence if the parameters are set according to the following rule:

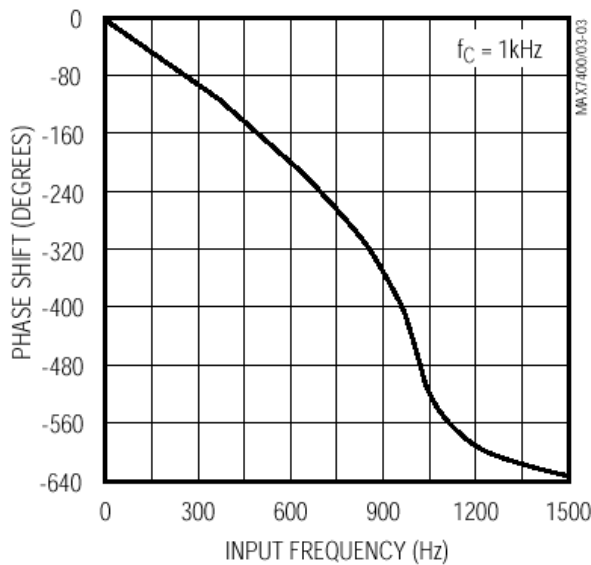Fs (sample freq.) = N x f_{LP} (edge freq. of the low pass filter) where N is 1, 2, 3 to N

MAX7400/MAX7404 (r = 1.5)
FREQUENCY RESPONSE

$f_C = 1kHz$
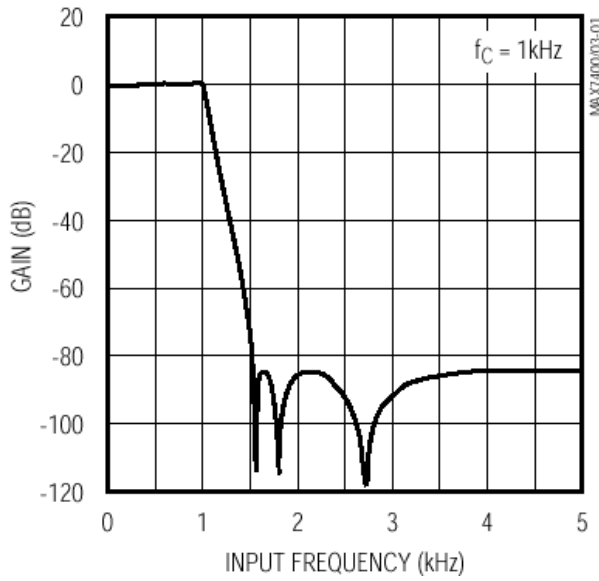
MAX7400/MAX7404 (r = 1.5)
PASSBAND FREQUENCY RESPONSE

$f_C = 1kHz$

MAX7400/MAX7404 (r = 1.5)
PHASE RESPONSE

$f_C = 1kHz$

These diagrams show the characteristic of the used programmable input filter.

The filter itself causes a delay within the ibaPADU. This delay is named Group delay.

At an edge frequency of 1 kHz this delay is approx. 80 μs (see left)

9.2.3   Calibration Parameters

Each submodule has a serial e²prom memory (or similar) where:

❑   The device type is encoded

❑   The biasing parameters are stored (that ensures that single modules may be added/changed

Tip

At cut-off frequencies <1000 Hz, reflected frequencies above 50x the corner frequency are possible.

Example 1: f_c = 100 Hz

Reflected frequency band starts at 50 Hz x 100 Hz = 5000 Hz. A signal frequency of 5100 Hz would be noticeable at 100 Hz.

Example 2: f_c = 1000 Hz

Reflected frequency band starts at 50 Hz x 1000 Hz = 50,000 Hz. A signal frequency of 51,000 Hz would be dampened 6 dB by the static low-pass filter. This signal would be noticeable for signal strengths above 20 dB.

If you need a device for low-frequency applications, iba AG can supply a variant of this device for sampling at 1 kHz or less, with a static low-pass filter. Please contact iba AG for further details.

10   Configuring with ibaPDA

This chapter describes only the ibaPADU-16-M / M mode interface of ibaPDA.

Note

The ibaPADU-16-M in F mode works like standard ibaPADU-8 or ibaPADU-16 de-vices. Configure them as Padu-8 or Padu-16 modules and set the scaling parameters like described in chapter 8.1.6.

Other documentation

For the general use of ibaPDA, see the manual "ibaPDA-V6".

For configuring the ibaPADU-16-M with ibaScope, see the manual "ibaScope"

10.1   Configuring ibaPADU-16-M with M mode

After installing ibaPDA and starting the ibaPDA client, select "Configure – I/O Man-ager…" in the main menu.

Configure the ibaPADU-16-M interface in following steps:

1. If several iba PCI cards are used in ibaPDA, set the board connected to ibaPADU-16-M to the interrupt mode "Master internal" and set the option "In use".
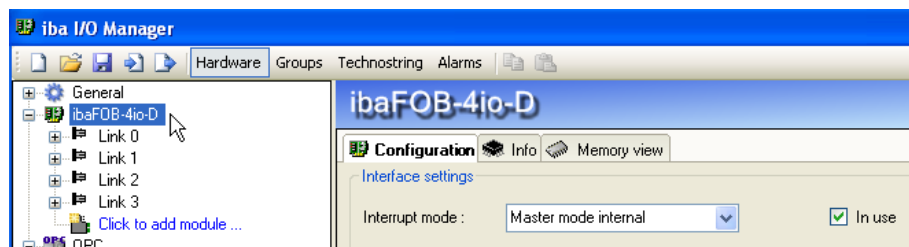
2. Create the device module by one of the following actions:

❑ Press the icon "New configuration" .
   When the device is connected correctly, the "autodetect" feature will find the iba-PADU-16-M and place modules "Padu 16-M" on the connected FOB links. Alterna-tively right-click the link of the FOB-D or FOB-S card to which the ibaPADU-16-M is connected and select "Autodetect"
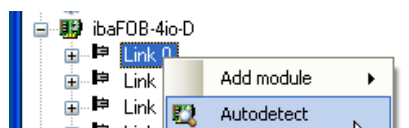
   When the device is connected correctly to this link, the "autodetect" feature will find it and place modules "Padu 16-M" on this link.

❑ Right-click the link of the FOB-D or FOB-S card to which the ibaPADU-16-M is con-
   nected and select "Add module" - "Padu 16-M" from the submenu
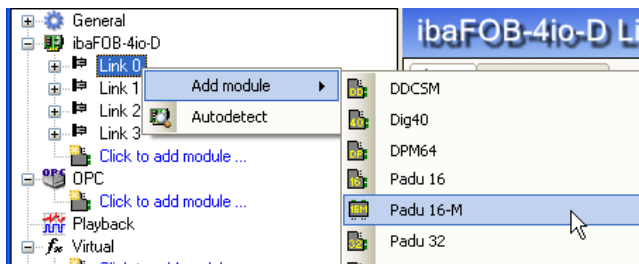
or click to the blue text link "Click to add module…" and select the Padu 16-M inter-
face from the displayed list.

Result:

When the device is connected correctly with two bidirectional fibre optic links, two
modules of the Padu 16-M (A) and (B) are defined on the connected links. You see the
communication status OK in the Info tab of the connected links.
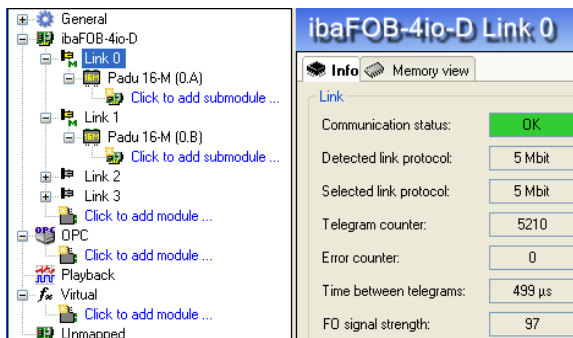
Note

When using ibaPADU-16-M together with other interfaces you must connect the
ibaPADU-16-M to the links beginning with the 1st link of the FOB card that is config-
ured as "Interrupt Master".

Note

All links configured for M mode must be connected correctly. Otherwise the acquisition
won't start.

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3. Add the Padu 16-M submodules:

❑ Select the submodule type according to the built in interface module and press the button <Add>.
For not used channels, add the "Empty slot" module.
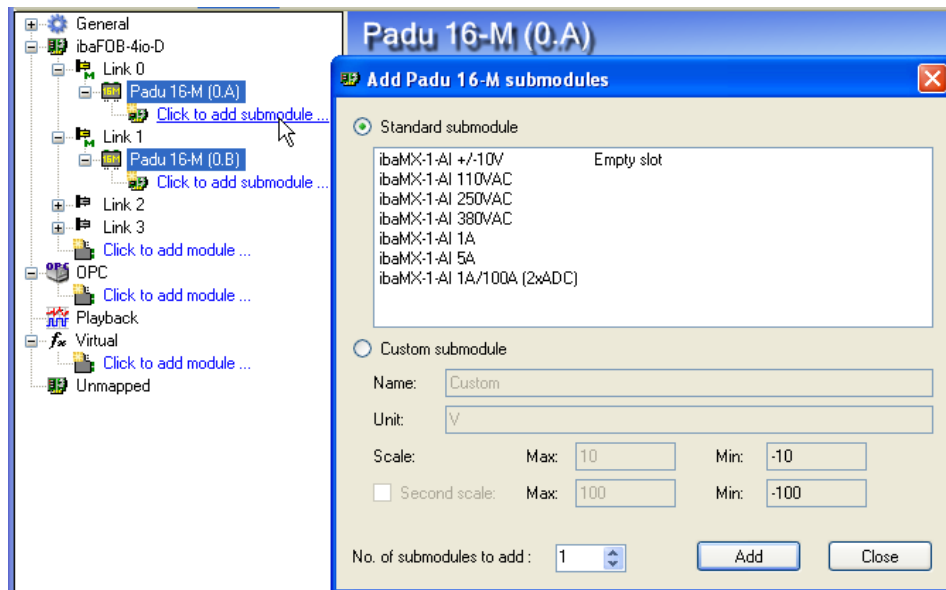
For future extensions, it is possible to define a custom submodule that allows the user to define the name, unit and scales of this submodule.
The standard submodules in the select box refer to the modules described in chapter 8.1.6.

❑ After adding the eight submodules click the button <close>.

❑ In the same way, add the submodules for module B.

4. Define the general properties

❑ Select the General Tab.
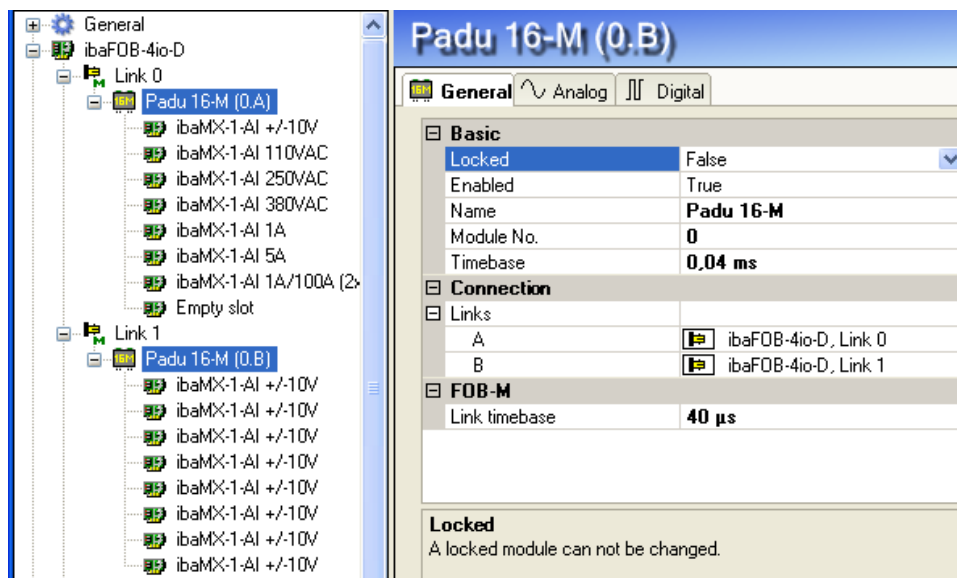
Whenever you click to a property field, you will see its description in the comment area at the bottom of the tab.

❑ Define the properties:
   Basic:

   - Locked: If true, the module can only be changed by authorized users.

   - Enabled: If false, this module is excluded from acquisition.

   - Name: Enter a comprehensive name for the module.

   - Module No.: Enter a module number. ibaPDA gives numbers automatically in a chronological order. However, you may prefer a different order later in the data file for analysis. The module number determines the order in the signal tree in ibaAnalyzer.

   - Timebase: An integer multiple of the FOB-M Link timebase, see below.

   Connection:

   - Link A / B: You can manually assign the connected link to the Padu 16-M module A or module B. If only one link is used, you must set the other link to "not connected".
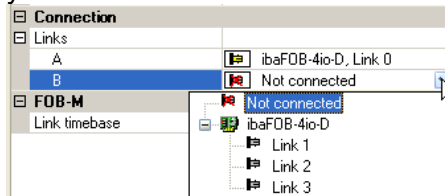
   FOB-M:

   - Link timebase: Set the time to a value between 40µs and 2000µs.
     Note: The Link timebase is valid for all other links that work in M mode.
     The module timebase (see above) must be equal or an integer multiple of this link timebase.
     Also, the general acquisition timebase of ibaPDA (configured in the *General* branch of the I/O manager tree) must be an integer multiple of the M mode timebase

Important information

Note that the difference between FOB-M link time base and general ibaPDA acquisition time base must not be too high to avoid exceeding the buffer limits.
iba AG recommends a multiple between 25 and 100.

5. Define the signal parameters.

❑ After selecting the tab "Analog", you see the signals with
   - predefined signal name and unit,
   - submodule specific scaling factors,
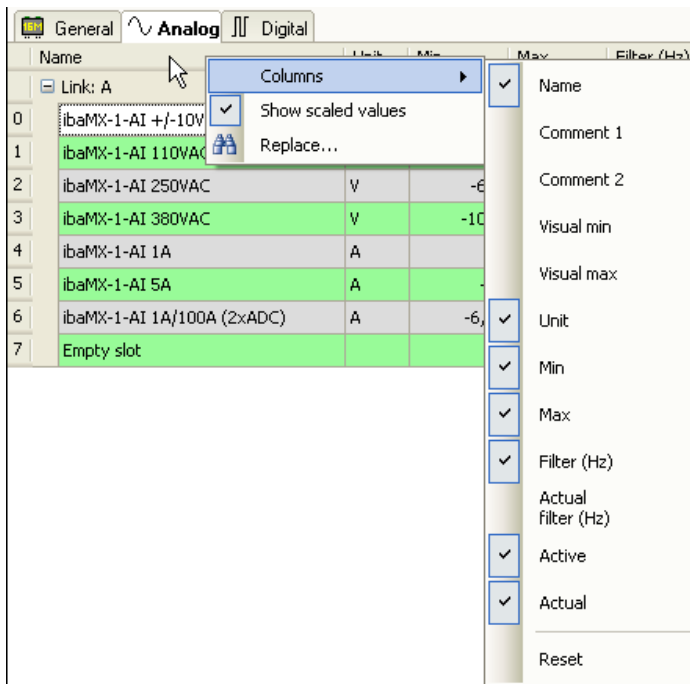   - standard filter frequency,
   - actual values.
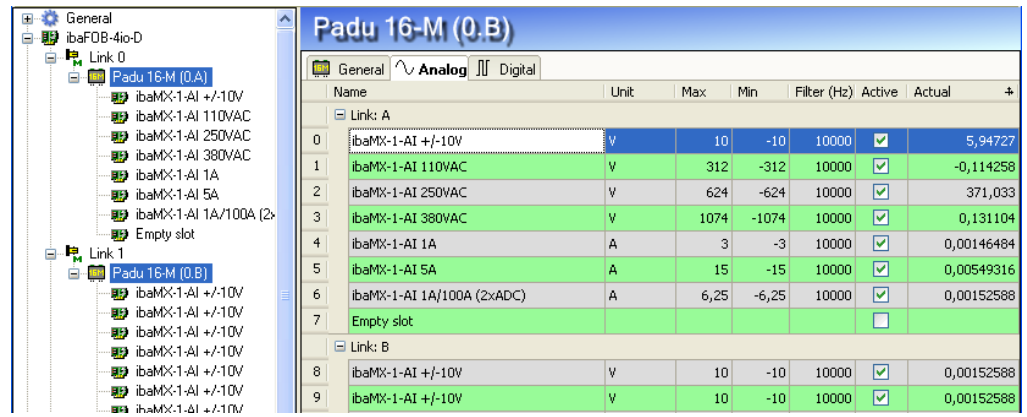
❑ You can change the parameters manually. It is possible to define signal comments by clicking the button at the end of the name field.
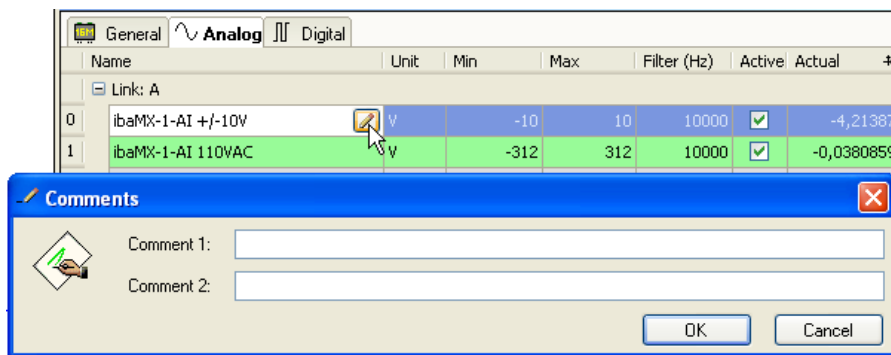
❑ You can also display other signal properties in the grid with a right mouse click on the headline of the grid.

❑ In the same way, you can parameterize the digital signals.

6. To finish the configuration, press <OK> or <Apply>.
The acquisition will start if all configured devices are connected correctly.

10.2 Configuring Triggers

Alternative to the definition of single trigger events, ibaPDA supports the definition of multiple trigger events as a trigger pool. For using the trigger pool you must first define all possible trigger events. In the 2nd step you must select the predefined events from the trigger pool to start and to stop storing the data.

1. Create Trigger Pool

❑ Start the I/O manager and add a trigger module under the interface "Virtual"
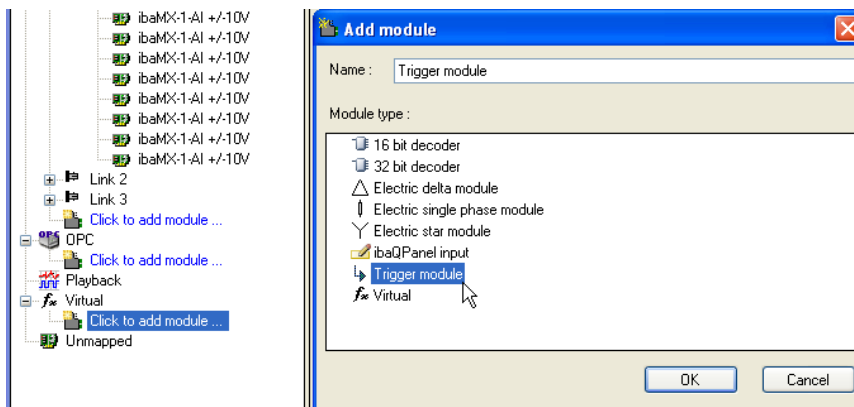
The trigger module is a virtual module with only digital signals. Each digital signal is a trigger. Instead of the normal expression builder the trigger module uses a special trigger builder dialog to create the expressions for the triggers. The trigger builder is based on the ibaScope trigger editor.

❑ Open the trigger builder by clicking on the expression builder icon of the digital signal.

❑ Define the trigger events

In the trigger properties you can set the name of the trigger and the comment. The expression of a trigger consists of one or more parts. Each part is an expression in itself. These parts are put together via the OR function. So the trigger will be 1 if one of its parts is 1.
The plus button will add a new part and the cross button will remove the currently selected part. The bottom part of the editor allows you to configure the currently selected part.
There are 4 standard functions that correspond to the ibaScope trigger functions

and then there is an extra "custom" function where you can build your own expression.
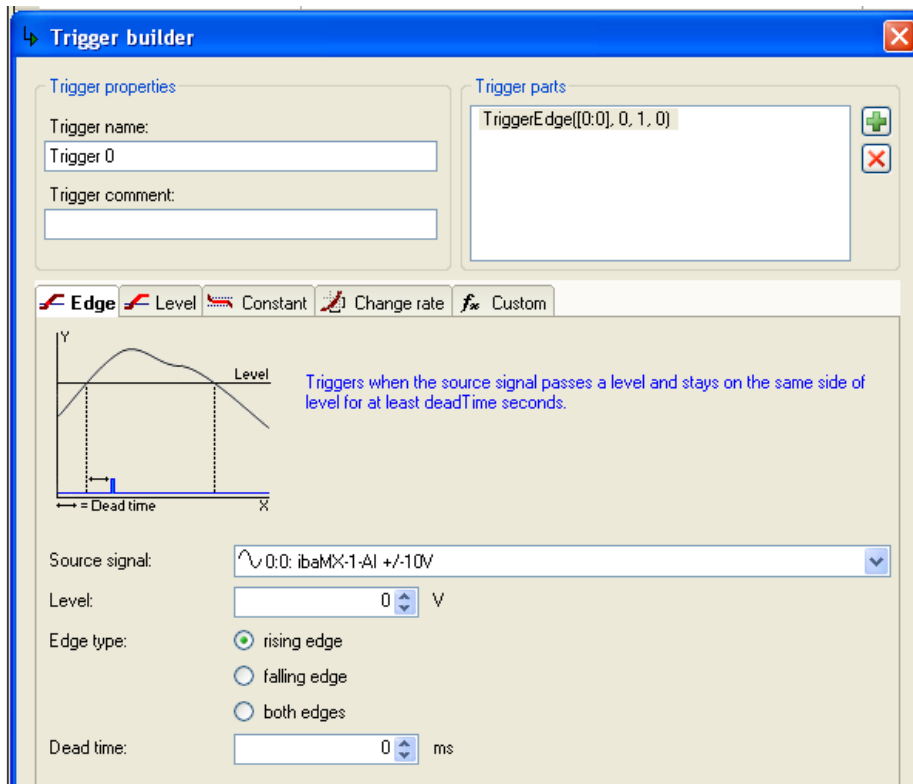
The custom tab contains the regular expression builder.
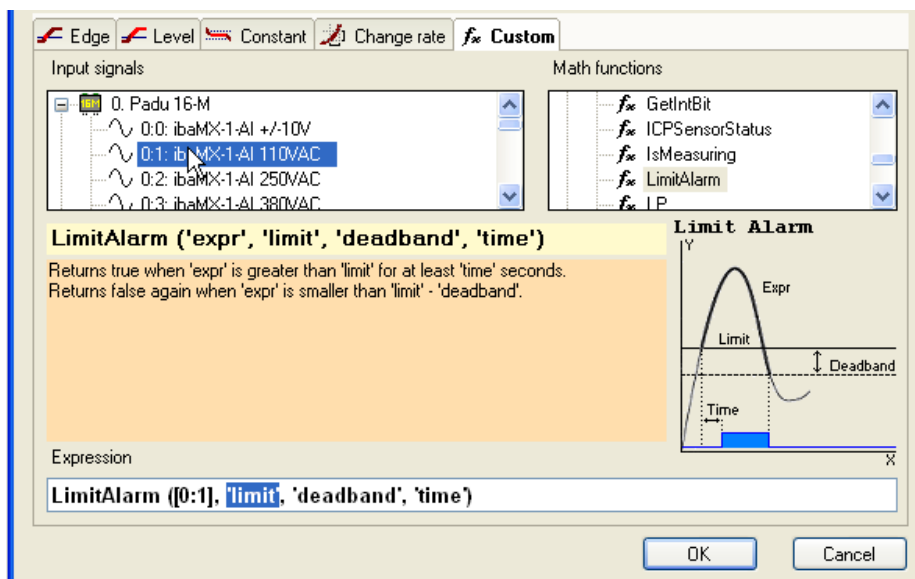
Finish the definition of one trigger event with <OK>

❑ Define further trigger events in the same way.

Result:

In the signal grid of the trigger module you see the overview of all defined trigger events.

2. Use the trigger events in the data store configuration

The signals from the trigger modules can be used as triggers in the datastore. Each datastore has a start trigger pool and a stop trigger pool. A trigger pool is actually a list of signals from all trigger modules. If one of the triggers fires then the trigger pool fires. The trigger can fire on a rising edge of the trigger signals or it can fire each sample the trigger signal is 1.

❑ If you want to use a trigger pool as a trigger then you have to set this option on the trigger mode form for start trigger

❑ Use the checkboxes to select which trigger signals belong to the trigger pool.

The selected trigger signals are marked green. The first row of the trigger grid can be used to filter the trigger signals. You can use multiselect via CTRL and SHIFT key to activate or deactivate multiple trigger signals at once.

❑ Do the same for the stop trigger

10.3   Configuring the Data Store

After finishing the configuration of the ibaPADU-16-M device, it is necessary to setup the data storage. For this, select "Configure – Data storage" in the main menu.

Proceed as follows:

1. Activate and name the data store
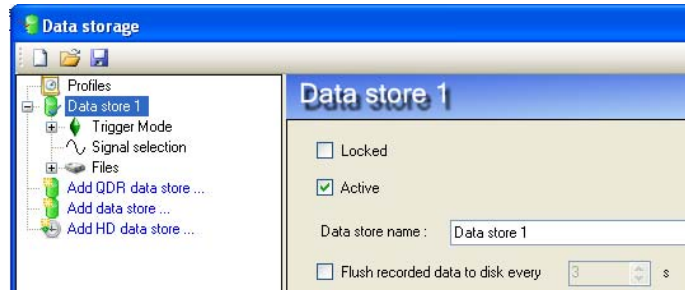
2. Define the Start / Stop Trigger
Either as a single trigger event,
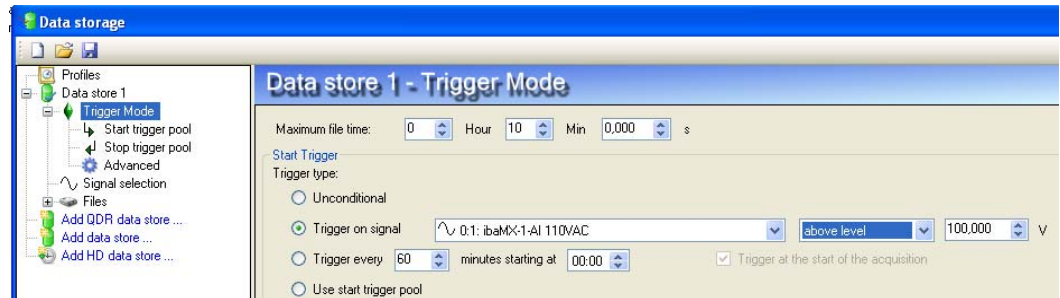
or one or more events from the trigger pool (see above).

3. Define the signals to store
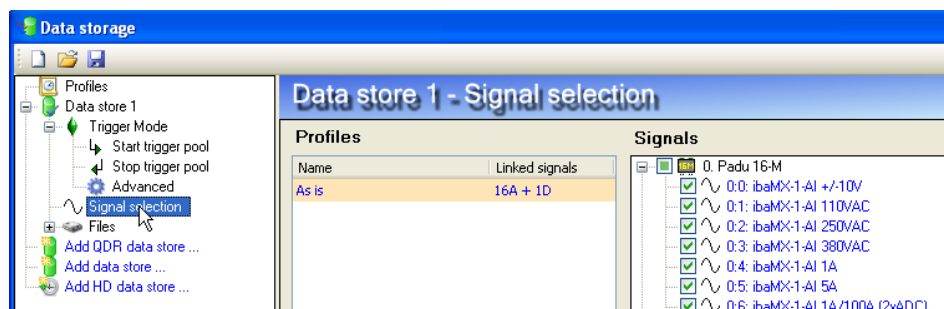
4. Define the data file properties
File name, location, directory organization etc.

5. To finish the configuration, press the button <OK> at the right bottom edge of the box. The data storage will be activated if the configuration is correct.

10.4   Configuring the Signal View

After closing the I/O Manager and the Data storage configuration you are in the ibaPDA client main view.

Mainly ibaPDA has three view types:

The trend graph ![icon], the Scope view ![icon] and the FFT view ![icon].

❑ Click to the icons to create the views in the signal monitor and place the dockable window in the monitor area.

❑ Drag and drop the signals from the signal tree and into the signal views.
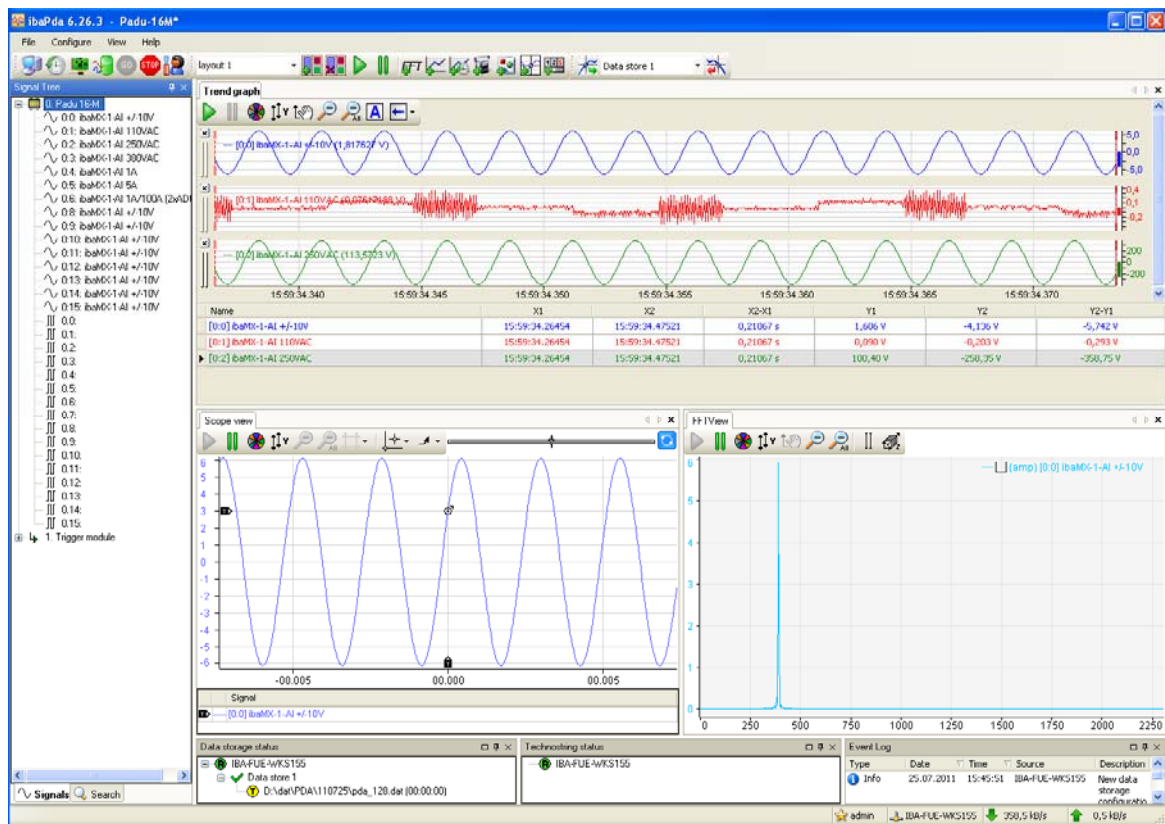
11   Tests

The devices are to be designed according to IEC 61000-6-2 and IEC/TS 61000-6-5. The following tests are to be made.

11.1   Type approvals

11.1.1   Environmental Conditions and Tests

Transport and storage	-13 °F to 158 °F (-25 °C to +70 °C)
Operating temperature	32 °F to 122 °F (0 °C to +50 °C) 131 °F on request (55 °C on request)
Humidity	95 %, no condensation
Coldness and dry heat	Acc. DIN EN 60068-2-1, DIN EN 60068-2-2
Rel. humidity (heat)	Acc. DIN EN 60068-2-30
Temperature change	Acc. DIN EN 60068-2-14
Other environmental conditions	Acc. VDE 0435 Part 303 (DIN EN 60255-25)

11.2   EMC- and Safety Test, CE Conformity

❑ Basic Unit 1.230-2

Modules:

❑ ibaMx1AI-10V

❑ ibaMx1AI-110V AC

❑ ibaMx1AI-1A/100A

❑ ibaMx8DI-24V

❑ ibaMx8DI-110V

Modules	
Product safety	EN 61010-1:2001
EMC Test	EN 61000-4-2, EN 61000-4-3 EN 61000-4-4, EN 61000-4-5 EN 61000-4-6, EN 61000-3-2 EN 61000-3-3, EN 61000-4-11 EN 55011, EN 55022 Cl.A

12   Technical Data

12.1   Main data

Ord.-no	10.123020
EMI test parameters	IEC 61000-6-2 or IEC/TS 61000-6-5 IEC 60255-22-1, IEC 60255-22-4
Operating temperature	32 °F to 122 °F (0 °C to +50 °C) 131 °F on request (55 °C on request)
Storage temperature	-13 °F to 158 °F (-25 °C to +70 °C)
Transport temperature	-13 °F to 158 °F (-25 °C to +70 °C)
Cooling	Passive
Humidity Class	F, no condensation
Protection Class	IP20
FO-cable Coupling	62.5/125 µm ST Lean
Maximum length of fiber optics between devices	1.24 mi (2000 m)

Product Safety according to EN 61010-1	1CATII 250 V AC
Power supply	115 V AC/60 Hz, 230 V AC /50 Hz 110/220 V DC ±20 %
Power supply cable	E. g. Distributor Farnell Order Nr.839140 H05VV-F3G 1,0 mm{+2} PVC-Isolated (VDE, DIN 0625)
Assembly	19 " rack mount
Power consumption	2 W to 25 W
Dimensions Device body (W x H x D) Front panel (W x H)	 1.73 in x 5.15 in x 8.90 in (440 mm x 130 mm x 226 mm) 19.02 in x 5.22 in (483 mm x 132 mm)
Weight (incl. box and documentation)	Approx. 13.23 lbs (6.0 kg)

12.2   Sub modules

Analog input modules	ibaMX-1-AI ±10V	ibaMX-1-AI 220VAC	ibaMX-1-AI 110VAC	ibaMX-1-AI 380VAC
Order-No.:	17.124000	17.124100	17.124200	17.124300
Number of inputs	1	1	1	1
Resolution	16 Bit			
Programmable filter	Selectable via software			
Dynamics	>80 dB			
Frequency response	0 Hz to 25,000 Hz			
RC Filter (twice)	-3 dB 20 kHz			
Filter Frequency range	75 Hz to 12,500 Hz (>80 dB)	75 Hz to 12,500 Hz (>80 dB)	75 Hz to 12,500 Hz (>80 dB)	75 Hz to 12,500 Hz (>80 dB)
Input level/type				
Nom	±10 V DC	220 V AC	110 V AC	380 V AC
Range	±10 DC V	±624 V DC	±312 V DC	±1074 V DC
Max	±100 V DC (for 1 min)	5 kV DC Transient	5 kV DC Transient	5 kV DC Transient
Input impedance	R_{on} = 130 kΩ R_{off} = 100 kΩ	1 MΩ	250 kΩ	Tbd
Sampling rate	25 kHz			
Error	<0.2 %			
Galvanic isolation				
Channel-Channel	2.5 kV AC	2.5 kV AC		
Channel-Ground	2.5 kV AC	2.5 kV AC		
Channel-Protection	2.5 kV AC	2.5 kV AC		

Analog input modules	ibaMX-1-AI 1A/100A (2xADC)	ibaMX-1-AI 5A	ibaMX-1-AI 1A
Order-No.	17.127000	17.127100	17.127200
Number inputs	1	1	1
Resolution	16 Bit		
Programmable filter	Selectable via software		
Dynamics	>80 dB		
Frequency response	0 Hz to 25,000 Hz		
RC Filter (twice)	-3 dB 35 kHz		
Filter Frequency range	75 Hz to 12,500 Hz (>80 dB)	75 Hz to 12,500 Hz (>80 dB)	75 Hz to 12,500 Hz (>80 dB)
Input level / type			
Nom	1 A AC	5 A AC	1 A AC
Range	±0 A to 6.25 A DC ±100 A DC (for 1s)	±15 A DC	±3 A DC
Max	±100 A DC (for 1 s/100 s pause)	±50 A DC (for 1 s /100 s pause)	20 A (for 1 s)
Input impedance	2.5 mΩ	5 mΩ	25 mΩ
Filter Frequency range	75 Hz to 12,500 Hz (>80 dB)	75 Hz to 12,500 Hz (>80 dB)	75 Hz to 12,500 Hz (>80 dB)
Sampling rate	25 kHz		
Error	<0.2%		
Galvanic isolation:			
Channel-Channel	2.5 kV AC		
Channel-Ground	2.5 kV AC		
Channel-Protection	2.5 kV AC		

Binary input modules	ibaMX-8-DI 24V	ibaMX-8-DI 110V DC	
Order-No.	17.126000	17.126100	
Number of inputs	8	8	
Input level			
Nom	24 V DC	110 V to 125 V DC	
Overload	±300 V DC (1 min)	±300 V DC (1 min)	
	log0 <6 V	log0 <30 V	
	log1 >10 V	log1 >40 V	
Input current	1 mA	1 mA	
Sampling rate	25 kHz		
Galvanic isolation:			
Channel-Channel	2.5 kV AC		
Channel-Ground	2.5 kV AC		
Channel-Protection	2.5 kV AC		

13   Support and Contact

Support

Phone: +49 911 97282-14

Fax: +49 911 97282-33

E-Mail: 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
E-Mail: 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 web site

www.iba-ag.com.