
# ibaMS16xAI-10V, -10V-HI, -24V, -24V-HI, -20mA

## Input modules for analog signals

Manual

Issue 2.2

Measurement Systems for Industry and Energy

www.iba-ag.com

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| Issue | Date | Revision | Author | Version HW/FW |
|---|---|---|---|---|
| 2.2 | 12-2025 | Circuit diagrams | st | B0/- |




**Certification**

The product is certified according to the European standards and directives. This product meets the general safety and health requirements.

Other international and national standards were observed.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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# 1 About this documentation

This manual describes the structure, application and operation of the *ibaMS16xAI-10V*, *ibaMS16xAI-10V-HI*, *ibaMS16xAI-24V*, *ibaMS16xAI-24V-HI* and *ibaMS16xAI20mA* modules. A general system description of the iba modular system and further information on the structure, application and operation of the central units can be found in separate documentation.

**Other documentation**

For a general description of the iba modular system and additional information about layout, application and operation of the modules, please refer to the dedicated documentations.

The documentation of the iba modular system is part of the data medium "iba Software & Manuals”.

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

- **Central units**

  The manuals of the central units contain information about:

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

- **Modules**

  The manuals of the single modules contain specific information on the individual module. For example:

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

## 1.1 Target group and previous knowledge

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

## 1.2 Notations

In this manual, the following notations are used:

| Action | Notation |
|---|---|
| Menu command | Menu *Logic diagram* |
| Calling the menu command | *Step 1 – Step 2 – Step 3 – Step x*<br>Example:<br>Select the menu *Logic diagram – Add – New function block*. |
| Keys | <Key name><br>Example: <Alt>; <F1> |
| Press the keys simultaneously | <Key name> + <Key name><br>Example: <Alt> + <Ctrl> |
| Buttons | <Key name><br>Example: <OK>; <Cancel> |
| Filenames, paths | `Filename`, `Path`<br>Example: `Test.docx` |

## 1.3 Used symbols

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

**Danger!**

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

- Observe the specified measures.

**Warning!**

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

- Observe the specified measures.

**Caution!**

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

- Observe the specified measures

**Note**

A note specifies special requirements or actions to be observed.

**Tip**

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

**Other documentation**

Reference to additional documentation or further reading.

# 2 About ibaMS16xAI-x

The modules *ibaMS16xAI-10V*, *ibaMS16xAI-10V-HI*, *ibaMS16xAI-24V*, *ibaMS16xAI-24V-HI* and *ibaMS16xAI-20mA* are members of the iba-modular system. The design and the handling of all modules are similar, they only differ in technical specifications (voltage or current modules, signal level, input impedance, see ↗ *Technical data*, page 37). The description is based on the example of the *ibaMS16xAI-10V* module.

The modular concept of the iba modular system is based on a module rack with backplane bus, on which a central unit and up to 4 additional input/output modules can be plugged. The power supply of the I/O modules is provided by the backplane bus.

**A brief overview**

- Entension modules for the iba-modular system
- 16 analog inputs, galvanically isolated
- Input level:
  - -10 V: ±10 V
  - -10V-HI: ±10 V (high input impedance)
  - -24 V: ±24 V
  - -24V-HI: ±24 V (high input impedance)
  - -20mA: ±20 mA
- 16 bit resolution
- Sampling rate up to 40 kHz, freely adjustable
- Real parallel data capturing with one A/D converter per channel
- Analog and digital filters per channel
- Power frequency measurement
- Rugged housing, easy mounting
- Certification according to CE

**Fields of application**

Acquisition of analog input signals ±10 V / ±24 V / ±20 mA in the fields:

- Power generation and distribution
- Power factor compensation plants
- Test benches
- General voltage or current measurement
- Sensor technology (*ibaMS16xAI-20mA*: 0 mA to 20 mA or 4 mA to 20 mA)
- Condition monitoring

# 3 Scope of delivery

After having unpacked the delivery, please check it for completeness and possible damages.

The scope of delivery contains:

- *ibaMS16xAI-10V*, *ibaMS16xAI-10V-HI*, *ibaMS16xAI-24V*, *ibaMS16xAI-24V-HI* or *ibaMS16xAI-20mA* device
- 2 x 16-pin multi-pin connector, clamp type terminal (contact spacing 5.08)
- Data medium “iba Software & Manuals” (only for single delivery)

# 4 Safety instructions

Observe the following safety instructions for *ibaMS16xAI-10V, -10V-HI, -24V, -24V-HI, -20mA*.

## 4.1 Intended use

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

- Automation of industrial plants
- Measurement data acquisition and measurement data analysis
- Applications of software products (*ibaPDA*, *ibaLogic*, etc.) and hardware products of iba AG.

The device may only be operated in conditions as specified in the technical data, see ↗ *Technical data*, page 37.

## 4.2 Special safety instructions

**Danger!**

**Risk of electric shock!**

- The device is only designed for electrical measuring currents as specified in the "Technical data" chapter.
- Never use damaged measuring cables!
- Measuring cables must NOT be attached or detached to/from the device under voltage!

**Warning!**

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

**Caution!**

Modules must NOT be attached or detached to/from the rack under voltage.

Switch off the central unit or disconnect power supply before attaching or detaching the modules.

**Note**

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

**Note**

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

# 5 System requirements

**Hardware**

- Central unit: *ibaPADU-S-IT-2x16* or *ibaPADU-S-CM* (version 02.10.001 or later)
- Module rack, e. g. *ibaPADU-B4S*

**Software**

- *ibaPDA* version 6.34.0 or later
- *ibaLogic-V5* version 5.0.2 or later

**Note**

The use of *ibaLogic-V5* requires the central unit *ibaPADU-S-IT-2x16*. If the module is used with the predecessor *ibaPADU-S-IT-16*, only *ibaLogic-V4* can be used.

**ibaMS16xAI-x**

- Hardware beginning with version B0

# 6 Mounting and dismounting

In the following, you will learn how to install, connect and dismount the modules *ibaMS16xAI-10V, -10V-HI, -24V, -24V-HI, -20mA* . Also refer to the notes in chapter ↗ *Safety instructions*, page 11.

**Caution!**

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

**Note**

Mount one or more modules on the right next to the central unit (slot X2 to X5 can be freely selected).

## 6.1 Mounting

Proceed as follows to mount the *ibaMS16xAI-10V, -10V-HI, -24V, -24V-HI, -20mA* module.

1. Disconnect the central unit from the power supply.
2. Remove the cover from the backplane bus, to which the module should be attached.
3. Attach the module to the backplane bus and press it firmly against the module rack.
4. Screw the module to the top and bottom of the module rack using the fastening screws.

**Note**

Always screw the device and the modules tightly. Plugging or unplugging the connectors for the inputs/outputs can otherwise cause damage.

## 6.2 Connecting

**Note**

The module rack and the device must be connected to a protective conductor.

1. Connect all cables.
2. If all required cables are connected, connect the central unit to the power supply.
3. Switch on the central unit.

## 6.3 Dismounting

To dismount the module, proceed as follows.

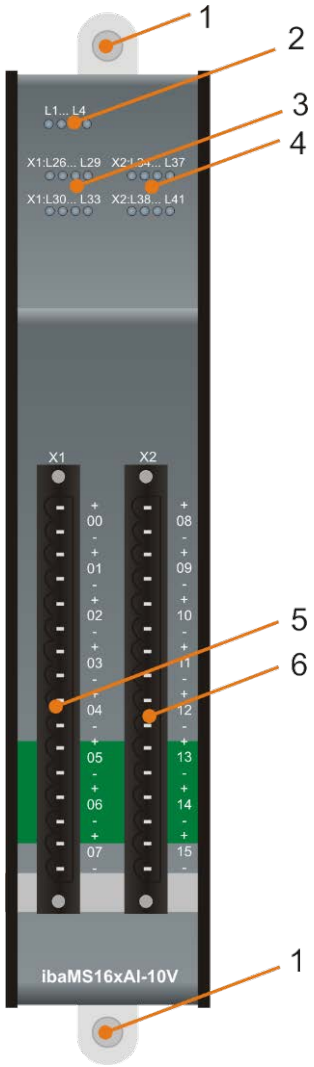
1. Disconnect the central unit from the power supply.
2. Remove all cables.
3. Loosen the upper and lower fixing screws that secure the module to the module rack.
4. Pull the device straight from the backplane.
5. Put the cover on the backplane bus.

# 7 Device description

Here you will find views and descriptions of the device *ibaMS16xAI-10V, -10V-HI, -24V, -24V-HI, -20mA*.

## 7.1 Device view

The position and the meaning of LEDs and plugs is similar for all 4 modules.




| | | | |
|---|---|---|---|
| 1 | Fixing screws | 4 | Status LEDs L34 to L41 of the analog inputs 08 to 15 |
| 2 | Operating status indicators L1 to L4 | 5 | Connector X1 for analog inputs 00 to 07 |
| 3 | Status LEDs L26 to L33 of the analog inputs 00 to 07 | 6 | Connector X2 for analog inputs 08 to 15 |

## 7.2 Indicating elements

The operating status of the device and the status of the analog inputs are shown by colored status LEDs.

### 7.2.1 Operating state

The following overview shows the possible operating states of the module *ibaMS16xAI-10V, -10V-HI, -24V, -24V-HI, -20mA*.

| LED | Color | State | Description |
|---|---|---|---|
| L1 | green | flashing | device ready for operation |
| | | off | device not ready for operation (switched off) |
| L2 | yellow | on | access to the backplane bus |
| L3 | white | - | - |
| L4 | red | off | normal status, no errors |
| | | flashing | failure/error |

**Note**

If an error is displayed on LED L4, contact iba support.

### 7.2.2 Status of analog inputs L26 to L41

| LED per channel | State/meaning | | Description (approx. values) | | |
|---|---|---|---|---|---|
| | | | **ibaMS16xAI-10V/ -10V-HI** | **ibaMS16xAI-24V/ -24V-HI** | **ibaMS16xAI-20mA** |
| L26 … L41 | off | no signal, signal too low | ± (0 … 0.1) V | ± (0 … 0.3) V | ± (0 … 0.2) mA |
| | green | within measuring range | ± (0.1 … 9) V | ± (0.3 … 21.6) V | ± (0.2 … 18) mA |
| | yellow | end of measuring range | ± (9 … 10) V | ± (21.6 … 24) V | ± (18 … 20) mA |
| | red | out of measuring range | > ± 10 V | > ± 24 V | > ± 20 mA |

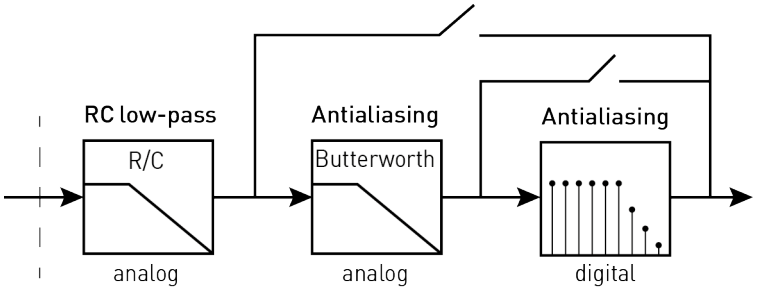
# 7.3 Analog inputs

## 7.3.1 Filters

There are the following filters per channel:

| Filter type | Order | Cutoff frequency | in addition / permanent |
|---|---|---|---|
| R/C low-pass | 1. | 40 kHz<br>-HI: 25 kHz | permanent |
| Analog anti-aliasing filter (Butterworth) | 4. | 20 kHz | in addition |
| Digital anti-aliasing filter (Tschebyscheff I) | 8. | can be adjusted (100 Hz ... 0.5*sampling rate) | in addition (sampling rate > 500 Hz) |

**Filter sections**




## 7.3.2 Power frequency measurement

Each channel provides power frequency measurement.

For information on parameterization, see ↗ *ibaMS16xAI-10V – Power frequency [10Hz…80Hz] tab*, page 30.

In addition to the actual measured values, the power frequency signals are available as virtual signals in the signal tree and can be displayed, recorded and used for calculations like all other signals.

**Properties**

- Frequency

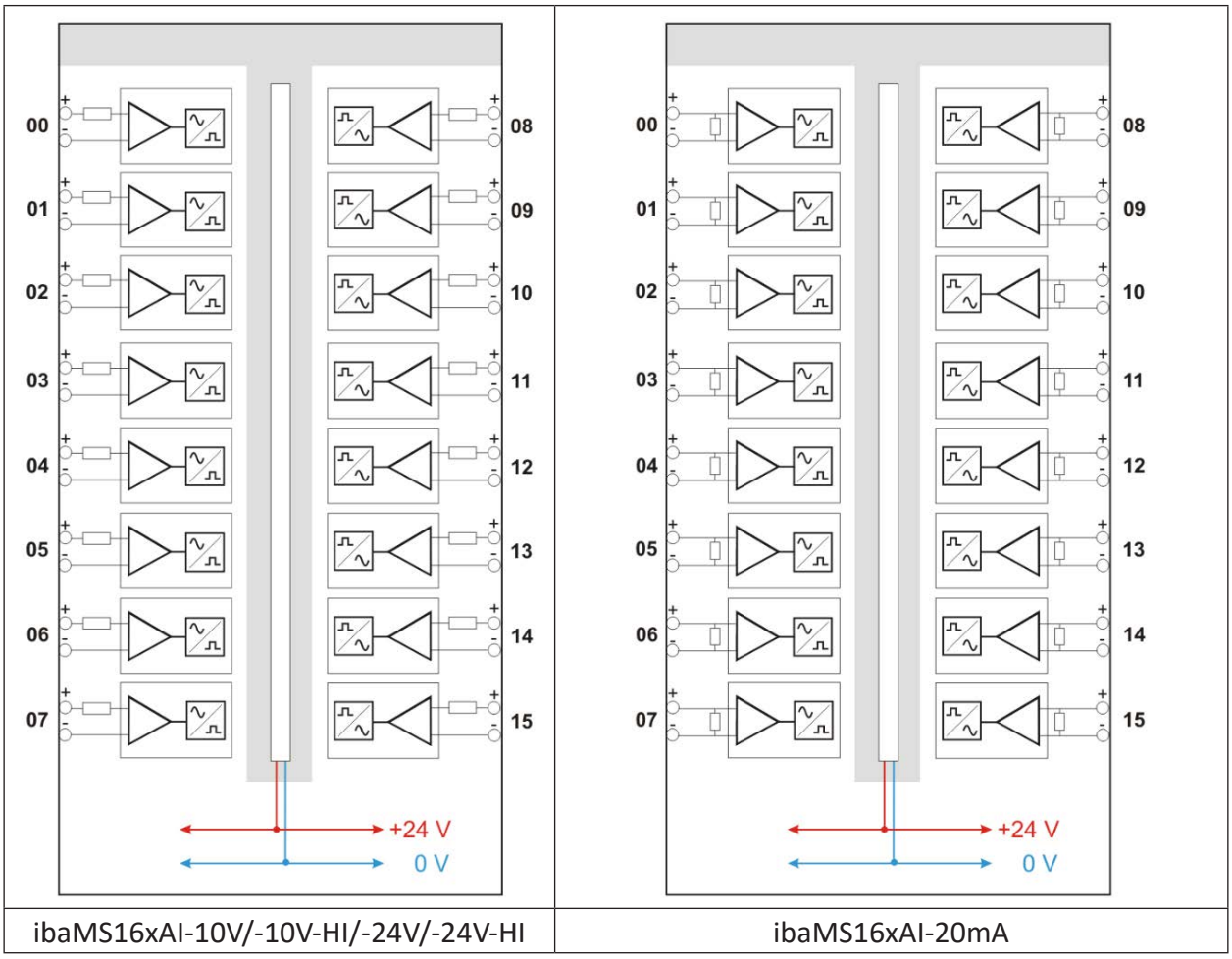
  Frequecies between 10 Hz and 80 Hz are supported.

- Measuring interval

| Measuring interval | Standard conformity | Accuracy |
|---|---|---|
| 1 s | - | ± 5 mHz |
| 10 s | according to DIN EN 61000-4-30 | ± 0.5 mHz |

### 7.3.3 Connection diagram / pin assignment

Here, you can connect 16 input signals (0…15), each bipolar and electrically isolated. Each channel is connected by means of two-wire connection.




| ibaMS16xAI-10V/-10V-HI/-24V/-24V-HI | ibaMS16xAI-20mA |
|---|---|

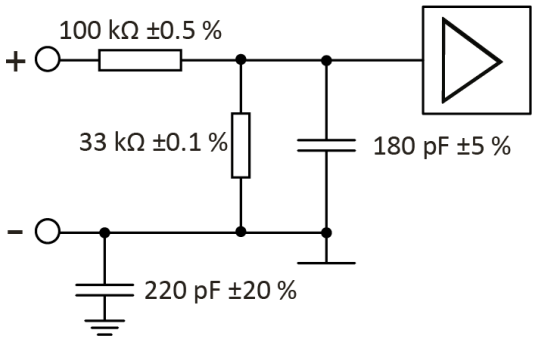
**Pin assignment**

| X1 Pin | Connection | LED | | X2 Pin | Connection | LED |
|---|---|---|---|---|---|---|
| 1 | Analog input 00 + | L26 | | 1 | Analog input 08 + | L34 |
| 2 | Analog input 00 – | | | 2 | Analog input 08 – | |
| 3 | Analog input 01 + | L27 | | 3 | Analog input 09 + | L35 |
| 4 | Analog input 01 – | | | 4 | Analog input 09 – | |
| 5 | Analog input 02 + | L28 | | 5 | Analog input 10 + | L36 |
| 6 | Analog input 02 – | | | 6 | Analog input 10 – | |
| 7 | Analog input 03 + | L29 | | 7 | Analog input 11 + | L37 |
| 8 | Analog input 03 – | | | 8 | Analog input 11 – | |
| 9 | Analog input 04 + | L30 | | 9 | Analog input 12 + | L38 |
| 10 | Analog input 04 – | | | 10 | Analog input 12 – | |
| 11 | Analog input 05 + | L31 | | 11 | Analog input 13 + | L39 |
| 12 | Analog input 05 – | | | 12 | Analog input 13 – | |
| 13 | Analog input 06+ | L32 | | 13 | Analog input 14 + | L40 |
| 14 | Analog input 06 – | | | 14 | Analog input 14 – | |
| 15 | Analog input 07+ | L33 | | 15 | Analog input 15 + | L41 |
| 16 | Analog input 07 – | | | 16 | Analog input 15 – | |

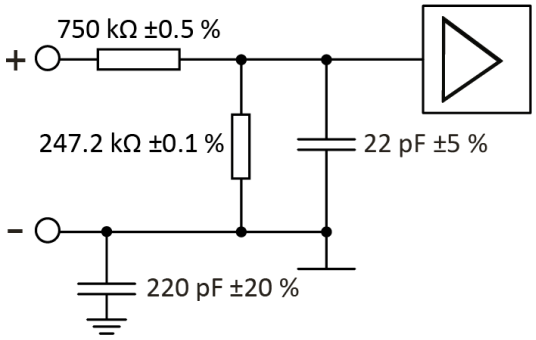
## 7.3.4 Circuit diagrams

The input circuit diagram of one channel is shown here as an example.

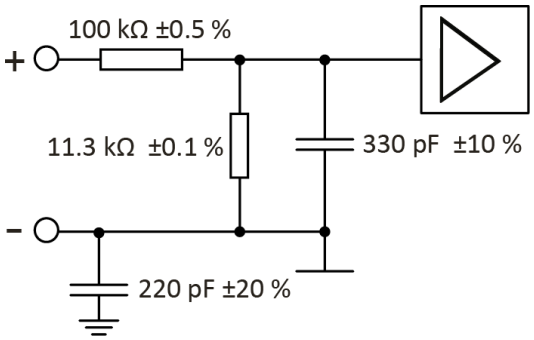
**ibaMS16xAI-10V**



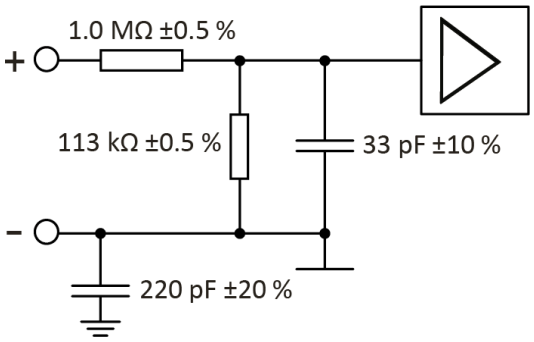

**ibaMS16xAI-10V-HI**



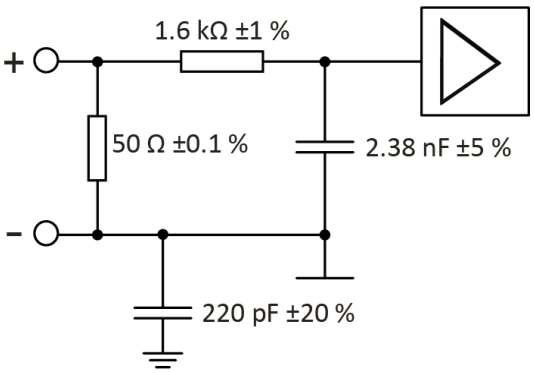
**ibaMS16xAI-24V**




**ibaMS16xAI-24V-HI**




**ibaMS16xAI-20mA**



# 8 Start-up and Update

**Note**

Do not switch off the device during an update as you may damage the device. Installing an update can take some minutes.

## 8.1 Auto-Update

After having mounted the module and applied the voltage to the central unit, the central unit detects the modules and checks the software version.

The central unit 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 website of the central unit on the *firmware* tab.

When the software version of a module does not match the “overall release version” of the central unit, the central unit does an automatic up- or downgrade of the module. After that the module is ready for use.

**Note**

The “overall release version” contains all modules developed up to the date of release of this firmware and the corresponding software versions. If the module is not yet known (i.e. newer than the firmware version of the central unit), it is ignored and framed in red in the web interface.

In this case, a new update file has to be installed for the "overall release version", see ↗ *Update*, page 23. Therefore, contact the iba support.

## 8.2 Overall release version

The “overall release version” provides information about the software version of the entire iba modular system. You can find it on the website of the central unit or in the I/O Manager of *ibaPDA*.

**Note**

Specify the "overall release version" for support cases.

## 8.3 Update

An update can be installed in two different ways:

- Web interface (only with *ibaPADU-S-IT-2x16*)

  see ↗ *Perform update via web interface*, page 23

- *ibaPDA*

  see ↗ *Perform update via ibaPDA*, page 24

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 will be rebooted.

**Note**

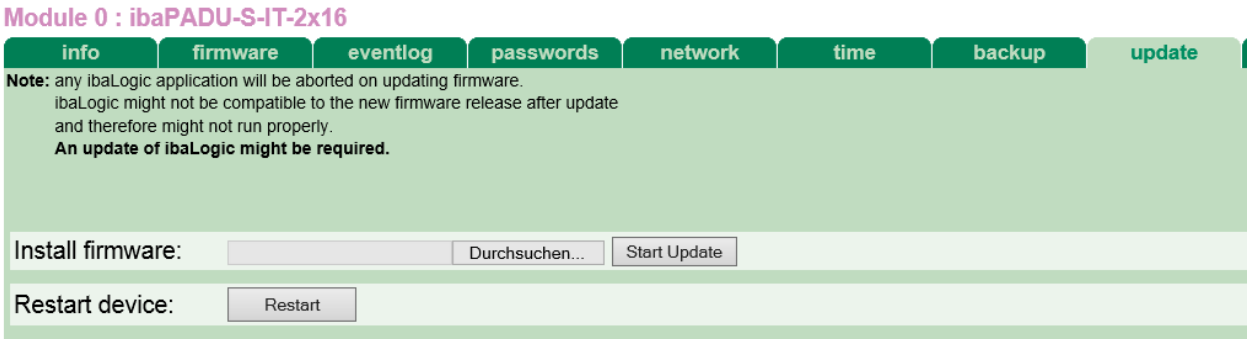
When updating the iba-modular system, a possible autostart of the *ibaLogic* PMAC is deactivated and the existing *ibaLogic-V5* application deleted. Furthermore, an update of the *ibaLogic-V5* software (*ibaLogic* Clients) might be necessary.

### 8.3.1 Perform update via web interface

**Note**

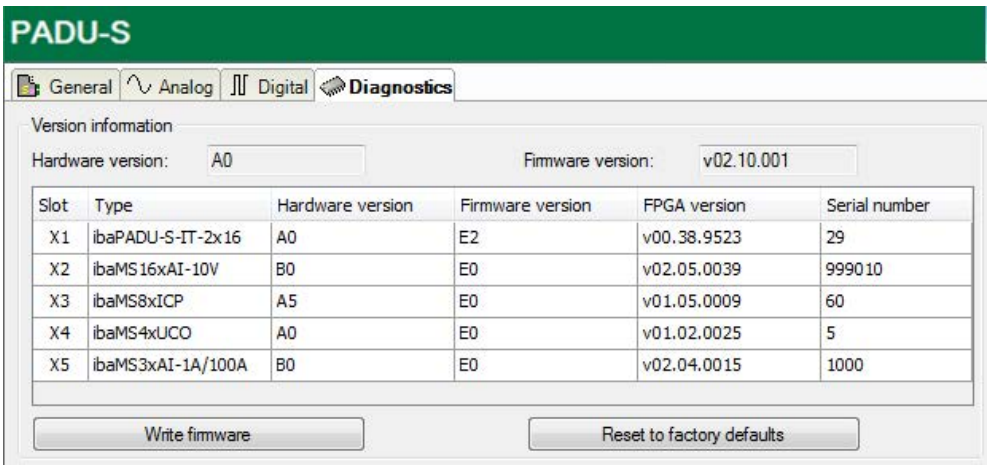
The web interface is available only with the central unit *ibaPADU-S-IT-2x16*.

1. Open the website of the iba modular system in your browser and select the central unit.
2. On the *update* tab, click on the <Browse…> button and choose the `padusit2x16_v[xx.yy.zzz].iba` update file.
3. By clicking on <Start Update>, you start the update.



### 8.3.2 Perform update via ibaPDA

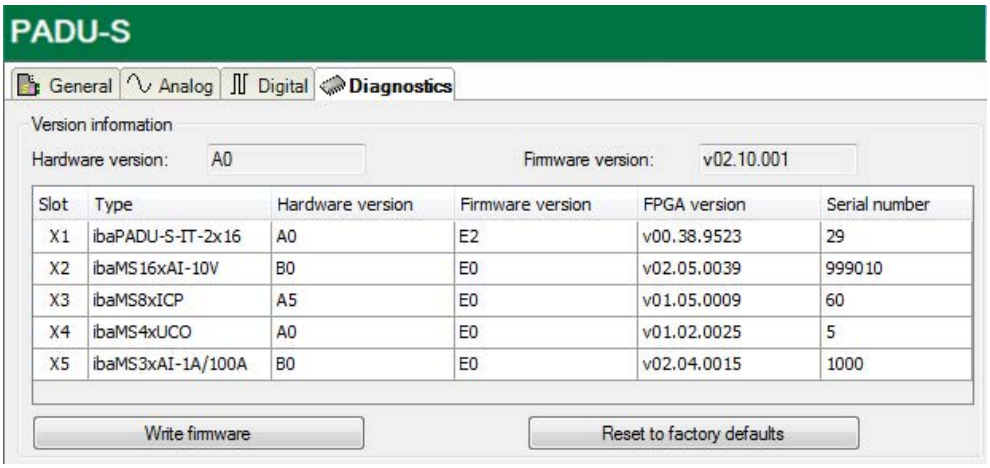
1. Open the *ibaPDA* I/O Manager and navigate to your iba modular system in the tree structure.
2. On the *Diagnostics* tab, click on the <Write firmware> button and select the `padusit2x-16_v[xx.yy.zzz].iba` or `paduscm_v[xx.yy.zzz].iba` update file.
3. You start the update by clicking on <OK>.




## 8.4 Module information/diagnostics

### 8.4.1 Diagnostics

Important information about the iba modular system, like hardware version, firmware version, FPGA version and serial number is displayed in the *Diagnostics* tab. Open the *ibaPDA* I/O Manager and choose your iba modular system in the tree structure.




### 8.4.2 Web interface

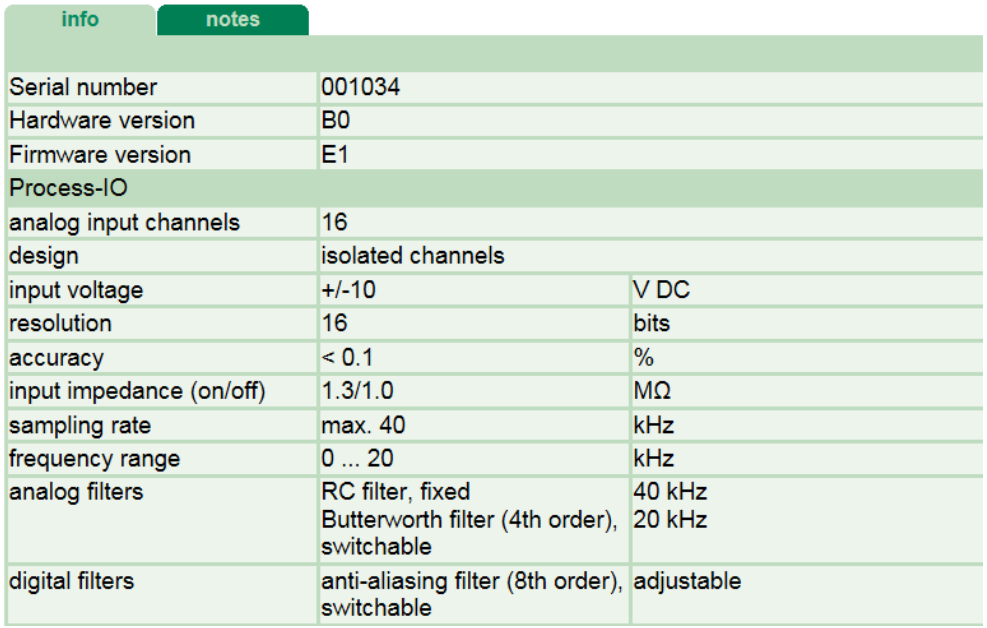
Only information on status and parameters is displayed on the module website. You cannot change the values.

**Note**

The web interface is available only with the central unit *ibaPADU-S-IT-2x16*.

### 8.4.2.1 info tab

The *info* tab displays general information and technical specifications of the I/O module.

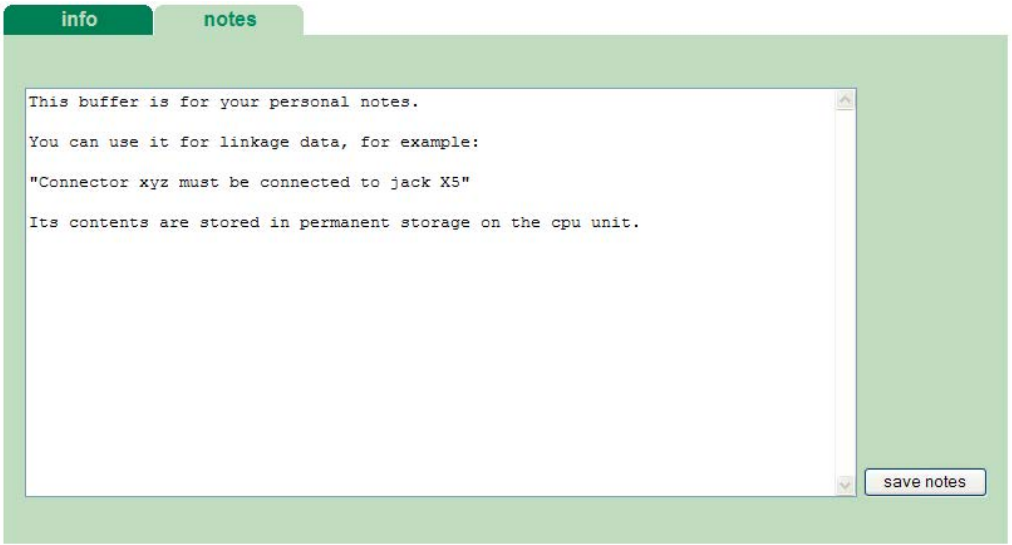



| | | |
|---|---|---|
| Serial number | 001034 | |
| Hardware version | B0 | |
| Firmware version | E1 | |
| Process-IO | | |
| analog input channels | 16 | |
| design | isolated channels | |
| input voltage | +/-10 | V DC |
| resolution | 16 | bits |
| accuracy | < 0.1 | % |
| input impedance (on/off) | 1.3/1.0 | MΩ |
| sampling rate | max. 40 | kHz |
| frequency range | 0 ... 20 | kHz |
| analog filters | RC filter, fixed<br>Butterworth filter (4th order), switchable | 40 kHz<br>20 kHz |
| digital filters | anti-aliasing filter (8th order), switchable | adjustable |

### 8.4.2.2 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.



# 9 iba Applications

## 9.1 Configuration with ibaPDA

You can configure the signals with the I/O Manager of *ibaPDA*. If the iba modular system is already installed and you want to add a new module, click on “Read configuration from device”. The module will be detected automatically.


**Note**

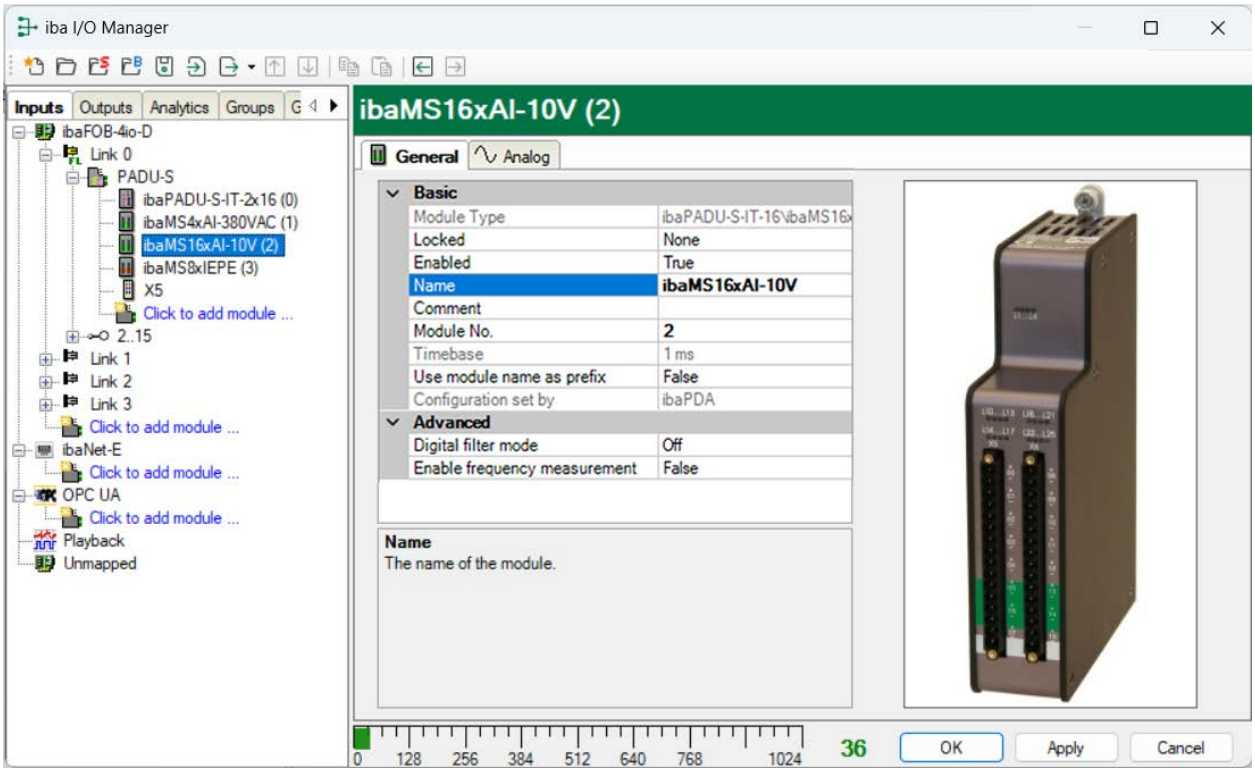
The automatic detection requires a bidirectional FO connection from the *ibaPDA* computer to the central unit.

**Other documentation**

If you want to install the iba modular system at first, refer to the manual of the central unit, chapter “Configuration with ibaPDA”.

### 9.1.1 ibaMS16xAI-10V – General tab

If the module is detected, click on the module in the tree structure and the *General* tab appears. The *General* and *Analog* tabs are the same for all ibaMS16xAI modules.



### Basic settings

**Module Type (information only)**
Indicates the type of the current module.

**Locked**
You can lock a module to avoid unintentional or unauthorized changing of the module settings.

**Enabled**
Enable the module to record signals.

**Name**
You can enter a name for the module here.

**Comment**
You can enter a comment or description of the module here. This will be displayed as a tooltip in the signal tree.

**Module No.**
This internal reference number of the module determines the order of the modules in the signal tree of *ibaPDA* client and *ibaAnalyzer*.

**Timebase**
All signals of the module are sampled on this timebase.

Timebase, specified in the PADU-S module.

**Use module name as prefix**
This option puts the module name in front of the signal names.

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

- *ibaPDA*

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

- Embedded application

  If embedded application is displayed, the configuration of the modules and signals is set by the embedded application on the device. In this case, it is also possible to import user-defined signal names - assigned by the runtime configuration - into *ibaPDA* (Import signal names: True), if the embedded application supports this function.

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

*ibaPDA* reads out this configuration and uses it for acquisition in *ibaPDA*. Modules and signals which are not displayed in gray can be used in *ibaPDA*.

### Advanced

#### Digital filter mode

When you select *Anti-aliasing* then after the analog anti-aliasing filter an additional digital anti-aliasing filter is applied to the signals. This digital anti-aliasing filter can be enabled only once per module and is then applied to all signals, that have the filter property enabled on the *Analog* tab.

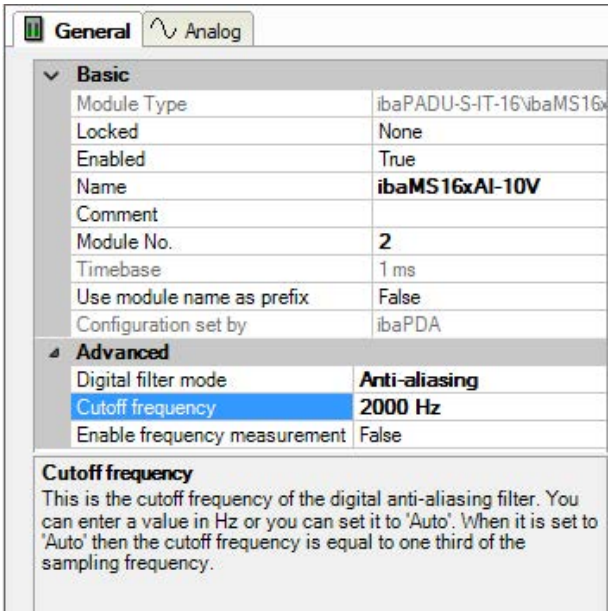
For this reason, it can only be activated together with the analog filter via the filter option in the *Analog* tab.

The digital anti-aliasing filter can only be enabled with a sampling rate > 500 Hz (= timebase < 2 ms).

If the digital filter is enabled, an additional field *Cutoff frequency* appears.

#### Cutoff frequency

You can enter a value in Hz for the cut-off frequency of the digital anti-aliasing filter or select the "Auto" setting. When it is set to “Auto” the cutoff frequency is equal to one third of the sampling frequency.



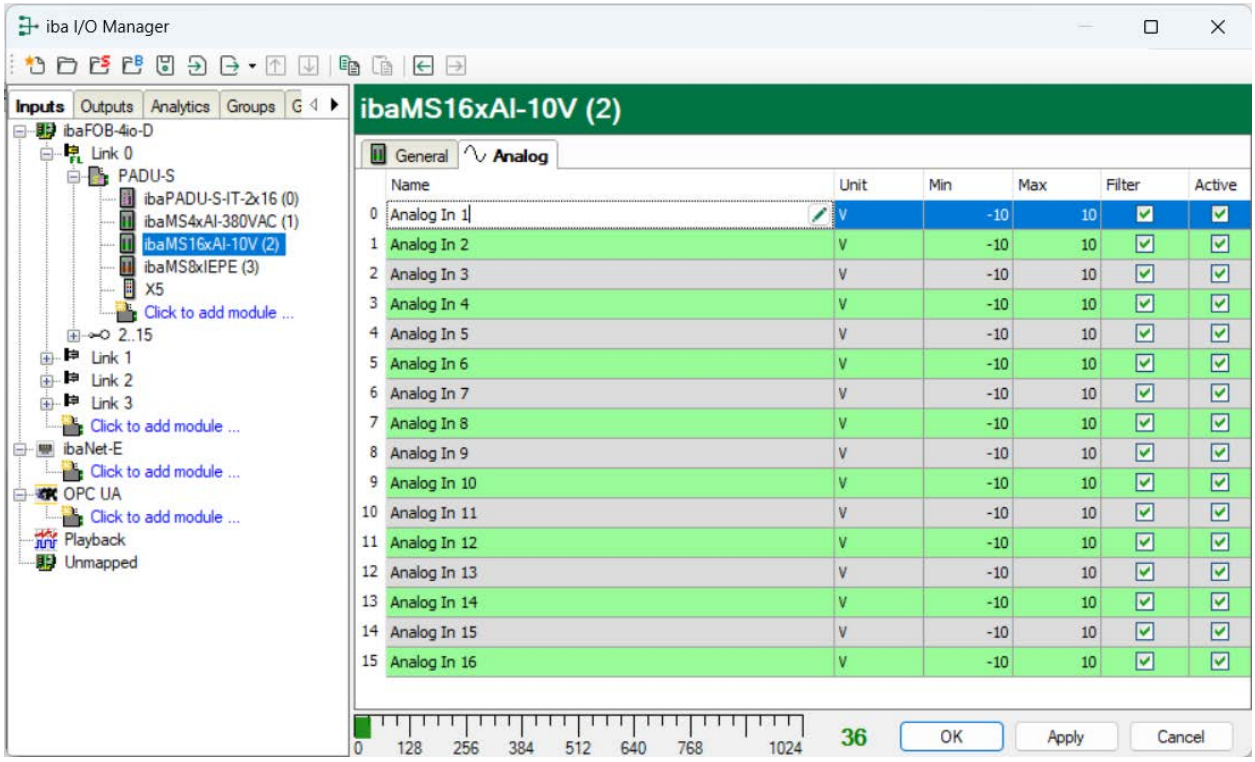

- Permissible values: 100 Hz … 0.5*sampling rate
- The entry “0" Hz corresponds to the setting “Auto".

#### Enable frequency measurement

Select „TRUE“, if you want to measure power frequency of the connected signals. The *Power frequency [10Hz..80Hz]* tab appears additionally.

### 9.1.2 ibaMS16xAI-10V – Analog tab

The following settings apply to the *Analog* tab:




**Name**

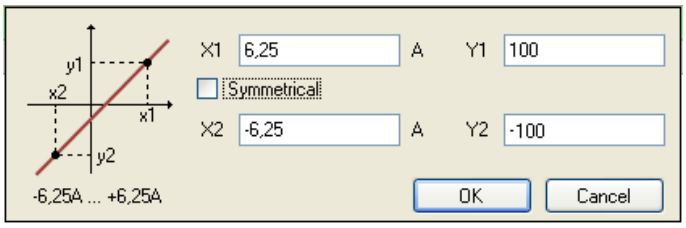
You can enter a signal name and additionally two comments when clicking on the symbol in the *Name* field.

**Unit**

You can enter a unit, the default setting is “V”.

**Min**

You can define a lower limit for the measuring range. The analog voltage standard level of -10 V is assigned to a physical variable (e.g. -20 °C).




**Max**

Here, you can define an upper limit for the measuring range. The analog voltage standard level of +10 V is assigned to a physical variable (e.g. +100 °C).

**Filters**

Here you can activate the anti-aliasing filter: Butterworth 4th order 20 kHz, see ↗ *Filters*, page 18.

**Active**
Enabling/disabling the signal

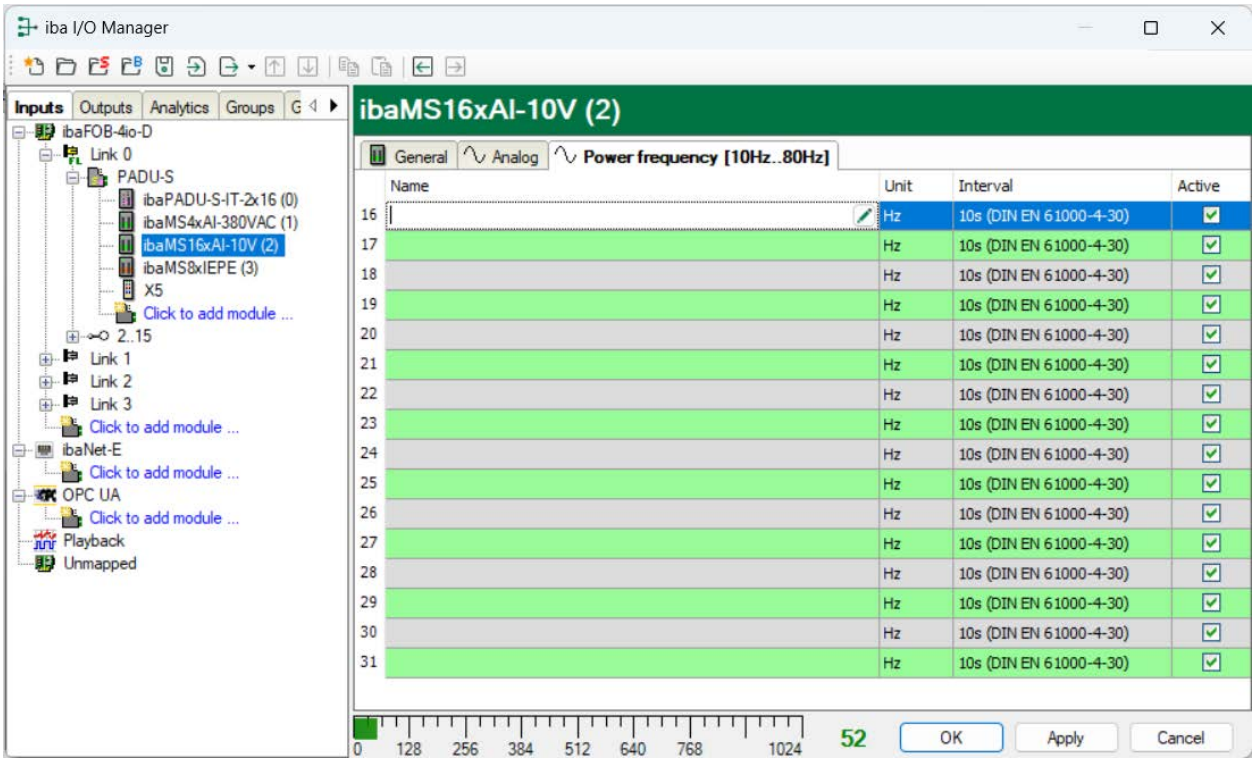
You can display or hide additional columns using the context menu (right mouse click in the heading line).

**Other documentation**

Detailed descriptions of the columns and how to fill in the signal tables can be found in the documentation for *ibaPDA*.

### 9.1.3 ibaMS16xAI-10V – Power frequency [10Hz…80Hz] tab

When power frequency measurement is enabled, this tab appears additionally.




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

**Unit**
Default value is „Hz“.

**Interval**
You can select the measuring interval via a drop-down list: 1s or 10 s (according to DIN EN 61000-4-30).


**Active**
Enabling/disabling the signal.

You can display or hide additional columns using the context menu (right mouse click in the heading line).

## 9.2 Configuration with ibaLogic-V5

Combined with *ibaLogic-V5*, an *ibaPADU-S-IT-2x16* device can be used to realize individual signal preprocessing or stand-alone applications.

**Other documentation**

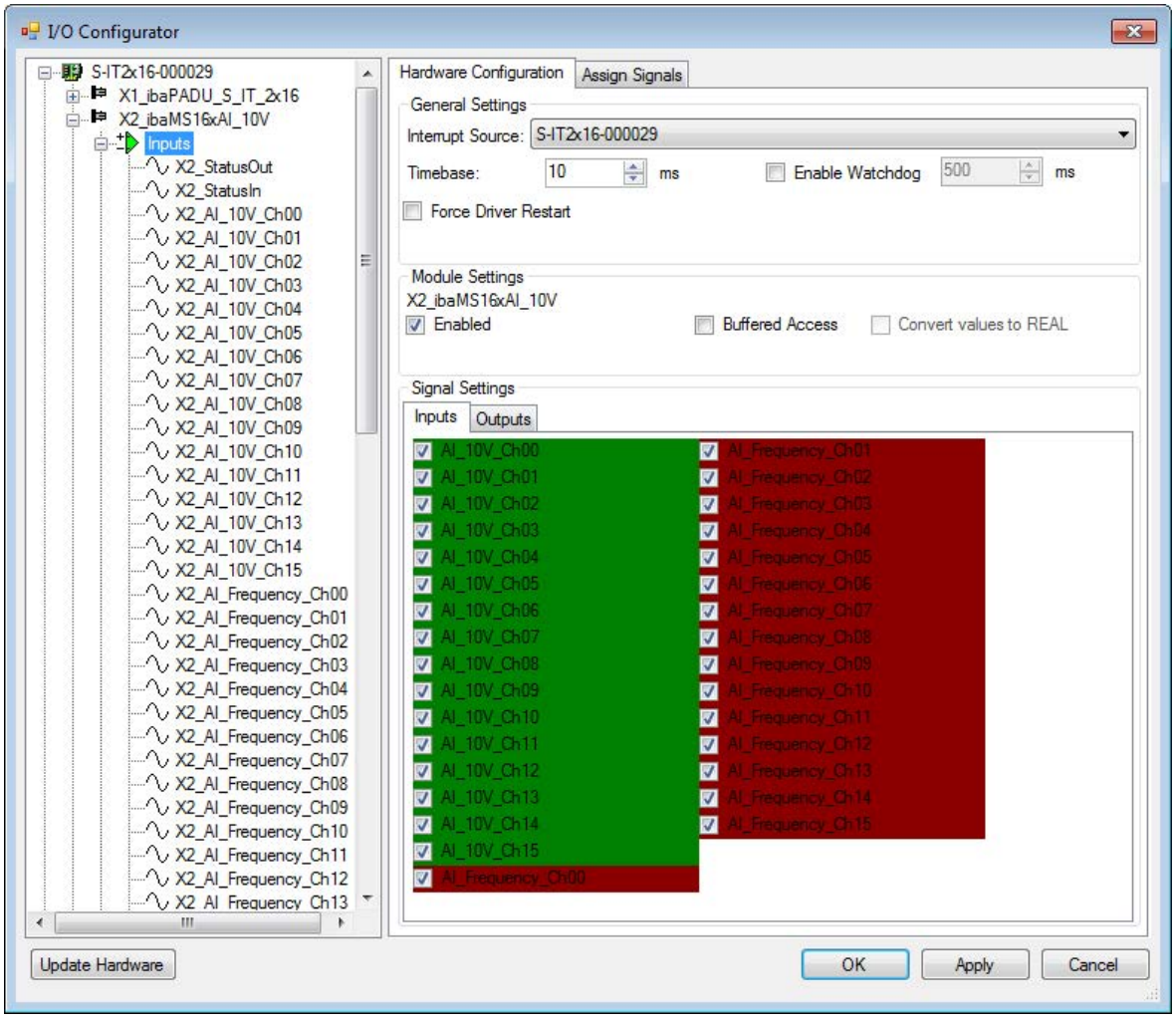
The basic procedure with *ibaLogic-V5* is described in the manual for the *ibaPADU-S-IT-2x16* central unit. This manual only describes the signals belonging to this module.

### 9.2.1 Configuring signals

The description is based on the example of the *ibaMS16xAI-10V* module. The signals can be configured in the I/O Configurator of *ibaLogic-V5*.

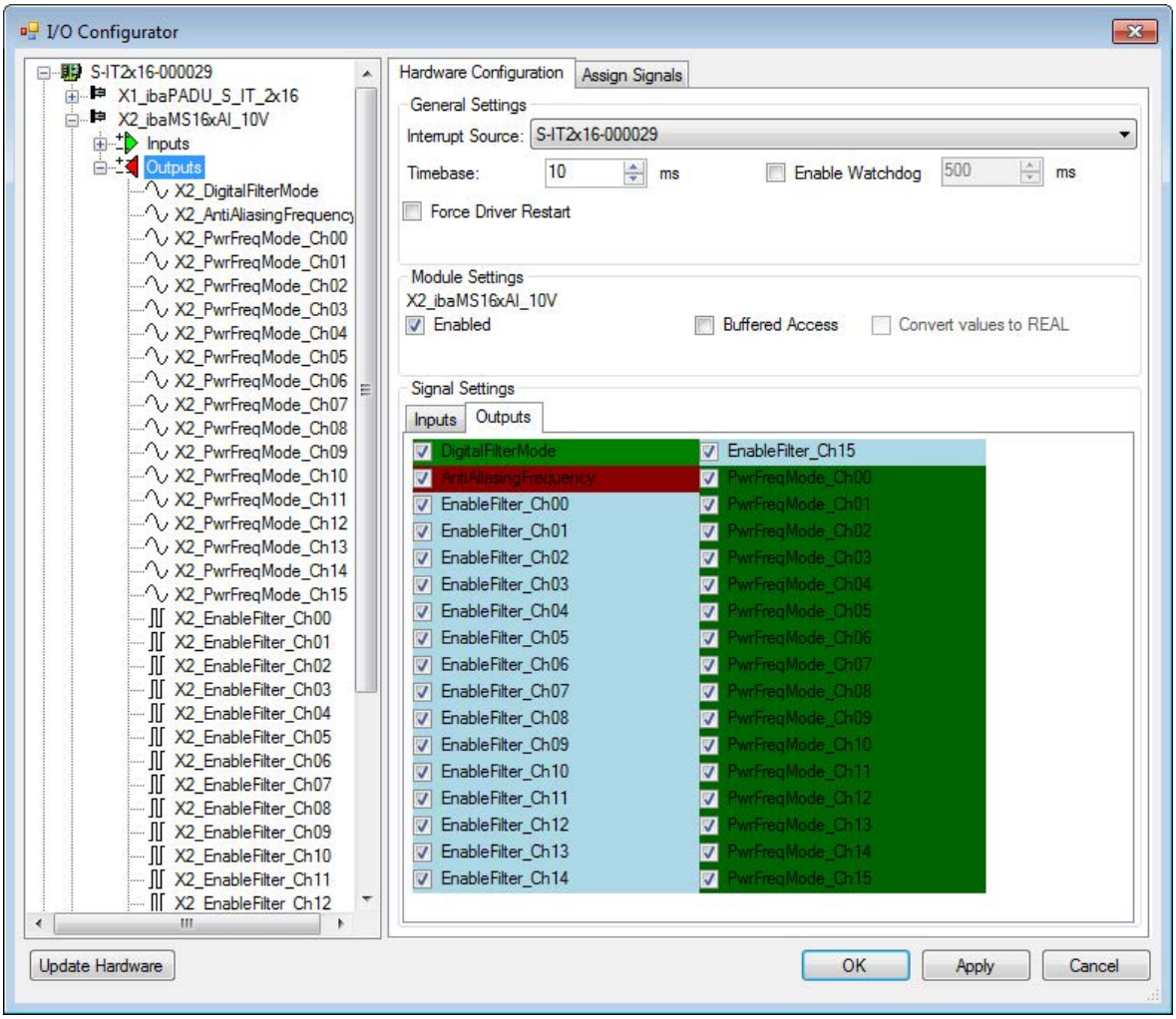
1. Open the I/O Configurator in the *Tools* – I/O Configurator menu.
2. Click on the <Update hardware> button.

→ *ibaLogic-V5* detects the module.




→ The analog input channels and the power frequency signals are displayed in the *Inputs* tab.

3. The filters are enabled and configured by means of signal outputs as well as the mode for power frequency measurement.




If *Buffered Access* is enabled, you can see additional input and output signals.

**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.

| Signal | Meaning |
|---|---|
| **Inputs** | |
| AI_10V_Ch[00…15] | Analog input signals |
| AI_Frequency_Ch[00…15] | Calculated grid frequencies |

| Signal | Meaning |
|---|---|
| StatusIn | Status information about the plugged input module (for output module without function):<br>0 = module not initialized<br>1 = module running<br>>1 = error (e.g. Module cannot be initialized) |
| StatusOut | Status information about the plugged module (for input module without function):<br>0 = module not initialized<br>1 = module running<br>>1 = error (e.g. Module cannot be initialized) |
| **Outputs** | |
| DigitalFilterMode | Activates the digital anti-aliasing filter in addition to the analog anti-aliasing filter (if activated) |
| AntiAliasingFrequency | Setting of the cutoff frequency of the digital anti-aliasing filter |
| EnableFilter_Ch[00…15] | Enables the analog antialiasing filters (per channel) |
| PwrFrqMode_Ch[00…15] | Setting of the measuring interval for power frequency measurement (per channel) |
| **Additional input signals for buffered access** | |
| AI_10V_Ch[00…15]_buf | Input buffer of analog signals: |
| AI_Frequency_Ch[00…15]_buf | Input buffer of calculated grid frequencies |
| BufferFillCount | Counter, when buffer is filled |
| BufferOverrun | Counter for Buffer-overrun |
| **Additional output signals for buffered access** | |
| BufferSize | Buffersize |
| SubSampling | Subsampling of the signals |

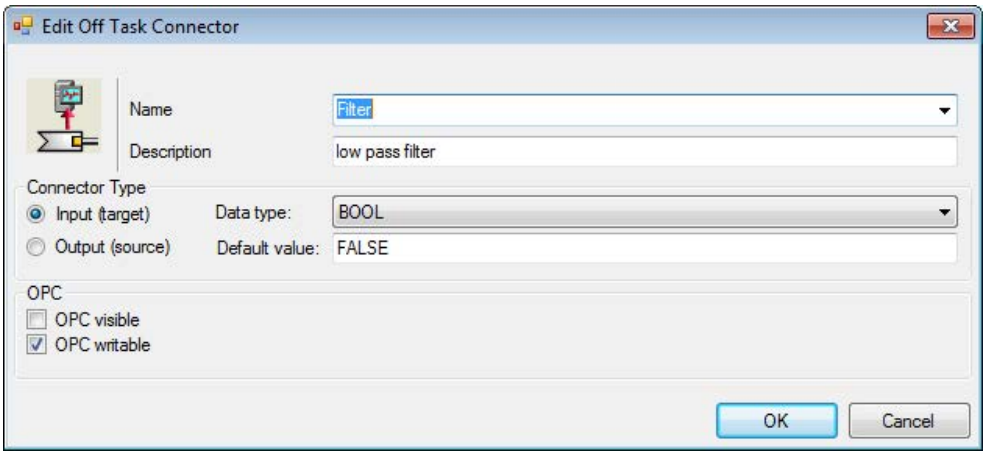
### 9.2.2 Additional functions

**Activating analog filters**

If you want to use anti-aliasing filters, these are set up 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 “X2_EnableFilter_Ch00” for the analog input 0.


Create a new off-task connector in the programming window, assign a meaningful name, e.g. “filter” and select the type Input. The data type must also be defined as a BOOL.




Meaning of the default values for the anti-aliasing filter:

FALSE = switched-off

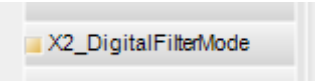
TRUE = switched-on

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


The configuration of the following functions is similar to the analog filter configuration as described above. The meaning of the parameters in detail:

**Digital anti-aliasing filter (DigitalFilterMode)**

The digital anti-aliasing filter can only be enabled when sampling rate > 500 Hz.

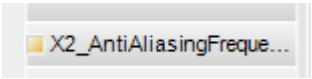



0: Off (default setting)

2: Digital anti-aliasing filter activated (once for all channels)

Data type: DINT

**Cutoff frequency of the digital anti-aliasing filter (AntiAliasingFrequency)**

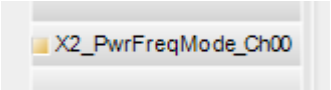



= 0: Auto = 1/3 of the sampling rate (default setting)

> 0: Cutoff frequency in Hz (permissible values: 100 Hz … 0.5*sampling rate)

Data type: LREAL

**Setting of the interval for power frequency measurement (PwrFrwqMode)**




1: Measuring interval 1 s

2: Measuring interval 10 s (according to DIN EN 61000-4-30)

Data type: USINT

# 10 Technical data

In the following you will find the technical data and dimensions for *ibaMS16xAI-10V, -10V-HI, -24V, -24V-HI, -20mA*.

## 10.1 Main data

**Short description**

| Name | Order number |
|---|---|
| ibaMS16xAI-10V | 10.124100 |
| ibaMS16xAI-10V-HI | 10.124101 |
| ibaMS16xAI-24V | 10.124102 |
| ibaMS16xAI-24V-HI | 10.124103 |
| ibaMS16xAI-20mA | 10.124110 |
| Description | Input module with 16 analog voltage or current inputs |

**Supply**

| | |
|---|---|
| Power supply | 24 V DC, internal via backplane bus |
| Power consumption max. | 12 W |

**Operating and indicating elements**

| | |
|---|---|
| Indicators (LEDs) | 4 LEDs for operating status of the device<br>16 LEDs for state of the analog inputs |

**Operating and environmental conditions**

| | |
|---|---|
| Temperature ranges | |
| Operation<br>Storage/transport | 32 °F to 122 °F (0 °C to 50 °C)<br>-13 °F to 158 °F (-25 °C to 70 °C) |
| Mounting position | vertical, plugged into backplane bus |
| Cooling | passive |
| Humidity class | F, no condensation |
| Protection class | IP20 |
| Certification/Standards | EMC: IEC 61326-1<br>FCC part 15 class A |
| MTBF[1)] | for *ibaMS16xAI-10V*: 1,084,665 hours / 123 years<br>for *ibaMS16xAI-20mA*: 1,124,943 hours / 128 years |

[1)] MTBF (mean time between failure) according to Telcordia 3 SR232 (Reliability Prediction Procedure of Electronic Equipment; Issue 3 Jan. 2011 and NPRD, Non-electronic Parts Reliability Data 2011

| | |
|---|---|
| Dimensions (width x height x depth) | 43 mm x 214 mm x 148 mm |
| Weight, incl. packing | 2.43 lbs (1.1 kg) |

## 10.2 Declaration of conformity

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

**Unique Identifier:**
10.124100 ibaMS16xAI-10V
10.124101 ibaMS16xAI-10V-HI
10.124102 ibaMS16xAI-24V
10.124103 ibaMS16xAI-24V-HI
10.124110 ibaMS16xAI-20mA

**Responsible Party - U.S. Contact Information**
iba America, LLC
370 Winkler Drive, Suite C
Alpharetta, Georgia
30004

(770) 886-2318-102
www.iba-america.com

**FCC Compliance Statement**
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## 10.3 Analog inputs

| | |
|---|---|
| Number | 16 |
| Version | galvanically isolated, single ended |
| Resolution | 16 bit |
| Filters | |
| permanent | R/C low-pass, 1st order, 40 kHz (-HI: 25 kHz) |
| in addition | analog anti-aliasing filter (Butterworth), 4th order, 20 kHz |
| | digital anti-aliasing filter (Chebyshev I)[2)], 8th order, cut-off frequency adjustable |

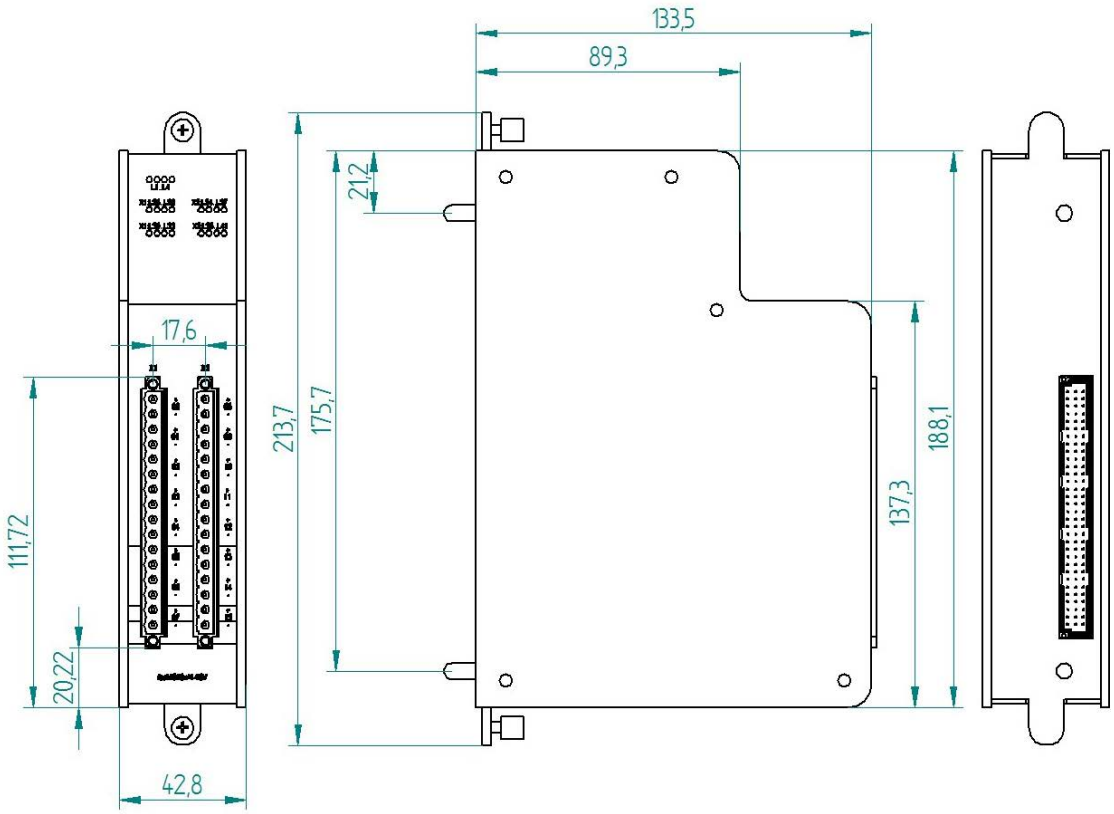
[2)] can be switched on if sampling rate > 500 Hz, cut-off frequency adjustable from 100 Hz to 0.5* sampling rate

| Input signal range | | |
|---|---|---|
| 10V/10V-HI | -10 V to +10 V | |
| 24V/24V-HI | -24 V to +24 V | |
| 20 mA | -20 mA to +20 mA | |
| Max. input voltage | ±60 V permanent<br>±100 V for 1 min, followed by 10 min max. signal voltage | |
| Input resistance | Device switched off | Device switched on |
| 10V | 100 kΩ | 133 kΩ |
| 10V-HI | 750 kΩ | 997 kΩ |
| 24V | 100 kΩ | 111 kΩ |
| 24V-HI | 1.0 MΩ | 1.1 MΩ |
| 20 mA | 50 Ω | 50 Ω |
| Input capacity | | |
| 10V | 7.8 pF | |
| 10V-HI | 10.3 pF | |
| 24V | 8.8 pF | |
| 24V-HI | 6.2 pF | |
| 20mA | n/a | |
| Sampling rate | max. 40 kHz, freely adjustable | |
| Frequency range | 0 Hz to 20 kHz | |
| Accuracy | < 0.1 % of total measuring range | |
| Electrical isolation | | |
| Channel-channel | 1.5 kV AC | |
| Channel – housing/power supply | 1.5 kV AC | |
| Connector type | 2 x 16-pin multi-pin connector;<br>Screw-type terminal (0.2 $mm^2$ to 2.5 $mm^2$), screw connection, included in delivery | |

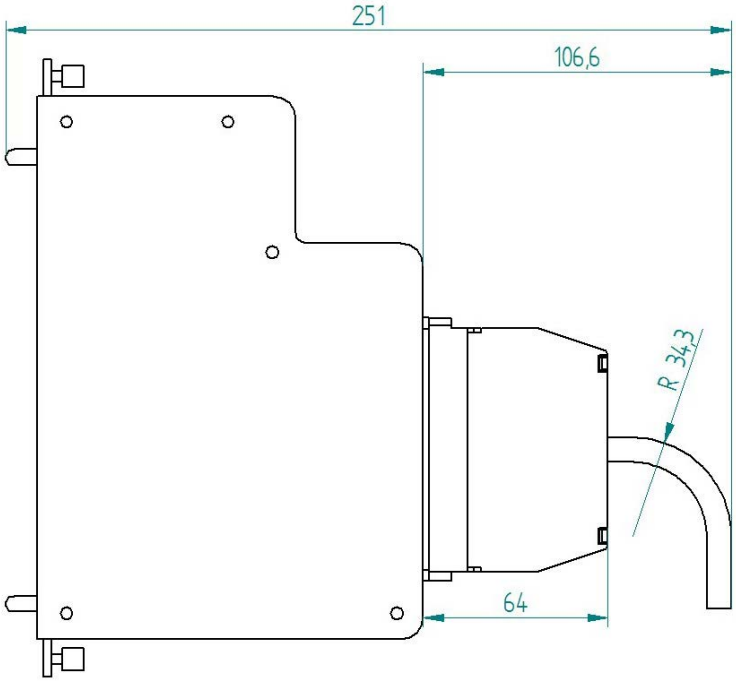
## 10.4 Additional functions

| Power frequency measurement<br>10 Hz … 80 Hz | Interval<br>1 s/10 s (according to DIN EN 61000-4-30) |
|---|---|

## 10.5 Dimensions




Dimensions of the module (dimensions in mm)




Dimensions with cable (dimensions in mm)

# 11 Support and contact

**Support**

Phone: +49 911 97282-14

Email: support@iba-ag.com

**Note**

If you need support for software products, please state the number of the license container. For hardware products, please have the serial number of the device ready.

**Contact**

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