ibaMS3xAI-1A, -5A, -1A/100A

Input modules for analog signals

Manual

Issue 2.1

Measurement Systems for Industry and Energy

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Issue	Date	Revision	Author	Version HW/FW
2.1	12-2025	Circuit diagram	st	B0/E5

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.

Contents

1 About this documentation

This documentation describes the design, application and operation of the *ibaMS3xAI-1A*, *ibaMS3x-AI-5A* and *ibaMS3x-AI-1A/100A* 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* Example: Select the menu *Logic diagram – Add – New function block*.
Keys	<Key name> Example: <Alt>; <F1>
Press the keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Key name> Example: <OK>; <Cancel>
Filenames, paths	`Filename`, `Path` 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 ibaMS3xAI-x

The modules *ibaMS3xAI-1A*, *ibaMS3x-AI-5A* and *ibaMS3x-AI-1A/100A* are part of the iba modular system. The design and the operation of all modules are similar, they only differ in technical specifications (signal level). The description is based on the example of the *ibaMS3x-AI-1A/100A* module.

The modular concept of the iba modular system is based on a module rack with backplane bus, onto which a central unit and up to 4 additional input or output modules can be plugged. The module is supplied with power via the backplane bus in the module rack.

A brief overview

- Extension module for the iba modular system
- 3 analog inputs, galvanically isolated
- Input current
  - ibaMS3xAI-1A: ±3.0 A
  - ibaMS3xAI-5A: ±15.0 A
  - ibaMS3xAI-1A/100A: ±6.25 A (±100 A for 1 s)
- 16 bit resolution
- Sampling rate up to 40 kHz, freely adjustable
- Analog and digital filters per channel
- Power frequency measurement
- Rugged housing, easy mounting
- Certification according to CE

Special feature of ibaMS3xAI-1A/100A

Genuine parallel measurement data acquisition using 2 A/D converters per channel: To ensure a resolution of 16 bits both in the nominal range and in the overload range, each channel is equipped with 2 A/D converters.

Fields of application

Capturing analog input signals in the fields:

- Power generation and distribution
- Power factor compensation plants
- Test benches
- General current measurement
- Condition monitoring

3 Scope of delivery

After unpacking, check that the delivery is complete and undamaged.

The scope of delivery includes:

- Device *ibaMS3xAI-1A, -5A, -1A/100A*
- 8-pin connector with clamp type terminals
- 2 fixing clamps with 2 screws
- Data medium “iba Software & Manuals” (only for single delivery)

4 Safety instructions

Observe the following safety instructions for *ibaMS3xAI-1A, -5A, -1A/100A*.

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 38.

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.

Caution!

The device may only be used for measuring in secondary circuits with a maximum voltage of 250 V AC related to ground potential.

The transient overvoltage of this circuit must not exceed 2500 V.

Caution!

The connector must be fixed by screwing tightly the 2 fixing clamps in order to ensure a safe connection:

Caution!

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

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.

ibaMS3xAI-1A / -5A / -1A/100A

- Firmware beginning with version E5
- Hardware beginning with version B0

6 Mounting and dismounting

In the following, you will learn how to install, connect and dismount the modules *ibaMS3xAI-1A, -5A, -1A/100A* . 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

To mount the module *ibaMS3xAI-1A, -5A, -1A/100A* , proceed as follows.

1. Disconnect the central unit from the power supply.
2. Remove the cover from the backplane bus onto which you want to attach the module.
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.

   Caution!

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

5. Connect the grounding screw on the bottom of the housing to the protective ground / grounding shield.

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

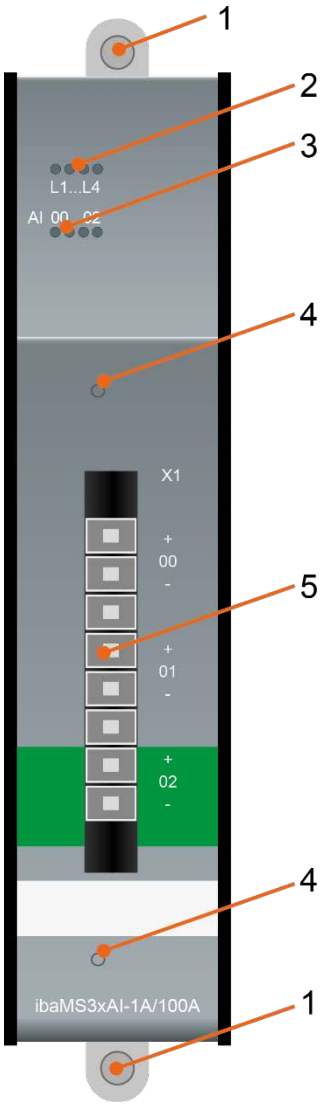
To dismount the module, proceed as follows.

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.

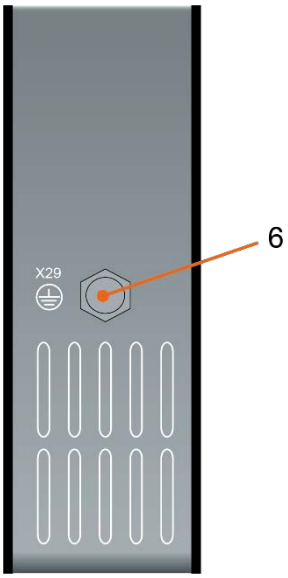
7 Device description

Here you will find views and descriptions of the device *ibaMS3xAI-1A, -5A, -1A/100A*.

7.1 Device views



1	Fixing screws	4	Screw holes for the fixing clamps
2	Operating status indicators L1 to L4	5	Connector X1 for analog inputs 00 to 02
3	Status LEDs L26 to L29 of the analog inputs 00 to 02		



6 Earthing screw X29

7.2 Indicating elements

Colored LEDs on the device indicate the status of the device and the status of the analog inputs.

7.2.1 Operating state

The following overview shows the possible operating states of the module *ibaMS3xAI-1A, -5A, -1A/100A*.

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 State of analog inputs

LED per channel	State/meaning		Range (approx. values)		
			ibaMS3xAI-1A	**ibaMS3xAI-5A**	**ibaMS3xAI-1A/100A**
L26 … L28	off	no signal, signal too low	± (0 … 0.03) A	± (0 … 0.14) A	± (0 … 0.06) A
	green	within measuring range	± (0.03 … 2.7) A	± (0.14…13.44) A	± (0.06 … 5.6) A
	yellow	end of measuring range	± (2.7 … 3.0) A	± (13.44…15.0) A	± (5.6 … 6.25) A
	red	out of measuring range	> ± 3.0 A	> ± 15.0 A	> ± 6.25 A

7.3 Analog inputs

7.3.1 Measuring ranges ibaMS3xAI-1A/100A

The measuring ranges are only valid for the *ibaMS3xAI-1A/100A* module. The internal 18 bit processing of the ibaMS3xAI module allows to display different measuring ranges in high resolution with 16 bit.

Measuring range	Resolution	Calibrated	Analog filter	Description
1.56 A	16 bit	x	x	for currents < 1.56 A DC
6.25 A	16 bit	x	x	**default**
100 A	16 bit	x	-	for currents < 100 A DC (only for 1 second)
6.25 A / 100 A	15 bit	x /x	x / -	combined range with 6.25 A and 100 A range, switch-over at 6.20 A.

Note

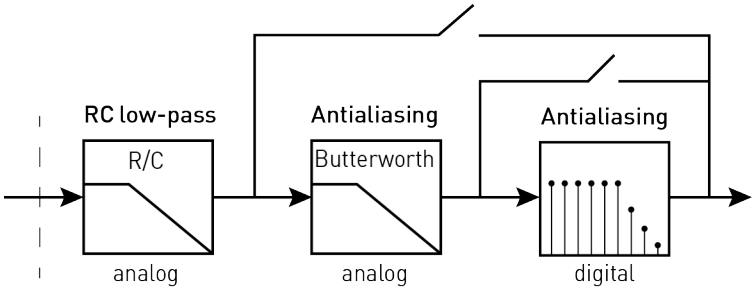
The additional analog filters can be adjusted only for the 6.25 A and the 1.56 A ranges!

7.3.2 Filters

There are the following filters per channel:

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

Filter sections



7.3.3 Power frequency measurement

Each channel provides power frequency measurement.

Note

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.

For information on parametrization, see ↗ *Power frequency [10Hz..80Hz] tab*, page 32.

Measuring properties

- Frequency

  Frequencies between 10 Hz and 80 Hz are supported.

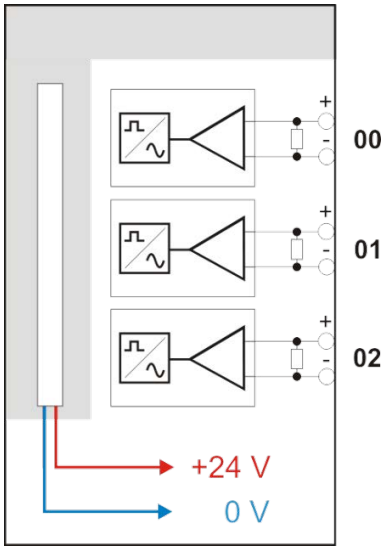
- Measuring interval

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

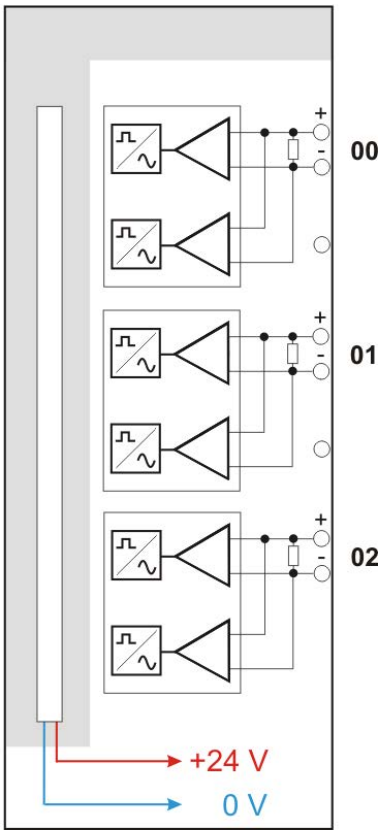
7.3.4 Connection diagram and pin assignment

Here, you can connect 3 input signals (0 ... 2), each bipolar and electrically isolated. Each channel is connected by means of two-wire connection.

Connection diagram ibaMS3xAI-1A and ibaMS3xAI-5A



Connection diagram ibaMS3xAI-1A/100A



Pin assignment

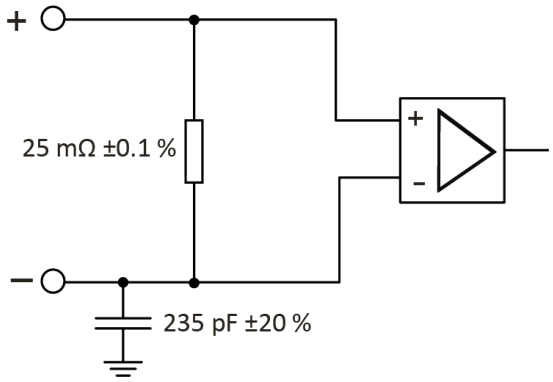
X1: Pin	Connection	LED
1	Analog input 00 +	L26
2	Analog input 00 –	
3	Without function	
4	Analog input 01 +	L27
5	Analog input 01 +	
6	Without function	
7	Analog input 02 +	L28
8	Analog input 02 –	

LED L29 is not used.

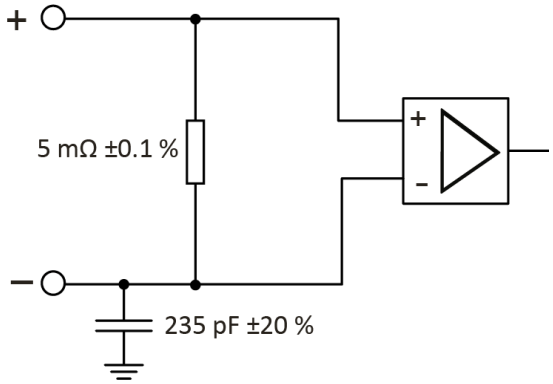
7.3.5 Circuit diagram

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

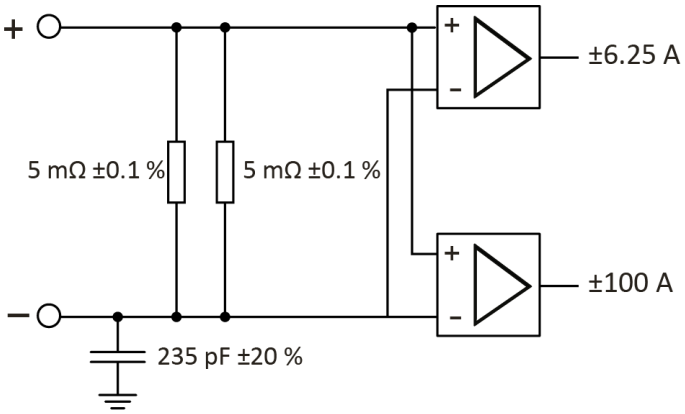
ibaMS3xAI-1A



ibaMS3xAI-5A



ibaMS3xAI-1A/100A



7.4 Connections

7.4.1 Grounding screw X29

For interference reasons, it may be necessary to connect the overall shield of the input cables to the grounding screw (M6) on the bottom of the device. Use an M6 cable lug for the connection.

Caution!

Only connect the shields to the device on one side, e.g. to avoid earth loops via the sensor housing.

Always ground the DIN-rail on which the device is installed.

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 24. 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 24

- *ibaPDA*

  see ↗ *Perform update via ibaPDA*, page 25

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

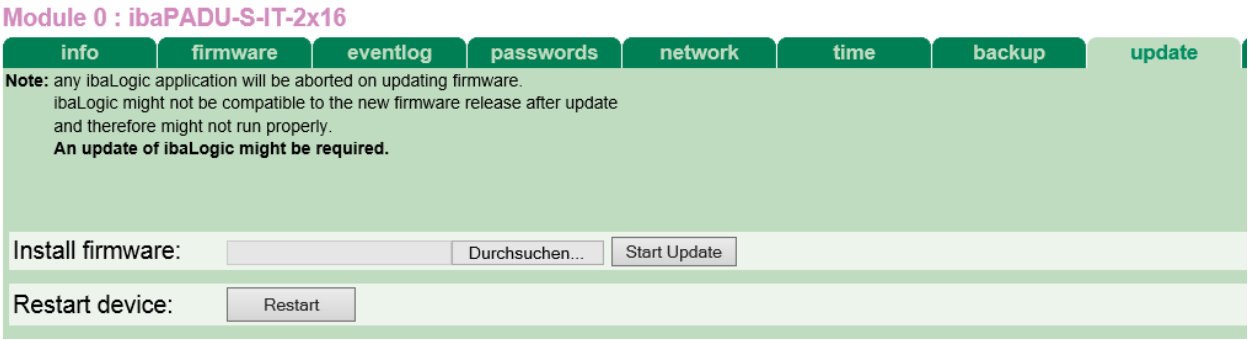
When updating the iba-modular system, a possible autostart of the *ibaLogic* PMAC is deactivated and the existing *ibaLogic-V5* application deleted. Furthermore, an update of the *ibaLogic-V5* software (*ibaLogic* Clients) might be necessary.

8.3.1 Perform update via web interface

Note

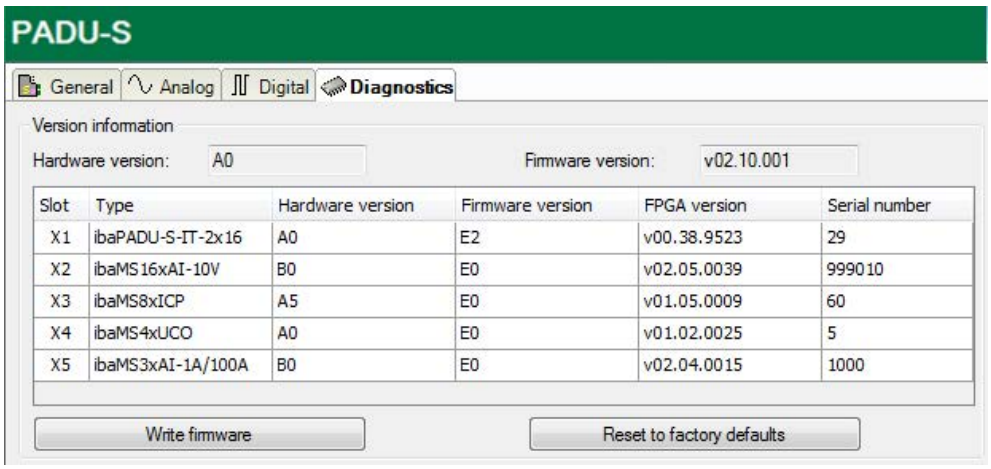
The web interface is available only with the central unit *ibaPADU-S-IT-2x16*.

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

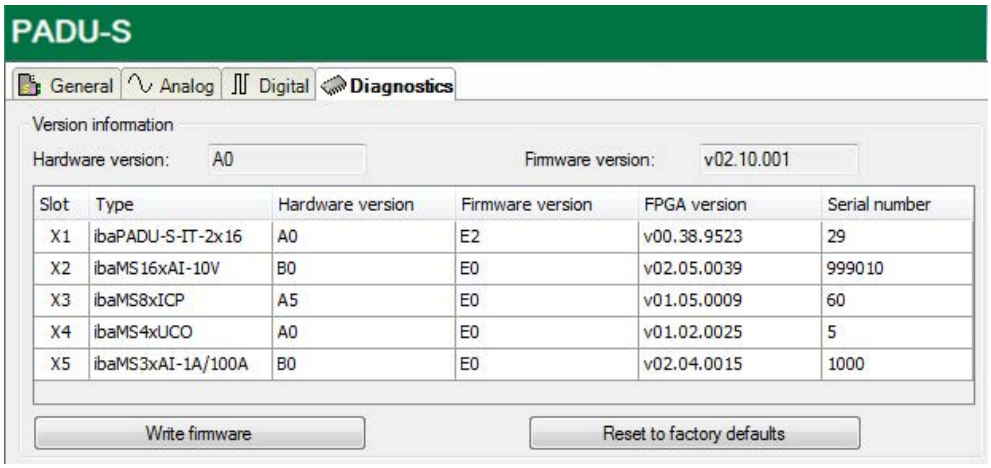
1. Open the *ibaPDA* I/O Manager and navigate to your iba modular system in the tree structure.
2. On the *Diagnostics* tab, click on the <Write firmware> button and select the `padusit2x-16_v[xx.yy.zzz].iba` or `paduscm_v[xx.yy.zzz].iba` update file.
3. You start the update by clicking on <OK>.



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

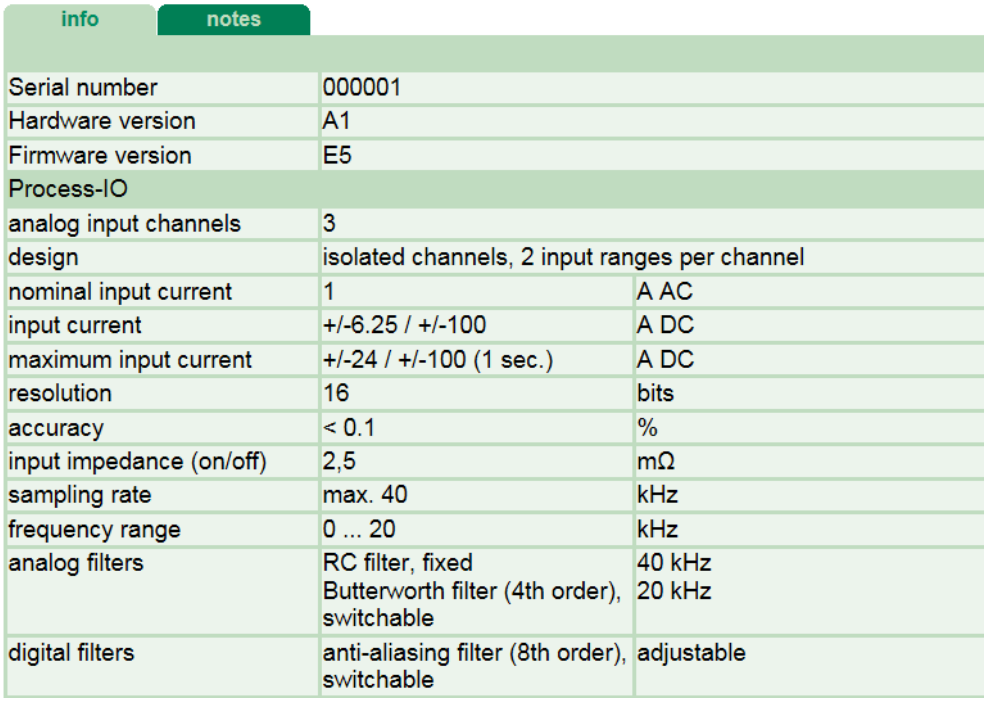
Only information on status and parameters is displayed on the module website. You cannot change the values.

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.

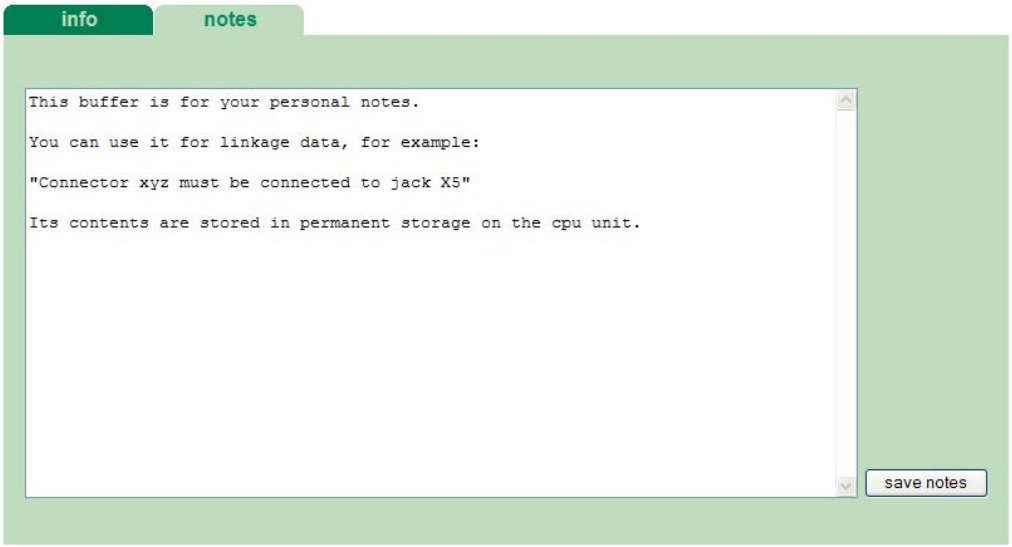


Serial number	000001	
Hardware version	A1	
Firmware version	E5	
Process-IO		
analog input channels	3	
design	isolated channels, 2 input ranges per channel	
nominal input current	1	A AC
input current	+/-6.25 / +/-100	A DC
maximum input current	+/-24 / +/-100 (1 sec.)	A DC
resolution	16	bits
accuracy	< 0.1	%
input impedance (on/off)	2,5	mΩ
sampling rate	max. 40	kHz
frequency range	0 ... 20	kHz
analog filters	RC filter, fixed Butterworth filter (4th order), switchable	40 kHz 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

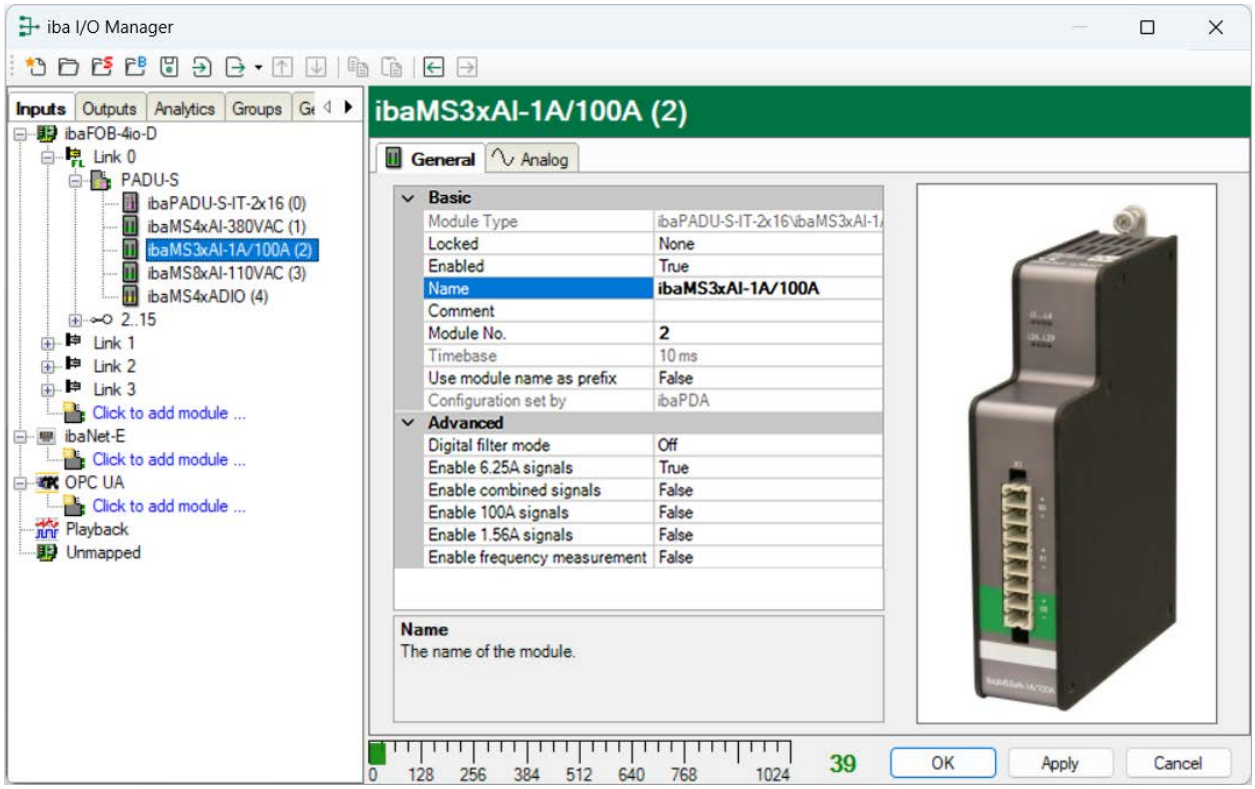
The automatic detection requires a bidirectional FO connection from the *ibaPDA* computer to the central unit.

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 ibaMS3xAI-1A/100A – General

If the module is detected, click on the module in the tree structure and the *General* tab appears.



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.

Acquisition 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*

Configuration set by	ibaPDA

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

- Embedded application

Configuration set by	Embedded application
Import signal names	False

  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

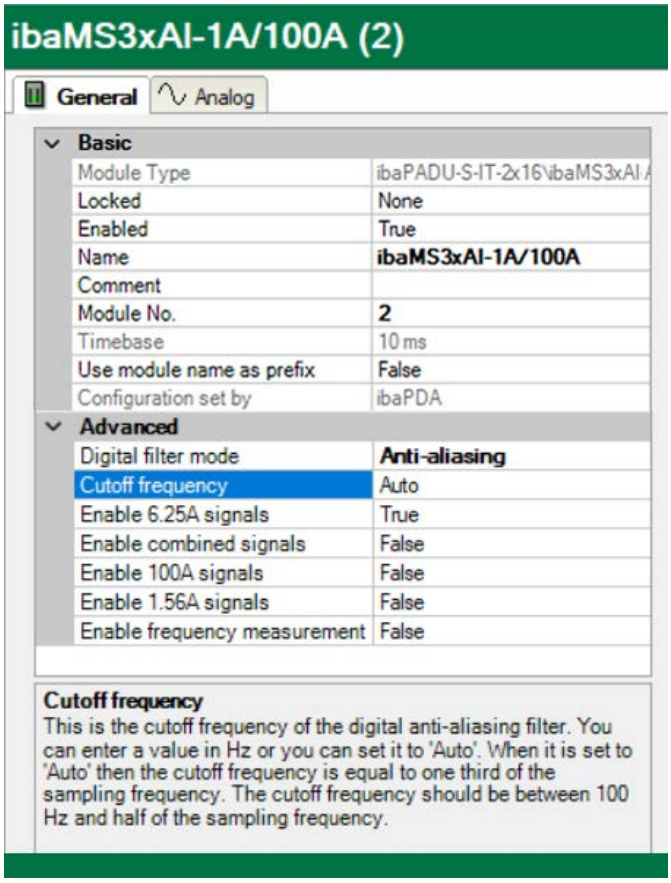
Select "Anti-aliasing" if an additional digital anti-aliasing filter is to be enabled after the analog anti-aliasing filter. This digital anti-aliasing filter can be enabled only once per module and is then applied to all signals, that have the filter property enabled on the *Analog* tab.

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 cutoff 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”.

The following additional signals are only available with module *ibaMS3xAI-1A/100A*:

- **Enable 6.25A signals**

  If "True" is selected, three additional signals of the "6.25A range" are displayed in the *Analog* tab.

- **Enable combined signals**

  If "True" is selected here, three additional signals of the "6.25A/100A range" are displayed in the *Analog* tab.

- **Enable 100A signals**

  If "True" is selected, three additional signals of the "100A range" are displayed in the *Analog* tab.

- **Enable 1.56A signals**

  If "True" is selected, three additional signals of the "1.56A range" are displayed in the *Analog* tab.

For information on the measuring ranges, see ↗ *Measuring ranges ibaMS3xAI-1A/100A*, page 18

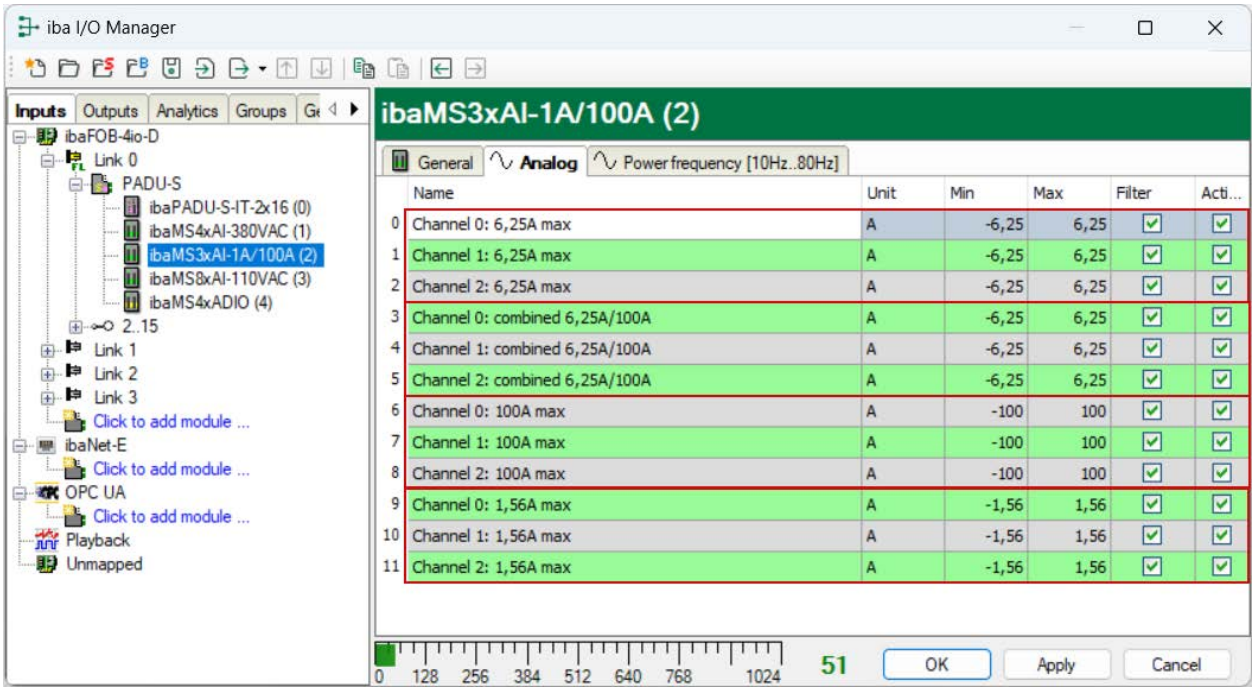
Note

Only the 6.25 A range and the 1.56 A range offer analog filters in addition!

Enable frequency measurement
Select “True”, if you want to measure power frequency of the connected signals. The *Power frequency [10Hz..80Hz]* tab is also displayed (available for all *ibaMS3xAI-x* modules).

9.1.2 ibaMS3xAI-1A/100A – Analog tab

Make the following settings in the *Analog* tab.

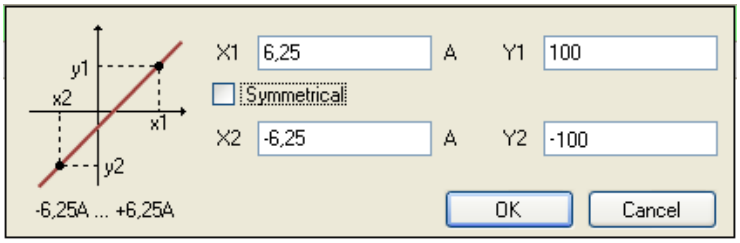


Name
You can enter a signal name and additionally two comments when clicking on the symbol in the *Name* field.

The signal names of the *ibaMS3xAI-1A/100A* module are preset, see figure above.

Unit
The default setting is „A“

Min
You can define a lower limit for the measuring range. The analog normalized value of -6.25 A is assigned to a physical value, e.g. -100 A.



Max
Here, you can define an upper limit for the measuring range. The analog normalized value of +6.25 A is assigned to a physical value, e.g. +100 A.

Filters
You can select the anti-aliasing filter Butterworth 4th order 20 kHz.

Active
Enabling/disabling the signal.

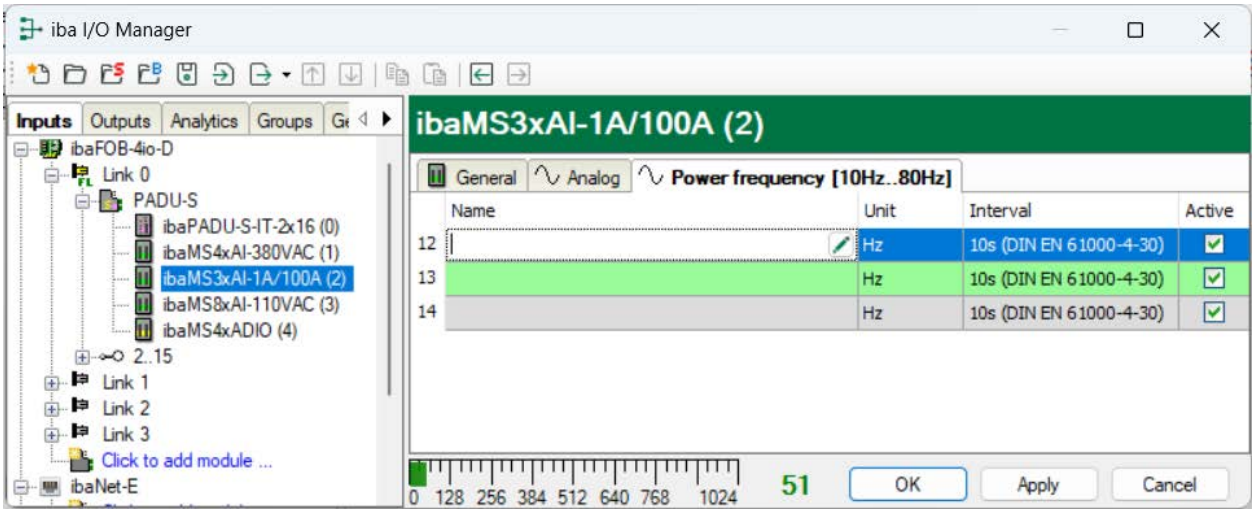
You can display or hide additional columns using the context menu (right mouse click in the heading line).

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 Power frequency [10Hz..80Hz] tab

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



Name

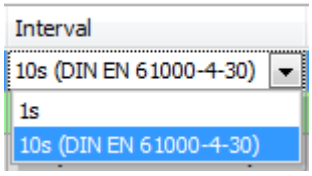
You can enter a signal name and additionally two comments when clicking on the symbol in the *Name* field.

Unit

Default value is „Hz“.

Interval

You can select the measuring interval via a drop-down list: "1s” or "10s” (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).

Other documentation

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

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

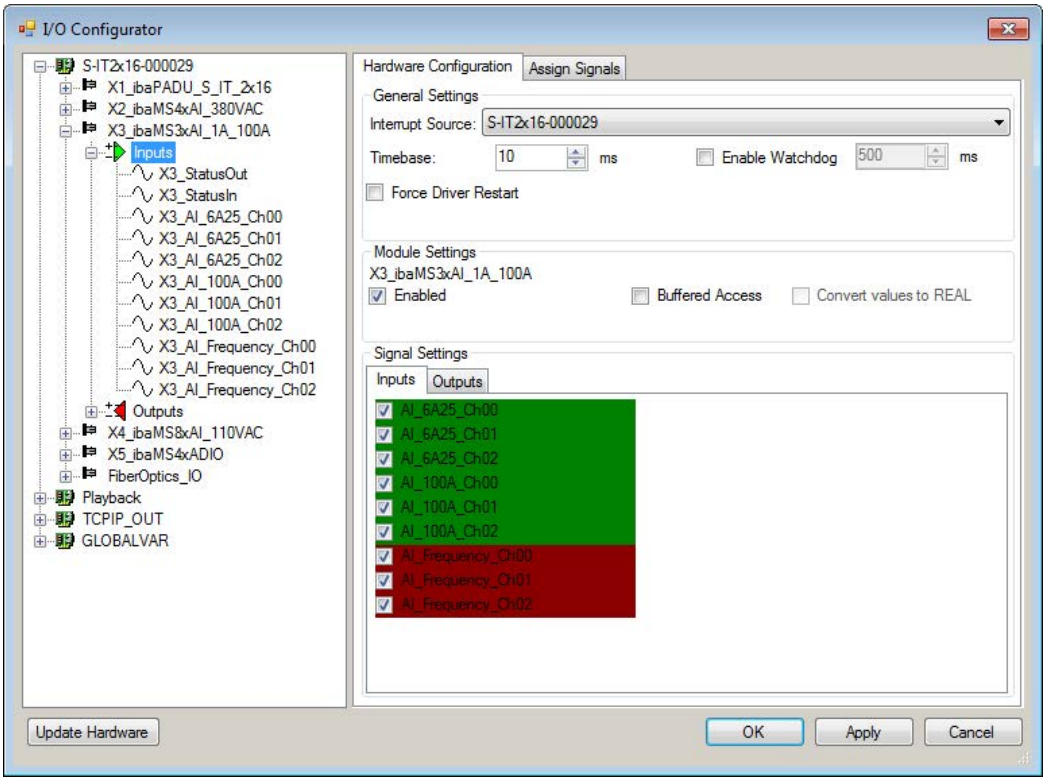
The basic procedure with *ibaLogic-V5* is described in the manual for the *ibaPADU-S-IT-2x16* central unit. This manual only describes the signals belonging to this module.

9.2.1 Configuring signals

The 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.



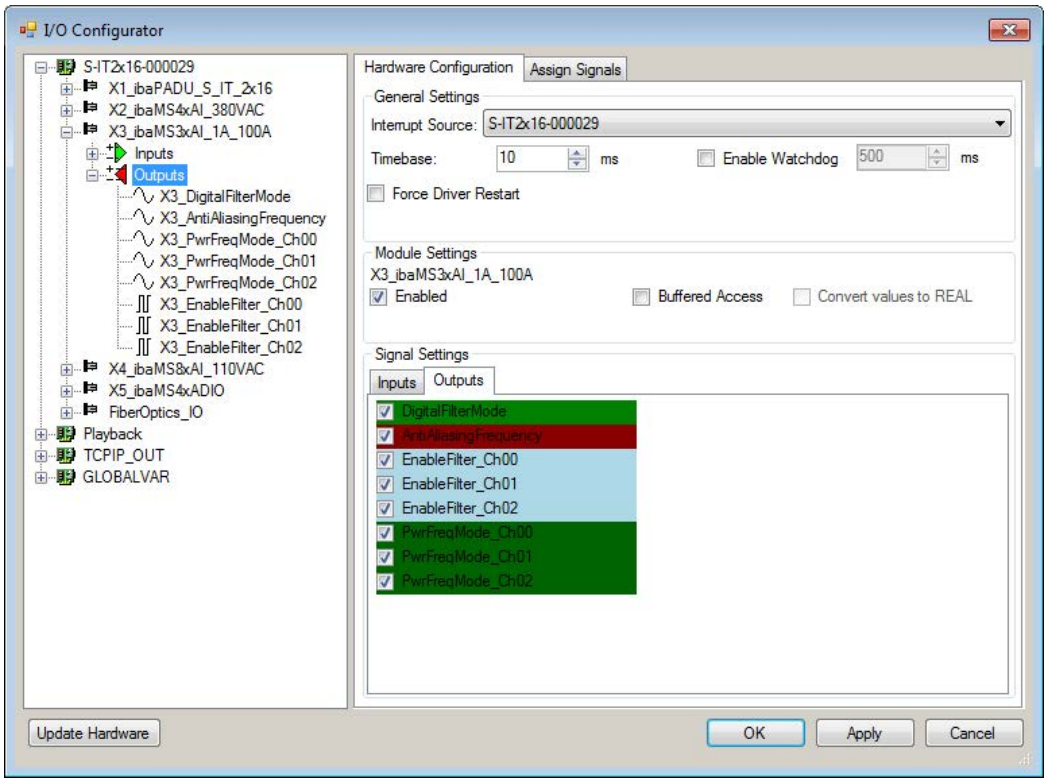
→ The analog input channels and the power frequency signals are displayed in the *Inputs* tab.

Note

Only the 6.25 A range and the 1.56 A range offer analog filters in addition.

See ↗ *Measuring ranges ibaMS3xAI-1A/100A*, page 18

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_6A25_Ch[00…02]	Analog input signals: 6.25A range (default range)
AI_100A_Ch[00…02]	Analog input signals: 100A range (expanded range)
AI_Frequency_Ch[00…02]	Calculated power frequencies
StatusIn	Status information about the plugged input module (for output module without function): 0 = module not initialized 1 = module running >1 = error (e.g. Module cannot be initialized)

Signal	Meaning
StatusOut	Status information about the plugged module (for input module without function): 0 = module not initialized 1 = module running >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…02]	Enables the analog anti-aliasing filters per channel within the ranges 6.25A and 1.56A
PwrFrqMode_Ch[00…02]	Setting of the measuring interval for power frequency measurement (per channel)
Additional input signals for buffered access	
AI_6A25_Ch[00…02]_buf	Input buffer of analog signals: 6.25A range (default range)
AI_100A_Ch[00…02]_buf	Input buffer of analog signals: 100 A range (expanded range)
AI_Frequency_Ch[00…02]_buf	Input buffer of calculated power 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

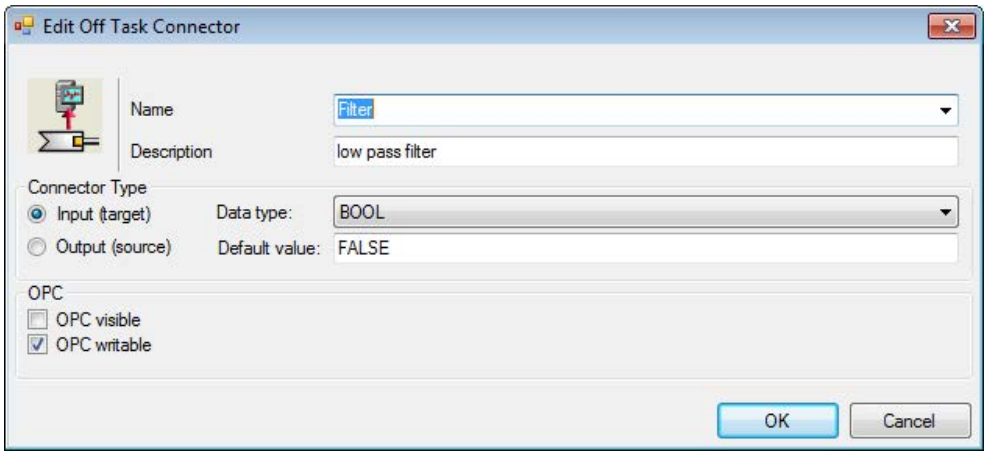
9.2.2 Additional functions

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

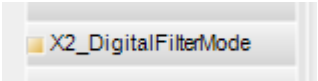
TRUE = switched-on

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.

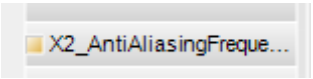


0: Off (default setting)

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

Data type: DINT

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

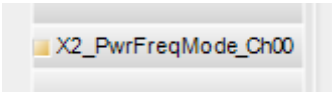


= 0: Auto = 1/3 of the sampling rate (default setting)

> 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 *ibaMS3xAI-1A, -5A, -1A/100A*.

10.1 Main data

Short description

Name	ibaMS3xAI-1A	ibaMS3xAI-5A	ibaMS3xAI-1A/100A
Description	Input module with 3 analog current inputs		
Order number	10.124600	10.124610	10.124620

Supply

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

Interfaces, operating and indicating elements

Indicators (LEDs)	4 LEDs for operating status of the device 3 LEDs for state of the analog inputs

Operating and environmental conditions

Secondary circuits	up to 250 V AC related to ground potential
Transient overvoltage	up to 2500 V
Temperature ranges	
Operation Storage/transport	32 °F to 122 °F (0 °C to 50 °C) -13 °F to 158 °F (-25 °C to 70 °C)
Mounting position	vertical, plugged into backplane bus
Installation height	up to 6562 ft (2000 m)
Cooling	passive
Humidity class	F, no condensation
Protection class	IP20
Certification/Standards	EMC: EN 61326-1 FCC part 15 class A Safety: EN 61010-1
MTBF[1)]	for ibaMS3xAI-1A/100A: 475,416 hours / 54 years
Dimensions (width x height x depth)	43 mm x 214 mm x 148 mm
Weight / incl. box	0.8 kg / 1.2 kg

[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

10.2 Declaration of conformity

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

Unique Identifier
10.124600 ibaMS3xAI-1A
10.124610 ibaMS3xAI-5A
10.124620 ibaMS3xAI-1A/100A

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	3		
Version	Galvanically isolated, single ended 2 A/D converters per channel (ibaMS3xAI-1A/100A only)		
Resolution	16 bit (18 bit internal)		
Filters			
permanent in addition	R/C low-pass, 1st order, 40 kHz Analog anti-aliasing filter (Butterworth), 4th order, 20 kHz Digital anti-aliasing filter (Chebyshev I)[2], 8th order, cutoff frequency adjustable		
	ibaMS3xAI-1A	ibaMS3xAI-5A	ibaMS3xAI-1A/100A
Input signal range	-3.0 A … +3.0 A	-15.0 A … 15.0 A	-6.25 A … +6.25 A -100 A … +100 A[3]
Max. input current	±10.5 A	±24 A	±24 A (permanent) ±100 A (only for 1 s per minute) ±500 A (briefly for 0.2 s per 5 minutes)[4]

[2] can be switched on if sampling rate > 500 Hz, cut-off frequency adjustable from 100 Hz to 0.5* sampling rate
[3] no additional filters in 100 A measuring range

Measuring shunt	25 mΩ	5 mΩ	2x 5.0 mΩ
Input resistance			
Device switched off	25 mΩ	5 mΩ	2.5 mΩ
Device switched on	25 mΩ	5 mΩ	2.5 mΩ
Input capacity	n/a	n/a	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	2.5 kV AC		
Channel - housing/power supply	2.5 kV AC		
Connector type inputs	8-pin connector, clamp-type terminal (0.5 mm^2 …10 mm^2) and interlocking device, included in delivery, without jumper		

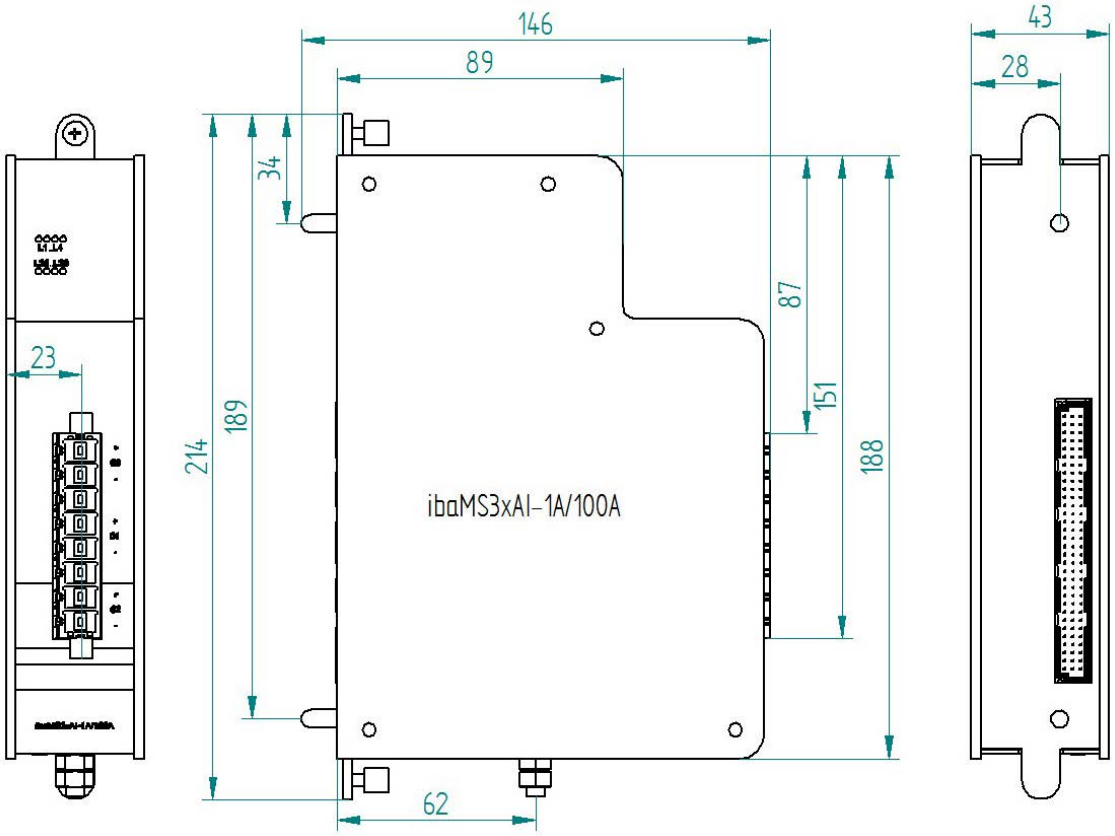
10.4 Additional functions

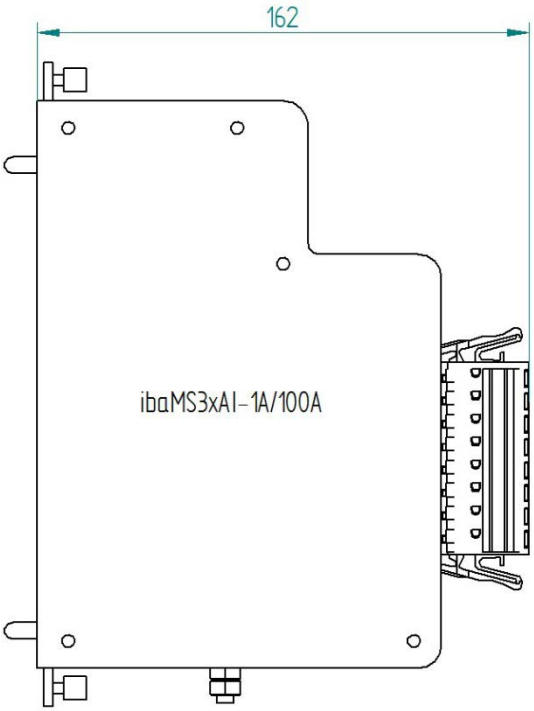
Grid frequency measurement	Interval
10 Hz … 80 Hz	1 s / 10 s (according to DIN EN 61000-4-30)

[4] A recalibration is recommended after the occurrence of this current, as in this case a permanent deviation of the measured values may occur.

10.5 Dimensions

Below you will find the dimensions of the modules *ibaMS3xAI-1A, -5A, -1A/100A*.





Module dimensions with connector (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.

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