



ibaMS3xAl-1A / -5A / -1A/100A

Input modules for analog signals

Manual

Issue 2.0

Measurement Systems for Industry and Energy

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Certification

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

Further international customary standards and directives have been observed.



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

Issue	Date	Revision	Chapter	Author	Version HW / FW
2.0	08-2023	Scope of delivery, ibaPDA GUI			

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1 About this manual

In this manual, you learn a lot about the design of the ibaMS3xAl-1A, ibaMS3xAl-5A and ibaMS3x-1A/100A modules and how to use and operate them. You can find a general description of the iba-modular system and further information about the design of the central units and how to use and operate them in separate manuals.



Note

The documentation for the iba-modular system is part of the data medium “iba Software & Manuals”. The documentation is also available at www.iba-ag.com in the download area.

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

❑ Central units

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

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

❑ Modules

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

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

1.1 Target group

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

1.2 Notations

In this manual, the following notations are used:

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

1.3 Used symbols

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



⚠ DANGER

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

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

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



⚠ WARNING

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



⚠ CAUTION

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



Note

A note specifies special requirements or actions to be observed.



Tip

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



Other documentation

Reference to additional documentation or further reading.

2 Introduction

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

The modular concept is designed on the basis of a backplane. You can plug on this backplane not only the CPU, but also up to 4 input/output modules. The power supply of the I/O modules is provided by the backplane bus.

In brief

- ☐ I/O 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
- ☐ Grid frequency measurement
- ☐ Rugged design, easy mounting
- ☐ Certification according to CE

Special feature of ibaMS3xAI-1A/100A

- ☐ Real parallel data capturing with 2 A/D converters per channel:
each channel is equipped with 2 A/D converters to ensure a 16 bit resolution within both the nominal and the overload range.

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 the delivery for completeness and possible damages.

The scope of delivery comprises:

- ☐ ibaMS3xAl-1A or ibaMS3xAl-5A or ibaMS3xAl-1A/100A device
- ☐ 8-pin multi-pin connector, clamp type terminal
- ☐ 2 fixing clamps with 2 screws
- ☐ Data medium „iba Software & Manuals“ (only for single delivery)

4 Safety instructions

4.1 Intended use

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

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

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

4.2 Special safety instructions

DANGER

Strictly observe the measuring range!

Never use damaged measuring cables!

Measuring cables must NOT be attached or detached to/from the device under voltage!

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.

WARNING

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 connector must be fixed by screwing tightly the 2 fixing clamps in order to ensure a safe connection, see figure below.



Connector attached by fixing clamps

⚠ 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.



Important Note

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



Note

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

5 System Requirements

5.1 Hardware

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

5.2 Software

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

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

- ☐ Firmware version E5 or later
- ☐ Hardware version B0 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.

6 Mounting, Connecting, Dismounting

CAUTION

Works on the device must NOT be done when it is under voltage! Always disconnect the central unit 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

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 device to the backplane bus and press it firmly against the backplane.
4. Secure the device with the fixing screws.
5. Connect the grounding screw with the protective ground / grounding shield.

CAUTION

Connect the grounding screw on the bottom side of the housing with the protective ground / grounding shield.



Important Note

Always screw tight the device and the modules. Otherwise, plugging or unplugging the connectors for the inputs/outputs can cause damage.

6.2 Connecting



Note

The backplane unit and the device must be connected to a protective conductor.

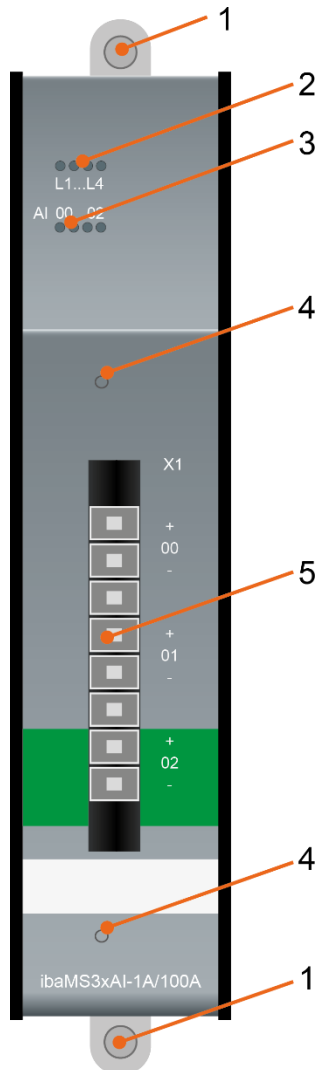
1. Connect all cables.
2. If all required cables are connected, connect the central unit to the power supply.
3. Switch on the central unit.

6.3 Dismounting

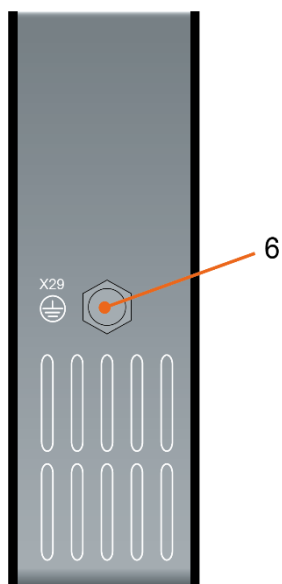
1. Disconnect the central unit from the power supply.
2. Remove all cables.
3. Remove the both fixing screws on the upper and the lower side of the device.
4. Pull the device straight from the backplane.
5. Put the cover on the backplane bus.

7 Device description

7.1 Views



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



- 6 Grounding screw X29

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 status

LED	Status	Description
L1: green	Flashing / On Off	Device is working Device is not working (switched off)
L2: yellow	On	Access to the backplane bus
L3: white	-	-
L4: red	Off Flashing	Normal status, no faults Device failure



Important note

When the LED L4 indicates a failure, please contact the iba Support.

7.2.2 Indicators analog inputs

LED per channel	Status/meaning		Range (approx. values)		
			ibaMS3xAI-1A	ibaMS3xAI-5A	ibaMS3xAI-1A/100A
L26 ... L28	Off	No signal, signal too low	$\pm (0 \dots 0.03) \text{ A}$	$\pm (0 \text{ A} \dots 0.14) \text{ A}$	$\pm (0 \dots 0.06) \text{ A}$
	Green	Within measuring range	$\pm (0.03 \dots 2.7) \text{ A}$	$\pm (0.14 \dots 13.44) \text{ A}$	$\pm (0.06 \dots 5.6) \text{ A}$
	Yellow	End of measuring range	$\pm (2.7 \dots 3.0) \text{ A}$	$\pm (13.44 \dots 15.0) \text{ A}$	$\pm (5.6 \dots 6.25) \text{ A}$
	Red	Out of measuring range	$> \pm 3.0 \text{ A}$	$> \pm 15.0 \text{ A}$	$> \pm 6.25 \text{ A}$

7.3 Analog inputs

7.3.1 Measuring ranges ibaMS3xAI-1A/100A

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

measuring range	resolution	cali-brated	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.



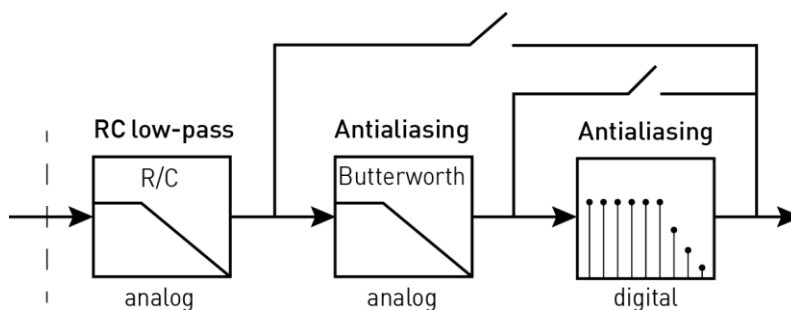
Important note

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

7.3.2 Filter

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 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

7.3.3 Grid frequency measurement

Each channel provides grid frequency measurement.



Note

In addition to the actual measured values, the grid 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 configuration refer to chapter 9.1.3 „Grid frequency [10Hz..80Hz]“ tab.

Properties

☐ Frequency

Frequencies between 10 Hz and 80 Hz are supported.

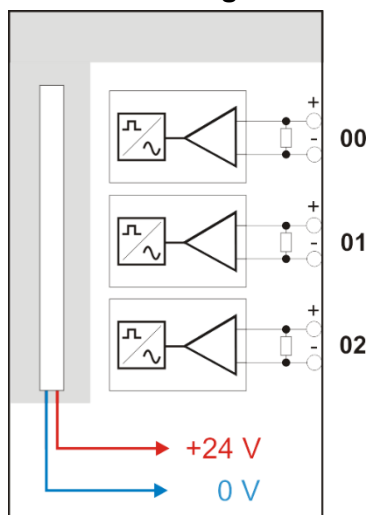
☐ Measuring interval

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

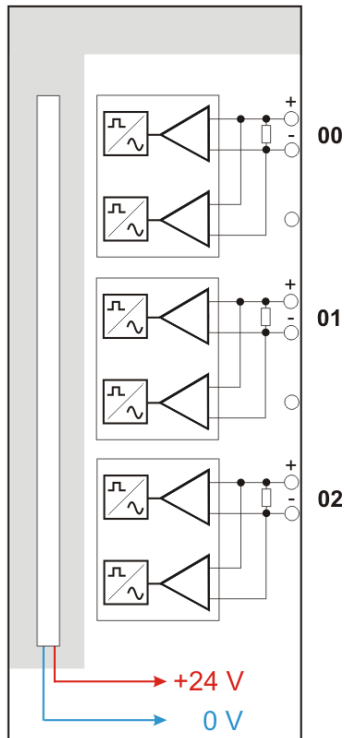
7.3.4 Connection diagram / pin assignment

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 ibaMS3xAl-1A and ibaMS3xAl-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.

7.4 Connectors

7.4.1 Grounding screw X29

Proper connection of cable shielding to the device should be ensured. The shield connector (M6 screw) found on the bottom of the device should be connected with any total shield that serves for all sensor cables. Use a M6 cable lug for the connection.



Important note!

Connect shield on one cable side only to avoid ground loops!

Always ground the DIN rail on which the device is installed!

8 Start-up / Update



Important note

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

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. Thereafter, the module is ready to be used.



Important note

The “overall release version” contains all modules developed up to the date of release of this firmware and the corresponding software versions. If a module cannot be detected yet (i.e. it is more recent than the firmware version of the CPU), this module is ignored and outlined in red on the web interface.

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

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.



Important note

If you require support, specify the „overall release version“.

8.3 Update

An update can be installed in two different ways.

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

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.



Important 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 Update via web interface



Important note

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

- ☐ Start the website of the iba-modular system in your browser and select the central unit.
- ☐ On the “update“ tab, click on the <Browse...> button and choose the <padusit2x16_v[xx.yy.zzz].iba> update file.
- ☐ By clicking on <Start Update>, you start the update.

Module 0 : ibaPADU-S-IT-2x16

8.3.2 Update via ibaPDA

- ☐ Open the ibaPDA I/O Manager and choose your iba-modular system in the tree structure.
- ☐ On the “Diagnostics“ tab, click on the <Write firmware> button and choose the „padusit2x16_v[xx.yy.zzz].iba“ or „paduscm_v[xx.yy.zzz].iba“ update file.
- ☐ You start the update by clicking on <OK>.

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

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 (see also the figure above.)

8.4.2 Web interface

On the module website, general information about the module is displayed. You cannot change the values.



Important note

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

8.4.2.1 „info“ tab

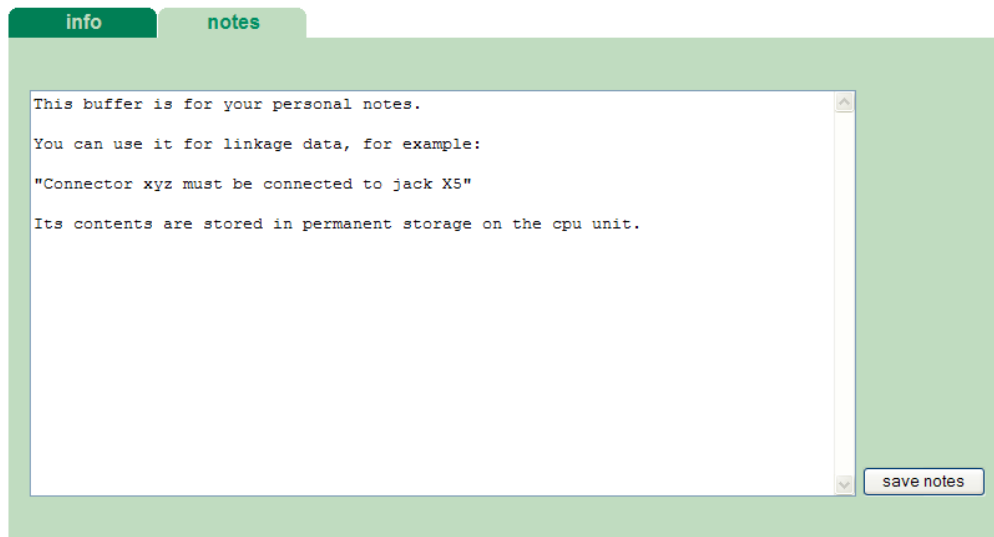
The „info“ tab displays general information and technical specifications of the I/O module.

info		notes
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 in 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.

[Read configuration from device](#)



Note

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

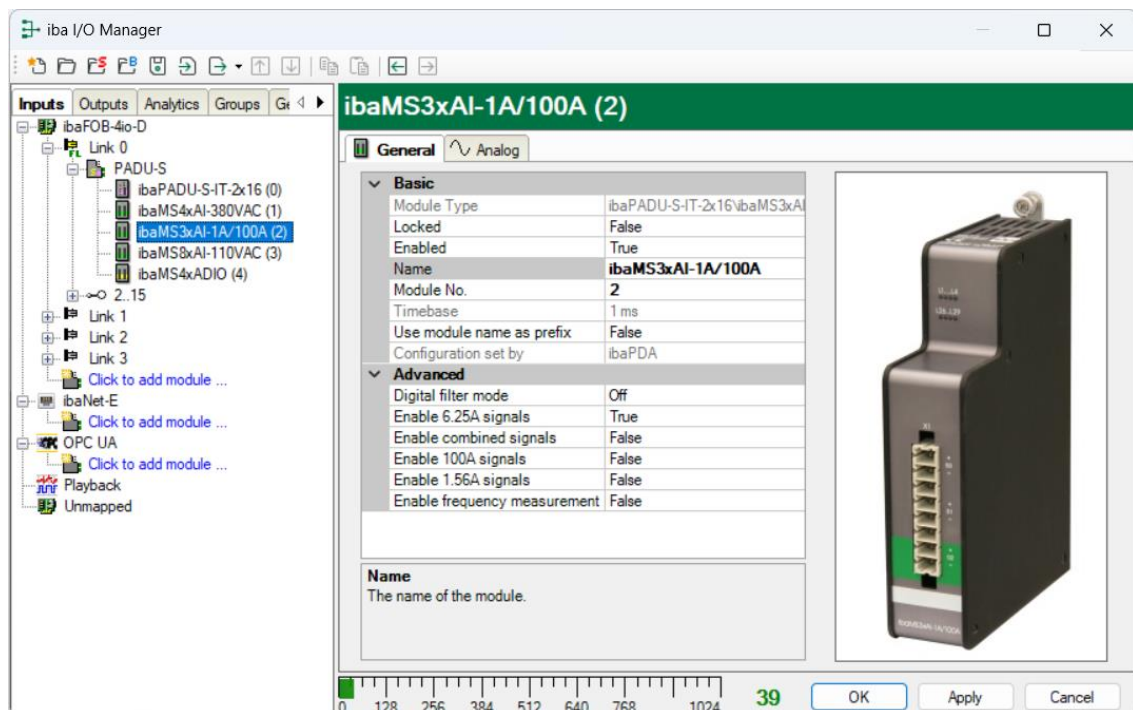


Other documentation

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 “General” tab

If the module is detected, click on the module in the signal tree and the “General” tab appears.



Basic

☐ Module Type

Display of module type (read only)

☐ Locked

True: the module can only be changed by an authorized user.

False: the module can be changed by any user.

☐ Enabled

Data capturing for this module is enabled.

☐ Name

You can enter a name for the module.

☐ Modul No.

Consecutive module number assigned by ibaPDA for clearly referencing the signals, e.g. in expressions or ibaAnalyzer. The number can be changed by the user.

☐ Timebase

Timebase, specified in the PADU-S module.

☐ Use name as prefix

Prefix the signal names of this module with the module name.

☐ Configuration set by

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

- ibaPDA

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

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

- Embedded application

Configuration set by	Embedded application
Import signal names	False

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

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

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

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. This means, that the digital anti-aliasing filter can only be activated together with the analog filter by activating the filter option on the “Analog” tab. The digital anti-aliasing filter can only be enabled, when the sampling rate > 500 Hz (= timebase < 2 ms).

When the digital filter is enabled, an additional field „Cutoff frequency“ appears.

☐ Cutoff frequency

You can enter a value in Hz or you can set it to „Auto“. When it is set to “Auto” the cutoff frequency is equal to one third of the sampling frequency.

ibaMS3xAI-1A/100A (2)

General
Analog

▼ **Basic**

Module Type	ibaPADU-S-IT-2x16\ibaMS3xAI
Locked	False
Enabled	True
Name	ibaMS3xAI-1A/100A
Module No.	2
Timebase	1 ms
Use module name as prefix	False
Configuration set by	ibaPDA

▼ **Advanced**

Digital filter mode	Anti-aliasing
Cutoff frequency	Auto
Enable 6.25A signals	True
Enable combined signals	False
Enable 100A signals	False
Enable 1.56A signals	False
Enable frequency measurement	False

Cutoff frequency

This is the cutoff frequency of the digital anti-aliasing filter. You can enter a value in Hz or you can set it to 'Auto'. When it is set to 'Auto' then the cutoff frequency is equal to one third of the sampling frequency. The cutoff frequency should be between 100 Hz and half of the sampling frequency.

Permissible values: 100 Hz ... $0,5 \cdot \text{sampling rate}$

The entry "0" Hz corresponds to the setting "Auto".

☐ **Enable frequency measurement**

Select „True“, if you want to measure grid frequency of the connected signals. The „Grid frequency [10Hz..80Hz]“ tab appears additionally.

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

☐ **Enable 6.25A signals**

If „True“ is selected (default setting), signals of the “6.25A” range (see chapter 7.3.1) are displayed in the „Analog“ tab.

☐ **Enable combined signals**

If „True“ is selected, additional signals of the “6.25A/100A” range (see chapter 7.3.1) are displayed in the „Analog“ tab.

☐ **Enable 100A signals**

If „True“ is selected, additional signals of the “100A” range (see chapter 7.3.1) are displayed in the „Analog“ tab.

☐ **Enable 1.56 signals**

If „True“ is selected, additional signals of the “1.56A” range (see chapter 7.3.1) are displayed in the „Analog“ tab.

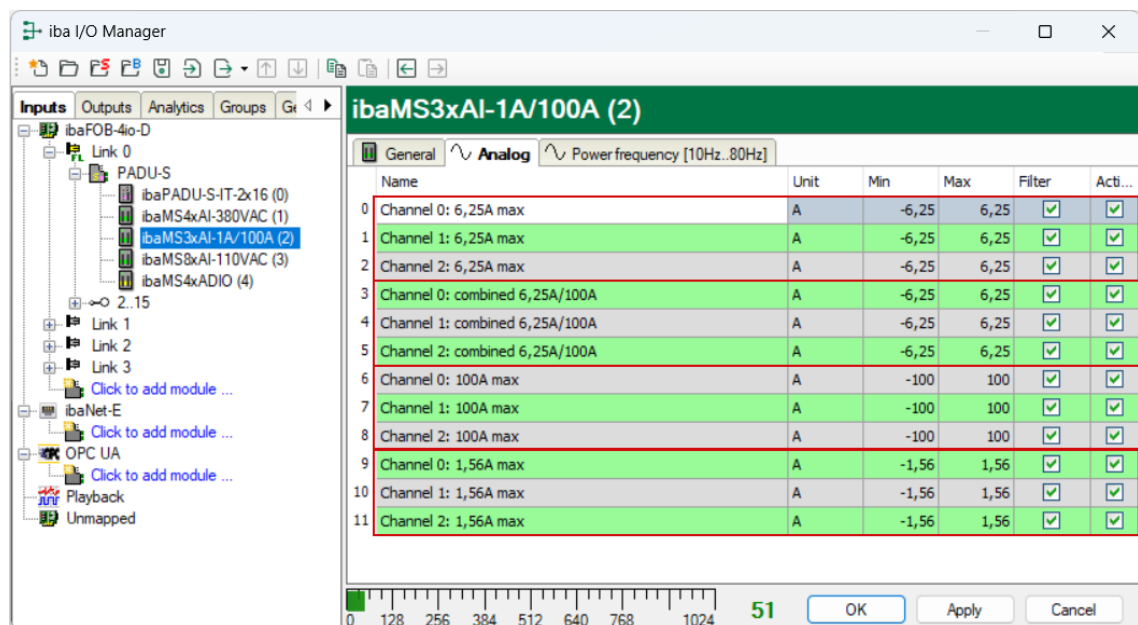


Note


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

9.1.2 “Analog” tab

The following settings apply to the “Analog” tab:



☐ Name

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

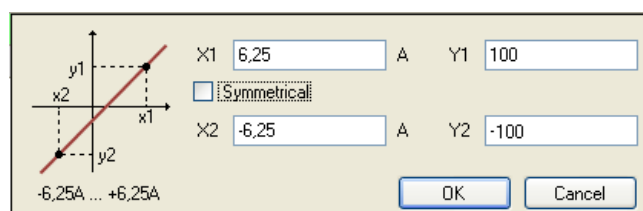
The signal names of the ibaMS3xAI-1A/100A module are preset, see figure above.

☐ Unit

You can enter a 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.

☐ Filter

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

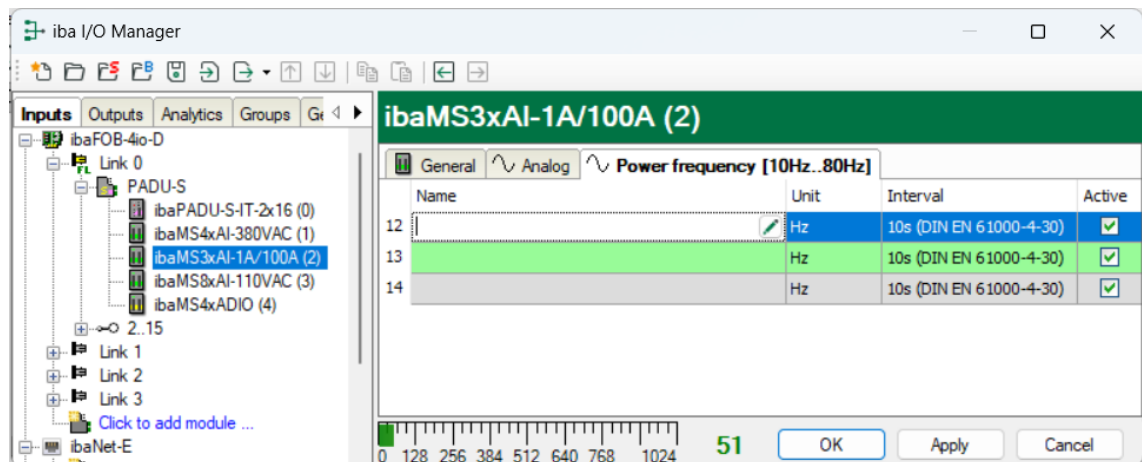
☐ Active

Enabling/disabling the signal.


☐ You can show or hide more columns via the context menu (click with the right mouse button in the headline).

9.1.3 „Grid frequency [10Hz..80Hz]“ tab

When grid frequency measuring is enabled, this tab appears additionally.



☐ Name

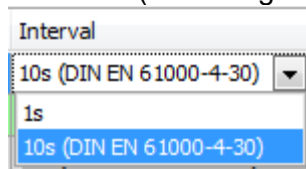
You can enter a name for the signal and two additional comments (click on the  icon in the Name field).

☐ Unit

Default value is „Hz“.

☐ Interval

You can select the measuring interval via a dropdown menu:
1s or 10 s (according to DIN EN 61000-4-30).



☐ Active

Enabling/disabling the signal.

- ☐ You can show or hide more columns via the context menu (click with the right mouse button in the headline).

9.2 Configuration in ibaLogic-V5

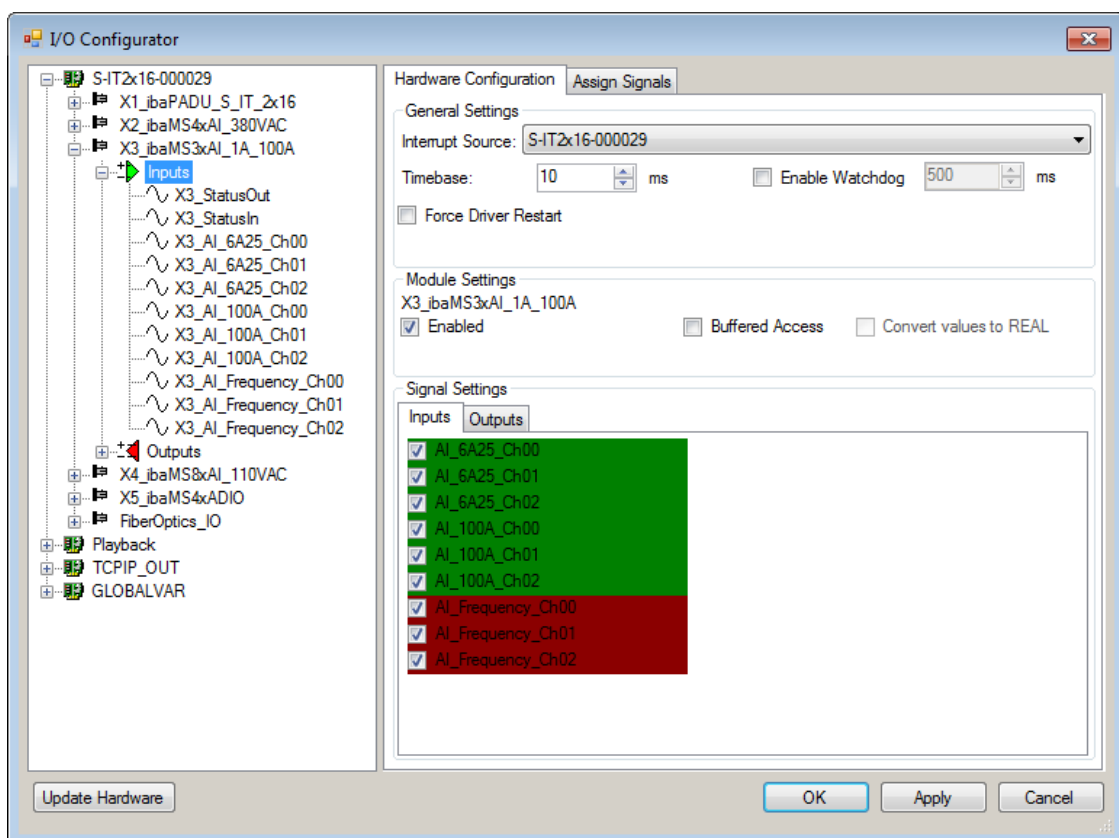


Other documentation

Combined with ibaLogic-V5, an ibaPADU-S-IT-2x16 device can be used to realize individual signal pre-processing or stand-alone applications. You find the basic way of proceeding description in the separate ibaPADU-S-IT-2x16 manual. This manual describes only the signals belonging to this module.

9.2.1 Configuring signals

The signals can be configured in the I/O Configurator of ibaLogic-V5. Open the I/O Configurator in the “Tools – I/O Configurator” menu. When you click on the <Update hardware> button, then ibaLogic detects the module.



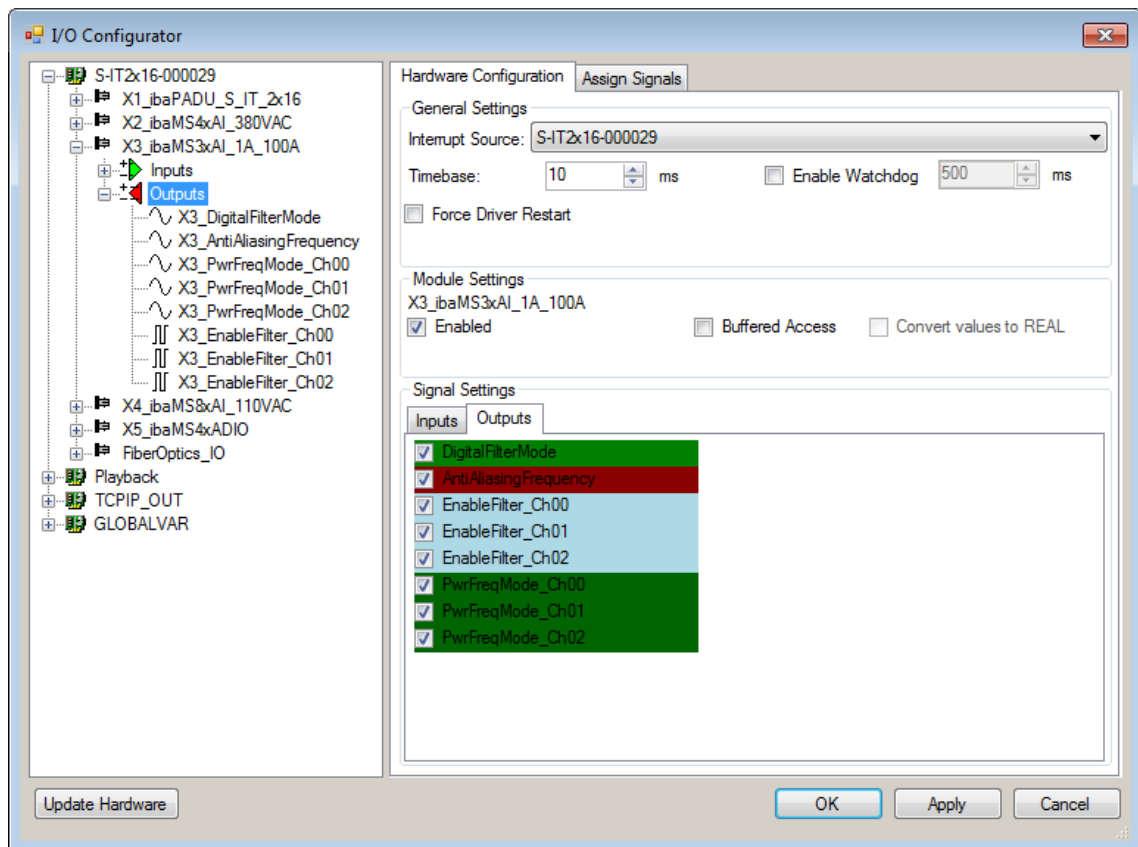
The analog input channels and the grid frequency signals are displayed in the „Inputs“ tab.



Important note

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

See chapter 7.3.1 “Measuring ranges”.



The filters are enabled and configured by means of signal outputs as well as the mode for grid 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	Description
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 grid frequencies
StatusIn	Status information about the plugged input module (for output module without function): 0 = Module not initialized 1 = Module running >1 = Mistake (e.g. module cannot be initialized)
StatusOut	Status information about the plugged module (for input module without function): 0 = Module not initialized 1 = Module running >1 = Mistake (e.g. module cannot be initialized)

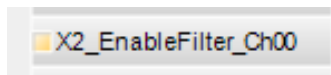
Signal	Description
Outputs	
DigitalFilterMode	Activates the digital anti-aliasing filter in addition to the analog anti-aliasing filter (if activated)
AntiAliasingFrequency	Setting of the cutoff frequency of the digital anti-aliasing filter
EnableFilter_Ch[00...02]	Enables the analog anti-aliasing filters per channel within the ranges 6.25A and 1.56A
PwrFrqMode_Ch[00...02]	Setting of the measuring interval for grid 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: 100A range (expanded range)
AI_Frequency_Ch[00...02]_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

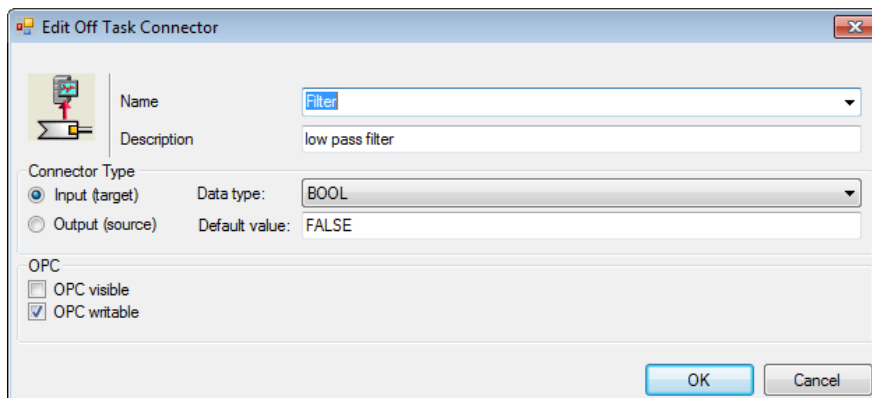
Activating analog filters

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 to the connector, e.g. “low pass filter” and choose “Input” and Data type “BOOL” under the Connector type option.



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

FALSE switched-off

TRUE switched-on

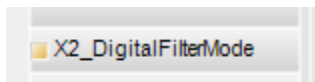
Now, connect the OTC and the signal on the margin of the programming surface.



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.

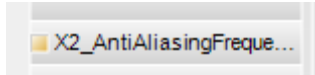


0: off (default setting)

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

Data type: DINT

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

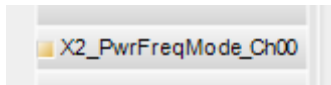


=0: Auto = 1/3 of the sampling rate (default setting)

>0: cutoff frequency in Hz (permissible values: 100 Hz ... 0.5*sampling rate)

Data type: LREAL

Setting of the interval for grid 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

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
Power supply			
Power supply	24 V DC, internal via backplane bus		
Power consumption max.	12 W		
Indicating elements			
Indicators (LEDs)	4 LEDs for device status 3 LEDs for status 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 2 °F to 122 °F (0 °C to 50 °C) Storage/transport -13 °F to 158 °F (-25 °C to 70 °C)		
Installation 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: IEC 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)	1.69 in x 8.43 in x 5.83 in (43 mm x 214 mm x 148 mm)		
Weight / incl. box and documentation	1.76 lbs (0.8 kg) / 2.65 lbs (1.2 kg)		

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

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

Unique Identifier: 10.124600 ibaMS3xAl-1A
 10.124610 ibaMS3xAl-5A
 10.124620 ibaMS3xAl-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.

10.2 Analog inputs

Analog inputs			
Number	3		
Design	Galvanically isolated Single ended 2 A/D converters per channel (ibaMS3xAl-1A/100A only)		
Resolution	16 bit (18 bit internal)		
Filters			
	permanent	R/C low-pass, 1 st order, 40 kHz	
	in addition	Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschebyscheff I) ² , 8 th order, cutoff frequency can be adjusted	
		ibaMS3xAl-1A	ibaMS3xAl-5A ibaMS3xAl-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 (only for 0.2 s per 5 minutes) ⁴
Input impedance		25 mΩ	5 mΩ 2.5 mΩ
Sampling rate	Up to 40 kHz, freely adjustable		

² can only be enabled when sampling rate > 500 Hz, cutoff frequency can be adjusted from 100 Hz to 0,5*sampling rate

³ no additional filters in 100 A measuring range

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

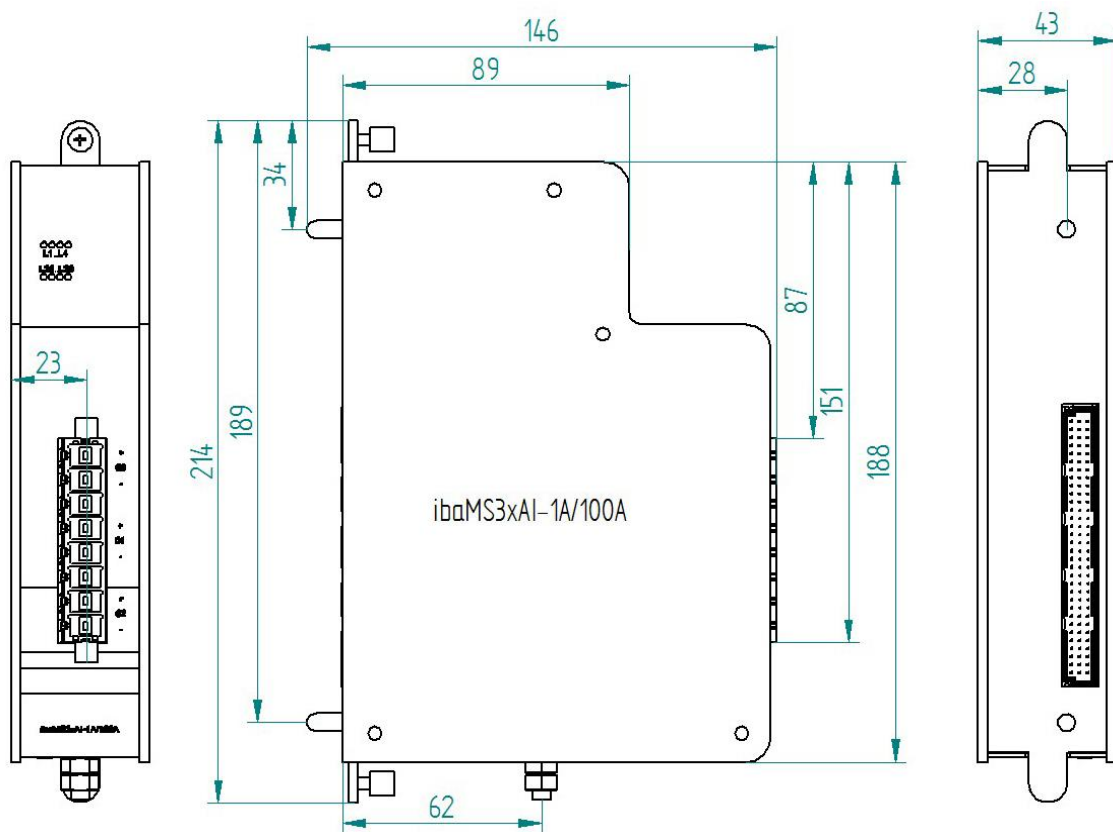
Frequency range	0 Hz ... 20 kHz
Accuracy	< 0.1 % of total measuring range
Electrical isolation	
Channel - channel	AC 2.5 kV
Channel - housing/power supply	AC 2.5 kV
Connector type	8-pin multi-pin connector, clamp-type terminal (0.5 mm ² ... 10 mm ²) and interlocking device, included in delivery, without jumper

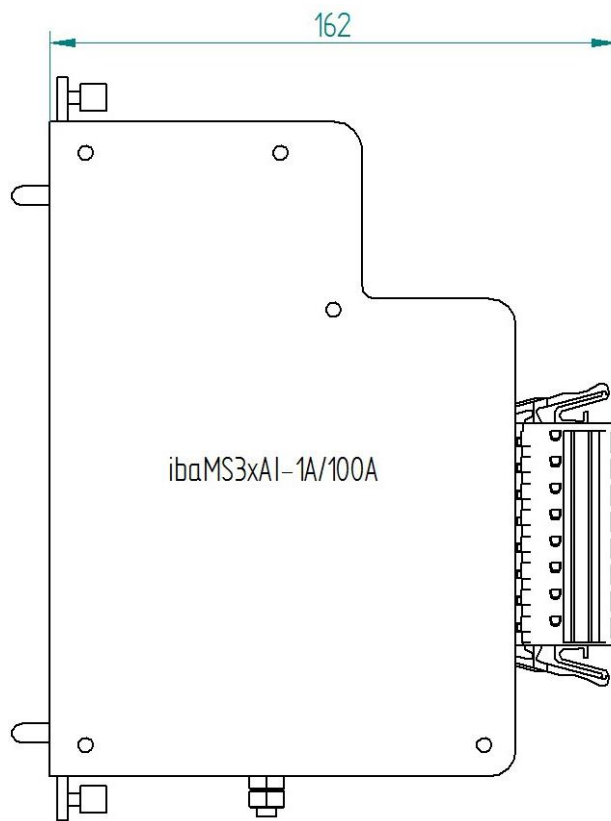
10.3 Additional functions

Additional functions

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





Module dimensions with connector (dimensions in mm)

11 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.

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www.iba-ag.com.