ibaM-4AI-IEPE

Input module for IEPE vibration sensors

Manual

Ausgabe 1.0

Messsysteme für Industrie und Energie

Manufacturer

iba AG

Koenigswarterstraße 44

90762 Fuerth

Germany

Contacts

Headquarters	+49 911 97282-0
Support	+49 911 97282-14
Engineering	+49 911 97282-13
E-Mail	iba@iba-ag.com
Web	www.iba-ag.com

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

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

Issue	Date	Revision	Author	Version HW/FW
1.0	03-2025	First edition	ms, st	1.04.001

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

Certification

The 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.

Contents

1 About this documentation

This documentation describes the design, application and operation of the device *ibaM-4AI-IEPE*.

Note

$\boxed{\mathbf{i}}$	Observe this danger sign:

⚠️

In all cases where this danger sign is displayed, refer to the manual to find out more about the nature of the potential hazards and the measures that must be taken to avoid them. |

1.1 Target group

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 ibaM-4AI-IEPE

Modular concept

The I/O module described in this documentation is part of the ibaMAQS modular measurement system.

The modular system consists of a central unit (*ibaM-DAQ* processor module or the *ibaM-COM* communication module), which can be combined with up to 15 different I/O modules. Modules are available for discrete input and output signals as well as for special technological features.

The I/O modules do not require their own power supply since they are powered via the module-module interface. The operating status of the module as well as the status of the individual channels are indicated by LEDs.

ibaM-4AI-IEPE

The *ibaM-4AI-IEPE* module is designed for the acquisition of mechanical vibrations with IEPE vibration sensors. Different input modes can be set in *ibaPDA* for each channel for the analog inputs:

■   IEPE input with 1 Hz or 0.1 Hz high-pass filter

■   24 V AC input

■   24 V DC input

Overview of the most important features:

■   Input module with 4 analog inputs

■   Constant current source 4 mA for sensors

■   Typical for IEPE sensors

■   Detection of broken line and short circuit

■   Galvanically isolated analog inputs

■   24 bit resolution

■   Sampling rate A/D converter 100 kHz

■   Timebase 10 µs to 1 ms, freely adjustable

■   Analog and digital filters per channel

■   Rugged housing, easy installation

The maximum number of *ibaM-4AI-IEPE* modules on a processor or communication module is not limited. A maximum of 15 of these modules can be operated on one of the two central units.

3   Scope of delivery

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

The scope of delivery includes:

■ *ibaM-4AI-IEPE* device
■ 2x 6-pin connector with spring terminals

4   Safety and other instructions

Note

<table>
<tr><td>

</td><td>

Work on the system, as well as mounting and dismounting, must only be carried out by trained and qualified specialists.

Careful working methods and compliance with safety measures when working with electrical devices of all types must be observed.

</td></tr>
</table>

Note

<table>
<tr><td>

</td><td>

Observe this danger sign:

In all cases where this danger sign is displayed, refer to the manual to find out more about the nature of the potential hazards and the measures that must be taken to avoid them.

</td></tr>
</table>

4.1   Intended use

The device is an electrical apparatus. It must only be used for the following applications:

■ Measurement data acquisition and analysis

■ Applications of software products (*ibaPDA*, *ibaLogic* etc.) and hardware products from iba AG.

The device must only be used as specified in the *Technical data* chapter, and is designed and approved for continuous operation.

Danger

<table>
<tr><td>

</td><td>

Electric shock

The device is only designed for electrical measured variables as specified in the "Technical data" chapter!

If the device is used or operated in a manner other than specified in the *Technical data chapter*, the protection supported by the device and the function itself may be impaired.

This also applies to the permissible operating and environmental conditions.

</td></tr>
</table>

4.2   Special safety instructions

Danger!

Operation

- The system must only be operated permanently connected and not touch-able, only in a building (in-door) and only in a fire protection housing in accordance with IEC 61010-1.

- The system must only be operated with a mounted end cover.

- The external power supply/power supply unit for supplying the central unit and thus for the complete system must be tested for use with this system in accordance with IEC 61010-1.

- Modules from this system must only be operated with a central processing unit from this system.

- The supply voltage for this system must only be fed from this system via a central unit.

- The supply may only be provided via an energy-limited circuit in accordance with IEC 61010-1 and must either include a fuse that trips after 120 s at the latest in the event of an overcurrent greater than 4 A or limit the total current of the system to 4 A.

- In addition to their own current consumption from the supply voltage via the module-module interface, the central units and the modules also pass on the supply voltage for other connected modules, so that the module-module interfaces may have to carry the maximum specified total current of the system.

- Only a maximum of 15 modules may be installed next to the central unit.

Danger!

Permanent measuring voltage

The device is non-destructive for permanent measuring voltages up to DC 60 V.

The device can be destroyed at voltages from DC 60 V and device safety can no longer be guaranteed.

Danger!

Duty of care

Take care when working on the system and always check that the system and the modules themselves are in perfect condition, as well as ensuring that they are properly installed and correctly attached to the DIN rail.

If damage to cables, devices, supplies or enclosures is detected before commissioning or during operation, the system must not be put into operation or must be taken out of operation immediately.

Warning!

Mounting and dismounting / Disconnection from the grid

Work on the device or system may only be carried out when the power is switched off!

Due to the modular concept of this system, modules connected in series with this module can also carry dangerous voltages.

All energized components of all modules in the system must therefore be disconnected from the grid before mounting and dismounting.

In addition to disconnecting the power supply at the system's central unit, the signal plugs and connections of all modules in the system must also be de-energized or disconnected from the grid.

Caution!

A suitable disconnecting device for this system must be available and disconnect all energized components of this system.

This disconnecting device must include a switch or circuit breaker that is easily accessible at a suitable location in the vicinity and is also clearly marked as a disconnecting device for this system.

Caution!

Measuring cable

■ Do not use damaged measuring cables!

■ Connecting and disconnecting measuring cables when the device is connected to the power is prohibited!

■ Measuring cables must be suitable for the measurement category and voltage, and must have a length of smaller than 10 m.

Caution!

You must only connect one conductor to each terminal connection.

Several individual conductors, whether single-wired or fine-wired, are not permitted.

Only connectors classified by iba may be used for connecting conductors.

Caution!

If the display of an analog input lights up red, the input signal is outside the displayable and permissible range.

The actual voltage at the input is higher than the permitted voltage.

Note

Do not open the device! Opening the device results in a loss of warranty!

Note

The device does not require any special cleaning or maintenance!

However, if you want to carry out an inspection or recalibration, return the device to iba.

Note

Calibration

If the device is used or operated in the manner specified in the *Technical data* chapter, a calibration interval of 4 years is recommended for the analog input channels.

The date of the last calibration can be found in *ibaPDA* and there in the system information on the *Info* tab of the central processing unit.

5   System requirements

Hardware
ibaMAQS central unit

■   *ibaM-DAQ* processor module or *ibaM-COM* communication module

Software

■   *ibaPDA* version 8.10.0 or higher

Firmware

■   ibaMAQS version 1.04.001 or higher

6   Mounting and dismounting

Danger!

Operation

- The system must only be operated permanently connected and not touchable, only in a building (in-door) and only in a fire protection housing in accordance with IEC 61010-1.

- The system must only be operated with a mounted end cover.

- The external power supply/power supply unit for supplying the central unit and thus for the complete system must be tested for use with this system in accordance with IEC 61010-1.

- Modules from this system must only be operated with a central processing unit from this system.

- The supply voltage for this system must only be fed from this system via a central unit.

- The supply may only be provided via an energy-limited circuit in accordance with IEC 61010-1 and must either include a fuse that trips after 120 s at the latest in the event of an overcurrent greater than 4 A or limit the total current of the system to 4 A.

- In addition to their own current consumption from the supply voltage via the module-module interface, the central units and the modules also pass on the supply voltage for other connected modules, so that the module-module interfaces may have to carry the maximum specified total current of the system.

- Only a maximum of 15 modules may be installed next to the central unit.

The modular system is designed as follows and is to be mounted on the DIN rail:

- Central unit on the far left

- Up to 15 modules to the right of the central unit

- End cover on the far right to protect the contacts

Make sure that the modules

- are properly secured to the DIN rail and

- are correctly positioned in the side guide rails.

Check the correct fitting of the modules after mounting by a visual inspection.

Note

> An end cover is included in the scope of delivery of the central unit.
>
> The end cover is also available as an accessory or spare part from iba.

Installation clearances

Ensure a minimum clearance of the entire system of 30 mm upwards and downwards and 10 mm to the right and left for sufficient ventilation of the device.

6.1   Disconnection from the grid

To enable safe, hazard-free work on the system, all live components in the system must be disconnected from the grid.

Warning!

> **Mounting and dismounting / Disconnection from the grid**
>
> Work on the device or system may only be carried out when the power is switched off!
>
> Due to the modular concept of this system, modules connected in series with this module can also carry dangerous voltages.
>
> All energized components of all modules in the system must therefore be disconnected from the grid before mounting and dismounting.
>
> In addition to disconnecting the power supply at the system's central unit, the signal plugs and connections of all modules in the system must also be de-energized or disconnected from the grid.

Caution!

> A suitable disconnecting device for this system must be available and disconnect all energized components of this system.
>
> This disconnecting device must include a switch or circuit breaker that is easily accessible at a suitable location in the vicinity and is also clearly marked as a disconnecting device for this system.

6.2   Modules

Mounting

- Shut down the system and/or switch off the power supply.
- Disconnect the power supply and the entire system from the mains as instructed in chapter ➚ *Disconnection from the grid*, page 15.
- Remove the end cover, if present.
- Lift the green lever of the module upwards.
- Push the module backwards along the guide rails onto the DIN rail.
- Push down on the green lever.
- To protect the side contacts from dirt and damage, install the end cover on the last module.
- Switch on the power supply.
- Start the system.
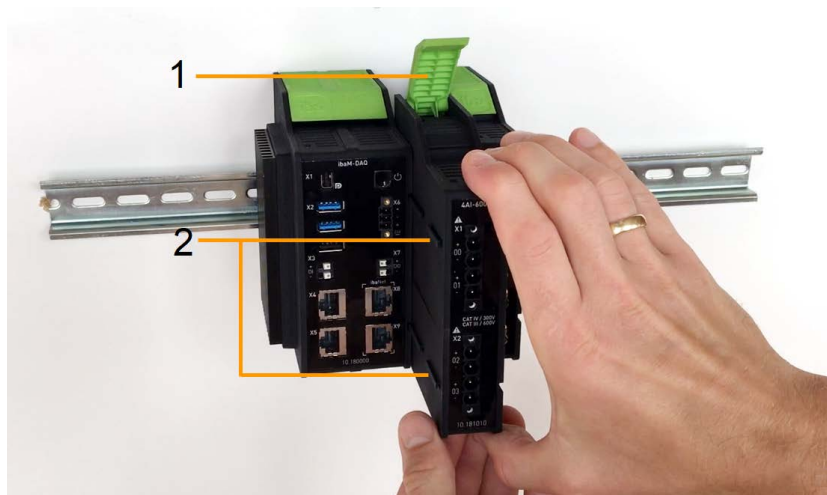
1   Green lever for locking and releasing the modules
2   Guide rails

Dismounting

- Shut down the system and/or switch off the power supply.
- Disconnect the power supply and the entire system from the mains as instructed in chapter ➚ *Disconnection from the grid*, page 15.
- Remove all connections from the module that is to be dismounted.
- If you want to dismount the module on the far right, first remove the end cover. This is mounted again on the last module on the right after the module has been dismounted.

■ Grasp the module at the top and bottom with one hand and lift the green lever upwards to release the lock on the DIN rail.

■ Pull the module forward along the guide rails.

■ Push down on the lever.

6.3   End cover

The rightmost module is terminated on the right side with the end cover ibaM-CoverPlate.

Mounting

■ Push this end cover along the guide rail until the cover snaps into place.

Dismounting

■ Push this end cover forward along the guide rail.

Note

An end cover is included in the scope of delivery of the central unit.

The end cover is also available as an accessory or spare part from iba.

6.4   Connector connection technology

Caution!

⚠️ You must only connect one conductor to each terminal connection.

Several individual conductors, whether single-wired or fine-wired, are not permitted.

Only connectors classified by iba may be used for connecting conductors.

| Connection technology	Push-in				
Clamping range	0.13 - 3.31 mm^2				
Conductor cross-sections					
Single-wired	0.2 - 2.5 mm^2				
Fine-wired	0.2 - 2.5 mm^2				
With wire end ferrule	0.25 - 2.5 mm^2				
With wire end ferrule/collar	0.25 - 2.5 mm^2				
Stripping length					
Cross-section	0.5 mm^2	0.75 mm^2	1 mm^2	1.5 mm^2	2.5 mm^2
Single-wired	10 mm				
Fine-wired					
With wire end ferrule	10 mm				
With wire end ferrule/collar	12 mm				
Recommended cables					
Single-wired	H05V-U; H07V-U				
Fine-wired	H05V-K; H07V-K				
Screwdriver blade	0.6 mm x 3.5 mm				

Caution!

⚠️ **Measuring cable**

■ Do not use damaged measuring cables!

■ Connecting and disconnecting measuring cables when the device is connected to the power is prohibited!

■ Measuring cables must be suitable for the measurement category and voltage, and must have a length of smaller than 10 m.

7 Device description

Here you will find views and descriptions of the *ibaM-4AI-IEPE* device.

7.1 View
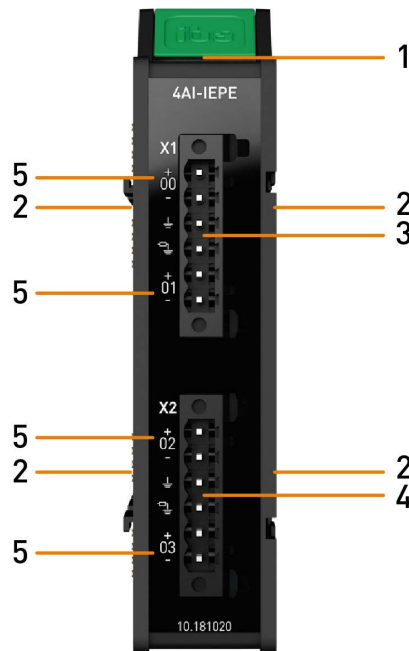
1   Module status indicator

2   Module-module interfaces

3   Connector analog inputs X1

4   Connector analog inputs X2

5   Analog input indicators

7.2 Indicating elements

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

7.2.1 Module status

Color	Status	Description
--	off	down, no power supply
Green	on	ready for operation
	flashing slowly	device is booting
	flashing quickly	update is running
Red	on	error, reset

7.2.2   State of IEPE inputs

Color	Status	Description
Input modes 24 V DC and 24 V AC		
--	off	channel inactive
		channel active and no input signal received, or input signal received but not measurable (<1% of full scale value)
Green	on	channel active and measurable input signal received
Red	on	channel active and input signal outside the measuring range
Input modes IEPE 0.1 Hz and IEPE 1 Hz		
--	off	channel inactive
Green	on	channel active and measurable input signal present
Red	on	channel active, but no sensor connected
		channel active, sensor connected, but broken line
Red	flashing	channel active, sensor connected, but short circuit

7.3   Analog inputs

Here you will find information on filters and connections for the analog inputs.

7.3.1   Filters

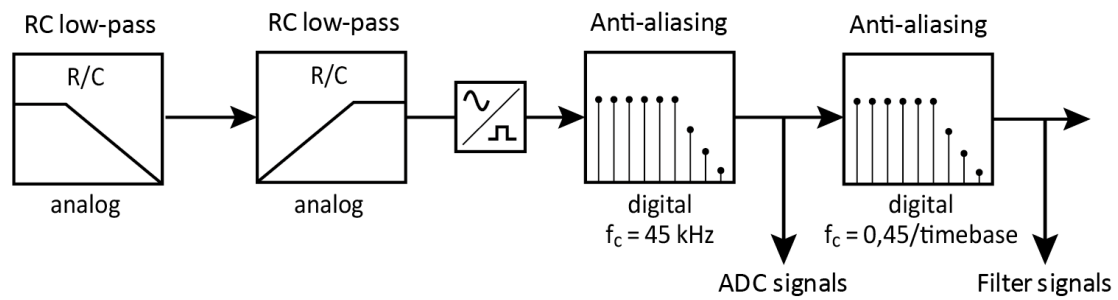In modes IEPE 0.1 Hz and IEPE 1 Hz there are the following filters for each channel:

Filter type	Ord.	Cut-off frequency	ADC signals	Filter signals
R/C low-pass	1st	50 kHz	x	x
R/C high-pass	1st	1 Hz or 0.1 Hz (digital); switchable	x	x
Digital anti-aliasing filter (FIR)	84th	cut-off frequency = 0.45 x ADC sampling rate oversampling = 32 x ADC sampling rate	x	x
Digital anti-aliasing filter (Elliptic/Cauer) or Digital anti-aliasing filter (Butterworth) Switchable	10th 2nd	0.45 / timebase	--	x

ADC sampling rate = A/D converter sampling rate
Timebase = Configured timebase or update time in *ibaPDA*

ADC signals = Acquired signals after A/D converter
Filter signals = Acquired signals after additional digital filter (see also Filter section)

Filter section:

In modes 24 V DC and 24 V AC there are the following filters for each channel:

Filter type	Ord.	Cut-off frequency	ADC signals 24 V DC	ADC signals 24 V AC	Filter signals
R/C low-pass	1st	50 kHz	x	x	x
R/C high-pass	1st	1 Hz	--	x	x
Digital anti-aliasing filter (FIR)	84th	Cut-off frequency = 0.45 x ADC sampling rate; Oversampling = 32 x ADC sampling rate	x	x	x
Digital anti-aliasing filter (Elliptic/Cauer) or Digital anti-aliasing filter (Butterworth) Switchable	10th 2nd	0.45 / timebase	--	--	x

7.3.2   Connection diagram, pin assignment

4 input signals can be connected here (0 ... 3), each of which must be bipolar plus ground. Each channel is connected using a two-wire system.
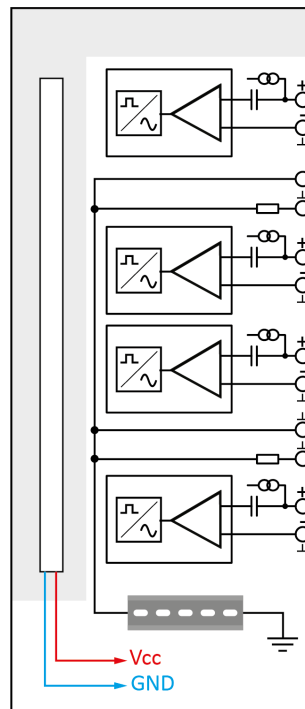
Pin assignment

Connector	Pin	Connection
X1	1	analog input 00 +
	2	analog input 00 -
	3	GND
	4	GND 50 Ω
	5	analog input 01 +
	6	analog input 01 -
X2	1	analog input 02 +
	2	analog input 02 -
	3	GND
	4	GND 50 Ω
	5	analog input 03 +
	6	analog input 03 -

Caution!

⚠️

Measuring cable

- ■ Do not use damaged measuring cables!

- ■ Connecting and disconnecting measuring cables when the device is connected to the power is prohibited!

- ■ Measuring cables must be suitable for the measurement category and voltage, and must have a length of smaller than 10 m.

7.3.3   Error signals and status signals

Error signals and status signals are available as status functions. The table below shows the availability of the status signals and error signals in the various input modes:

	IEPE 0.1 Hz/1 Hz	24 V AC	24 V DC
Status signal			
Data valid	x	x	x
Error signal			
Broken line	x	-	-
Shorted	x	-	-

The error and status signals are switched off by default. The signals are activated by switching on the diagnostics in the general module tab. See also ↗ *General tab*, page 27.

7.3.3.1   Data valid

The "Data valid" signal indicates (True) when the oscillation process of the corresponding channel has ended.

If the measured incoming values are processed further before this point, the resulting values may be distorted.

If there is an error during IEPE operation (broken line, short circuit), the signal will change to False.

7.3.3.2   Broken line

In addition to a broken line, the signal also indicates when no IEPE sensor is connected.

A broken line is detected if the sensor's supply voltage exceeds 20 V. The "Broken line" error signal becomes *True* with a delay of 10 seconds.

If the sensor's supply voltage decreases below 20 V, this error state will automatically be reset and the signal will change to *False* with a delay of 10 seconds.

7.3.3.3   Shorted

In the event of a short circuit, this error signal will be set to *True* with a delay of 10 seconds.

If the short circuit is eliminated and the sensor correctly re-connected, this error state will automatically be reset and the signal will change to *False* with a delay of 10 seconds.

7.3.4   Statistical values

Calculations of statistical values are available as additional functions. The statistical values of a module are all calculated according to the same calculation interval. The calculation interval can be set in *ibaPDA* in 1 ms steps in the range 100 ms to 5000 ms.

The general characteristic values are calculated based on the ADC signals:

Characteristic value	Description
Minimum	minimum of the input signal
Maximum	maximun of the input signal
Average	arithmetic average of the input signal
Root Mean Square Value (RMS)	mean square value (effective value) of the input signal
Peak	maximum or minimum value (absolute)
Peak-to-Peak	difference between the largest value and the lowest value
Crestfactor	Crest factor (ratio of maximum to RMS) of the input signal
Used Range	peak-to-peak in relation to the measuring range

7.4   Type label

The type label provides the following information:
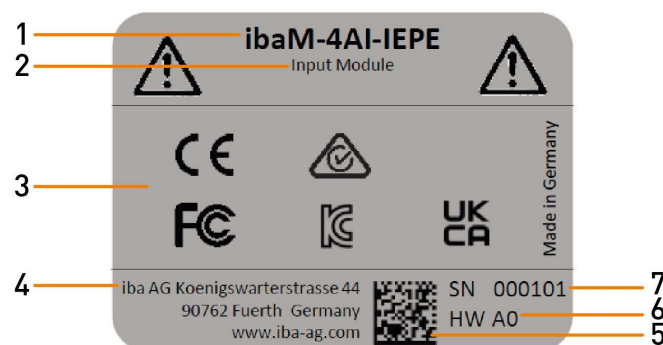
1	Product name	5	Data matrix code (iba internal)
2	Module type	6	Hardware version
3	Certifications, standards	7	Serial number
4	Manufacturer		

8   Confguration in ibaPDA

With *ibaPDA* you can search for devices in the network and configure them for operation in the network, but *ibaPDA* can also be used to configure, acquire and record the analog and digital signals of the connected terminals, and output them.

Modules from the ibaMAQ system can only be operated at an ibaMAQS central unit, either at the processor module *ibaM-DAQ* or communication module *ibaM-COM*. Configure the respective central unit before adding further modules.

Other documentation

Please read the description and configuration of the modules *ibaM-DAQ* or *ibaM-COM* in the corresponding device manuals.

8.1   Adding modules

There are several ways to add modules in *ibaPDA*:

■   Automatically

■   Manually / offline

The procedure is described using the example of the processor module *ibaM-DAQ*.

8.1.1   Adding module automatically

1.   Select the "ibaM-DAQ" link in the I/O Manager.

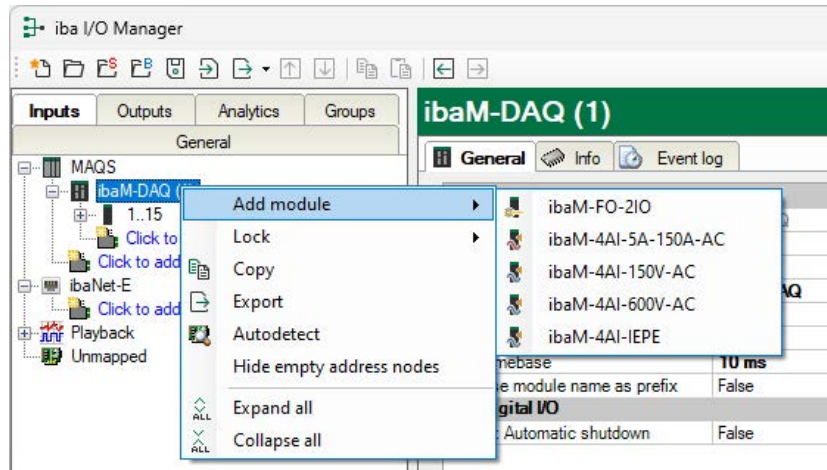2.   Right-click on the link to open a submenu.

3.   Select *Autodetect*.

→   If *ibaPDA* detects the device automatically, the device and the connected modules are listed in the module tree.
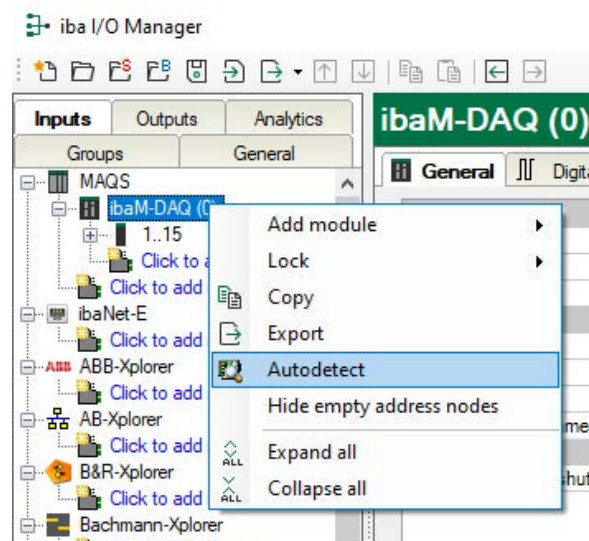
8.1.2   Adding module manually / offline

Modules can also be added manually.

1. Right-click on the "ibaM-DAQ" link and select *Add module*.

2. Select the desired modules from the list.

An offline configuration makes it possible, for example, to export a module configuration without existing or connected modules or to save the entire I/O configuration of the I/O Manager.

Other documentation

For detailed information, refer to the corresponding device manuals.

8.2   Module configuration

If the module is displayed correctly, carry out the configuration as described below.

8.2.1   General tab

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.

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

Advanced

Enable diagnostics
The *Diagnostics* tab is added with analog and digital diagnostic signals. See ➚ *Diagnostics tab*, page 30.

Enable ADC signals
Enable and display ADC signals on the *Analog* tab.

Anti-aliasing filter type
Select the filter type for the anti-aliasing filter which is applied to the filtered signal. The available options are:

- Elliptic/Cauer 10th order

- Butterworth 2nd order

Enable statistical values
If you enable Statistical values, the *Statistical values* tab is added. The time base is 10 ms. See ➚ *Statistical values*, page 24.

In addition, the *Statistical values interval* field appears. Enter the calculation interval (in ms) for statistical values here. Valid range is 100 ms to 5000 ms. The interval for statistical values has no effect on the timebase (10 ms).

Channels

Channel x
Enable the channel by selecting the measuring range or disable the channel in the drop-down list.

- Off: Channel is disabled

- IEPE 1 Hz

- IEPE 0.1 Hz

- 24 V DC

- 24 V AC

8.2.2   Analog tab

The *Analog* tab lists the analog signals in two groups. The *ADC* group contains the ADC signals directly after the A/D converter, while the *Filtered* group contains the filter signals with the additional digital anti-aliasing filter.

	Name	Unit	Input mode	Min	Max	Sensitivity	Active	Actual
	ibaM-4AI-IEPE (0)							
	⊟ ADC							
0	ADC signal Ch 0	g	IEPE 0.1Hz	-10	10	100 mV/g	☐	0
1	ADC signal Ch 1	V	24V DC	-24	24		☐	0
2	ADC signal Ch 2	V	24V DC	-24	24		☐	0
3	ADC signal Ch 3	V	24V DC	-24	24		☐	0
▶	⊟ Filtered							
4	Filtered signal Ch 0	g	IEPE 0.1Hz	-10	10	100 mV/g	☑	0
5	Filtered signal Ch 1	V	24V DC	-24	24		☑	0
6	Filtered signal Ch 2	V	24V DC	-24	24		☑	0
7	Filtered signal Ch 3	V	24V DC	-24	24		☑	0

Name

You can enter a signal name here, as well as two comments, by clicking on the ✎ icon in the *Name* field.
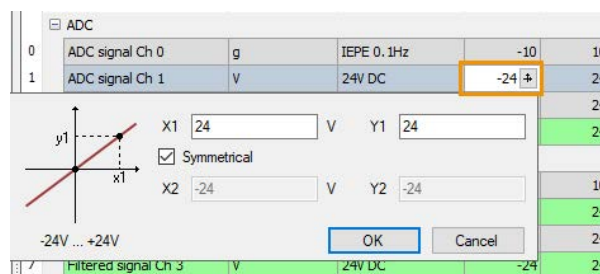
Unit
The unit is preset.

Input mode
Displays the input mode, based on the setting on the *General* tab.

Min/Max
You can define an upper and lower limit for the measuring range here. The analog voltage level of the upper and lower limit is assigned to a physical variable. The dialog box is opened by clicking on the cross.

Sensitivity
Specifies the sensitivity of the sensor.

Active
You can enable or disable the signal here.

Actual

Displays the current measured value.

You can show or hide additional columns using the context menu (right-click in the header).
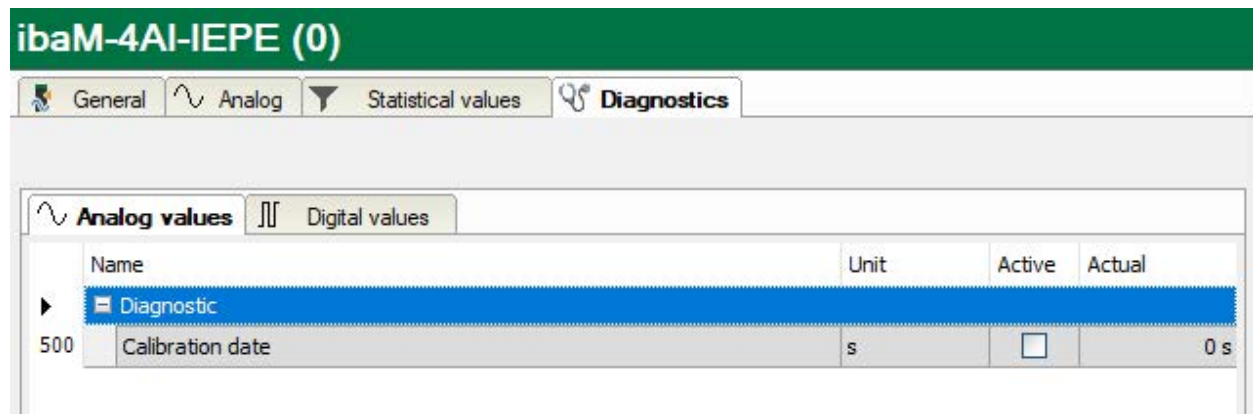
8.2.3   Diagnostics tab

The *Diagnostics* tab displays the analog and digital diagnostic signals. The signals can be enabled individually.

Digital values

Analog values

The meaning of the signals:

Name	Meaning
Hardware state	live bit to indicate the hardware status (1 Hz)
Error Ch x	hardware error in channel x
Channel x data valid	
Channel x shorted	see chapter ⏶ *Error signals and status signals*, page 23
Channel x broken line	
Calibration date	32-bit value that represents the seconds since 1970. This number can be converted to text using a virtual signal: *ConvertUnixTimeToText()*

8.2.4   Statistical values tab

The calculated statistical values are available as signals in the *Statistical values* tab. See also chapter ⏶ *Statistical values*, page 24.

The signals are grouped by channel in the *Channel 0* to *Channel 3* tabs and can be activated individually.
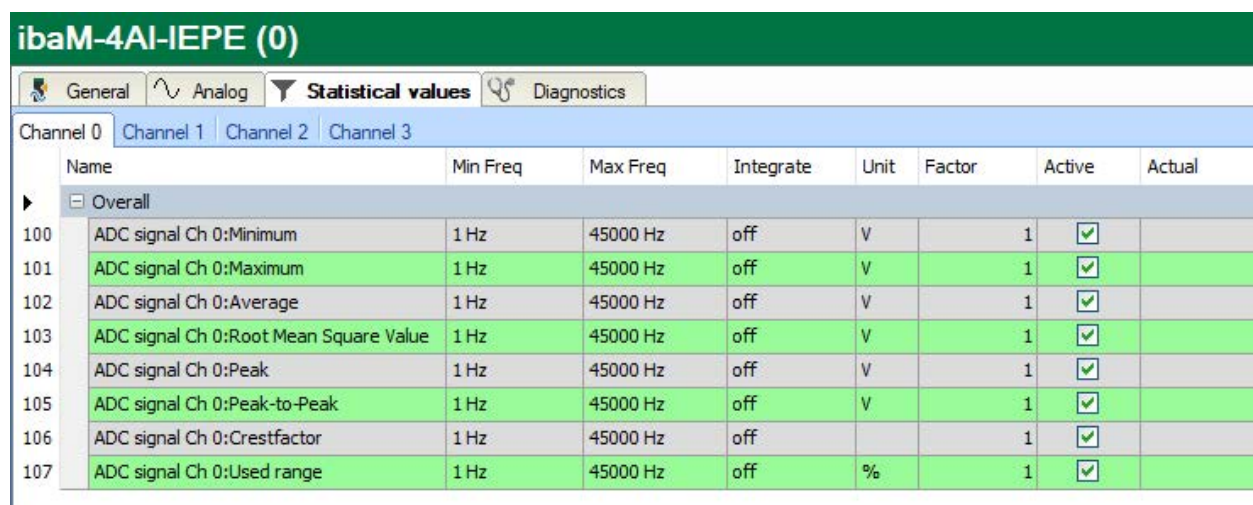
Name

The signal name is preset. It consists of the channel name and the statistical value.

Min / Max Freq

Display of the lower or upper frequency.

Integrate

Off = acceleration values are output

On = velocity values are output

Unit

The unit can be selected using the drop-down list.

Factor

In IEPE mode, the value changes depending on the selected unit.

Active

You can enable/disable the signal here.

Actual

Display of the currently measured value.

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

9   Technical data

Danger

⚡

Electric shock

The device is only designed for electrical measured variables as specified in the "Technical data" chapter!

If the device is used or operated in a manner other than specified in the *Technical data chapter*, the protection supported by the device and the function itself may be impaired.

This also applies to the permissible operating and environmental conditions.

Danger!

⚠

Permanent measuring voltage

The device is non-destructive for permanent measuring voltages up to DC 60 V.

The device can be destroyed at voltages from DC 60 V and device safety can no longer be guaranteed.

9.1   Main data

Short description	
Product name	ibaM-4AI-IEPE
Module label	4AI-IEPE
Description	Input module with 4 analog inputs for voltage measurements and IEPE sensors with modes switchable by channel
Order number	10.181020
Module-module interface	
Number	2
Connection technology	4x 8 sliding contacts
Supply	
Supply voltage	24 V DC via module-module interface
Power consumption	
Own consumption	0.3 A
Input/output current	max. 4 A
Other interfaces, operating and indicating elements	
Indicators	LEDs for operation, channel states, and errors
Operating and environmental conditions	
Temperature range	
Operation	14 °F to 131 °F (-10 °C to +55 °C)
Storage	-13 °F to 185 °F (-25 °C to +85 °C)

Mounting	on DIN rail according to EN 50022 (TS 35, DIN rail 35)
Cooling	passive
Relative humidity	15 % … 95 % (indoor), no condensation
Operating altitude	0 … 2000 m above sea level
Protection type	according to IP20; without test certificate according to IEC 60529
Certifications / standards	CE, C-Tick, UKCA, FCC, IEC 61010-1
Pollution degree	2
Dimensions	
Width x height x depth	28 mm x 133 mm x 120 mm
Height with open lever	160 mm
Height unit	3
Installation clearances	
Top / bottom	30 mm / 30 mm
Left / right (system)	10 mm / 10 mm
Mounting position	vertical, lever up
Weight / incl. packaging/connector	0.24 kg / 0.50 kg

9.2   Analog inputs

Analog inputs	
Number	4
Design	Galvanically isolated, single ended; additionally 2x GND and 2x GND with 50 Ohm
Input signal	Voltages up to 24 V DC / IEPE sensors; switchable by channel
Input modes	24 V DC / 24 V AC / IEPE 0.1 Hz / IEPE 1 Hz; switchable by channel
IEPE 0.1 Hz/1 Hz	Integrated constant current source: +4 mA (24 V DC)
Resolution	24 Bit (Delta-Sigma)
ADC sampling rate	100 kHz
ibaPDA timebase (update time)	min. 10 µs; freely adjustable (integer multiple); max. 1 ms[1] in the case of filter signals
Filters	
ADC signal	
24 V DC	
Analog	R/C low-pass, 1st order, 50 kHz

[1] For the filter signals, the maximum time base in ibaPDA (update time) is limited to 1 ms for the correct operation of these filters.

|		
	Digital	Anti-aliasing filter (FIR), 84th order; cut-off frequency = 0.45 x ADC sampling rate; oversampling = 32 x ADC sampling rate
24 V AC		
	Analog	R/C low-pass, 1st order, 50 kHz R/C high-pass, 1st order, 1 Hz
	Digital	Anti-aliasing filter (FIR), 84th order; cut-off frequency = 0.45 x ADC sampling rate; oversampling = 32 x ADC sampling rate
IEPE 0.1 Hz		
	Analog	R/C low-pass, 1st order, 50 kHz
	Digital	R/C high-pass, 1st order, 0.1 Hz anti-aliasing filter (FIR), 84th order; cut-off frequency = 0.45 x ADC sampling rate; oversampling = 32 x ADC sampling rate
IEPE 1 Hz		
	Analog	R/C low-pass, 1st order, 50 kHz
	Digital	R/C high-pass, 1st order, 1 Hz anti-aliasing filter (FIR), 84th order; cut-off frequency = 0.45 x ADC sampling rate; oversampling = 32 x ADC sampling rate
Filter signal[2]		
24 V DC/AC / IEPE 0.1 Hz/1 Hz		
Like ADC signal, in addition		
	Digital	Anti-aliasing filter (Elliptic/Cauer), 10th order; cut-off frequency = 0.45 / timebase; or anti-aliasing filter (Butterworth), 2nd order; cut-off frequency = 0.45 / timebase; switchable
Measuring ranges		
24 V DC/AC	±24 V	
IEPE 0.1 Hz/1 Hz	±10 V (at ~160 Hz and BIAS voltage ~12 V DC)	
Input gain IEPE	None	
Input impedance 24 V DC/AC	1 MΩ	
Accuracy (+25 °C)		
24 V DC	< 0.1 % of the double full scale value	
24 V AC	< 2 % of the double full scale value	
IEPE 0.1 Hz/1 Hz	< 0.1 % of the double full scale value	

[2] For the filter signals, the maximum time base in ibaPDA (update time) is limited to 1 ms for the correct operation of these filters.

Electrical isolation	
Channel - channel	Functional isolation: 2.5 kV AC
Channel - system	Functional isolation: 2.5 kV AC
Connection technology	2x 6-pin pin header, pitch 5 mm
Connector	2x included in delivery; push-in, conductor max. 2.5 mm^2, locking lever (latching), protected against reverse polarity, lockable; For information on the conductor and stripping length, see chapter ⤢ *Connector connection technology*, page 18; Order number: 52.000052
Sensor cable length	Up to 30 m at 100 pF/m cable capacitance and a bandwidth of used signals up to 50 kHz
Status functions	
Input modes	
24 V DC/AC	Data valid
IEPE 0.1 Hz/1 Hz	Data valid, broken line, short circuit
Additional functions	
Statistical values	
Input modes	24V DC/AC / IEPE 0.1Hz/1Hz
Calculation basis	
Interval	100 ms … 5000 ms, freely adjustable (in 1 ms steps)
Signal	ADC signal
Sampling	ADC sampling rate
General characteristic values	
Characteristic values	Min, Max, Avg, Peak, Peak-to-Peak, aRMS, Crestfactor, used range
Bandpass-filtered characteristic values[3]	
Number	6 bandpass filters per channel; each freely adjustable
Bandpass filter	Butterworth, 4th order
Characteristic values	vRMS, vPeak-to-Peak, vCrest factor or aRMS, aPeak-to-Peak, aCrest factor; switchable
TEDS (according to IEEE-1451)[4]	
Design	0-wire
Supported EEPROMs	DS2430A, DS2431

[3] available in a later firmware version
[4] available in a later firmware version

9.3   Dimensions
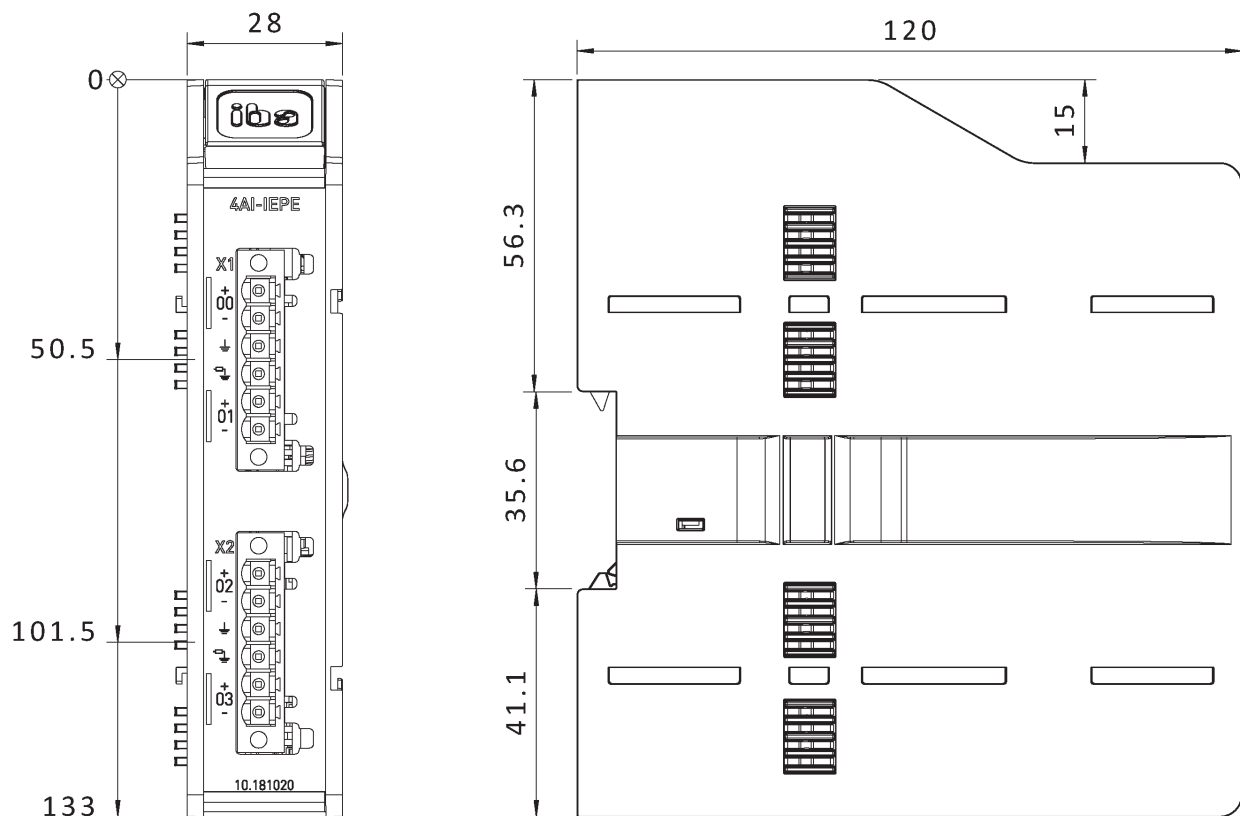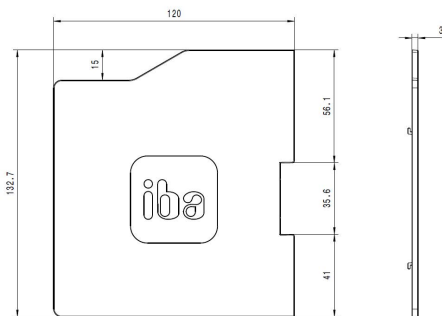

ibaM-4AI-IEPE dimensions, in mm

10   Accessories

Connector for analog inputs

Short description	
Name	6-Pin Terminal Block MAQS-IO RM5.00 Push-In LR
Description	6-pin female header/connector for analog inputs, push-in, lockable
Order number	52.000052

End cover for MAQS modules

Short description	
Name	ibaM-CoverPlate
Description	End cover for MAQS modules
Order number	10.180020
Design	
Dimensions (w x h x d)	3 mm x 132.7 mm x 120 mm
Weight	0.05 kg

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

Headquarters

iba AG
Koenigswarterstrasse 44
90762 Fuerth
Germany

Phone: +49 911 97282-0

Email: iba@iba-ag.com

Mailing address

iba AG
Postbox 1828
D-90708 Fuerth, Germany

Delivery address

iba AG
Gebhardtstrasse 10
90762 Fuerth, Germany

Regional and Worldwide

For contact data of your regional iba office or representative please refer to our web site:

www.iba-ag.com