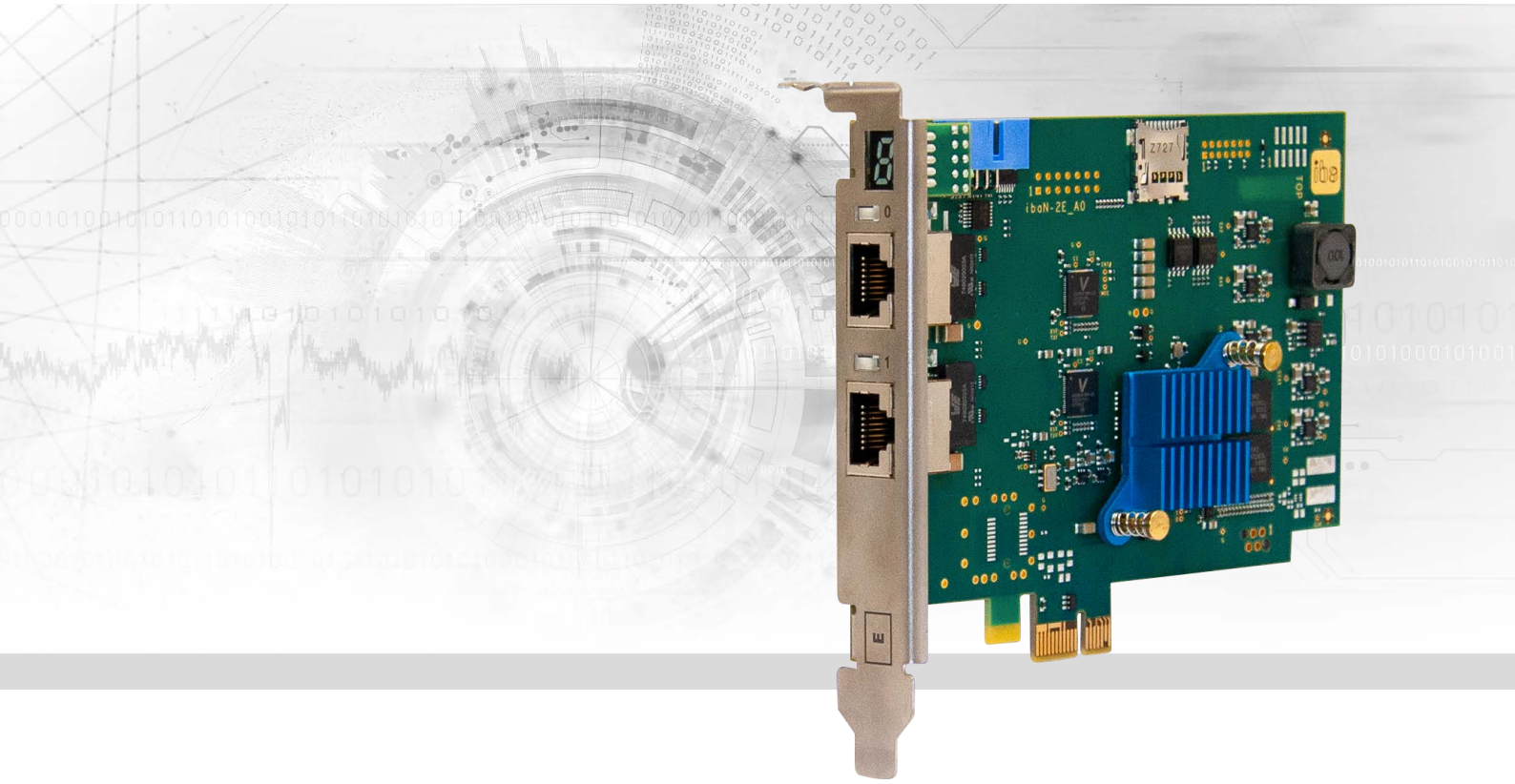

ibaN-2E

PCI Express card for ibaNet-E connections

Manual

Issue1.2

Measurement Systems for Industry and Energy

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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 www.iba-ag.com and can be found in the iba help center docs.iba-ag.com.

Issue	Date	Revision	Author	Version HW/FW
1.2	03-2026	ibaNet-E HP support	st	01.02. 001

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 structure, application and operation of the card *ibaN-2E*.

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 they are capable of assessing safety and recognizing possible consequences and risks on the basis of their 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 ibaN-2E

The *ibaN-2E* card enables ibaNet-E-compatible devices to be connected to a standard or industrial computer via Ethernet and the ibaNet-E transmission protocol with *ibaPDA*, making it possible to record measurement values deterministically. ibaNet-E-capable devices from iba can be connected either via a dedicated ibaNet-E network or via an existing standard Ethernet network. In addition, iba also supports the implementation of the ibaNet-E protocol in devices from OEM partners, such as programmable logic controllers or drives.

The *ibaN-2E* card can be used in combination with *ibaM-COM* and *ibaM-DAQ* modules to set up a dedicated ibaNet-E network, enabling deterministic and highly synchronous sampling with up to 1 µs. The data throughput corresponds approximately to the entire bandwidth of a network interface.

If an existing standard Ethernet network is used, measurement data can also be acquired from other ibaNet-E participants, such as *ibaW-750*. Sampling then is carried out synchronously with up to 1 ms and with a lower guaranteed data throughput.

The two 1 GbE network interfaces of the *ibaN-2E* card are designed as RJ45 (copper) and with a switch function.

A 7 segment display is used to identify the card (display of the card ID) and to display interrupt master/slave and external/internal synchronization.

The mechanical design of the *ibaN-2E* card is standard for PCI Express slots. Up to 4 *ibaN-2E* cards are supported per computer.

At a glance

- Features in the dedicated ibaNet E network per interface:
  - data throughput with ibaNet-E HP (High Performance): 750 Mbit/s
  - max. 10 *ibaM-COM* systems in daisy chain
- Features via standard Ethernet per interface:
  - data throughput: typ. 500 Mbit/s
  - different ibaNet-E participants
  - different network topologies
- *ibaN-2E* card in the *ibaPDA* computer:
  - max. 4 *ibaN-2E* cards
  - data throughput per *ibaN-2E* card: 1000 Mbit/s
  - data throughput of all *ibaN-2E* cards: 1600 Mbit/s

3 Scope of delivery

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

The scope of delivery includes:

- *ibaN-2E* card
- Synchronization cable (sync cable)

4 Safety instructions

Observe the following safety instructions for *ibaN-2E*.

4.1 Intended use

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

- Measurement data acquisition and analysis
- Applications of software products (*ibaPDA*, *ibaLogic*, etc.) from iba AG.

This card must only be connected to peripheral devices of iba AG or dedicated devices of other manufacturers.

This card must only be installed in Windows computers.

4.2 Special safety instructions

Danger from electric shock!

Switch off the computer and disconnect it from the mains power supply before opening!

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

Electrostatic discharges can damage the module.

Before touching the board make sure that your body is electrically discharged or works in a designated ESD protected area! Observe the ESD guidelines for the handling of electrostatically sensitive assemblies and components.

5 System requirements

Observe the following requirements for using the *ibaN-2E* card.

Hardware

PC with at least:

- Multicore CPU 2 GHz or better
- 4 GB RAM or more
- 100 GB HDD
- 1 free PCIe v2.x/x1 compatible slot per card

Software

- *ibaPDA* version 8.12.0 or higher

Firmware

- *ibaN-2E* version 01.02.001 or higher

Note

It is recommended using a separate network segment to exclude mutual interference from other network components.

6 Installing and removing the card

Observe the following warnings when working with the cards.

Danger from electric shock!

Switch off the computer and disconnect it from the mains power supply before opening!

Caution

Electrostatic discharges can damage the module.

Before touching the board make sure that your body is electrically discharged or works in a designated ESD protected area! Observe the ESD guidelines for the handling of electrostatically sensitive assemblies and components.

6.1 Installing the card

Proceed as follows to install the card.

1. Shut down the computer.
2. Switch off the power supply of the computer.
3. Unplug the mains power line.
4. Open the computer on the side where you can reach the PCIe slot.
5. Carefully remove the card from its packaging.
6. Hold the card by the front panel and the top rear corner. Do not touch the contacts.
7. Carefully insert the card into a free PCIe slot.

Tip

To avoid damaging the card, press on the top of the front plate and on the top edge of the circuit board when inserting the card.

Do **not** press on the plugs along the top edge of the card. They might brake off.

8. Attach the card to the housing of the computer.

   If you install more than one card, connect them with the synchronization (sync) cable.
9. Close the computer.
10. Insert the mains plug into the earthed socket.
11. Switch on the power supply of the computer.
12. Start the computer.

6.2 Removing the card

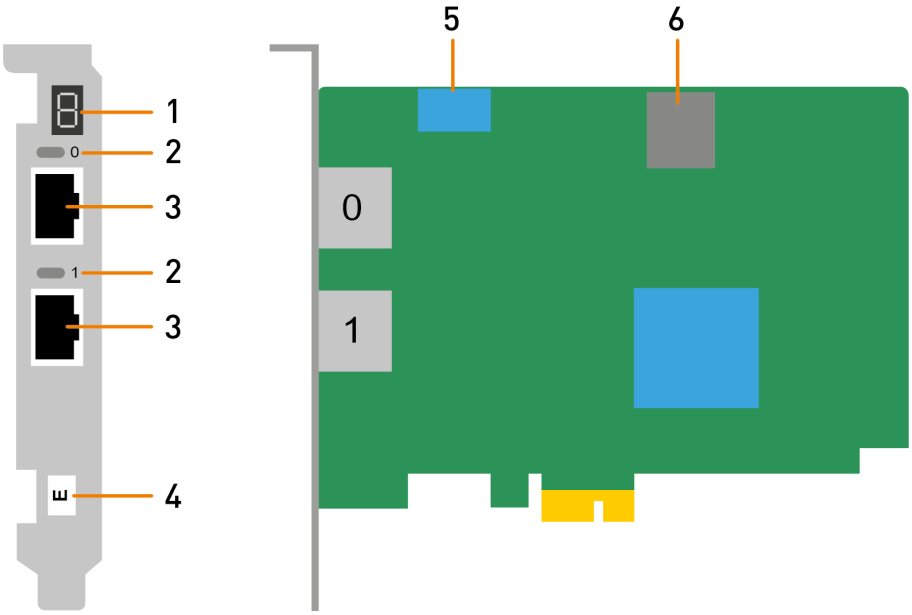
Proceed as follows to remove the card.

1. Shut down the computer.
2. Switch off the power supply of the computer.
3. Unplug the mains power line.
4. Open the computer on the side where you can reach the card freely.
5. Disconnect all external connecting cables from the card.
6. Release the fixing screws.
7. Carefully pull the card out of the PCI(e) slot.
8. Store the card in suitable packaging.
9. Close the computer.
10. Insert the mains plug into the earthed socket.
11. Switch on the power supply of the computer.
12. Start the computer.

7 Description

Here you will find views and descriptions of the *ibaN-2E* card.

7.1 Views



1 7 segment display

2 ibaNet interface indicators

3 Connectors ibaNet interface

4 Identifier for cards of the ibaN-E family

5 Connector for synchronizing iba PC cards (ibaFOB, ibaN-E, etc.) via sync cable

6 SD interface, for service purposes only

7.2 Indicating elements

Colored LEDs on the device indicate the status of the device and the status of the ibaNet connections.

7.2.1 7 segment display

The 7 segment display on the front of the card shows:

- Horizontal segment: *ibaN-2E* card not initialized
- Numbers 0 to 7: Ident number, *ibaN-2E* card is initialized

The decimal point shows how the *ibaN-2E* card is configured:

- Always lights up: Internal interrupt master
- Flashing: External interrupt master
- Off: Interrupt slave

7.2.2 Network/ibaNet interface

An LED above each connector indicates the status of the link.

LED	Status	Meaning
ibaNet 0, 1	green on	connectivity OK
	off	no connectivity

7.3 Connectors

You will find the following connections and interfaces on the device *ibaN-2E*.

7.3.1 Connectors ibaNet interface 0, 1

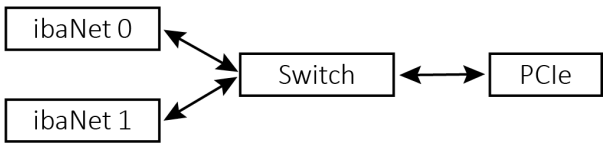
The two ibaNet connections 0 and 1 are intended for dedicated use with ibaNet-E connections, which can acquire data with an accuracy of up to 1 µs.

The two 1GbE interfaces are **with switch function** and support:

- Autonegotiation (100/1000 Mbit, full duplex)
- Auto-MDI(X)

7.4 Flow chart

The following block diagram visualizes the internal communication of the card.



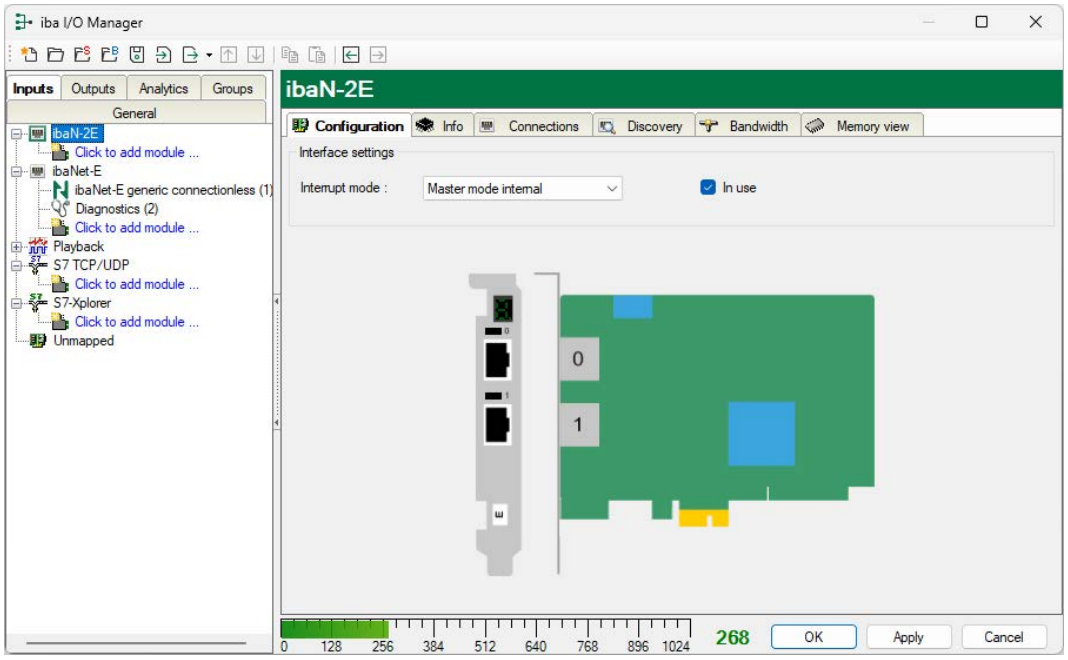
8 Configuration in ibaPDA

Up to 4 *ibaN-2E* cards are supported simultaneously by *ibaPDA*, version 8.11.2 or higher.

If the card has been installed correctly, it is displayed as an interface in the tree structure of the I/O manager.

8.1 ibaN-2E – Configuration tab

If you select the *ibaN-2E* interface, you will see the properties of the card in several tabs on the right-hand side of the dialog. Select the *Configuration* tab.



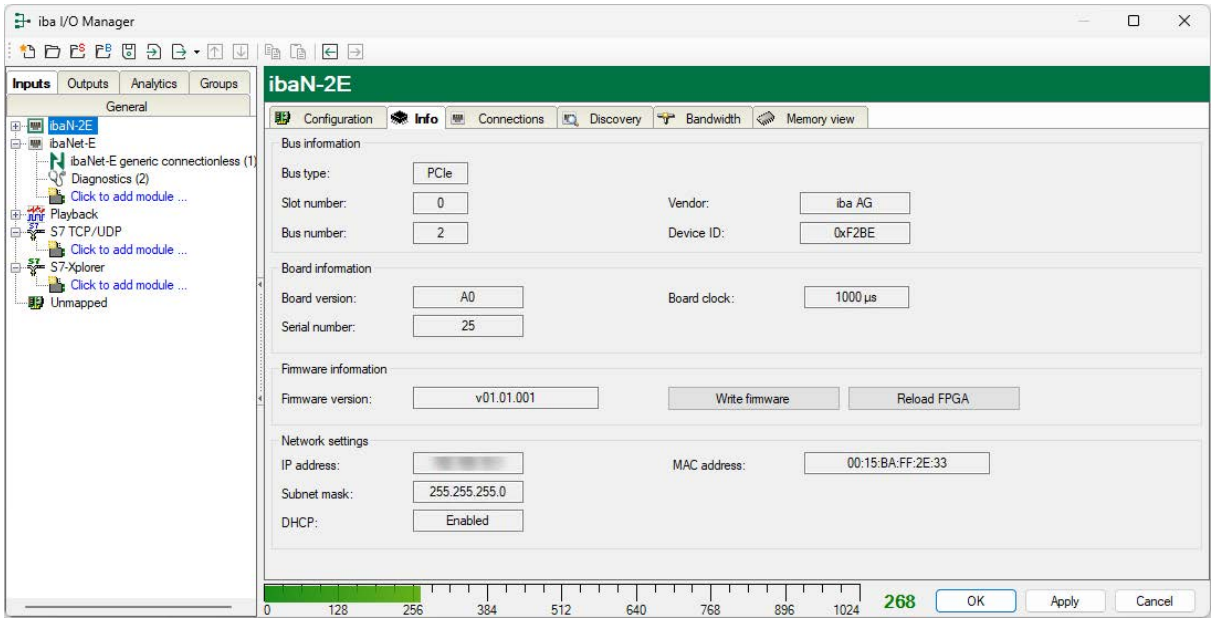
Interrupt mode
The interrupt mode is set automatically by *ibaPDA*: As soon as several different cards are inserted, *Master mode internal* is set.

Only if no other card types but several *ibaN-2E* cards are inserted, you can specify which of the cards has the *Master mode internal* and thus generates the interrupt for the other cards. The interrupt is passed to the other iba PCIe cards (interrupt slaves) via the synchronization line (ribbon cable supplied).

In use
Enable the option if you want to use the card with *ibaPDA*.

8.2 ibaN-2E – Info tab

The *Info* tab provides information about the card and the loaded firmware. Functions for service and support, such as reloading the FPGA and updating the firmware, are also integrated.



Bus information
Display of current bus information.

Board information
Display of current board information.

Firmware information
Display of current firmware version.

<Write firmware>
Using the button, it is possible to install firmware updates.

1. Select the update file `ibaN_v[xx.yy.zzz].iba` in the browser.
2. Start the update with a click on <Write firmware>.
3. The following dialog informs you about the progress of the update.

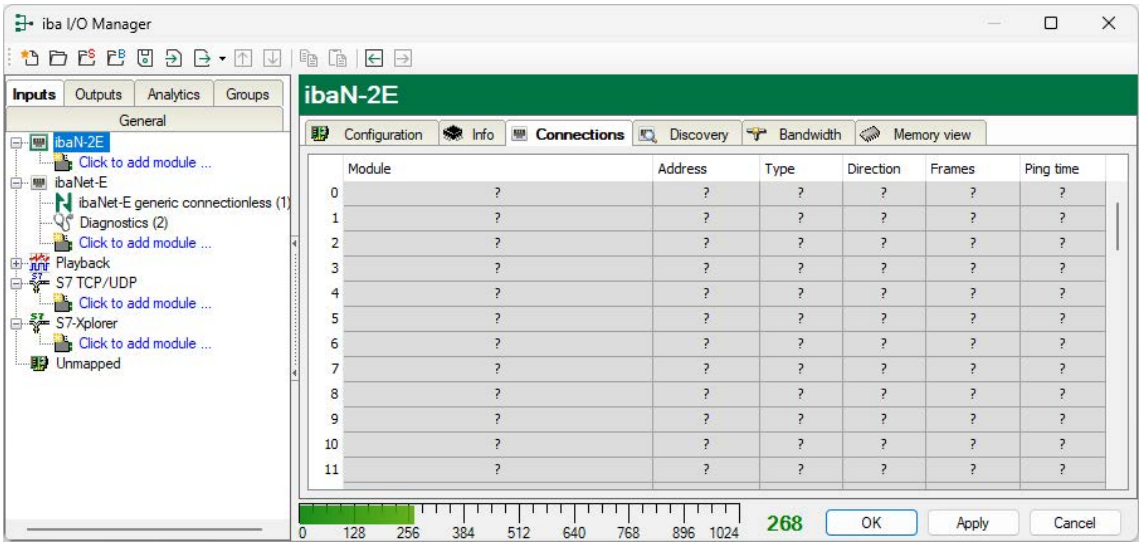
Note

This process may take several minutes and must not be interrupted.

Network settings
Display of network interface, IP address, subnet mask, MAC address and whether DHCP is enabled.

8.3 ibaN-2E – Connections tab

All ibaNet-E connections are displayed in an overview.



Module
The name of the connected module or device.

Address
Address of the target device. Depending on the set data path, the MAC address or the IP address/host name (with DHCP) is displayed here.

Type
Type of the ibaNet-E connection.

- ACQ: Receive connection; isochronous acquisition of all values; with telegram repetitions
- PLC: Send connection; only the most recent value is sent without any repetitions if there are transmission errors

Direction
Input or output direction

- Input direction: Receiving data from the ibaNet-E device
- Output direction: Sending data to the ibaNet-E device

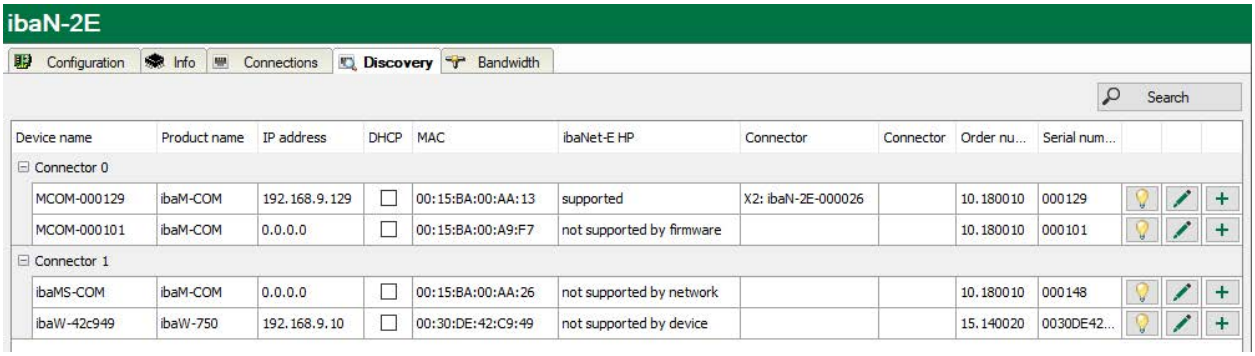
Frames
Number of telegrams for this connection.

Ping time
Current ping time for this connection.

While a valid ibaNet-E receive connection is live, a ping is sent cyclically to the ibaNet-E device. The measured time is displayed here, and indicates the connection quality of the Ethernet network. The shorter this time is, the better the connection quality, and the more secure the data transmission. If the connection quality is poor, the connection in question is highlighted in orange.

8.4 ibaN-2E – Discovery tab

You can search for ibaNet-E devices in the *Discovery* tab. Please note that this search can only be successful if the device is located in the same LAN as the computer with the *ibaN-2E* card.



Search devices

1. Start *ibaPDA* and open the I/O Manager.
2. Select the *ibaN-2E* interface and select the *Discovery* tab.
3. Start the search by clicking on <Search>.

→ Devices found are listed in a table and cannot be changed in this display.

Information on the devices found

If individual columns are not displayed, you can show or hide them using the context menu (right-click in the header). The header contains the following information:

Device name
Device name, or host name of the device

Product name
ibaN-2E

IP address
The IP address of the device

Subnet mask
The subnet mask of the IP settings

Gateway
The gateway of the IP settings

DHCP
The IP settings are obtained from a DHCP server (enabled or not).

MAC
MAC address of the device

Order number
The iba order number of the device

Serial number
The serial number of the device

ibaNet-E HP
This column shows support for ibaNet-E HP (High Performance). Explanations for the display in this column can be found in chapter ↗ *ibaNet-E HP support, page 19*.

Under certain conditions, ibaNet-E communication can also be operated as “High Performance (HP)”, then referred to as ibaNet-E HP. With ibaNet-E HP, it is possible to achieve, among other things, a higher data throughput per ibaN-2E interface (750 Mbit/s) and a synchronization accuracy of up to 1 µs.

Connector
The *ibaN-2E* card recognizes the participants in the ibaNet-E network. The participants are displayed per connector of the *ibaN-2E* card (Connector 0 or Connector 1). Connected participants that can be identified are displayed with the connector they are using.

Meaning of the buttons:


Identify device
When you click this button, the status indicators (LEDs) on the front of the device start blinking for a short time. This makes it possible to identify the device directly.


Edit device settings
Click this button to open the window for the device and IP settings.


Add device to I/O configuration
Click this button to add the device to the I/O configuration of the ibaNet-E-interface in *ibaPDA*. Connected modules are identified and added automatically as far as possible.

8.4.1 ibaNet-E HP support

The *Discovery* tab, in the *ibaNet-E HP* column, shows support for ibaNet-E HP (High Performance).

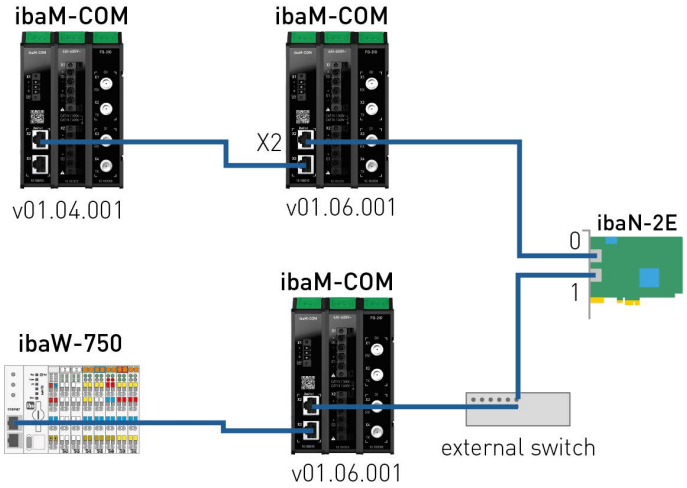
The requirements for ibaNet-E HP are:

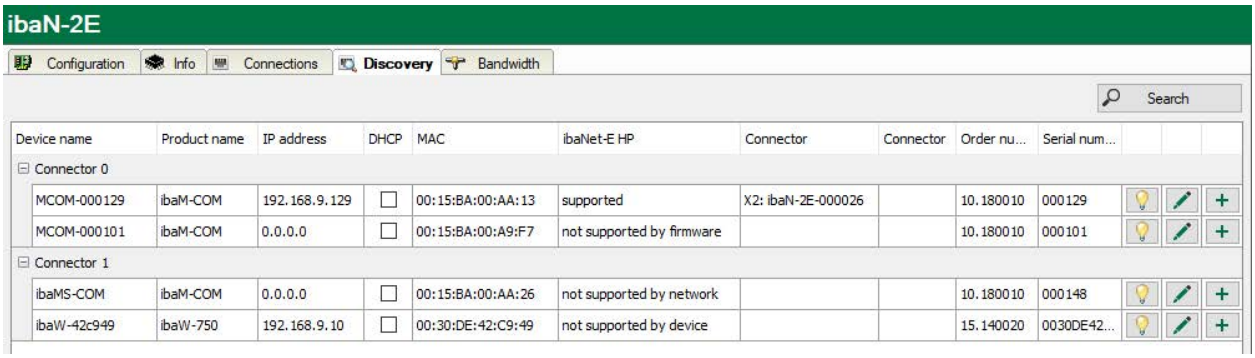
- *ibaPDA* v8.12.0 or higher
- dedicated ibaNet-E network
- *ibaN-2E* card with firmware v01.02.001 or higher
- max. 10 *ibaM-COM* devices in a daisy chain (firmware v01.05.001 or higher)
- Data path MAC in the *ibaPDA* configuration

Possible displays in the *ibaNet-E HP* column and their meaning:

Display	Meaning
supported	The connected device supports ibaNet-E connections with High Performance (ibaNet-E HP).
not supported by network	The connected device supports ibaNet-E HP. However, the network is not configured in such a way that ibaNet-E HP can be used.
not supported by firmware	The connected device may support ibaNet-E HP, but the firmware on the device does not support ibaNet-E HP. A firmware update is required to support ibaNet-E HP.
not supported by device	The device itself does not support ibaNet-E HP.
not supported	A device was found for which no statement can be made about the capability of ibaNet-E HP.

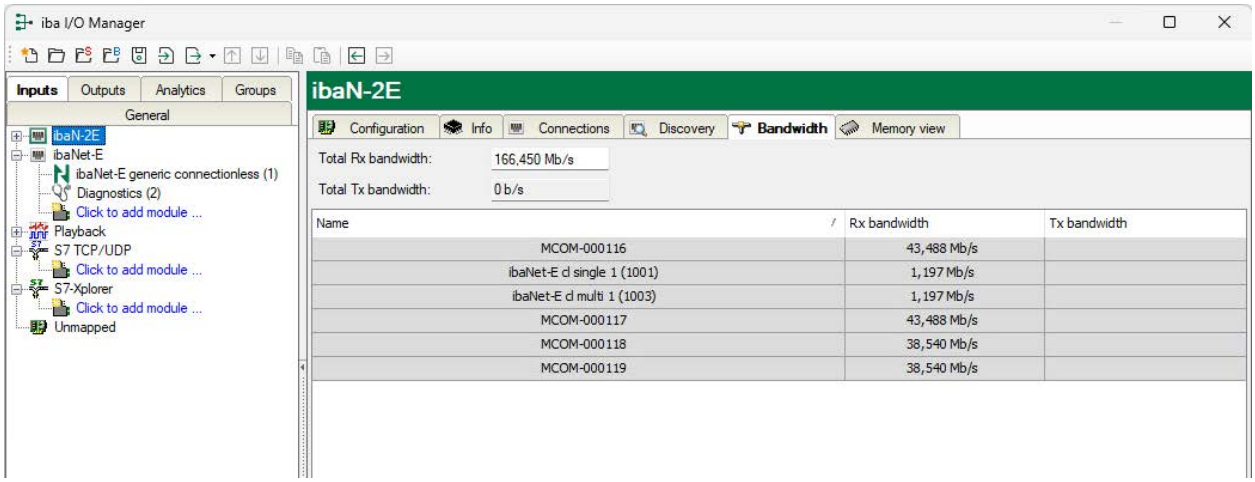
Example:
With the following network topology, this display appears in the *Discovery* tab:





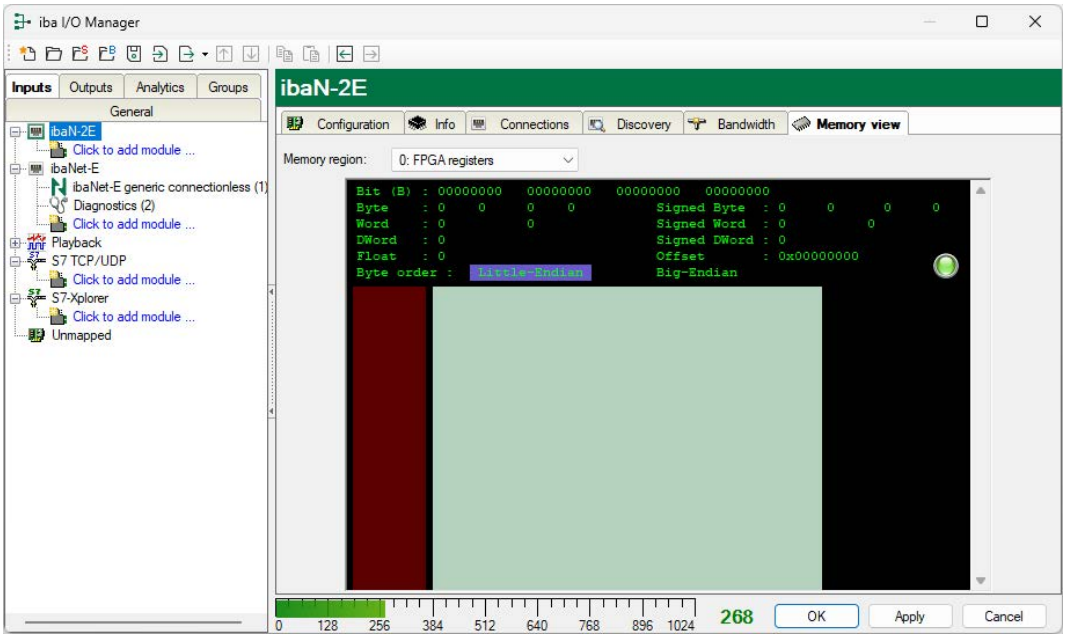
8.5 ibaN-2E – Bandwidth tab

The *Bandwidth* tab provides information about data throughput. It displays the estimated total data throughput in the transmit and receive directions, as well as the data throughput for the connected ibaNet-E devices.



8.6 ibaN-2E – Memory view tab

This view provides the necessary information on telegram traffic for service purposes.



9 Synchronization of more than one card

Observe the following notes when synchronizing several cards.

Note

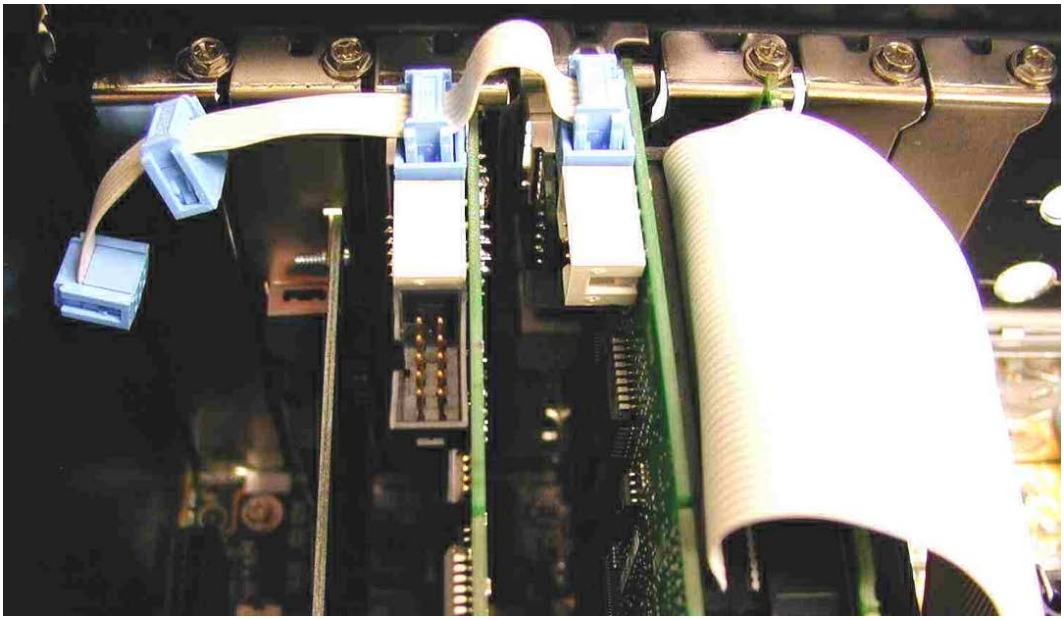
A bad or missing synchronization can lead to inconsistent or contradictory data blocks. This can affect the signal correlation!

Each card is delivered with a synchronization cable (flat ribbon cable) for connecting up to 5 cards. Unused connections of the synchronization cable can remain unused and must not be terminated.

If you plug in or unplug cards this may change the entire configuration of the PC. This may also have an effect on the signals or the I/O configuration of the system, as the module ID may change. Always save your system configuration before making any hardware changes.

Prerequisite: The cards are installed in the computer.

1. Connect the synchronization cable to all cards that are to be synchronized with each other (light blue plug SYNC).



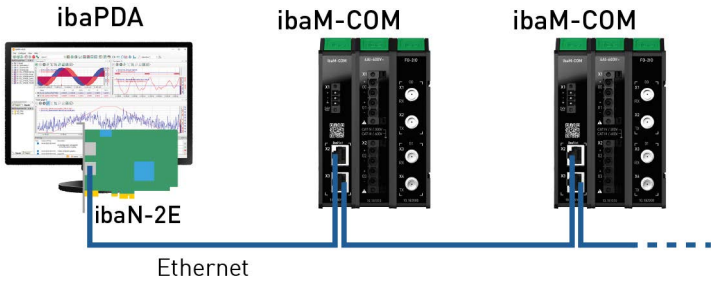
2. Close the computer.
3. Insert the mains plug into the earthed socket.
4. Switch on the power supply of the computer.
5. Start the computer.

10 System integration

Below you will find examples of the connection to the *ibaN-2E* card. The data path is set in *ibaPDA* for the respective ibaNet-E device. ibaNet-E-capable devices from iba provide an ibaNet interface, such as *ibaM-COM*, etc.

Measurement data acquisition via ibaM-COM

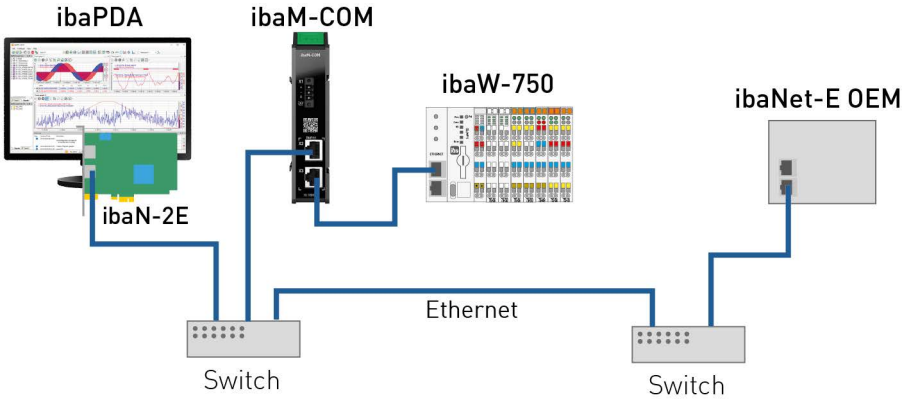
If an *ibaN-2E* card is used in the *ibaPDA* computer, it is possible to synchronously sample the data with up to 1 µs. To do this, the *ibaPDA* computer and *ibaM-COM* must be connected directly via a dedicated Ethernet network.



ibaNet protocol	ibaNet-E / ibaNet-E HP
Data path	MAC
Ethernet	Dedicated ibaNet-E network
Topology	Daisy chain
Application	*ibaPDA*
ibaNet-E participant	*ibaM-COM* (max. 10 devices)
Data throughput	750 Mbit/s per interface (1000 Mbit/s per ibaN-2E card)
Synchronization accuracy	up to 1 µs

Measurement data acquisition via standard Ethernet

An *ibaN-2E* card is used in the *ibaPDA* computer. Transmission is carried out via an existing network (standard Ethernet). Switches can be integrated into the Ethernet network.

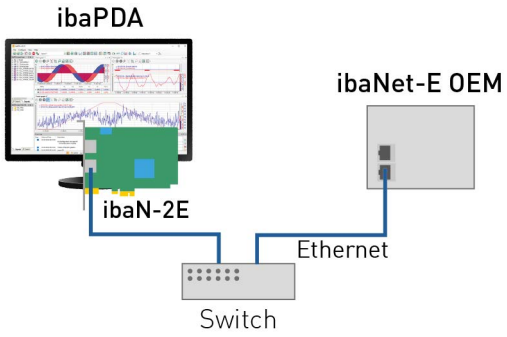


ibaNet protocol	ibaNet-E
Data path	MAC, IPv4
Ethernet	Standard Ethernet
Topology	Daisy chain, star; incl. switches
Application	*ibaPDA*
ibaNet-E participant	*ibaM-COM*, *ibaW-750*, ibaNet-E OEM devices
Data throughput	500 Mbit/s
Synchronization accuracy	typ. 1 ms

Network components such as switches, but also the utilization of the standard network can have an additional negative impact on transmission quality and typical synchronous sampling.

Measurement data acquisition with OEM devices via connectionless connection

An *ibaN-2E* card is used in the *ibaPDA* computer, which communicates with the connected devices via standard Ethernet components, e.g. a switch or OEM devices. The connectionless communication profile is used for this.



ibaNet protocol	ibaNet-E
Data path	MAC, IPv4
Ethernet	Standard Ethernet
Topology	Daisy chain, star; incl. switches
Application	*ibaPDA*
ibaNet-E participant	ibaNet-E OEM devices
Data throughput	900 Mbit/s, with 2 directly connected transmitters, MAC data path (transport protocol) 500 Mbit/s, other configurations

11 Technical data

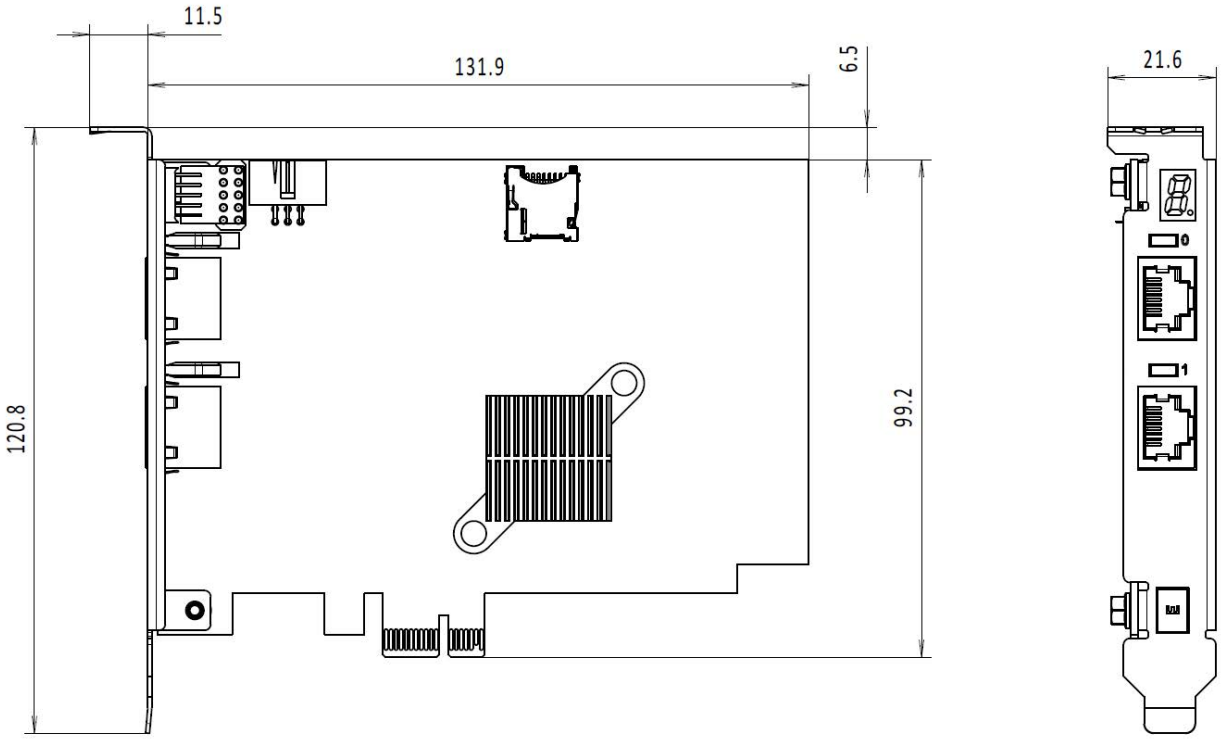
Short description	
Name	ibaN-2E
Description	PCI Express cards for ibaNet-E connections
Installation height	Standard
Order no.	11.114000
ibaNet interface	
Number	2; switched
Design	copper
ibaNet protocol	ibaNet-E / ibaNet-E HP
Data throughput per interface in the dedicated ibaNet-E network	
Requirements	
ibaNet-E participant	ibaM-COM; max. 10
Topology	daisy chain
Data path / transport protocol	MAC
Data throughput with ibaNet-E HP	750 Mbit/s
Synchronization accuracy	up to 1 µs
Data throughput per interface via standard Ethernet	
Requirements	
ibaNet-E participants	ibaM-COM, ibaW-750, ibaNet-E OEM devices
Topology[1)]	daisy chain, star; incl. switches
Data path / transport protocol	MAC, IPv4
Data throughput with ibaNet-E	typ. 500 Mbit/s
Synchronization accuracy	typ. 1 ms
Connection technology	2 RJ45 socket; 1GbE, Base-T
Cable length (P2P)	max. 100 m
Cable type	min. Cat. 6a S/FTP
ibaPDA computer	
Number of ibaN2-E cards	max. 4
Data throughput of one ibaN-2E card	1000 Mbit/s
Data throughput of all ibaN-2E cards	1600 Mbit/s

[1)] Network components such as switches, but also the utilization of the standard network, can have an additional negative impact on transmission quality and typical synchronous sampling.

Supply	
Power supply	via PCIe bus
Further interfaces, operating and indicating elements	
Indicators	LEDs for operation and errors; 7 segment display
Operating and environmental conditions	
Temperature range	
Operation	32 °F to 131 °F (0 °C to +55 °C)
Storage	-13 °F to 185 °F (-25 °C to +85 °C)
Mounting	
PCIe slot	lane x1 or higher
PCIe Gen	v2.x
Architecture	x64
Operating system	from Windows 10
Cooling	passive
Certifications / standards	CE, C-Tick, UKCA, FCC, KC
MTBF[2)] (+25 °C)	5,938,264 hours / 677 years
Dimensions (width x height x depth)	21.6 mm x 120.8 mm x 143.4 mm
Weight, incl. packaging	0.18 kg

[2)] MTBF (mean time between failure) according to Telcordia 4 SR332 (Reliability Prediction Procedure of Electronic Equipment; Issue Mar. 2016) and NPRD (Non-electronic Parts Reliability Data 2011)

11.1 Dimensions



Dimensions ibaN-2E, dimensions in mm

12 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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