ibaFOB-io-ExpressCard

ExpressCard with ibaNet FO connectors

Manual

Issue 1.2

Measurement and Automation Systems

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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 http://www.iba-ag.com.

Protection note

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 device is certified according to the European standards and directives. This device corresponds to the general safety and health requirements. Further international customary standards and directives have been observed.

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Issue	Date	Revision	Chapter	Author	Version HW / FW
1.2	06/22´/2012	ESD safety instruction	2	st	

Table of contents

1   About this manual

This manual describes the construction, the use and the operation of the devices ibaFOB-io-ExpressCard/54 and ibaFOB-io-ExpressCard/34. The function and handling of the cards are similar, they only differ in their dimensions. By way of an example this description is based on the ibaFOB-io-ExpressCard/54.

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   Designations

The following designations are used in this manual:

Action	Designations
Menu command	Menu „Logic diagram"
Call of menu command	„Step 1 – Step 2 – Step 3 – Step x" Example: Select menu „Logic diagram – Add – New logic diagram"
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!

⚠ 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.

Important note

Note if some special features must be observed, for example exceptions from the rule.

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   Safety instructions

> ⚠ **CAUTION**
>
> **Electrostatic discharge!**
>
> This board contains components which can be destroyed by electrostatic discharge **> 2 kV**.
>
> The standards for handling electrostatic sensitive devices (ESD) must be followed.

2.1   Designated use

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

❑   Automation of industrial systems

❑   Measurement data logging and analysis

❑   Applications of ibaSoftware products (ibaPDA, ibaLogic etc.)

The device may not be operated in mains supply circuits!

The card should only be used in connection with peripheral devices of iba brand or with selected components of other automation systems.

3   Scope of delivery

After unpacking check the completeness and intactness of the delivery.

The scope of delivery includes:

❑   ibaFOB-io-ExpressCard/54 or ibaFOB-io-ExpressCard/34

❑   Manual

↗ For more accessories not included in delivery, please see www.iba-ag-com.

4   System prerequisites

4.1   Hardware

IBM-PC-compatible notebook computer with following characteristics:

❑   Pentium IV/3 GHz or better

❑   512 MB RAM or more

❑   ExpressCard/54- or ExpressCard/34-slot

4.2   Software

❑   Microsoft Windows XP, Server 2003[*], Server 2008[*], Vista[*] or Windows 7[*] [*] 32-Bit version

❑   ibaPDA-V6.24.0 or higher

❑   ibaLogic-V4

5   Description

5.1   Properties

❑   ExpressCard with 2 fiber optic connections for laptop computers

❑   Fast data transfer between card and computer's memory by DMA technology (CPU load relieving)

❑   Support for all ibaNet communication protocols (2 Mbit/s, 3.3 Mbit/s, 5 Mbit/s, 32 Mbit/s and 32Mbit Flex)

❑   Up to 512 analog and 512 digital signals to be sent/received over the fiber optic link

❑   Sampling time between 10 µs and 2 ms

❑   Replacement for ibaCom-PCMCIA-F with FO-adapter ibaCom-FO-A

❑   Suitable for ExpressCard slots with 34 mm or 54 mm

❑   Plug and Play

5.2   Usage

The card is a member of the ibaFOB-D card family and should be used with mobile computers for measurement purposes. It can be used for connecting a notebook computer with iba field devices like ibaPADU analog-digital converter units, ibaNet750 devices, ibaLink system couplings and iba bus monitors.

The ibaFOB-io-ExpressCard with its integrated fiber optic adapter provides for higher data transmission rates (up to 32 Mbit/s) compared with the former ibaPCMCIA-F card and shows a performance like the ibaFOB-io-D card.

Considered this, a measurement with mobile computers can be of the same quality level like with stationary systems.

ibaPDA-V6, version 6.24 or higher is required for operation of this card.

5.3   Communication protocols

All current and former ibaNet communication protocols are supported. Thus, data from an old ibaPADU device (S/N < 1000) as well as from an ibaPADU-S-IT of the new generation can be processed by this card.

Furthermore, the ibaNet protocol 5 Mbit/s for fast data acquisition (25 kHz) over devices ibaPADU-8-ICP, ibaPADU-8-M or -16-M is supported.

The valid ibaNet protocol of the fiber optic input data stream is detected automatically by the card. The 32Mbit Flex protocol is supported with firmware version V2.00 (build 172 (C2)) or higher.

5.4   Fast data processing with reduced CPU load

Due to the DMA technology (DMA = Direct Memory Access) measured data are written directly into the computer's memory which is used by the software application for reading the data. It is a significant relief for the CPU load while data traffic is boosted.

5.5 iba field devices

Following, you'll find a listing of some iba field devices which can be connected to the ibaFOB-io-ExpressCard:

- ❑ ibaPADU-8, -16, -32
- ❑ ibaPADU-8-ICP, -8-M, -16-M
- ❑ ibaPADU-S-IT
- ❑ ibaDIG-40
- ❑ ibaBM-DPM-S, -S-64 (Profibus DP)
- ❑ ibaBM-eCAT
- ❑ ibaBM-SiLink
- ❑ ibaBM-SLM (SIMOLINK)
- ❑ ibaBM-DDCS (DDCS Drive Bus)
- ❑ ibaBM-COL-8i-o
- ❑ ibaBM-DIS-i-8o
- ❑ ibaBM-FOX-i-3o-D
- ❑ ibaNet750-BM
- ❑ ibaPACO-4
- ❑ ibaLink-SM-64-i-o
- ❑ ibaLink-SM-64-SD16
- ❑ ibaLink-SM-128V-i-2o
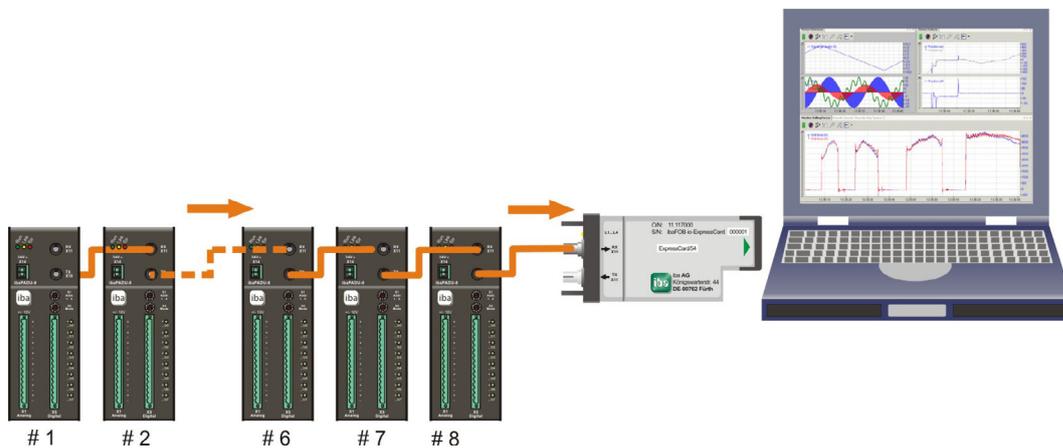
5.6   Modes of operation

The table below gives an overview of the available operation modes, link speed, number of signals, data sampling time and typical devices:

Link speed	Max. number of signals per FO link	Sampling time	Typical device
Single fiber input-only modes			
2.0 Mbit/s	32 INT + 32 Digital	≥1 ms	ibaPADU16/32 (old, S/N < 1000)
3.3 Mbit/s	64 INT + 64 Digital	≥1 ms	ibaPADU8/16/32
	64 REAL + 64 Digital	≥1 ms	ibaLink-SM-64-i-o
5.0 Mbit/s	8 INT + 8 Digital	≥50 µs	SIMATIC TDC LO5
32 Mbit/s	64 INT + 64 Digital	≥50 µs	SIMATIC TDC LO6
	128 INT + 128 Digital	≥100 µs	SIMATIC TDC LO6
	512 REAL + 512 Digital	≥800 µs	ABB AC 800PEC (1 ms)
	DPM-S mode	≥800 µs	ibaBM-DPM-S (1 ms)
	8 x (64 INT + 64 Digital)	≥1 ms	ibaBM-COL-8i-o (1 ms)
Bidirectional fiber modes (output link required)			
5 Mbit/s	8 INT + 8 Digital	≥40 µs	ibaPADU-8-M
			ibaPADU-8-ICP
32Mbit Flex	variable*	≥10 µs	ibaPADU-S-IT
Single fiber output-only modes (output link required)			
3.3 Mbit/s	64 REAL + 64 Digital	≥1 ms	ibaNet750BM
32 Mbit/s	Not supported by PC software yet		

*Example: transmission of 72 Byte at 25 µs sample time or 3147 Byte at 1 ms.

Beside the mere hardware parameters the usability of card and devices in combination with a certain operational mode depends also on the iba software application.

Not all of iba application software products support all modes or cards at the time.

The following table shows the supported combinations of modes of operation and software applications:

Transmission rate	3.3 Mbit/s		5 Mbit/s		32 Mbit/s		32Mbit Flex	
Sampling rate	1 Hz -1 kHz		0.5 kHz - 25 kHz		1.25 kHz - 20 kHz		0.5 - 100 kHz	
Number of signals per FO-link	64 A + 64 D		8A + 8D		512 A + 512 D (1 ms) 64 A + 64 D (50 µs)		max. 512 A + 512 D	
Application	**Input**	**Output**	**Input**	**Output**	**Input**	**Output**	**Input**	**Output**
ibaPDA-V6	■	□ 1)	■	-	■	-	■	■
ibaLogic-V4	■	■	-	-	■	■	-	-

■ = Ok, □ = possible, - = not supported

1) Alarm outputs (50 ms) via ibaFOB-io-ExpressCard

6   Device view

6.1   Front view
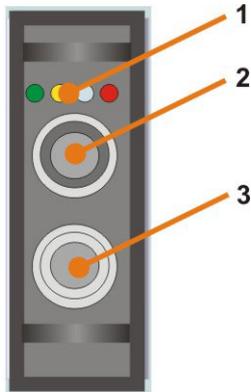
1   4 LEDs for link status

2   Fiber optic input

3   Fiber optic output

6.2   Link status indicators

LED	Status	Description
Run (green)	Flashing	Power is on and the channel is functioning properly
	OFF	Controller stopped (hardware failure)
Link Slow (yellow)	ON	Receiving telegrams on this channel with 2 Mbit/s, 3.3 Mbit/s or 5 Mbit/s, link correctly configured
	Flashing	Receiving telegrams on this channel with 2 Mbit/s, 3.3 Mbit/s or 5 Mbit/s, but link configured for another protocol
	OFF	No 2 Mbit/s, 3.3 Mbit/s or 5 Mbit/s telegrams detected or fiber not connected
Link Fast (white)	ON	Receiving telegrams on this channel with 32 Mbit/s, link correctly configured for 32 Mbit/s
	Flashing	Receiving telegrams on this channel with 32 Mbit/s, but link configured for another protocol
	OFF	No 32 Mbit/s telegrams detected or fiber not connected
Error (red)	ON	Watchdog alarm
	Flashing	Running the "Golden FPGA Flash Rescue mode"
	OFF	Normal state

7   Installing and removing the card

7.1   Inserting the card and installing the drivers

The card has plug and play ability and can be installed while the computer is running. For inserting or removing the card it is not necessary to shut down the computer.

Note

In order to take advantage of the plug and play function be sure that ibaPDA-V6, version 6.24 or higher, respectively ibaLogic-V4 has been installed before inserting the card. Otherwise, Windows will not recognize the card.

1.   Insert the card carefully into the ExpressCard slot until it latches into the internal connector. If the card is plugged in properly the green LED starts flashing and the red LED is on for a moment. The red LED will be permanently lit if the drivers are not installed or started by Windows.

If you use the card in a notebook computer for the first time a message "New hardware found" appears and the dialog for installation of new hardware opens.

2.   Follow the steps of the Windows' Add Hardware Wizard.
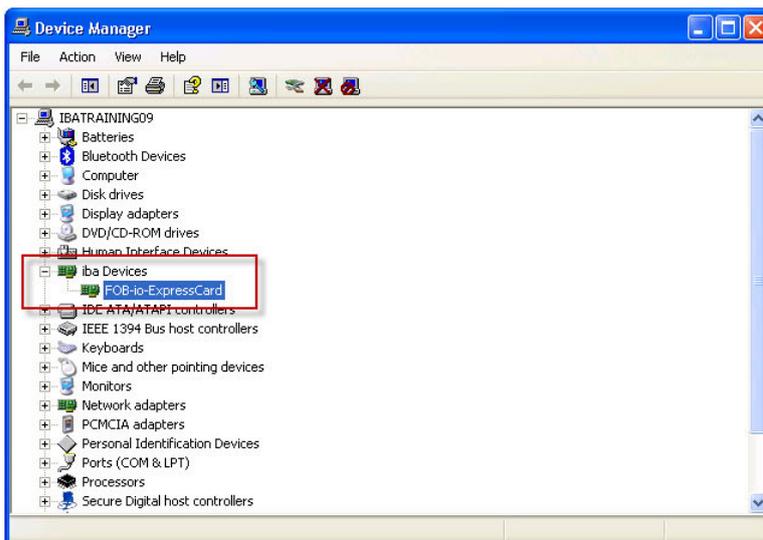
Note

In case the dialog should not open use the Windows "Add Hardware Wizard" in the control panel in order to look for new hardware

After the drivers have been installed successfully on the computer you will get a message.

3.   You can check the proper installation of the card in the Windows Device Manager.

Important note!

If the card is not listed then the driver software is not correctly installed. Please contact iba support desk.

If the card is listed in the Device Manager then the drivers have been installed successfully.

4.   Connect the required fiber optic cables with the card.

7.2   Removing the card

The card can be unplugged while the computer is running.

1.   Disconnect the fiber optic cables.

2.   Unlatch the card and pull it out of the slot carefully.

8   Configuration in ibaPDA-V6

8.1   Procedure

After you have installed the card and drivers you can configure the card in ibaPDA-V6.

1.   Start the ibaPDA-V6 client and select the local ibaPDA server in case this doesn't happen automatically.

2.   Select menu "Configure – I/O Manager".

3.   Select the ibaFOB-io-ExpressCard in the tree on the left side.
      In the right pane of the dialog you can see a simplified representation of the card.

8.2   Settings

8.2.1   Tab „Configuration"
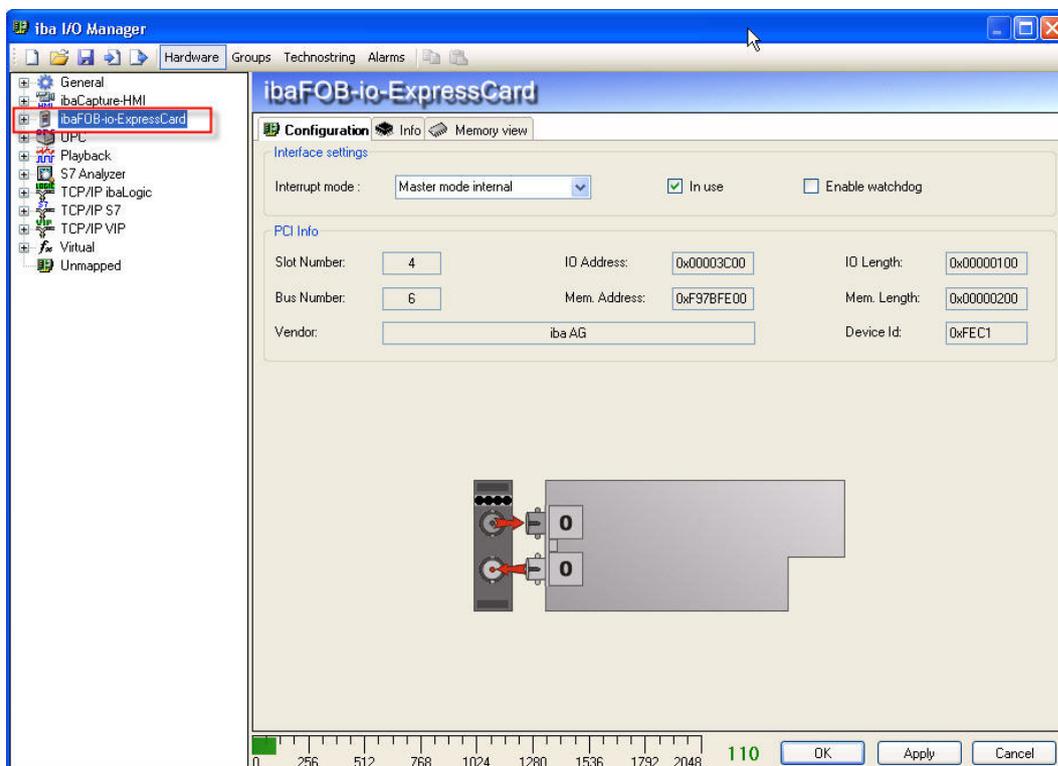
Select the interrupt mode from the drop-down list. For a notebook computer with one ibaFOB-io-ExpressCard it should be typically "Master mode internal".
Enable the "In use" option if you want to use this card by ibaPDA-V6.
The board watchdog can also be enabled for the purpose of monitoring the proper operation of ibaPDA-V6 by another system. If the watchdog is enabled then the board will generate an alarm telegram when the acquisition is not running for more than 2 seconds. The alarm telegram can only be used by the FO output channel (I/O manager: "Alarms").
In case of an alarm, all output values will be set to 0 (zero) in the alarm telegram.
The alarm is also activated during the reset of the computer. When the alarm occurs then the red LED will be lit.

8.2.2   Tab „Info"
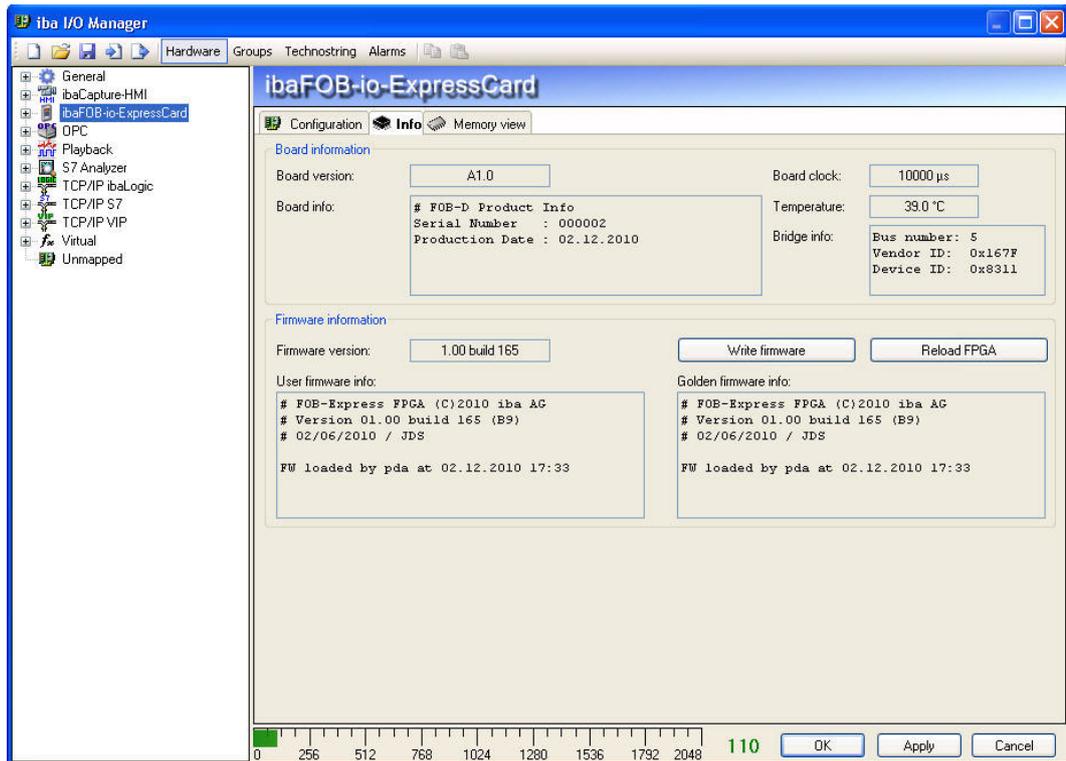
On the "Info" tab you can see information about the board and the loaded firmware. Functions for service and support, such as reloading the FPGA and updating the firmware are available on this tab.
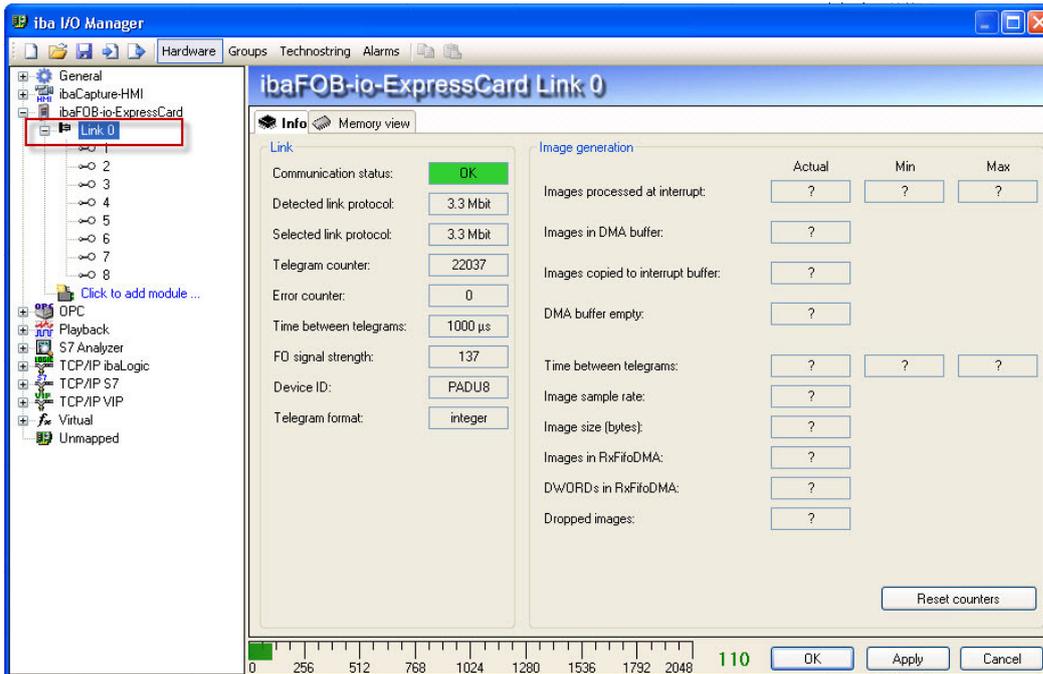
Important note

A firmware update should only be performed after consulting the iba service and support department. In case iba sent a firmware file it should be stored in a dedicated directory.

By means of the "Fob-D firmware loader dialog" you will be able to select and load the correct file.

8.2.3 Link 0 "Info" tab

When you click on a link in the tree view then you get information about this link. On the "Info" tab the information on the left describes the fiber optic (FO) communication. The displayed information will depend on the current protocol on the FO link.

"Link" area

❑ **Communication status**
OK when the FO communication is working well. This means that the telegrams that are being received correspond with the mode that is configured on the link. The link mode is determined by the module that is attached to the link, e.g. if an ibaPADU-8 module is configured then the link will be put in 3.3 Mbit/s mode. If an ibaPADU-8-ICP module is configured then the link will be set in 5.0 Mbit/s mode.

❑ **Detected link protocol**
This is the link protocol that the board detects. This can be 2.0 Mbit/s, 3.3 Mbit/s, 5.0 Mbit/s, 32 Mbit/s or "?" (No device connected).

❑ **Selected link protocol**
This is the link protocol that the link is configured in. It is determined by the module that is attached to the link.

❑ **Telegram counter**
Counter of correctly received telegrams

❑ **Error counter**
Counter of received telegrams that have errors (e.g. incorrect checksum)
If this counter is changing then it means the FO communication is not working correctly.

❑ **Time between telegrams**
The time between the last 2 correctly received telegrams.

Additional information for 3.3 Mbit/s and 2.0 Mbit/s

If the link is running in 3.3 Mbit/s mode or 2.0 Mbit/s mode you'll find further items:

❑ **FO signal strength**
This is the difference between the maximum value and the minimum value received from the FO unit. This can be maximum 255. The higher this value is the stronger the FO input signal is.

❑ **Device ID**
This is the ID of the last device in the FO chain connected to this link.

❑ **Telegram format**
This is the format of the analog data that is transferred in the telegram. The possible values are integer, real and S5 real.

Additional information for 5.0 Mbit/s

If the link is running in 5.0 Mbit/s mode you'll find even more information:

❑ **Device firmware date**
The firmware date of the connected device.

❑ **Gain and filter table**
The gains and filters that are configured in the device. This only applies to the ibaPADU-8-ICP device.

Additional information for 32Mbit Flex

❑ **Mode**
Status of the connection mode
Ring: one or more devices (cascade) are bidirectionally connected and the FO ring is closed.
Open chain: Only the fiber optic input is connected to a device. The output is not connected or the FO ring is interrupted.

❑ **Roundtrip delay**
Telegram cycle in the closed FO ring. The time depends on the number of the connected devices in the ring (approx. 2 µs per device).

❑ **Frame time**
Fixed cycle time the data frames are being sent. When the ring is closed, the frame time is equal to the time between two telegrams.

 "Image generation" area

The information on the right side of the dialog describes the image generation. An image is a collection of bytes that the board writes into the PC system memory via DMA. This image contains all the data of the measured signals on that link.

Here is a short description of the image generation information:

❑ **Images processed at interrupt**
These counters show how many images where available in the DMA buffer when the last interrupt fired. This value should normally correspond with the interrupt time divided by the image sampling rate.

❑ **Images in DMA buffer**
This is the number of images that are in the DMA buffer. This number should re-

main constant. If this number starts increasing then something is wrong. This can happen if e.g. an interrupt is missed.

❑ **Images copied to interrupt buffer**
This counter shows how many images have been retrieved from the DMA buffer and have been processed by ibaPDA. This counter should be constantly increasing.

❑ **DMA buffer empty**
This counter increments each time the DMA buffer is empty when the interrupt fires. The driver will use the value 0 (zero) for all signals that are on this link when this happens. This can happen if the FO link is disconnected.

❑ **Time between telegrams**
The time between the last 2 correctly received telegrams
This is the same as the time in the FO communication information but the driver maintains the minimum and maximum values. There shouldn't be much difference between the minimum and maximum values.

❑ **Image sample rate**
The rate at which the board writes images to the DMA buffer. This should be faster than or equal to the fastest time base of the modules connected to this link.

❑ **Image size**
This is the size of the image in bytes. If you multiply the image size with the image sample rate then you know how many bytes per second are transferred by this link over the PCI bus.

❑ **Images in RxFifoDMA**
This is the number of images that are in the board's DMA fifo waiting to be transferred over the PCI bus. Normally this value should be 0 (zero) or 1. If this value rises then this means that the PCI bus is overloaded.

❑ **DWORDs in RxFifoDMA**
This is the same counter as the images in RxFifoDMA. The only difference is that this is now expressed in DWORDs.

❑ **Dropped images**
This counter increments when the board's DMA fifo is full and an additional image arrives. If this happens then something is seriously wrong. This means that the board is unable to transfer images over the PCI bus.

❑ **DMA buffer size**
 DMA buffer size for this interface.

9   Technical data

Short description		
Name	ibaFOB-io-ExpressCard/54	ibaFOB-io-ExpressCard/34
Order number	11.117000	11.117001
Description	ExpressCard with 2 fiber optic connectors	
Connections		
Number	2 (1 x input RX, 1 x output TX)	
Fiber optic cable	62.5/125 µm	
Fiber optic connector type	ST plug	
Data transmission rate	Support for all ibaNet communication protocols: 2 Mbit/s, 3.3 Mbit/s, 5 Mbit/s, 32 Mbit/s, 32Mbit Flex	
Power supply and indicators		
Power supply	3.3 V (ExpressCard slot)	
Bus clock	2.5 Gbit/s (PCI Express 1x)	
Power consumption	Typ. 1.5 W	
Indicators	4 LED (card status)	
Operating and environmental conditions		
Cooling	By notebook computer	
Installation	ExpressCard/54 slot of the notebook computer	ExpressCard/54 slot or ExpressCard/34 slot of the notebook computer
Operating temperature	32 °F to 122 °F (0 °C to 50 °C)	
Storage temperature	13 °F to 158 °F (-25 °C to 70 °C)	
Transport temperature	13 °F to 158 °F (-25 °C to 70 °C)	
Dimensions and weight		
Dimensions (depth x width x height)	126 mm x 54 mm x 5 mm/20 mm	126 mm x 34 mm x 5 mm/20 mm
Weight (incl. box and documentation)	Approx. 200 g	

10 Support and contact

Support

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E-Mail: support@iba-ag.com

Note

If you require support, specify the serial number (iba-S/N) of the product.

Contact

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