

ibaF0B-PlusControl

Interface Card for PLUSCONTROL Systems

Manual

Issue 1.2

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

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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.

Version	Date	Revision	Chapter	Author	Version HW/FW
1.2	12-2020	General card settings	7.1		

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1 About this manual

This manual describes in detail the configuration and use of the product ibaFOB-PlusControl.

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	Notation
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 Symbols used

If safety instructions or other information 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 iba 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 indicates special requirements or actions to be observed.



Important information

Information that a special indication has to be observed, e.g. exceptions from the general rule.



Tip

Tip or example which serves as helpful information or a trick to facilitate the work.



Other documentation

Reference to supplementary documentation or further literature.

2 Scope of delivery

The following components are included in delivery:

- ibaFOB-PlusControl card
- Synchronization cable (sync cable)
- Manual

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

3 Safety information

Please consider the following safety advises:

⚠ DANGER

To prevent electrical shock during installation or uninstallation of the device disconnect the power supply from the computer before opening!

**⚠ CAUTION**

This card contains components which can be destroyed by electrostatic discharge. Prior to touching any electronics card, your body must be electrically discharged.

4 System requirements

4.1 Hardware

PC with the following minimum configuration (depending on application):

- Pentium IV/3 GHz or higher
- At least one free PCIe slot (PCIe 1.0-x1-compatible slot)
- 512 MB RAM or higher
- Free disk space > 10 GB

➤ For more information about iba PC, please see www.iba-ag.com.

4.2 Software

- ibaPDA version v7.2.0 or higher

5 Product properties

5.1 Application

The ibaFOB-PlusControl card couples the iba process data acquisition system ibaPDA with Siemens PLUSCONTROL systems. To achieve this, the ibaFOB-PlusControl card must be connected to a PLUSCONTROL CP.

The connection supports a data transmission rate of 1 Gbit/s. Up to 400 analog or digital signals can be transmitted.

The parameters are completely configured in the software. Jumper settings are not necessary.

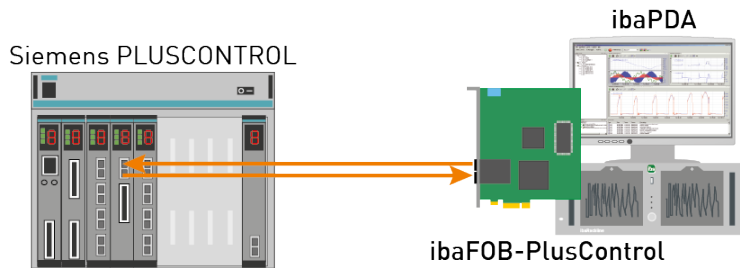


Figure 1: Coupling to a Siemens PLUSCONTROL system

5.2 Characteristics

The card has the following characteristics:

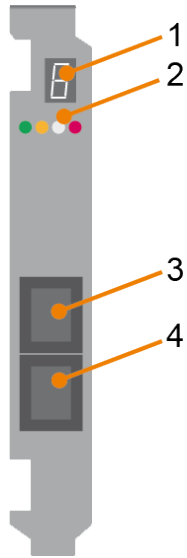
- PCI Express card for 1.0-x1 compatible slot
- Firmware update without dismounting the card
- Bidirectional fiber optic link with SC technology
- Transmission rate up to 1 Gbit/s
- Absolutely noise free acquisition of process data
- Display for card ID, processor and link status via 7-segment display and LEDs
- Up to 4 PCIe cards per PC (depending on performance and workload, especially when data transmission rate is high, the number of cards per PC should be limited to 3 or 2)
- Plug and play installation

5.3 Operational modes

The ibaFOB-PlusControl card in combination with ibaPDA is suitable for measurement data acquisition with free operand/symbol selection.

The data to be measured is requested online by ibaPDA. For this purpose the symbolic names and addresses of all available variables are read from the PLUSCONTROL CP and stored internally in ibaPDA when the connection has been established for the first time. This address book serves as base to select the measuring data using the address book browser.

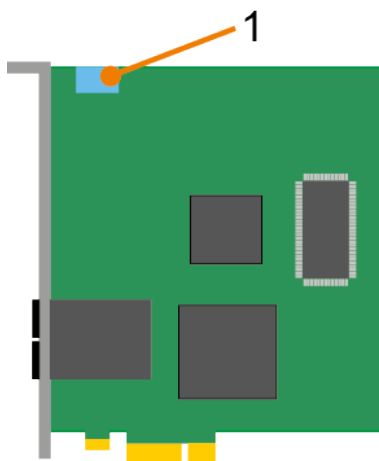
5.4 Front view



- 1 7-segment display
- 2 Device status display
- 3 FO connector (SC technology)
- 4 FO connector (SC technology)

Figure 2: Front view

5.5 Plug and socket connections



- 1 Synchronization (Sync-IRQ-connector)

Figure 3: Plug and socket connections

5.6 Indicators

Device status LEDs

LEDs indicate the operational state of the card and fiber optic channels. On power on all LEDs are lit for a few seconds to prove their proper function.

LED	Status	Indication
Green	Off	Card is dead or defect
	Blinking	Normal operation
Yellow	Off	No connection, fiber optics not connected or PLUSCONTROL system switched off
	Blinking	Connection to PLUSCONTROL system is OK, but system not ready
	On	Connection to PLUSCONTROL system is OK, system ready
White	Off	No data transfer
	On	Data transfer in progress
Red	Off	Normal state
	Blinking	Running in FPGA factory rescue mode
	On	Hardware failure (FPGA not configured)

7-segment display



The 7-segment display shows the following information:

- Horizontal bar: After switching on, until the initialization by ibaPDA is finished.
- Card ID (ranging from 0 to 3): After card was initialized
- The decimal point is ON: Card is configured as an internal interrupt master
- The decimal point is OFF: Card is configured as an interrupt slave
- The decimal point is blinking: Card is configured as an external interrupt master



Note

It is not allowed to configure the ibaFOB-PlusControl as **external** interrupt master.

5.7 Fiber optical interface

The ibaFOB-PlusControl card provides 1 duplex SC type jack with optical transmitter and optical receiver.

6 Mounting and dismantling

6.1 Safety information

The cards may be used in every PCIe 1.0-x1 compatible slot.



Electric shock!

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



Electrostatic discharge!

This card contains components which can be destroyed by electrostatic discharge. Before touching the card make sure that your body is electrically discharged or work in a designated ESD protected area!

The standards for handling electrostatic sensitive devices (ESD) must be followed.

6.2 Mounting

1. Shut down the PC.
2. Unplug the mains power line and open the PC so you can reach the PCIe slots.
3. Take the card carefully out of the package. Use a grounding cable or discharge any electrostatic charge before taking the card.
No wiring or jumpering is necessary.
4. Grab the card at the front plate and the rear upper corner. Do not touch the contacts.
5. Plug in the card carefully into a free PCIe slot and fix the card to the housing of the PC.
6. If more than one iba card is installed connect all cards with one another by the flat ribbon cable (sync cable).
7. Close the PC.
8. Plug in the power line and start the PC.

6.3 Dismounting

1. Shut down the PC.
2. Unplug the mains power line and open the PC so you can reach the card.
3. Disconnect all external connections from the card.
4. Release the fixing screw.
5. Unplug the card carefully out of the slot. Store the card in an appropriate container.

7 Configuration in ibaPDA

If the card has been installed correctly it should be available in the I/O manager's signal tree as data interface.

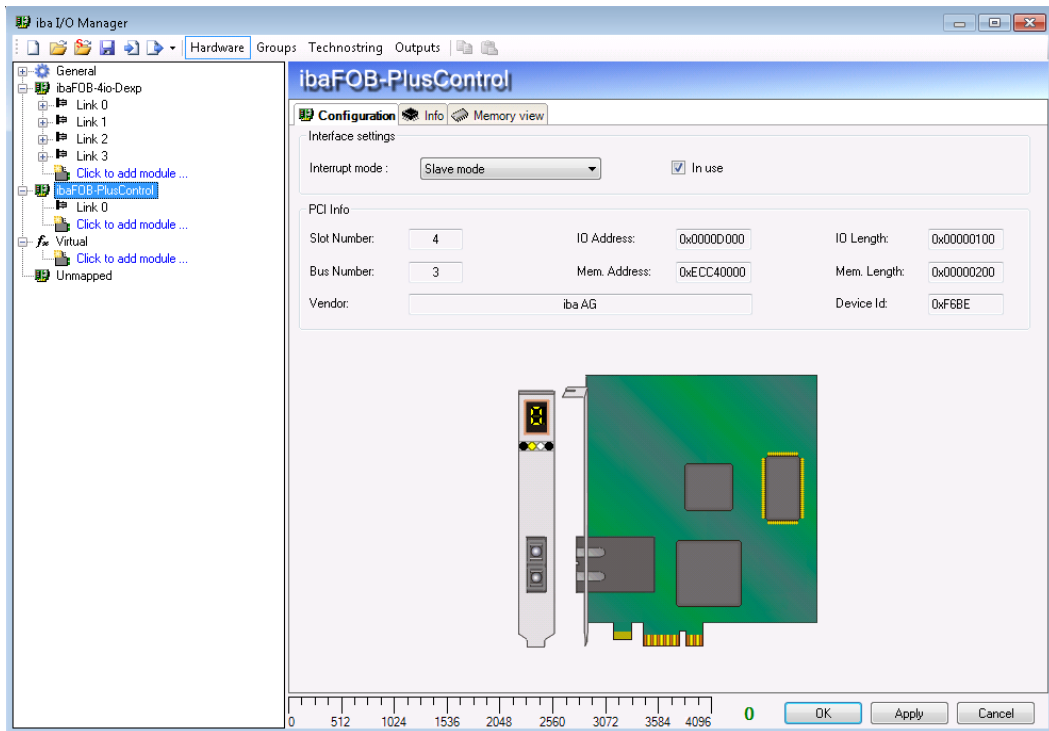


Figure 4: Card representation in ibaPDA

7.1 General card settings

In order to configure general settings of the ibaFOB-PlusControl card, select the "General" branch in the interface tree and choose the "Boards" tab.

In the section "ibaFOB-PlusControl", you can enable the following options:

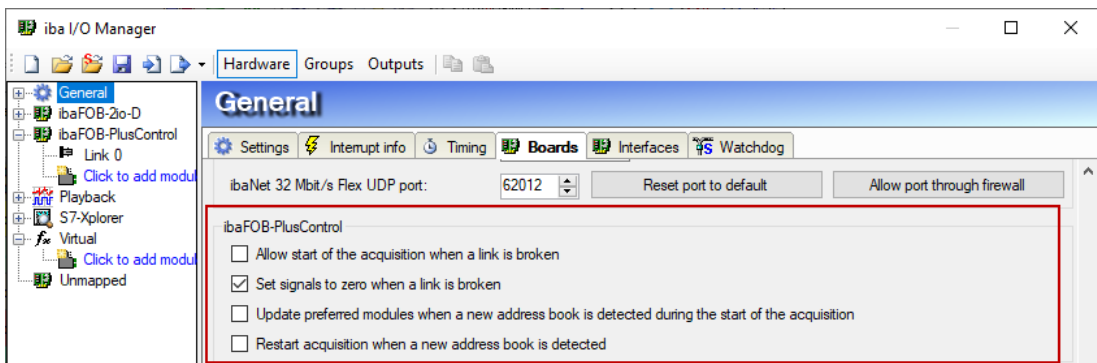


Figure 5: Settings in the "Boards" tab in the "General" branch

Allow start of the acquisition when a link is broken

If one or more connections to the PLUSCONTROL system cannot be established at the start of the acquisition, the acquisition will start anyway.

Set signals to zero when a link is broken

If you enable this option, all measurement signals of the connection will be set to zero if the link is broken. Otherwise the signal values would display the last value at the time the connection was broken.

Update preferred modules when a new address book is detected during the start of the acquisition

When establishing a connection with a PLUSCONTROL system, the address book is read and evaluated. "Preferred modules" are automatically created for "preferred signals". If there is a new address book, then it is usually possible to choose how to proceed with the "preferred modules" (update, replace or leave unchanged).

If you enable this option, then the existing "preferred modules" will be updated with the "preferred modules" from the new address book. Signal IDs of the already existing "preferred signals" will be preserved.

Restart acquisition when a new address book is detected

If this option is enabled, ibaPDA checks regularly every 10 s whether the address book has changed.

If a new address book is detected, then the acquisition is stopped and restarted.

When the acquisition is restarted, the address book is read. If the option above is enabled, the preferred modules are also updated automatically.

7.2 Card configuration

If you click on the interface icon 3 tabs appear on the right side of the dialog displaying the card's properties. Select the „Configuration“ tab.

The interrupt mode is automatically generated by ibaPDA: as soon as other iba-cards are plugged in, „slave mode“ is activated. In case no other card types are used, but only several ibaFOB-PlusControl cards, it is possible to specify which card is set to „interrupt master internal“. As a result, this card will generate the interrupt for the other cards. The interrupt will be transmitted to these iba cards via the synchronization cable (sync cable is included in delivery).

Check the option “In use” if the card is being used by ibaPDA.

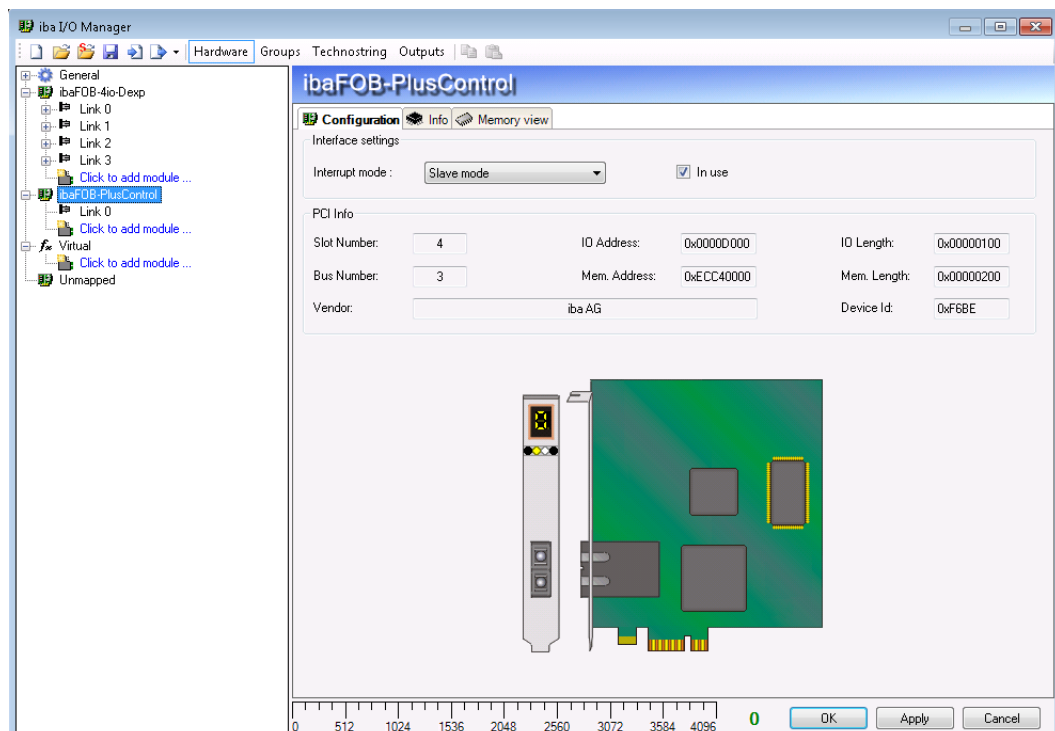


Figure 6: Card representation in ibaPDA

➤ Further data and tabs are described in chapter 8.1 „Card diagnostics“.

7.3 Link configuration

If the card is displayed correctly in the I/O manager, mark the “Link” node under the interface. 3 tabs appear on the right side displaying connection information.

➤ For description of diagnostics information and other tabs please refer to chapter 8.2 “Connection diagnostics”.

The connection to a PLUSCONTROL system is being established by clicking the <Test connection> button in the “Connection” tab.

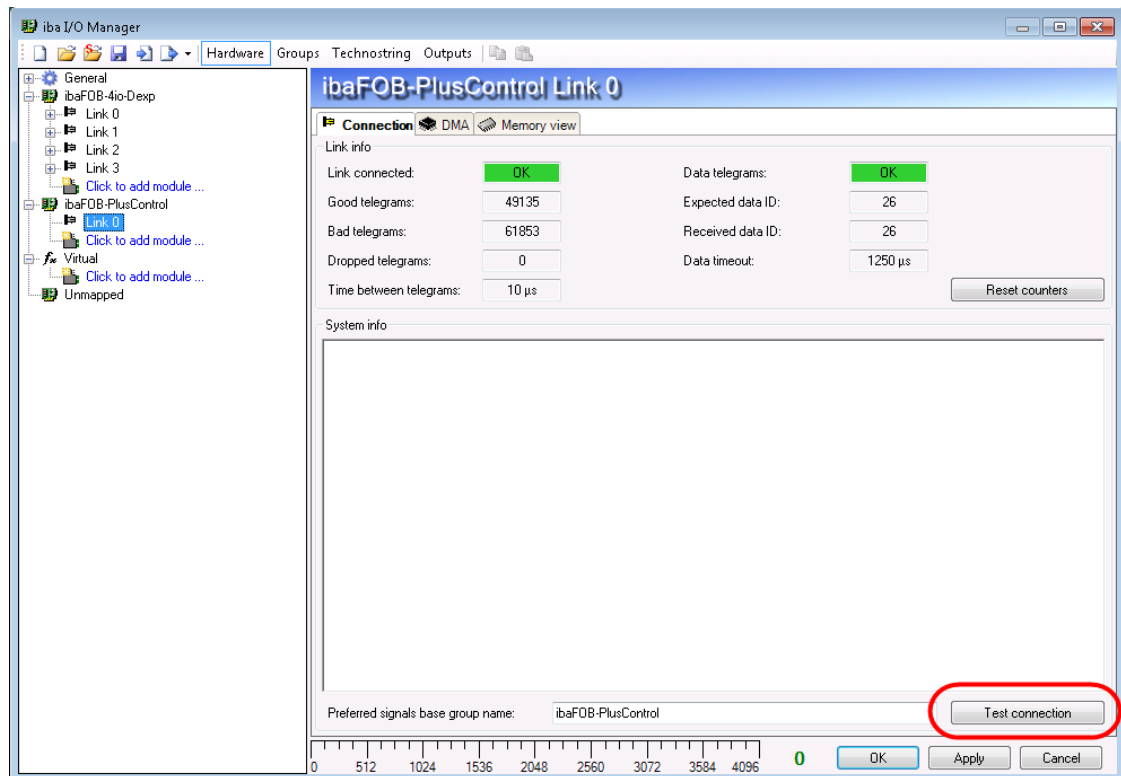
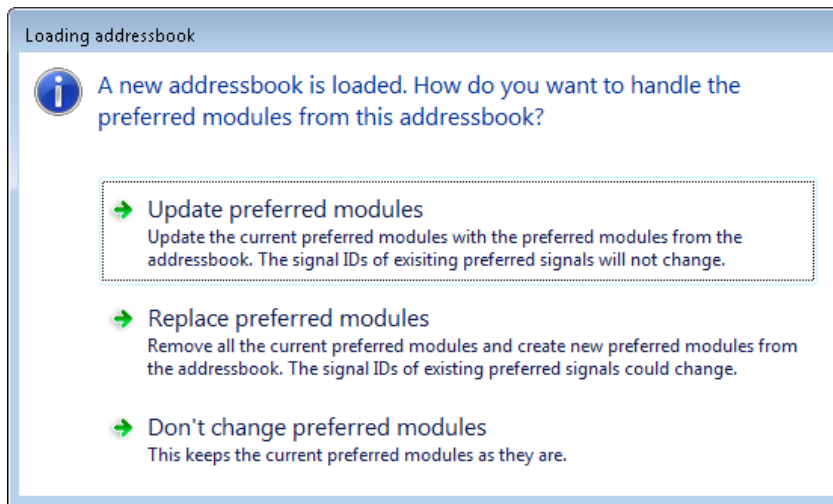


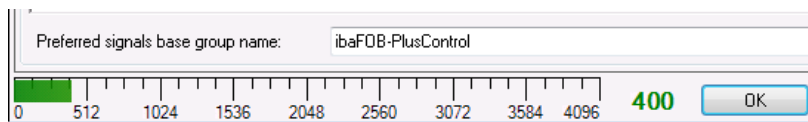
Figure 7: ibaFOB-PlusControl, “Connection” tab

If the connection to the PLUSCONTROL system has been successfully established, the following actions are performed:

1. The system information of the connected PLUSCONTROL CP is read and displayed in the “Connection” tab.
2. The address book is read and evaluated:
The address book contains all available variables. Available signal types are standard signals and preferred signals, see chapter 7.4 Configuration of „preferred modules“.
3. “Preferred modules” are automatically created in ibaPDA for the preferred signals. When the address book has been updated, a dialog appears providing 3 options how to proceed with preferred signals:



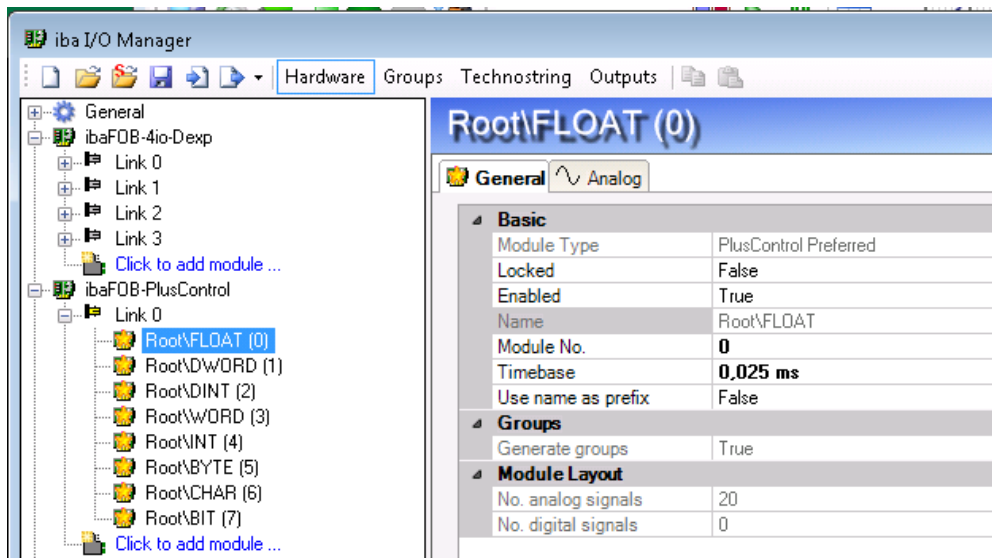
- Update preferred modules:**
The preferred modules are updated with the preferred modules from the address book. The signal IDs of already existing preferred signals remain unchanged.
 - Replace preferred modules:**
The current preferred modules are removed and replaced by new preferred modules from the address book. The signal IDs of existing preferred signals may change.
 - Don't change preferred modules:**
The current preferred modules remain unchanged.
4. Groups are automatically created for preferred signals in the I/O manager. You can enter a group name in the text box at the bottom of the tab. Default name is "ibaFOB-PlusControl".



➤ See also chapter 7.6 "Groups".

7.4 Configuration of „preferred modules“

General tab



Figuer 8: Preferred module, „General“ tab

The preferred modules contain the preferred signals assigned in the address book.

Only the following properties of a preferred module can be changed:

Locked

A locked module can only be modified by authorized users.

Enabled

The data acquisition for this module is either enabled (TRUE) or disabled (FALSE).

Module No.

Logic module number for clearly referencing of signals e. g. in expressions in virtual modules or ibaAnalyzer. The module number is assigned automatically by ibaPDA in ascending order, but may be changed by the user.

Timebase

Timebase for data acquisition, cycles down to 10 μ s are possible (depending on the number of signals). Default setting is 25 μ s.

Use name as prefix

IF TRUE is selected, the module name is put as prefix in front of the signal name of this module.

Analog tab

Root\FLOAT (0)							
General		Analog					
Name	Unit	Gain	Offset	Symbol	Active	Actual	
0	FLOAT_1	float	1	0	Root\FLOAT\FLOAT_1	<input checked="" type="checkbox"/>	79358,3 float
1	FLOAT_2	float	1	0	Root\FLOAT\FLOAT_2	<input checked="" type="checkbox"/>	80374,1 float
2	FLOAT_3	float	1	0	Root\FLOAT\FLOAT_3	<input checked="" type="checkbox"/>	81389,9 float
3	FLOAT_4	float	1	0	Root\FLOAT\FLOAT_4	<input checked="" type="checkbox"/>	82404,6 float
4	FLOAT_5	float	1	0	Root\FLOAT\FLOAT_5	<input checked="" type="checkbox"/>	83419,2 float
5	FLOAT_6	float	1	0	Root\FLOAT\FLOAT_6	<input checked="" type="checkbox"/>	84433,8 float

Figure 9: Preferred module, „Analog“ tab

Name

Here, you can enter a signal name and additionally two comments, if you click on the icon on the signal name field.

Unit

Here, you can enter a physical unit.

Gain / Offset

Gradient (Gain) and y axis intercept (Offset) of a linear equation. You can convert a standardized value transferred without a unit into a physical value.

Symbol

Name of the displayed value provided by the address book. This field cannot be changed.

Active

Only enabled signals are acquired.

Actual

Display of the currently acquired value (only available when acquisition is running).

Digital tab

Root\BIT (7)				
General		Digital		
Name	Symbol	Active	Actual	
0	BIT_0	<input checked="" type="checkbox"/>	1	
1	BIT_1	<input checked="" type="checkbox"/>	1	
2	BIT_2	<input checked="" type="checkbox"/>	1	
3	BIT_3	<input checked="" type="checkbox"/>	1	
4	BIT_4	<input checked="" type="checkbox"/>	0	
5	BIT_5	<input checked="" type="checkbox"/>	0	
6	BIT_6	<input checked="" type="checkbox"/>	0	

Figure 10: Preferred module, „Digital“ tab

Name

Here, you can enter a signal name and additionally two comments, if you click on the icon on the signal name field.

Symbol

Name of the displayed value provided by the address book. This field cannot be changed.

Active

Only enabled signals are acquired.

□ Actual

Display of the currently acquired value (only available when acquisition is running).

7.5 Configuration of standard modules

Standard modules may contain preferred symbols and standard symbols.

Add module

In order to add manually a standard module right-click the link of the ibaFOB-PlusControl card and select “PlusControl Standard”.

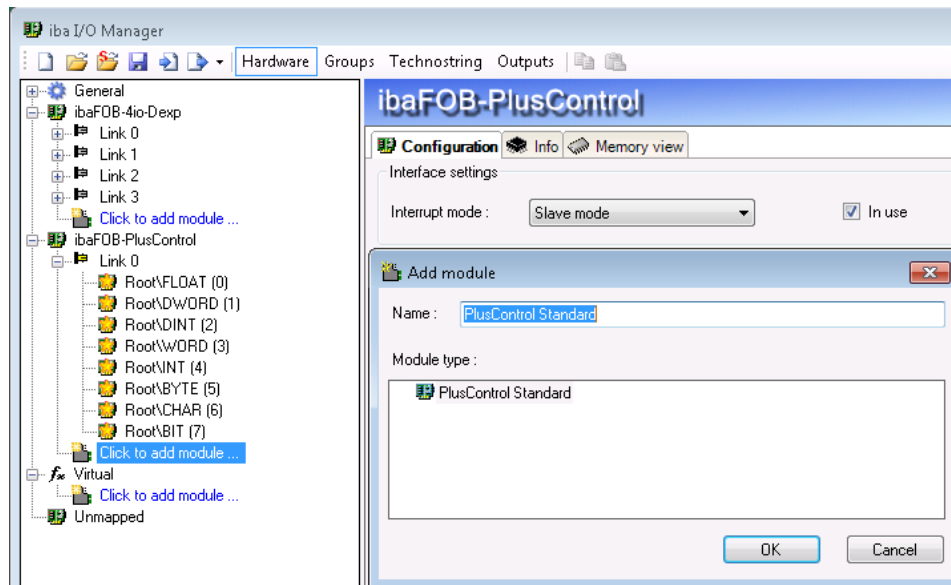


Figure 11: Add standard module

General tab

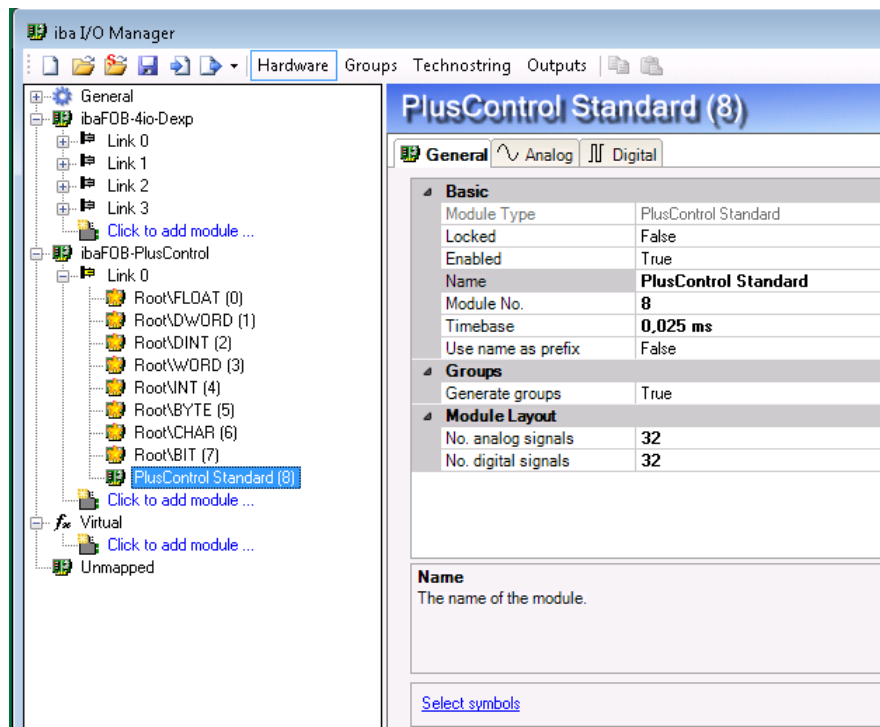


Figure 12: Standard module, „General“ tab

Basic

Module type

Display of the module type (read only)

Locked

A locked module can only be modified by authorized users.

Enabled

The data acquisition for this module is either enabled (TRUE) or disabled (FALSE).

Name

Here, you can enter a module name.

Module No.

Logic module number for clearly referencing of signals e. g. in expressions in virtual modules or ibaAnalyzer. The module number is assigned automatically by ibaPDA in ascending order, but may be changed by the user.

Timebase

Timebase for data acquisition, cycles down to 10 μ s are possible (depending on the number of signals). Default setting is 25 μ s.

Use name as prefix

If TRUE is selected, the module name is placed in front of the signal name as prefix.

Groups

Generate groups

If TRUE is selected, the symbols are entered in the I/O manager groups according to the structure in the address book which has already been generated for the preferred signals.

➤ See also chapter 7.6 "Groups".

Module Layout

No. Analog signals

Defining the number of analog signals in this module.

No. Digital signals

Defining the number of digital signals in this module.



Note

When clicking in a field the corresponding description will be displayed in the text field below the input fields. For a detailed parameter description please refer to the ibaPDA manual.

Select symbols

Measurement values for this standard module can be selected using the PlusControl symbol browser. A click on the blue link "Select symbols" opens the symbol browser.

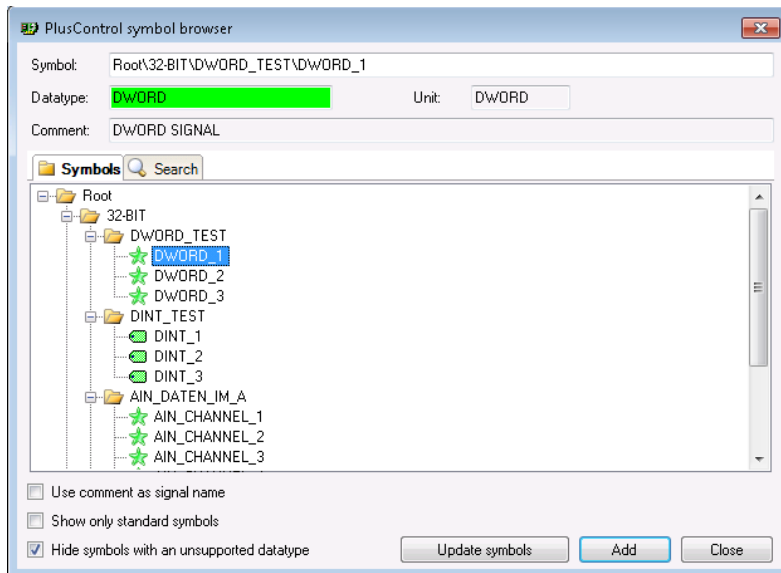




Figure 13: PlusControl symbol browser

Preferred symbols are indicated by a star symbol , standard symbols by a flag .

In the symbol browser, you have the following options:

Use comment as signal name

The signal comment from the symbol table is used as signal name in the standard module.

Show only standard symbols

Filter function for standard symbols

Hide symbols with unsupported datatype

A symbol whose datatype is not supported, will not be displayed.

In order to add symbols to the recording, mark the desired symbols and click the <Add> button. The marked symbols will be inserted in the corresponding “Analog” or “Digital” tab.




Tip

While pressing the keys <Shift> or <Strg> several symbols can be marked at once and then be added together.

Analog tab

Identical to the “Analog” tab of the preferred modules.

It is also possible to open the symbol browser with a click on the  button and directly enter the variables.

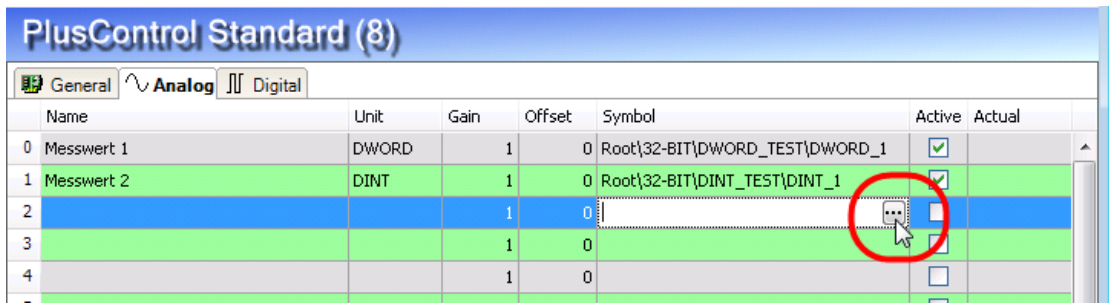



Figure 14: Standard module, Analog tab

Digital tab

Identical to the “Digital” tab of the preferred modules.

It is also possible to open the symbol browser with a click on the  button and directly enter the variables.

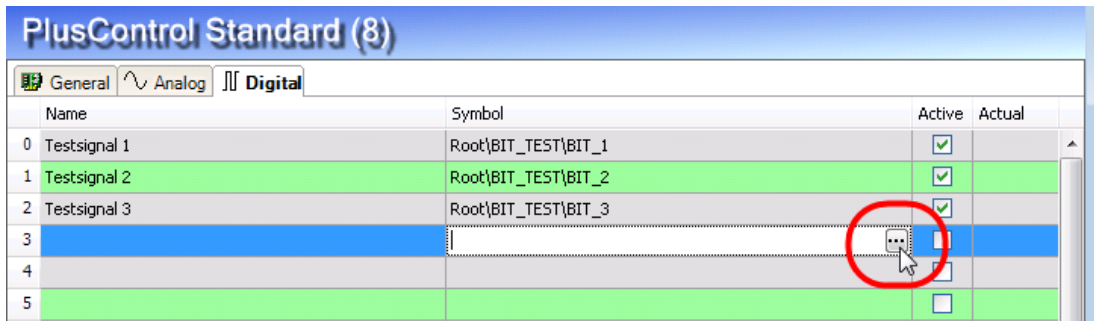


Figure 15: Standard module, Digital tab

7.6 Groups

A group is generated automatically for each ibaFOB-PlusControl card. The group names are preset with the interface name, e. g. "ibaFOB-PlusControl". The names, however, may be changed, see also chapter 7.3 "Link configuration".

The signals from the preferred modules are entered automatically in the groups. The signals from the standard groups are entered in the groups only when the setting "Generate groups" is set to TRUE.

The grouped signals are displayed in a tree structure according to the address book. The generated groups cannot be deleted and are indicated by a key symbol.

Signals which are selected several times will be entered in the group only once.

Grouped symbols

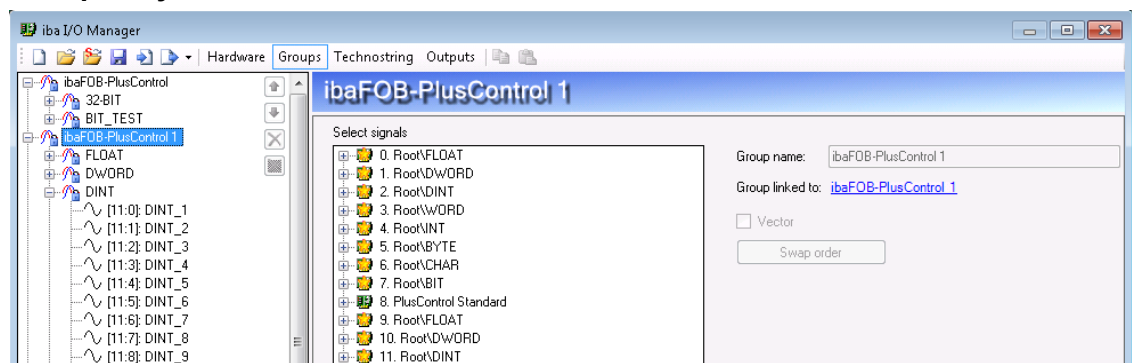


Figure 16: Display of grouped symbols

8 Diagnostics

The essential tools for diagnostics are integrated in the I/O manager of ibaPDA.

8.1 Card diagnostics

If you click on the ibaFOB-PlusControl interface in the tree structure of the I/O manager, 3 tabs appear in the right part of the dialog window showing the card properties.

Configuration tab

In addition to the image of the card the interrupt mode, addresses and memory regions in the PCIe bus are displayed.

The graphic depiction of the card is dynamic, i.e. the 7-segment display with the card number and the LEDs for the connection status reflect the same status that can be seen on the card itself (see chapter 7.2 "Card configuration").

➤ The displays and their meanings are summarized in chapter 5.6 "Indicators".

Info tab

The screenshot shows the 'Info' tab of the ibaFOB-PlusControl interface. It is divided into two main sections: 'Board information' and 'Firmware information'.

Board information:

- Board version: A0.0
- Board clock: 25 μs
- Board info:


```
# FOB-PlusControl Product Info
Serial Number : 000025
Production Date : 11.03.2016
```
- Bridge info:


```
Bus-Number: 2
Hersteller: 0x167F
Karten-ID: 0x8311
```

Firmware information:

- Firmware version: 1.00 build 8
- User firmware info:


```
# ibaFOB-PlusControl FPGA (C)2015 iba AG
# Version 01.00 build 8 (A0)
# 27/08/2015 / JDS
FW loaded by dkoop at 21.06.2016 12:09
```
- Golden firmware info:


```
# ibaFOB-PlusControl FPGA (C)2015 iba AG
# Version 01.00 build 8 (A0)
# 27/08/2015 / JDS
FW loaded by IBA AG at 11.03.2016 10:04
```

Buttons for 'Write firmware' and 'Reload FPGA' are visible next to the firmware version field.

Figure 17: Card and firmware information

Here you will find information about the card and the current firmware. Service and support features are also integrated, e.g. the reload of the FPGA and the firmware update.



Important note

An update of the firmware should only be executed after consulting the service and support department of iba AG. The respective file can be selected and loaded via the "Write firmware" dialog.

Memory view tab

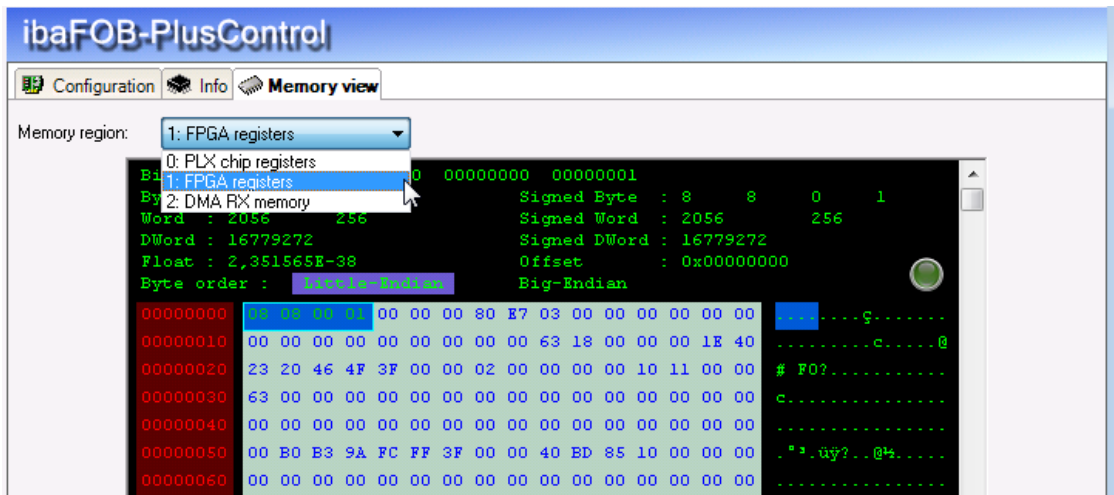


Figure 18: Memory view

The memory view can be used for diagnostics of internal register and memory ranges.

8.2 Connection diagnostics

Connection tab

The „Connection“ tab shows information about the connection status and the connected system.

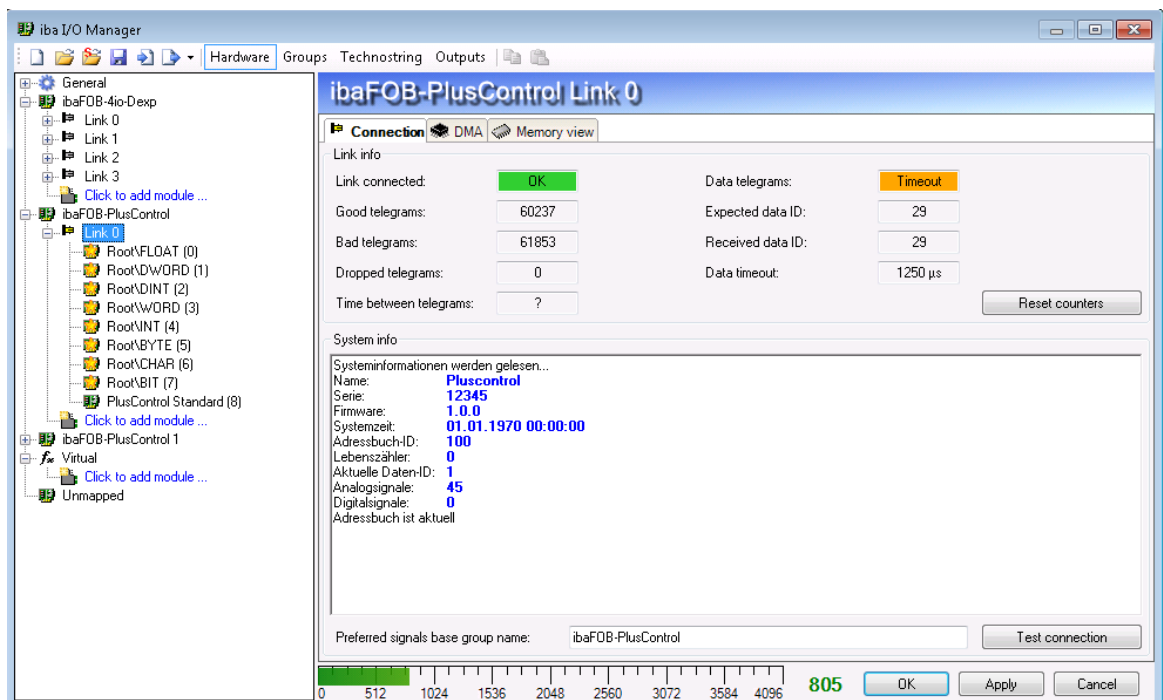


Figure 19: „Connection“ tab

In addition to the display of the connection status and telegram status several counters are available:

- Good telegrams**
Counter of correctly received telegrams

- ❑ **Bad telegrams**
Counter of faulty telegrams
- ❑ **Dropped telegrams**
Counter of dropped telegrams
- ❑ **Time between telegrams**
Interval between the last 2 correctly received telegrams
- ❑ **Expected data ID, received data ID**
The IDs are used to identify the received data in ibaPDA. The ID is incremented by every request. The ID in the measurement data telegram must match the ID of the request telegram. Otherwise the data will be dropped.
- ❑ **Data timeout**
ibaPDA monitors the telegram counter of the measurement data telegrams. If the counter does not change within the timeout calculated according to the cycle time, the data is set to 0.
- ❑ **System info**
System information is displayed in this field, which is read from the PLUSCONTROL CP while testing the connection.

DMA tab

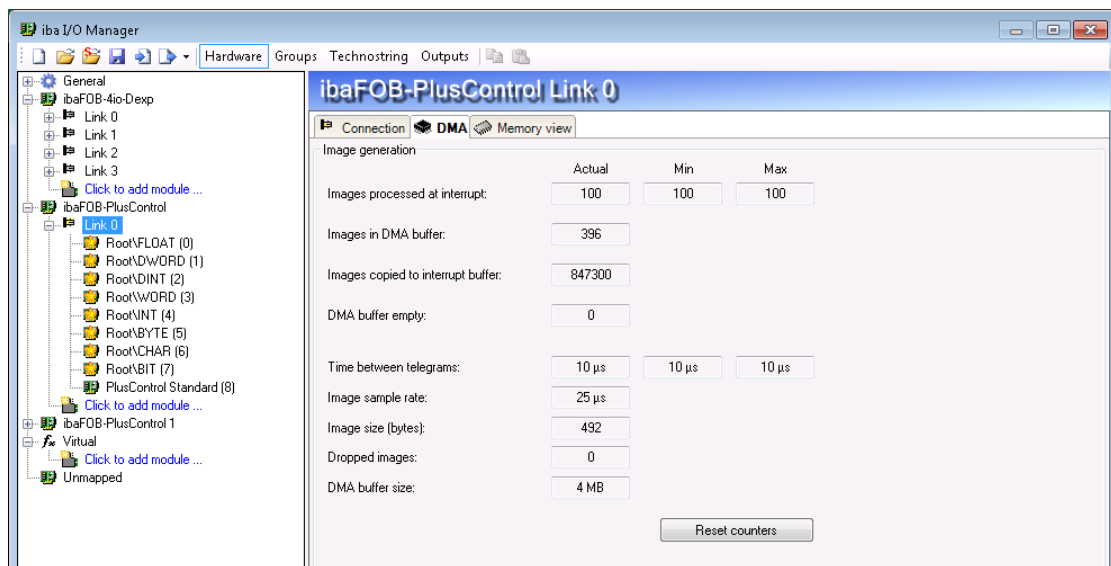


Figure 20: DMA

The tab gives information about the image generation (process image). An image is a dataset which is written by the card to the computer memory via DMA. This image contains all data of the measured signals within a sample on the respective link.

Here is a short description of the image generation information:

- ❑ **Images processed at interrupt:**
These counters show how many images were 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 remain constant. If this number starts increasing then something is wrong. This may 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 increased.
- ❑ **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 may 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 PCIe bus.
- ❑ **Dropped images:**
A value >0 indicates an overload on the PCIe bus.
- ❑ **DMA buffer size:**
Fixed value of the card

Memory view tab

The memory view tab displays the DPR memory on the ibaFOB-PlusControl card.

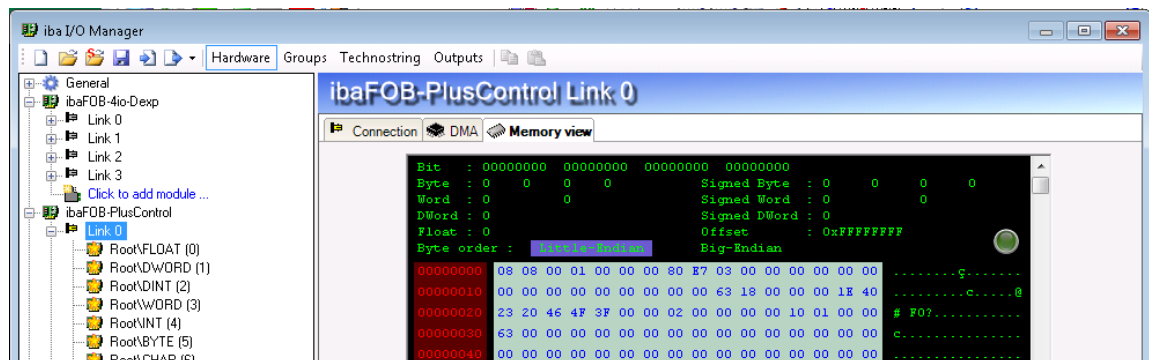


Figure 21: Memory view

This memory view corresponds to the view in the memory view tab of the card diagnostics when “1: FPGA registers” is selected as memory region.

9 Synchronization of more than one card

9.1 Important information



Important information!

A bad or missing sync-connection may lead to inconsistent data blocks. This would affect the data integrity and data correlation!

Each card is delivered with a synchronization cable (sync cable) for connecting up to 6 cards. Unused plugs of the cable can left unconnected and must not be terminated.

If you plug in or unplug PCI/PCIe cards this may change the PCI/PCIe configuration of the PC. This can affect the signal or I/O configuration of the system because the ID of the boards may change.

In that case move the fiber optic cables to the correct card.

Always save your system configuration before changing hardware components.

9.2 Procedure

Perform the following steps after you've installed the card in the computer:

1. Connect all iba cards with the synchronization cable using the blue plugs.

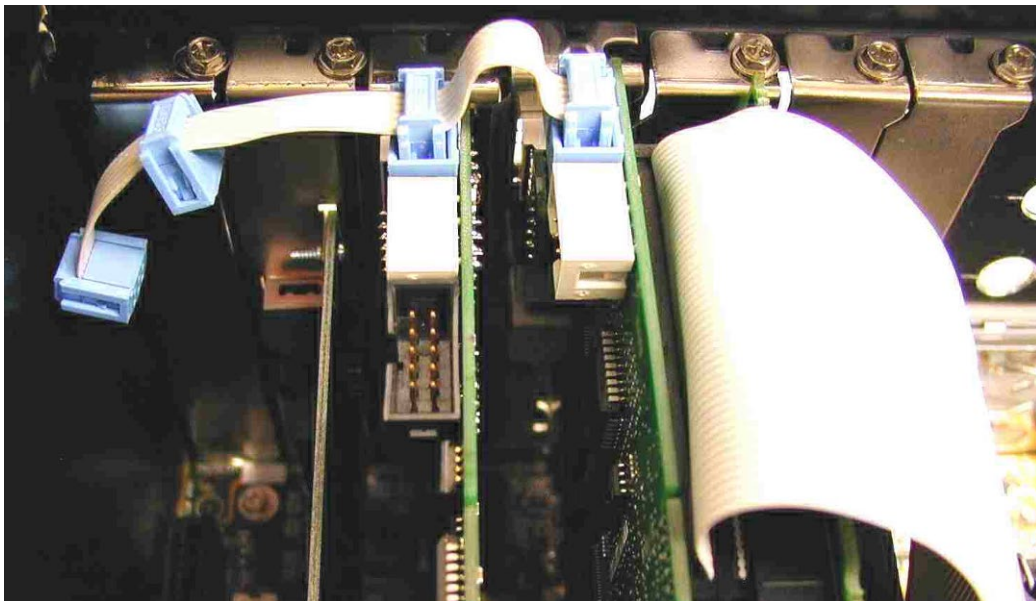


Figure 22: Connecting multiple cards by sync cable

2. Close the PC.
3. Plug in the power line.
4. Switch on the power supply of the PC.
5. Start the PC.

10 Technical data

10.1 Main data

Order no.	11.112602
Format/size	PCI Express card
Operating temperature	From 32 °F to 122 °F (from 0 °C to 50 °C)
Storage temperature	From -13 °F to 158 °F (from -25 °C to 70 °C)
Transport temperature	From -13 °F to 158 °F (from -25 °C to 70 °C)
Cooling	Passive
Power supply	Via PCIe 1.0-x1 compatible slot
Current consumption	Up to 1000 mA
FO cable	62,5/125 µm
FO coupling	SC
Distance between 2 devices	Up to 1,312 ft. (400 m) without repeater
Weight (incl. packaging and documentation)	0.44 lb (200 g)
Number of FO connections	1 (duplex)
Data transmission rate	1 Gbit/s
Fastest sample time	10 µs

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

Unique Identifier: 11.112602 ibaFOB-PlusControl

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.

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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