



See the Big Picture



# ibaBM-eCAT

Bus monitor for EtherCAT®

Manual

Issue 1.12

**Measurement Systems  
for Industry and Energy**

## Manufacturer

iba AG  
Koenigswarterstr. 44  
90762 Fuerth  
Germany

## Contacts

Main office           +49 911 97282-0  
Fax                    +49 911 97282-33  
Support               +49 911 97282-14  
Engineering          +49 911 97282-13

E-Mail: [iba@iba-ag.com](mailto:iba@iba-ag.com)

Web: [www.iba-ag.com](http://www.iba-ag.com)

This manual must not be circulated or copied, or its contents utilized and disseminated, without our express written permission. Any breach or infringement of this provision will result in liability for damages.

©iba AG 2018, All Rights Reserved

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. EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany. 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.



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

Issue	Date	Revisions	Chapter/pages	Author	Version HW / FW
V 1.12	07/26/2018	32Mbit mode	11.2	ms	02.05.001

## Table of contents

<b>1</b>	<b>About this manual</b> .....	<b>5</b>
1.1	Target group .....	5
1.2	Notations .....	5
1.3	Used symbols .....	6
<b>2</b>	<b>Introduction</b> .....	<b>7</b>
<b>3</b>	<b>Scope of delivery</b> .....	<b>9</b>
<b>4</b>	<b>Safety instructions</b> .....	<b>9</b>
4.1	Designated use .....	9
4.2	Special advices .....	9
<b>5</b>	<b>System requirements</b> .....	<b>10</b>
5.1	Hardware .....	10
5.2	Software .....	10
5.3	Firmware .....	10
5.4	IO Device File (ESI) .....	10
<b>6</b>	<b>Assembly and disassembly</b> .....	<b>11</b>
6.1	Assembly .....	11
6.2	Connecting .....	11
6.3	Disassembly .....	11
<b>7</b>	<b>Device description</b> .....	<b>12</b>
7.1	Views .....	12
7.2	Operating and indicating elements .....	13
7.2.1	Operating status display .....	13
7.2.2	EtherCAT connection status display .....	13
7.2.3	Slave function status display .....	13
7.2.4	Rotary switch S1 .....	14
7.3	Connections .....	14
7.3.1	Power supply X14 .....	14
7.3.2	EtherCAT interfaces X40, X41 .....	14
7.3.3	Fiber optic cable connectors X10 (TX) and X11 (RX) .....	14
7.3.4	Grounding screw X29 .....	15
<b>8</b>	<b>System integration</b> .....	<b>16</b>
<b>9</b>	<b>Configuration with ibaPDA</b> .....	<b>17</b>
9.1	First Steps in ibaPDA .....	17
9.2	Configuration as active slave .....	19
9.2.1	EtherCAT Master configuration .....	19
9.2.2	ibaPDA configuration .....	23
9.3	Device module and modules in the I/O Manager .....	24
9.3.1	ibaBM-eCAT – „General“ tab .....	24
9.3.2	ibaBM-eCAT – „Diagnostics“ tab .....	26
9.3.3	ibaBM-eCAT – „Analog“ tab .....	27
9.3.4	ibaBM-eCAT – „Digital“ tab .....	27

9.3.5	Module „Standard“ – „General“ tab .....	28
9.3.6	EtherCAT symbol browser .....	29
9.3.7	Module „Standard“ – „Analog“ tab .....	30
9.3.8	Module „Standard“ – „Digital“ tab .....	32
<b>10</b>	<b>Technical Data .....</b>	<b>34</b>
10.1	Main data.....	34
10.2	Dimension sheet.....	36
<b>11</b>	<b>Appendix .....</b>	<b>37</b>
11.1	IO Device File (ESI) < Version 1.7 .....	37
11.2	FO configuration using 32Mbit ibaNet protocol.....	37
11.2.1	Configuration of 32Mbit ibaNet protocol .....	37
11.2.2	FTP connection to the device.....	38
11.2.3	Signal list file.....	39
<b>12</b>	<b>Support and contact.....</b>	<b>42</b>

# 1 About this manual

This manual describes the construction, the use and the operation of the device ibaBM-eCAT.

## 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

The following designations are used in this manual:

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

## 1.3 Used symbols

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

---

** DANGER**

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

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

---

** 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 Introduction

The device ibaBM-eCAT can be used for recording of net data transmitted over an EtherCAT® line. The device should be connected directly to the EtherCAT wire, positioned in line right next to the EtherCAT master.

Generally, the configuration of the device can be performed in the I/O Manager of the software application ibaPDA. For this purpose a bidirectional fiber optic connection to a PC is required, which is provided by a fiber optic card of the ibaFOB-D family (e. g. ibaFOB-io-D).

The setup of the signals can be retrieved from the EtherCAT project file provided that the ENI export file of the EtherCAT configuration is imported in ibaPDA. Hence, the signal selection and configuration can easily be done by mouse click in ibaPDA.

The following adjustments are possible:

- Specification of up to 512 analog signals in each direction (input and output) by means of a symbolic name. The address is mapped by ibaPDA to a logical 32 bit address or a physical address, consisting of a 16 bit device address and a 16 bit internal address. The data formats BYTE, SINT, WORD, INT, DWORD, DINT, REAL, FLOAT and LREAL are supported.
- Specification of up to 512 digital signals in each direction (input and output) by means of a symbolic name. The address is mapped by ibaPDA to a logical 32 bit address or a physical address, consisting of a 16 bit device address and a 16 bit internal address, and the bit number 0 to 7.

Moreover, you can configure ibaBM-eCAT as active slave on the EtherCAT bus. Hence, it can be addressed by the EtherCAT-master. This way, the EtherCAT master can address exactly the user data that is needed for recording on the ibaPDA. Those signals are regarded as outputs from the EtherCAT bus' view.

### Bus addressing notes

- ❑ The maximum number of analog and digital channels is limited to 512 each, whereby the LREAL data format (64 bit) has to be count as 2 analog channels.
- ❑ The overall data volume of the analog groups 0-7 and the digital groups 16-23 is limited to 1360 Bytes.
- ❑ The overall data volume of the analog groups 8-15 and the digital groups 24-31 is limited to 1360 Bytes.

These restrictions mentioned above apply only, when the MTU (maximum transmission unit) size is set to the maximum value of 1514 Bytes.

For ibaBM-eCAT as sniffer and/or active slave applies: ibaPDA can acquire up to a total of 512 analog and 512 digital values in each signal direction according to the sampling rate configured on the EtherCAT bus<sup>1</sup>.

### A brief overview:

- ❑ Bus monitor for EtherCAT lines
- ❑ To be connected directly with the EtherCAT wire next to the master, no further adapters needed

---

<sup>1</sup> If the cycle time is below 500 µs, there are restrictions on the number of values

- ❑ Configuration as active EtherCAT-slave
- ❑ 2 Ethernet interfaces (to the master and to the slave)
- ❑ Configuration with ibaPDA
- ❑ Signal configuration can be retrieved from the EtherCAT project file of the automation system
- ❑ Transmission of up to 512 digital and 512 analog signals in each direction to ibaPDA according to the bus cycle time<sup>2</sup>.
- ❑ Supported data types: BYTE, SINT, WORD, INT, DWORD, DINT, REAL, FLOAT and LREAL
- ❑ Rugged housing, easy mounting

---

<sup>2</sup> If the cycle time is below 500 µs, there are restrictions on the number of values



### 3 Scope of delivery

After unpacking check the completeness and intactness of the delivery.

The scope of delivery includes:

- Device ibaBM-eCAT
- Manual
- 2-pin plug for power supply
- DVD "iba Software & Manuals"

## 4 Safety instructions

### 4.1 Designated use

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

- Measurement data logging and analysis
- Applications of ibaSoftware products (ibaPDA, ibaAnalyzer etc.)

The device may only be operated in conditions as specified in the technical data.

### 4.2 Special advices

---

**⚠ CAUTION****Observe the operating voltage range**

The device may not be operated at voltages exceeding +24 V DC ( $\pm 10\%$ )! An overly high operating voltage destroys the device.

---

**Important note**

Do not open the device!

There are no serviceable parts inside the device.

Opening the device will void the warranty.

---

**Note**

Cleaning

To clean the device, use a dry or slightly moistened cloth.

---

## 5 System requirements

### 5.1 Hardware

**For operation:**

- 24 V DC ( $\pm 10\%$ ) power supply

**To set the device's parameters and for measuring:**

- PC with at least:
  - 1 GHz Pentium III or more
  - 512 MB RAM
  - 4 GB free memory on the hard drive for measurement values
  - 1 free PCI/PCIe slot or ExpressCard slot (notebook)

On our Website <http://www.iba-ag.com>, you find suitable industry-type and desktop-type PC systems.

- At least one fiber optic card of type ibaFOB-D (firmware version V2.00 build 172 (C2) or later):
  - ibaFOB-io-D / ibaFOB-io-Dexp
  - ibaFOB-2io-D / ibaFOB-2io-Dexp
  - ibaFOB-2i-D / ibaFOB-2i-Dexp with extension module ibaFOB-4o-D
  - ibaFOB-4i-D / ibaFOB-4i-Dexp with extension module ibaFOB-4o-D
  - ibaFOB-io-ExpressCard (for notebooks)
- One ibaNet fiber optic patch cable (duplex) for connecting ibaBM-eCAT and ibaPDA-PC

### 5.2 Software

- ibaPDA version 6.39.0 or later for measuring and recording data

### 5.3 Firmware

- ibaBM-eCAT version 02.05.001 or later

### 5.4 IO Device File (ESI)

- Device-specific ESI file for bus configuration (IBA\_eCAT-monitor.xml) version 1.7 / Revision = 17 or later

## 6 Assembly and disassembly

The device is provided with a mounting rail clip for installation.

### 6.1 Assembly

1. Place the mounting rail clip attached to the device on the mounting rail.
2. Press the device down in such a way that the clip of the mounting rail engages with a click.

### 6.2 Connecting

1. If there is a rule to ground the device, connect the device to the ground.
2. Connect the power supply. Observe the correct polarity.
3. Connect the device to the ibaPDA-PC via a ibaNet fiber optic patch cable (duplex):
  - the RX input (X11) of the device with the TX interface of the ibaFOB-D card in the ibaPDA-PC,
  - the TX output (X10) of the device with the RX interface of the ibaFOB-D card in the ibaPDA-PC.
4. Connect the EtherCAT master to the EtherCAT master interface of the device (X40) via Ethernet cable
5. Connect the first EtherCAT slave to the EtherCAT slave interface of the device (X41) via Ethernet cable
6. When all cables are connected, switch on the device.

### 6.3 Disassembly



Disconnect the power supply before disassembly!

---

1. Disconnect the power supply.
2. Disconnect the ground.
3. Disconnect all cables.
4. Close the open fiber optic inputs and outputs with a cover.
5. Hold the device to prevent it from falling down and press it slightly downwards.
6. After that pull the device and lift it up. The clip of the mounting rail will disengage with a click.
7. Remove the device.
8. When storing or transporting the device observe the values specified in the technical data.

## 7 Device description

### 7.1 Views

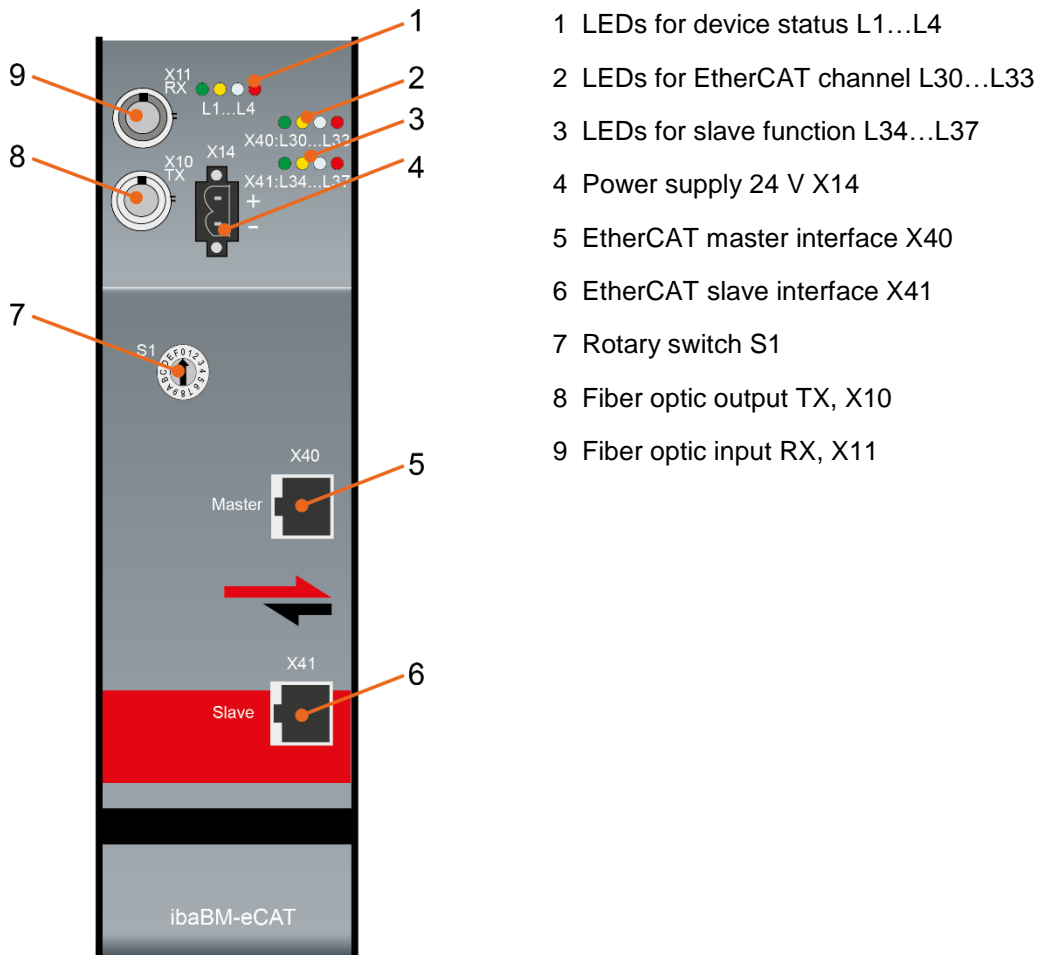


Figure 1: Front view

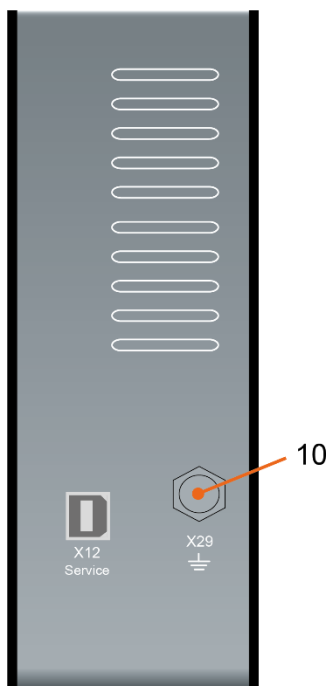


Figure 2: Bottom view

10 Grounding screw X29

(X12 for service purposes only)

## 7.2 Operating and indicating elements

LED indicators with different colors show the operating status and the status of the EtherCAT channels.

### 7.2.1 Operating status display

LED	Status	Description
L1 (green/red)	off blinking green on (red)	no power supply ready for operation device is booting; Once the device has booted, the LED changes to green
L2 (yellow)	off on	no measuring device is measuring
L3 (white)	off on blinking	no data reception at X11 data reception at X11 OK data reception at X11, but signal is wrong
L4 (red)	off blinking	Normal, everything OK Error

### 7.2.2 EtherCAT connection status display

LED	Status	Description
L30	off blinking	device not active device is working
L31	on	EtherCAT messages are recognized
L32	off blinking quickly blinking slowly on	no measuring values requested measuring values requested, but none can be found measuring values requested, but not all can be found measuring values requested, all are available
L33	on	a failure is recognized within the EtherCAT message

### 7.2.3 Slave function status display

LED	Status	Description
L34	off on	device not activated as EtherCAT slave device activated as EtherCAT slave
L35	off blinking quickly blinking slowly on	EtherCAT slave status „INIT“ EtherCAT slave status „PRE-operational“ EtherCAT slave status „SAFE-operational“ EtherCAT slave status „Operational“
L36/L37		reserved for future functions

## 7.2.4 Rotary switch S1

With ibaNet 32Mbit Flex protocol, it is possible to connect up to 15 devices to a ring topology. The devices are addressed via the rotary switch S1.

Device number within the cascade	Rotary switch setting
not allowed	0
1 <sup>st</sup> device	1
2 <sup>nd</sup> device	2
:	:
14 <sup>th</sup> device	E
15 <sup>th</sup> device	F



### Note

If the rotary switch position is „0“, the connection is interrupted in delivery state.

However, it is possible to configure the device with a predefined FO signal configuration using the ibaNet protocol 32Mbit, when the rotary switch position is “0”.

For further information see appendix, chapter 11.2.

Cascading is possible with all devices supporting the 32Mbit Flex ibaNet protocol.

## 7.3 Connections

### 7.3.1 Power supply X14

The ibaBM-eCAT device requires an external 24 V DC ( $\pm 10\%$ ) power supply (unregulated) and should be operated at a maximum of 0.7 A. The operating voltage should be run through the provided 2-pin Phoenix threaded coupling connector. If desired, you can order DIN rails or plug-in power supply units from iba.

### 7.3.2 EtherCAT interfaces X40, X41

EtherCAT interfaces (master and slave connection): EtherCAT 100 Mbit/s with RJ45 plug.

### 7.3.3 Fiber optic cable connectors X10 (TX) and X11 (RX)

X11 (RX): Fiber optic reception interface

X10 (TX): Fiber optic transmission interface

ibaPDA requires a fiber optic card of the ibaFOB-D or ibaFOB-Dexp family to receive and transmit data.

The ports are designed for cables with 62.5/125  $\mu\text{m}$  multi-mode fibers and ST couplings which are available at iba too.

### 7.3.4 Grounding screw X29

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



#### **Important note!**

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

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

---

## 8 System integration

The device ibaBM-eCAT will be connected directly to the EtherCAT wire, positioned in line right next to the EtherCAT master. The device provides 2 EtherCAT interfaces, which are galvanically isolated from each other. The output channel of the master device will be connected with the master channel of the ibaBM-eCAT (X40) while its slave channel (X41) will be connected with the next slave in line.

In this configuration, 512 analog and 512 digital signals can be captured in each direction. In case that more signals are needed, you can integrate more ibaBM-eCAT devices in a row on the EtherCAT-bus, following directly the master.

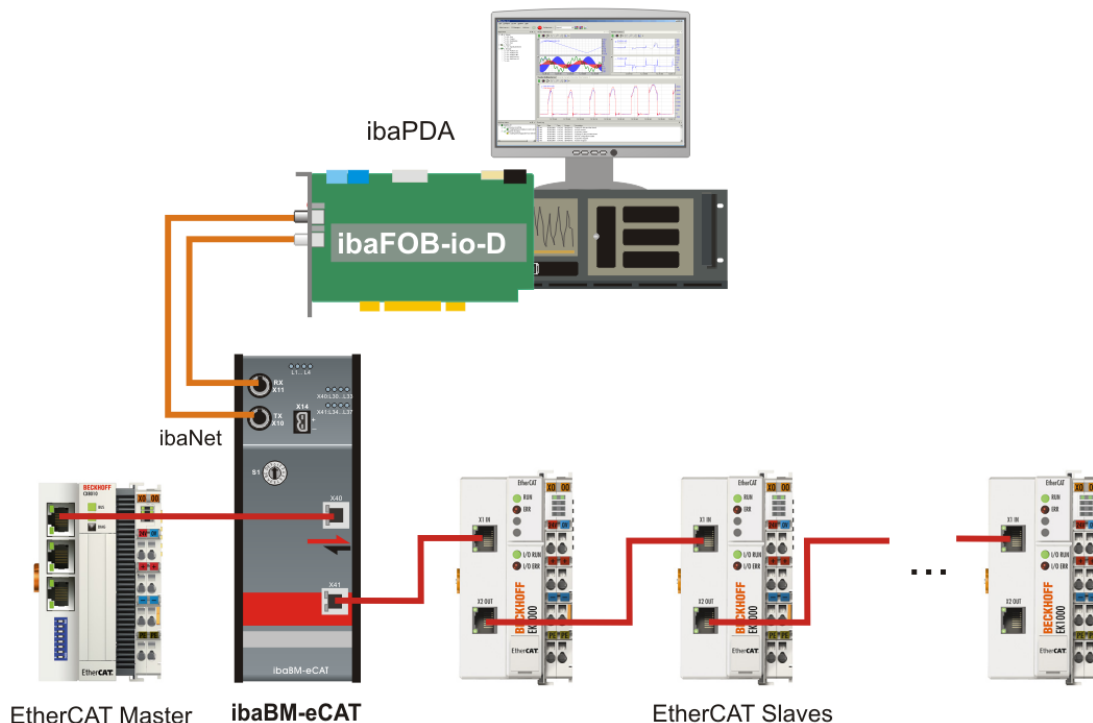


Figure 3: Topology (EtherCAT master and EtherCAT slave)

The setup of the signals can be retrieved from the EtherCAT project file, exported by the EtherCAT master as ENI file (xml format). The file contains the description of all slaves including all projected terminals. The EtherCAT project file can be imported in ibaPDA. Hence, the signal selection and configuration can easily be done by mouse click in ibaPDA.

### **CAUTION**

When ibaBM-eCAT is switched off, the EtherCAT connection between the master and the slaves will be interrupted!

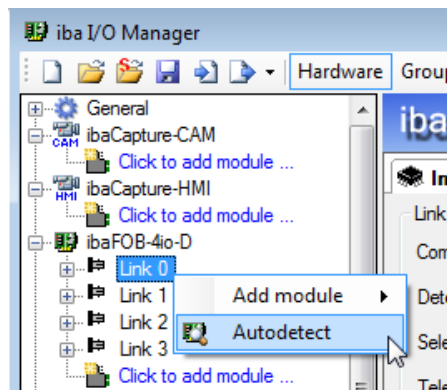


## 9 Configuration with ibaPDA

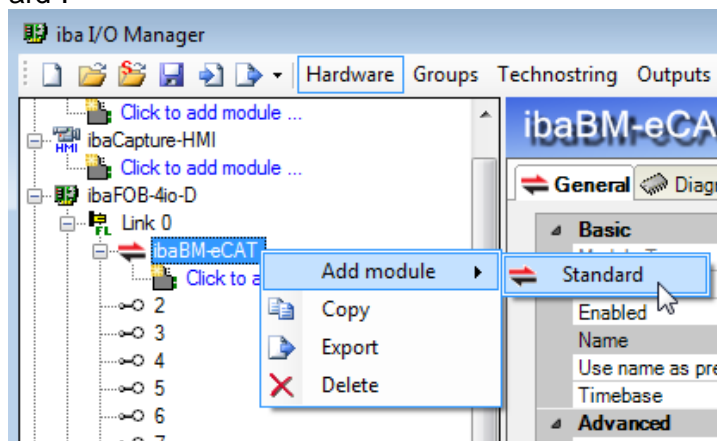
### 9.1 First Steps in ibaPDA

The following instructions show you how to integrate ibaBM-eCAT into ibaPDA and to configure the signals. You find a detailed description of the I/O Manager in chapter 9.3 „Device module and modules in the I/O Manager“.

1. Start ibaPDA on the PC and open the I/O Manager.
  2. Find the appropriate link of the ibaFOB card to which ibaBM-eCAT is connected. Click on the link with the right mouse button, which opens a submenu. Select „Autodetect“.
- If the device is correctly connected, „ibaBM-eCAT“ will be shown below the link of your ibaFOB card. The slot number corresponds to the device address, which is set at the rotary switch.



3. Add a module „Standard“. Click on the link „ibaBM-eCAT“ with the right mouse button and select „add module“ and the module „Standard“.
- Alternatively you can click on the link „Click to add module...“ and then select „Standard“.



#### Note

If there was already a configuration stored in the device then „Autodetect“ will read out the configuration.




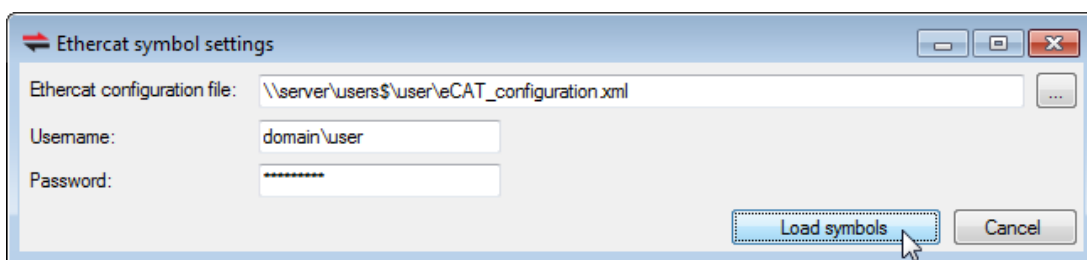
#### Note

If there is no connection to ibaBM-eCAT at the time of configuration, you can manually add and configure the device module and the modules.

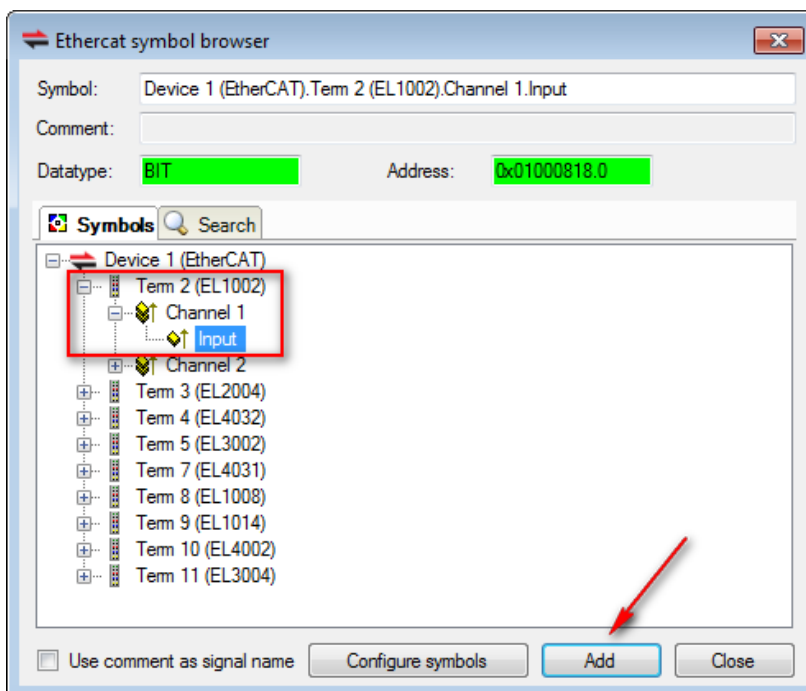
- Import the EtherCAT project file (generated by the master via „export XML“, see also example with “TwinCAT System Manager in chapter 9.2.1 “EtherCAT Master configuration”, item 9): Change to the module „ibaBM-eCAT“ – „General“ tab. Click on the link „Configure symbols“.



- Select the EtherCAT project file by entering the file address in the first field or by opening a browser with the browse button . If the EtherCAT project file is on a remote PC and a login name is necessary, enter the server name, the user name and the password. Close the window with a click on <Load symbols>.



- In order to select the signals to be captured, change to the module “Standard” – “General” tab. Click on the link “Select symbols” and the following window will be opened:



- In the tree structure, select the terminals whose signals should be recorded. Open the terminal symbol and select the signal. The signal is added to the appropriate signal table (analog or digital) by double clicking on the desired signal or clicking on the button <Add>.

**Note**

A signal must not be added twice. If a signal is added twice to the signal table, an error message appears when configuration is validated by ibaPDA.

8. When all desired signals are selected close the window with a click on the button <Close>. If required, you can add further signals later.
9. In order to apply the settings click on <OK>. Then ibaPDA checks the configuration. If the configuration is OK, it will be applied by ibaPDA and written to the device. Now the signals can be displayed and recorded by ibaPDA as usual.

## 9.2 Configuration as active slave

If you want to configure the device as active EtherCAT slave, you need to activate the „active slave“ option in ibaPDA and integrate the device in the EtherCAT configurator. The ESI-file, an xml file, has to be imported from the DVD (included in delivery) to the EtherCAT configurator. Then, the signals are configured, linked and exported as ENI configuration file. The configuration file can be loaded in ibaPDA.

In the following, we describe the procedure, taking the EtherCAT configurator „TwinCAT System Manager“ by Beckhoff as example. For other EtherCAT configurators, the procedure is quite similar.

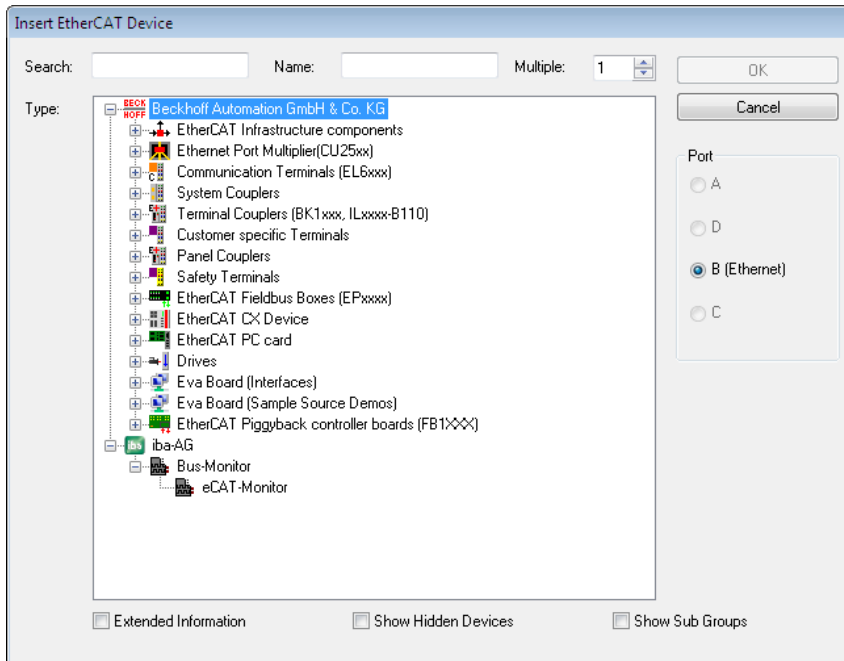
### 9.2.1 EtherCAT Master configuration

1. Copy the "IBA\_eCAT-monitor.xml" file from the DVD "iba Software & Manuals" from the „02\_iba\_Hardware\ibaBM-eCAT\02\_IO-Device-File“ directory to the „...\IO\EtherCAT“ directory of the EtherCAT configurator.

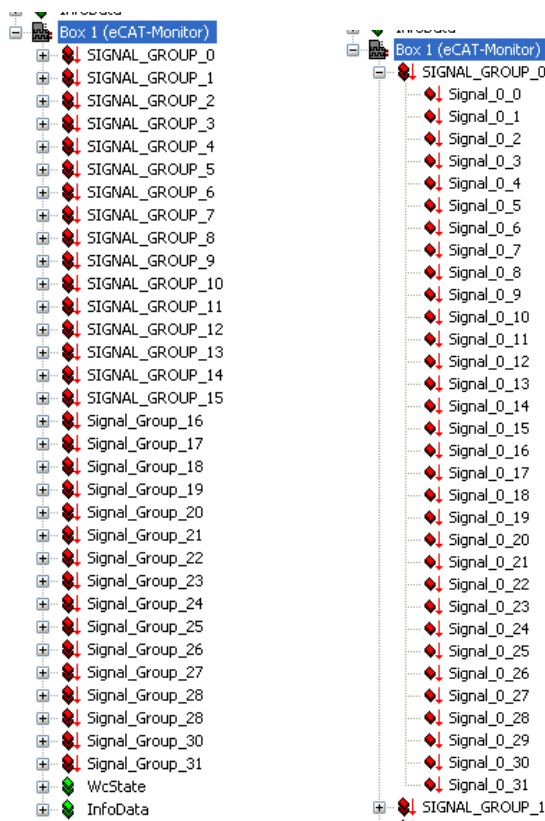
**Note**

The target directory can be different for other EtherCAT configurators. In the target directory, you will usually find all XML files of the integrated EtherCAT devices.

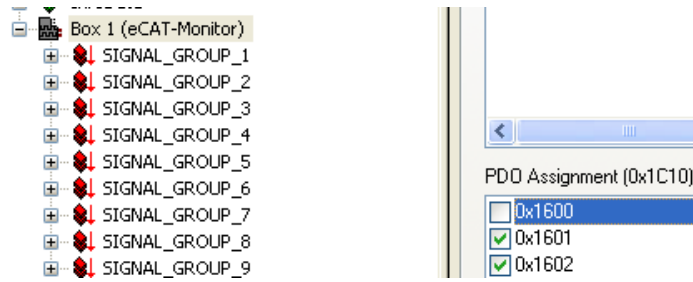
2. After having restarted the EtherCAT configurator, you have got ibaBM-eCAT as EtherCAT-slave with the name „eCAT-Monitor“ at your disposal:



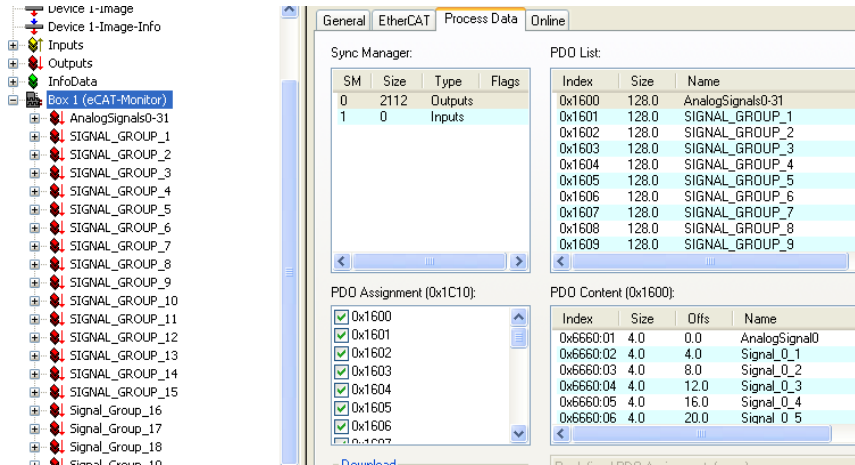
3. Choose „eCAT-Monitor“ and integrate the device into the EtherCAT-bus by clicking on <OK>.
4. For each device, there are up to 16 analog (SIGNAL\_GROUP\_0 ... SIGNAL\_GROUP\_15) and 16 digital (Signal\_Group\_16 ... Signal\_Group\_31) signal groups with 32 signals, each:



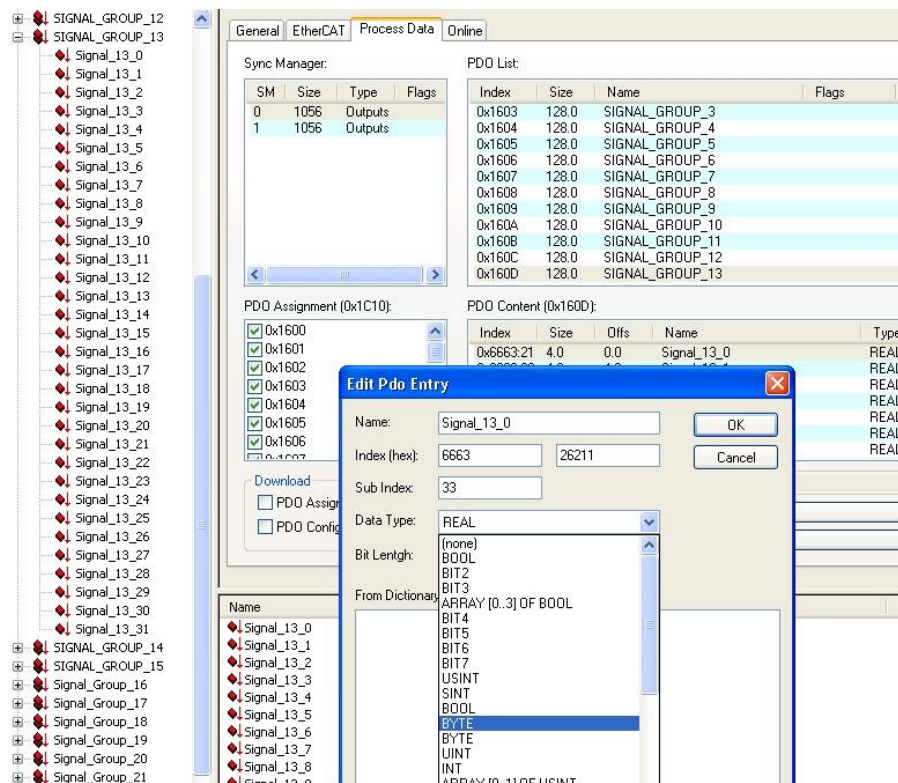
5. The number of signals can be reduced in groups. The group has to be deactivated in the EtherCAT configurator.  
In our example, deactivating the PDO assignment 0x1600 deletes the SIGNAL\_GROUP\_0.



6. You can also change the names of groups and signals:



7. If another datatype is required for the analog signals than the preset one, it is possible to modify the datatype here.

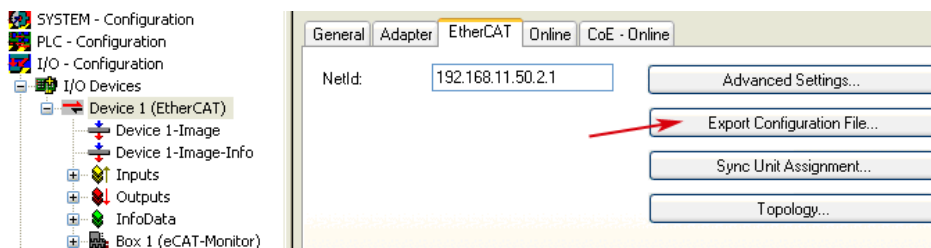


8. Configure and link the signals as for the other slaves (please observe additional notes in the appendix, chapter 11.1):

The screenshot shows a configuration window with three tabs: "Variable", "Flags", and "Online". The "Variable" tab is active. The fields are as follows:

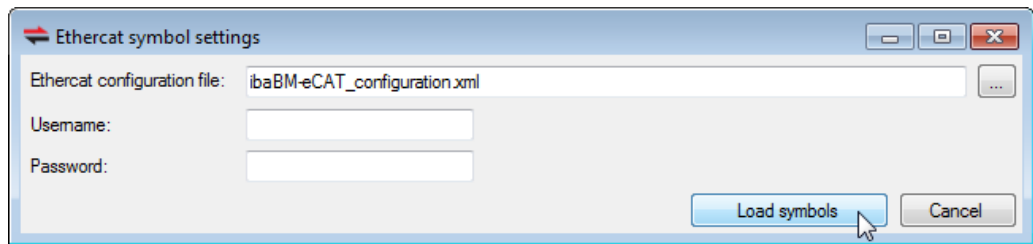
Name:	Signal_0_0		
Type:	REAL		
Group:	SIGNAL_GROUP_0	Size:	4.0
Address:	26 (0x1A)	User ID:	0
Linked to...:	[Empty field]		
Comment:	[Large empty text area]		
ADS Info:	Port: 300, IGrp: 0x11001, IOffs: 0x1A, Len: 4		

9. Export the EtherCAT configuration (ENI export file) by clicking on <Export Configuration File...>.

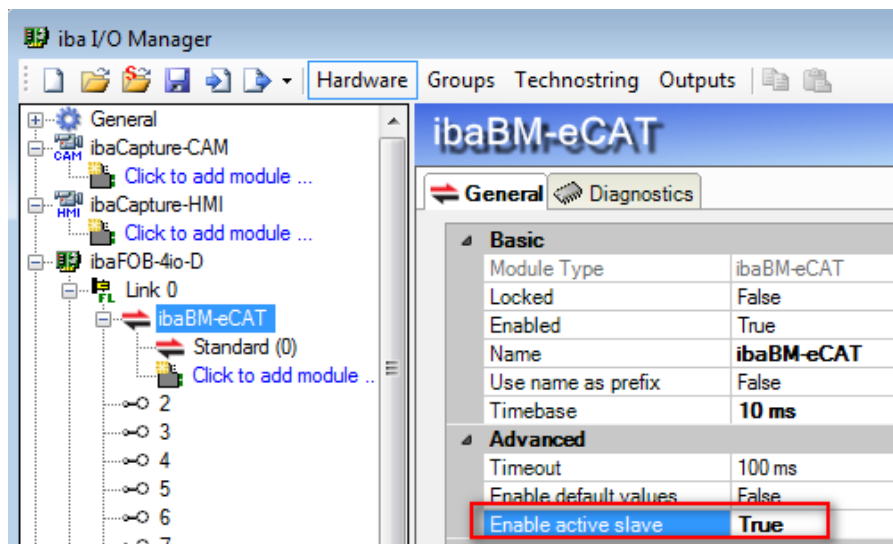


## 9.2.2 ibaPDA configuration

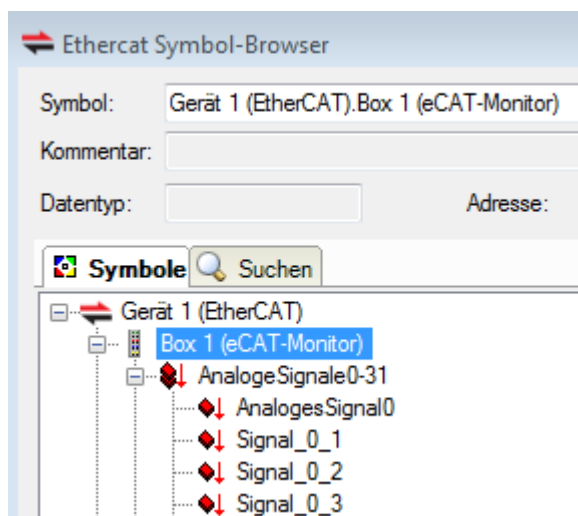
1. Load that configuration file into ibaPDA as described in chapter 9.1.



2. Open in the I/O Manager the “General” tab in “ibaBM-eCAT”. Choose the “True” option in the “Enable active slave” field.



3. Now, you can access the exported signals in the EtherCAT symbol browser as described in chapter 9.1.



## 9.3 Device module and modules in the I/O Manager

In order to use ibaBM-eCAT with ibaPDA the device has to be configured with the I/O Manager in ibaPDA. For this purpose follow the instructions in chapter 9.1 „First Steps in ibaPDA“.

Below you find a description of the device module “ibaBM-eCAT” and the module “Standard”.

### 9.3.1 ibaBM-eCAT – „General“ tab

The device module „ibaBM-eCAT“ has 4 different tabs. The “General” and “Diagnostics” tabs are always visible. The “Analog” and “Digital” tabs contain dynamic online views on the captured analog and digital signals. Both tabs are only visible after modules have been added.

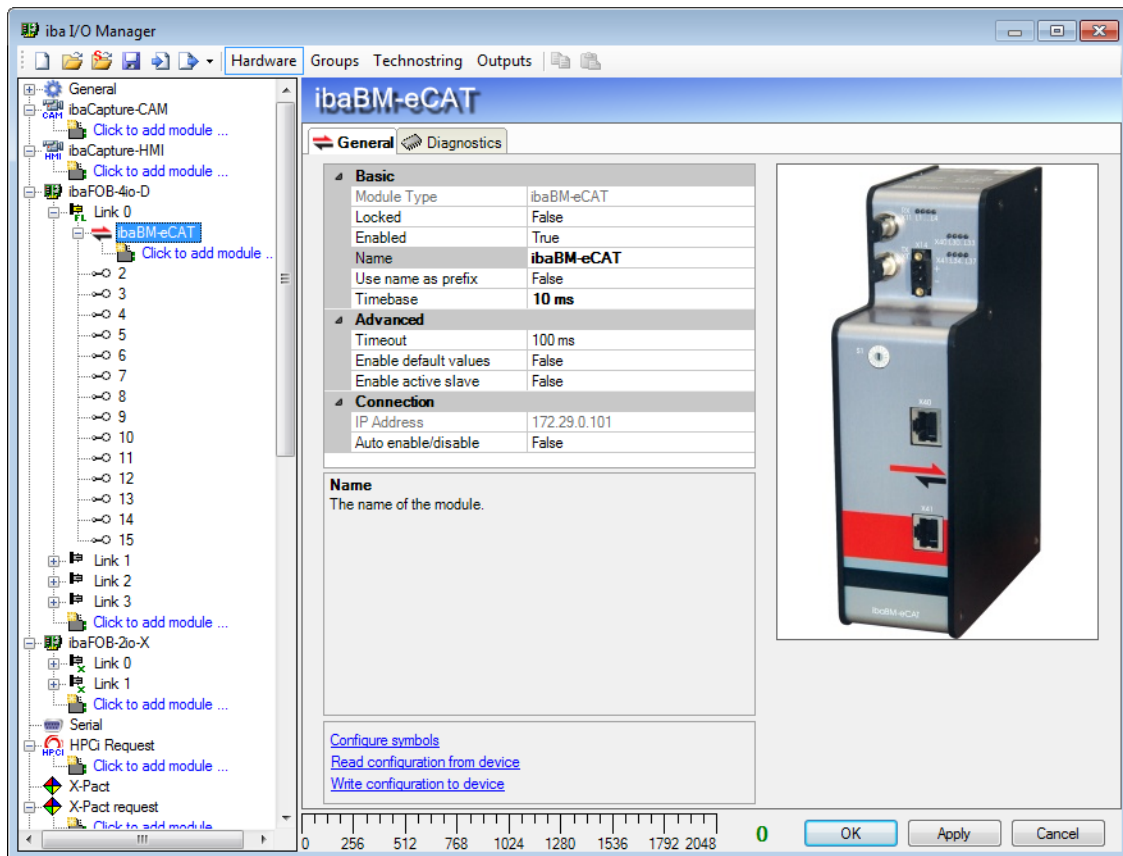


Figure 4: ibaBM-eCAT – “General” tab

#### Basic

- Module Type**  
Display of module type (read only)
- Locked**  
True: Only authorized users can change the module.  
False: Any user can make changes
- Enabled**  
Data acquisition for this module is active/not active.
- Name**  
You can enter a name of the module.
- Use name as prefix**  
Prefix the signal names of this module with the module name.



**Timebase**

Acquisition timebase used for this module, given in ms.

**Advanced** **Timeout**

The timeout specifies the maximum time between EtherCAT messages before the connection is considered to be broken. If the timeout is set to 0, monitoring is disabled and the last value remains valid.

 **Enable default values**

If this option is enabled (True), then the device will send the default signal value when the EtherCAT connection is broken. If the default value option is not enabled (False) then the last received signal value will be repeated.

 **Enable active slave**

In case, this option is enabled (True), the “active slave” function will be switched on. Hence, the controller can address directly the device, provided that it is integrated in the configuration (see chapter 9.2). If this option is not enabled (False) ibaBM-eCAT can work only in sniffer mode.

**Connection** **IP Address**

The IP address is determined by the slot number, the link number of the ibaFOB card and the device number the device is set to. ibaPDA sends configuration data and reads diagnostic data via a TCP/IP connection, which is realized in the fiber optic protocol. The IP address cannot be changed.

 **Auto enable/disable**

When this option is enabled and ibaPDA cannot connect to this device during the start of the acquisition then it will disable this module and start the acquisition without it. During the acquisition it will try to reconnect to the device. When it succeeds it will automatically restart the acquisition with this module enabled. If this option is not enabled then ibaPDA won't start the acquisition when it cannot connect to the device.

Several links are available in the field at the bottom of the general tab:

 **Configure symbols**

Using this link you can import the EtherCAT project file, see also chapter 9.1, step 5.

 **Read configuration from / Write configuration to the device**

Reading the configuration from the device / Writing current configuration to the device.

**Note**

Using these links, the configuration is not validated by the I/O Manager (like it is done with a click on <OK> or <Apply>). Therefore iba recommends to apply the configuration always with the buttons <OK> and <Apply> in the I/O Manager.

### 9.3.2 ibaBM-eCAT – „Diagnostics“ tab

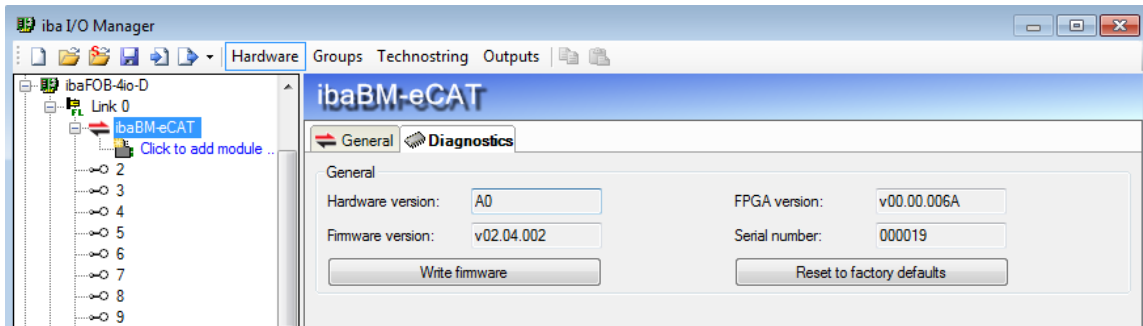


Figure 5: ibaBM-eCAT – “Diagnostics” tab

Here, you find information about the hardware version, firmware version, FPGA version and the serial number of your device.

#### Write firmware

Using this button you can install a firmware update. Select the update file „bm-ecat\_XXX.iba“ in the browser and start the update with <OK>.

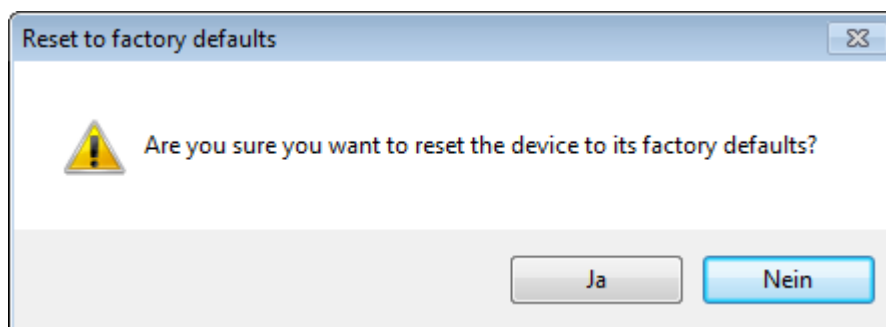


#### Important note

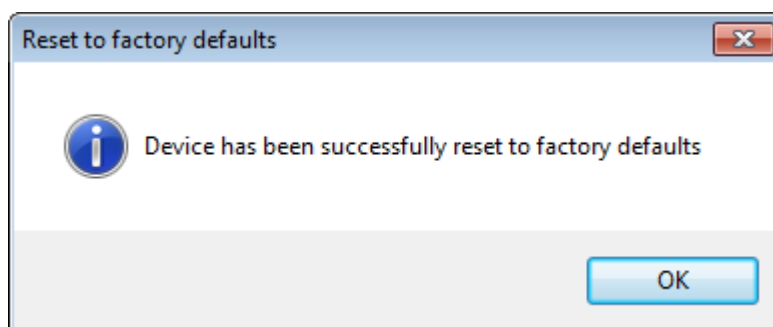
The update may take approx. 30 s and must not be interrupted. After an update the device will be automatically rebooted.

#### Reset to factory defaults

Using this button all settings are reset to factory defaults after having confirmed the following request with <Yes>.



After the reset the following message appears and the device will be automatically rebooted.



### 9.3.3 ibaBM-eCAT – „Analog“ tab

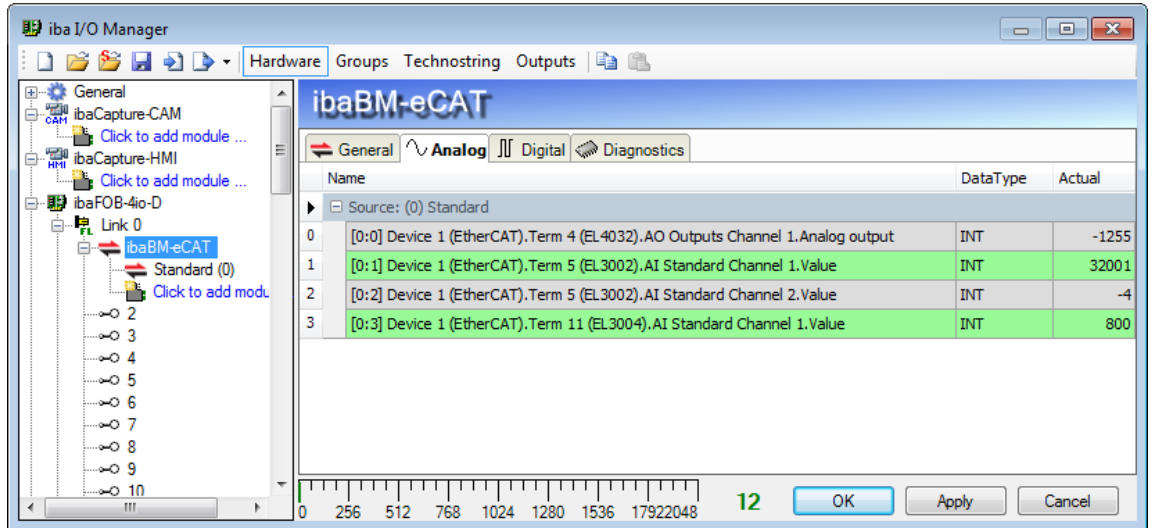


Figure 6: ibaBM-eCAT – “Analog” tab

If analog signals are configured in the “Standard” module and the configuration was written to the device a signal overview is given here including the current measured values.

### 9.3.4 ibaBM-eCAT – „Digital“ tab

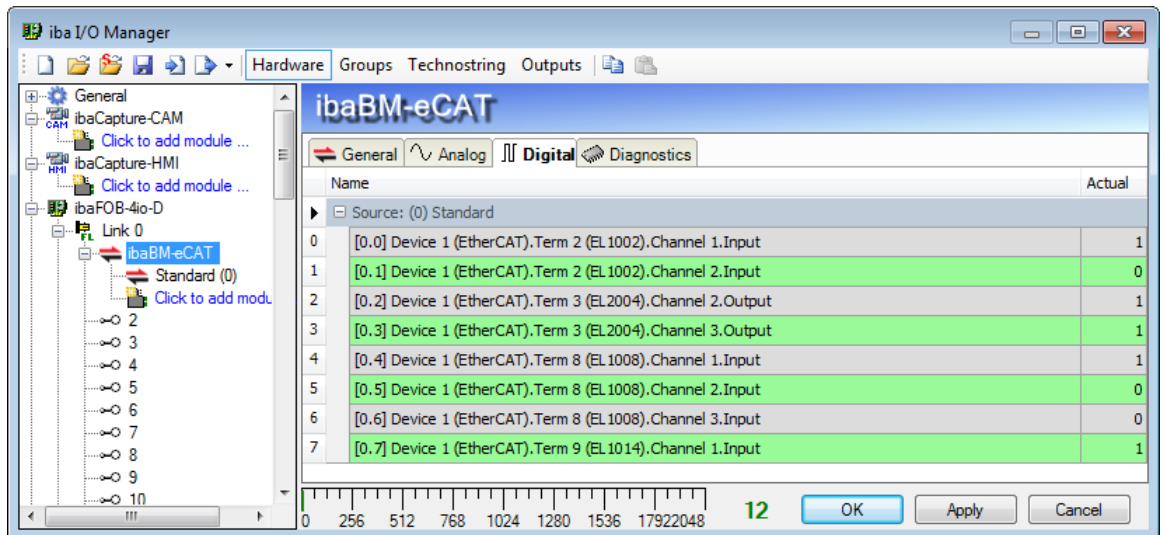


Figure 7: ibaBM-eCAT – “Digital” tab

If digital signals are configured in the “Standard” module and the configuration was written to the device a signal overview is given here including the current measured values.

### 9.3.5 Module „Standard“ – „General“ tab

Modules may be added almost unlimited. However, it has to be observed that each signal can be requested only once, i.e. not several times in several modules.

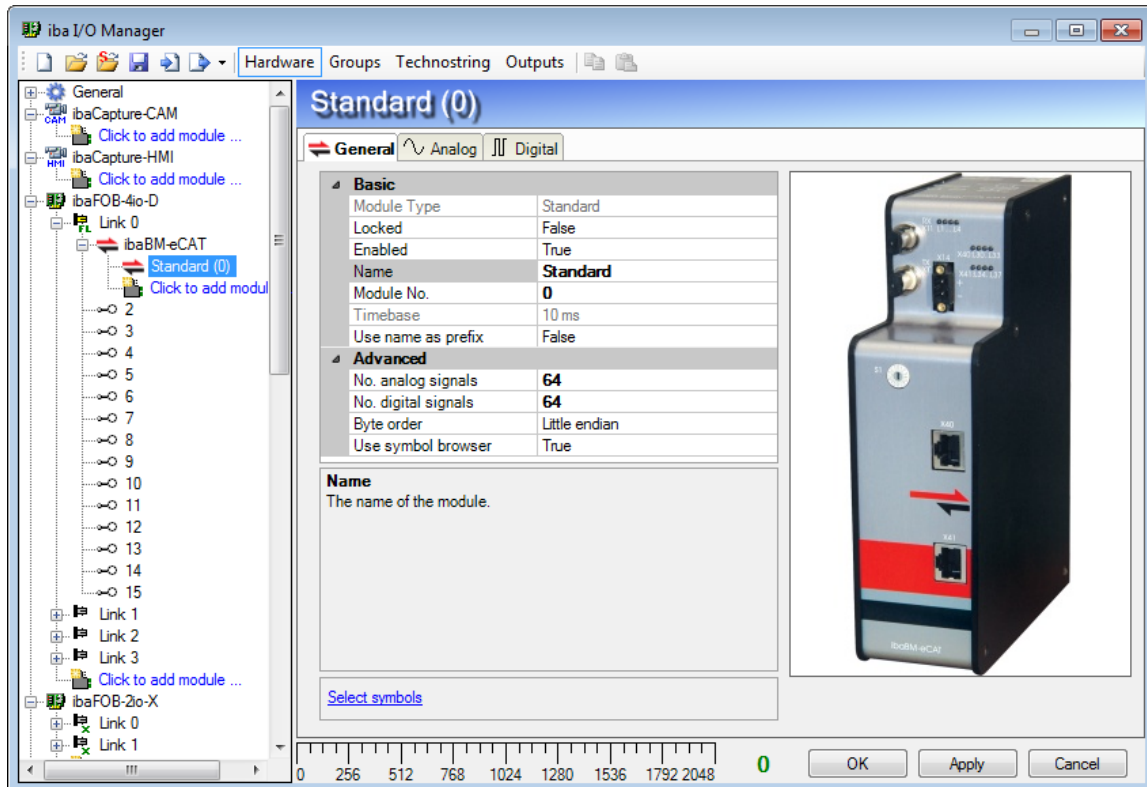


Figure 8: Module “Standard” – “General” tab

#### Basic

- Module Type, Locked, Enabled, Name, Timebase, Use name as prefix**  
See chapter 9.3.1 „ibaBM-eCAT – „General“ tab“.
- Module No.**  
Serial number, which is assigned by ibaPDA in increasing order. It can be changed by the user. The number is useful to identify signals, e. g. in expressions or ibaAnalyzer.

#### Advanced

- No. analog signals (up to 1000)**  
Enter the number of analog signals of this module (up to 512 signals in each direction).
- No. digital signals (up to 1000)**  
Enter the number of digital signals of this module (up to 512 signals in each direction)
- Byte order**  
Select the byte order that is used by the signals defined in this module. Possible settings: little endian or big endian.
  - 16 Bit:
    - Little Endian: Byte A – Byte B
    - Big Endian: Byte B – Byte A

- 32 Bit:  
Little Endian: Byte A – Byte B – Byte C – Byte D  
Big Endian: Byte D – Byte C – Byte B – Byte A

#### ❑ Use symbol browser

##### True:

The signals can be selected via the symbol browser. Open the symbol browser with the “Select symbols” link, see below.

##### False:

The signals can be addressed directly. For this purpose enter manually the address information of the signals in the analog and/or digital tab, like address type, direction, address, data type and/or bit no. iba recommends to use the symbols only. That's why direct addressing is not part of this manual.

#### Link to the EtherCAT symbol browser

#### ❑ Select symbols

A click on this link opens the EtherCAT symbol browser, where the signals can be selected.

### 9.3.6 EtherCAT symbol browser

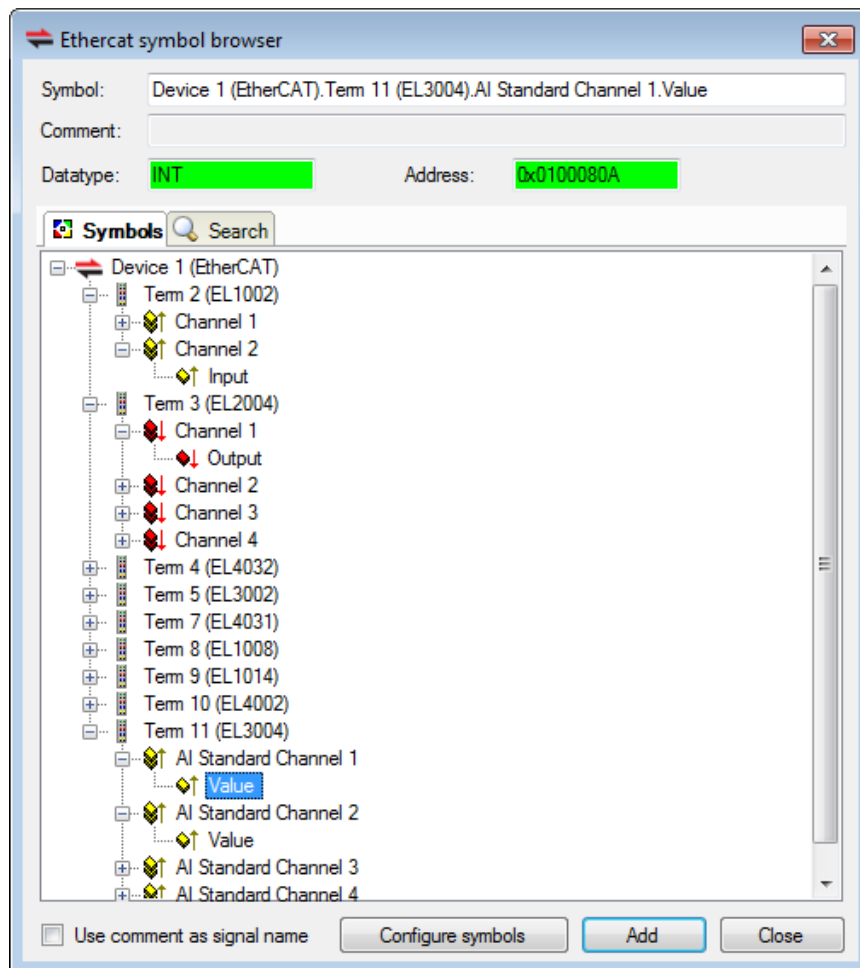


Figure 9: EtherCAT symbol browser

In the tree structure, now select all terminals, whose signals should be recorded. Open the terminal symbol and select the signal. The appropriate symbol name, the data type, the logical address and perhaps a comment are displayed in the upper section. It is also

possible to select several signals within a terminal. The signal is added to the signal table when double clicking on the desired signal or clicking on the button <Add>.

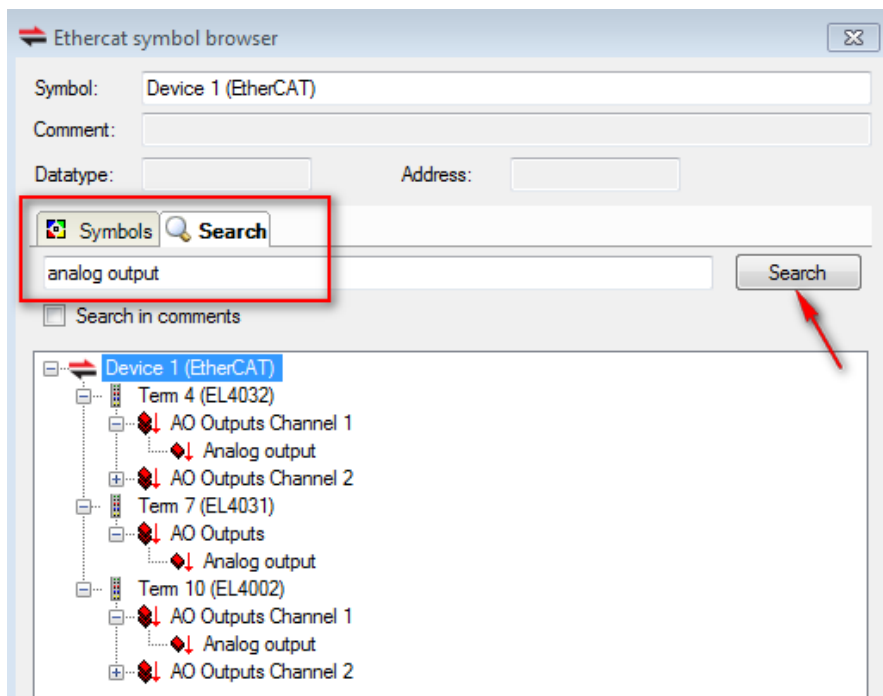
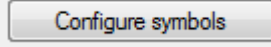


Figure 10: EtherCAT symbol browser

Moreover the EtherCAT symbol browser offers a search function, which makes the signal selection easier. Enter a search term in the search tab and when clicking on the <Search> button all appropriate signals will be listed.

When the EtherCAT project file contains comments on the signals, it is also possible to search for comment terms. In order to use comments as signal names mark the check box “Use comment as signal name”.

Use comment as signal name

A new EtherCAT project file can be loaded by clicking on the button . A form will open in which you can enter the name of the EtherCAT project file, or you can select the file from your file directory via a browser.

If all desired signals are selected, close the window with the <Close> button. If necessary, you can add more signals later.

### 9.3.7 Module „Standard“ – „Analog“ tab

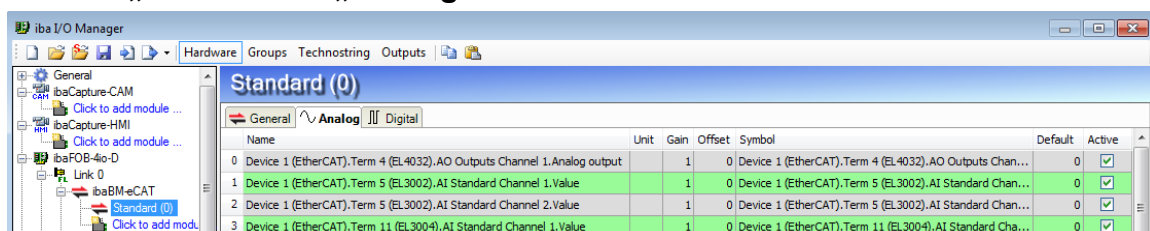


Figure 11: Module “Standard” – “Analog” tab



- Active**  
Activate/deactivate the signal.
- Further columns can be shown or hidden by using the context menu (right mouse click in the table header).

### 9.3.8 Module „Standard“ – „Digital“ tab

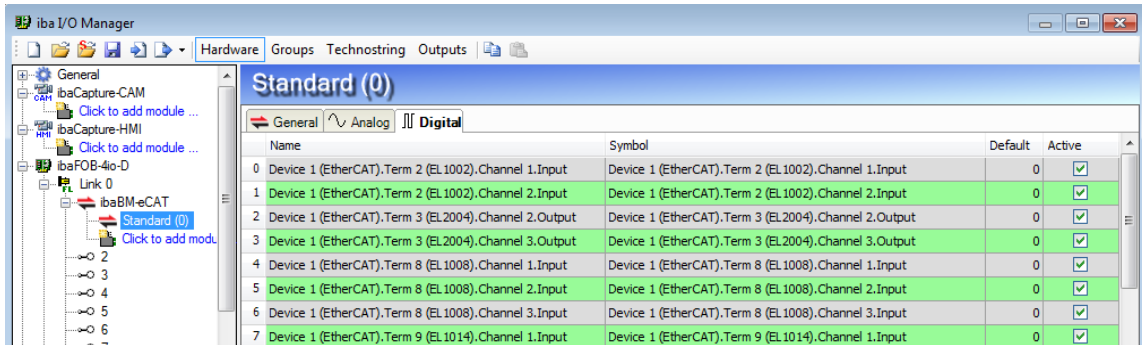



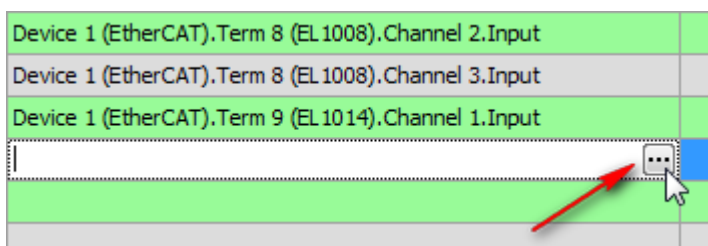
Figure 12: Module “Standard” – “Digital” tab



#### Note

If the columns “Address type, Direction, Address and Bit no.” are visible in the signal grid in the “Digital” tab instead of the column “Symbol”, the EtherCAT symbols are not loaded (see chapter 9.1, step 5) or the “Use symbol browser” option is not enabled (see chapter 9.3.5). iba recommends to use the symbols only. That’s why this view of the signal grid is not part of this manual.

- Name**  
The signal name will be imported automatically. Alternatively you can enter a signal name and additionally two comments when clicking on the  symbol.
- Symbol**  
The entry will be imported automatically and contains the name of the EtherCAT master, the terminal name, the channel and the measured value, each separated by a dot.  
The complete information will be displayed as a tooltip, including the actual physical or logical address, the bit number and the direction.  
It is also possible to add new signals from this view. Just click in a field in the “Symbol” column and then on the browse button.



Then the EtherCAT symbol browser, which now only shows the digital signals, will open.

- Default value**  
The device will send the value entered here, when the EtherCAT connection is broken, see chapter 9.3.1.



- Active**  
Activate/deactivate the signal.
- Further columns can be shown or hidden by using the context menu (right mouse click in the table header).

## 10 Technical Data

### 10.1 Main data

<b>Short description</b>					
Designation	ibaBM-eCAT				
Description	Bus monitor for EtherCAT lines				
Order number	13.127000				
<b>Bus interfaces (EtherCAT)</b>					
Number	2 (1x master, 1x slave) for 1 EtherCAT line				
Data recording	<table border="0"> <tr> <td style="text-align: right;">Sniffer</td> <td>without additional bus configuration</td> </tr> <tr> <td style="text-align: right;">Slave, optional</td> <td>additional direct addressing of signals with a device-specific ESI file (IO device file) for the bus configuration</td> </tr> </table>	Sniffer	without additional bus configuration	Slave, optional	additional direct addressing of signals with a device-specific ESI file (IO device file) for the bus configuration
Sniffer	without additional bus configuration				
Slave, optional	additional direct addressing of signals with a device-specific ESI file (IO device file) for the bus configuration				
Data volume	<table border="0"> <tr> <td style="text-align: right;">Sniffer</td> <td>Up to 512 analog and 512 digital values in each direction (up to 4096 Bytes) at min. ibaNet sampling rate</td> </tr> <tr> <td style="text-align: right;">Slave</td> <td>Addressing of up to 512 analog and 512 digital outputs (<math>\leq 32</math> Bit) on the bus, up to 2 x 1360 Bytes (also when values <math>&gt; 32</math> Bit)</td> </tr> </table>	Sniffer	Up to 512 analog and 512 digital values in each direction (up to 4096 Bytes) at min. ibaNet sampling rate	Slave	Addressing of up to 512 analog and 512 digital outputs ( $\leq 32$ Bit) on the bus, up to 2 x 1360 Bytes (also when values $> 32$ Bit)
Sniffer	Up to 512 analog and 512 digital values in each direction (up to 4096 Bytes) at min. ibaNet sampling rate				
Slave	Addressing of up to 512 analog and 512 digital outputs ( $\leq 32$ Bit) on the bus, up to 2 x 1360 Bytes (also when values $> 32$ Bit)				
Sampling rate	According to bus cycle time (if cycle time is below 500 $\mu$ s, there are restrictions on the number of values)				
Signal delay	355 ns to 570 ns				
Supported EtherCAT address range	4 GByte for both logical and physical allocation				
Supported signal types	Digital with 1 Bit Analog as integer values with 8 bit, 16 bit or 32 bit (signed and unsigned) or as IEEE 32 bit and 64 bit floating point values				
Connector type	2 x RJ45 socket (EtherCAT 100 Mbit/s)				
<b>ibaNet interface (fiber optics)</b>					
Number	1 (e. g. for the connection to ibaPDA)				
ibaNet protocol	32Mbit Flex protocol Allows connecting up to 15 devices at a time in ring topology Can be used for measured data, setup data and service ( e. g. updates)				
Data transmission rate	32 Mbit/s				
Sampling rate	Up to 40 kHz, freely adjustable				

Connector type	2 ST connectors (62.5 µm/125 µm) for RX and TX, cable length up to 2000 m without repeater
<b>Supply, operating and indicating elements</b>	
Power supply	24 V DC (±10 %), not stabilized
Power consumption	Max. 8 W
Indicators	4 LEDs for device status 4 LEDs for the two EtherCAT-channels 4 LEDs for the slave function
<b>Operating and environmental conditions</b>	
Cooling	passive
Operating temperature	32 °F to 122 °F (0 °C to 50 °C)
Storage and transport temperature	-13 °F to 158 °F (-25 °C to +70 °C)
Mounting	Mounting rail according to DIN EN 60715, vertical
Humidity class (DIN 40040)	F, no condensation
Protection class	IP20
Certificates	EMC: EN 61326-1, FCC part 15 class A
<b>Dimensions and weight</b>	
Dimensions (width x height x depth)	2.1 in x 7.4 in x 5.6 in (54 mm x 188 mm x 141 mm), including mounting rail clip
Weight (incl. box and documentation)	Approx 2.43 lbs (1.1 kg)

## 10.2 Dimension sheet

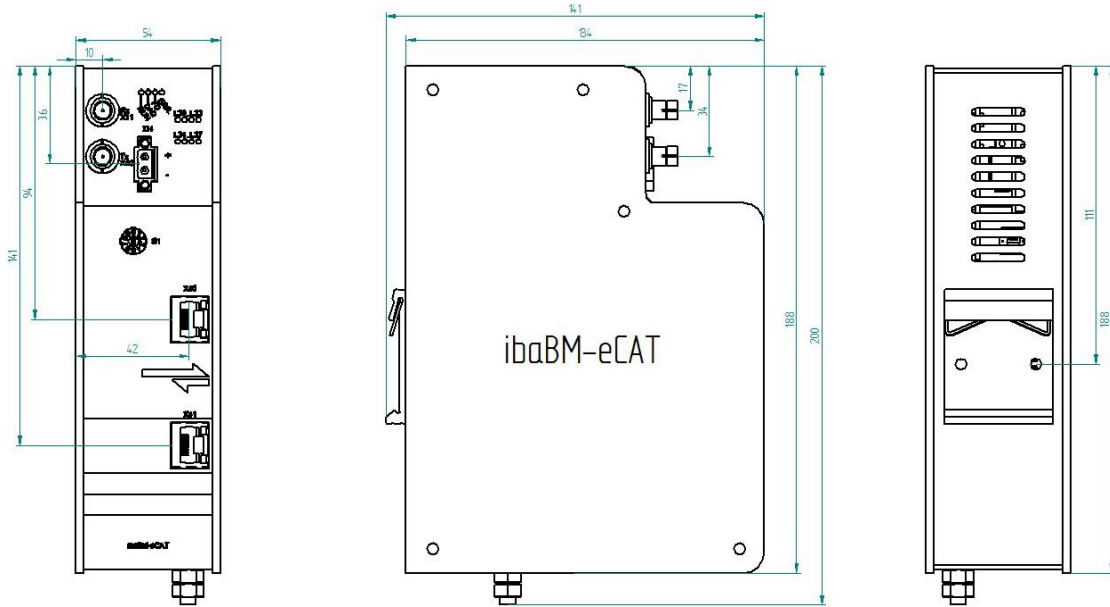


Figure 13: Dimension sheet (dimensions in mm)

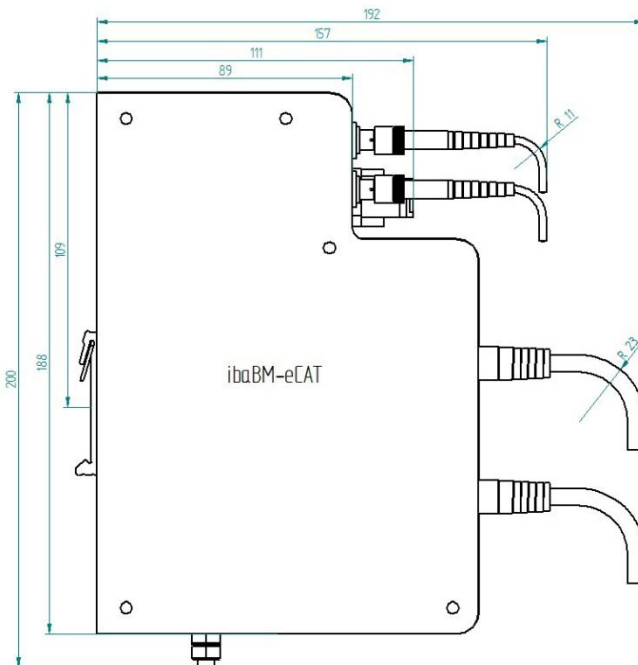


Figure 14: Dimension sheet device with cables (dimensions in mm)

## 11 Appendix

### 11.1 IO Device File (ESI) < Version 1.7

When using ESI files up to version 1.5 for ibaBM-eCAT the following limitation occurs with the TwinCAT version v2.11.1555 (System Manager Version v2.11.0):

When the ESI file of ibaBM-eCAT is integrated in the EtherCAT configuration a conflict occurs with the EtherCAT configuration in

- Signalgroup\_11, from signal\_11\_19 to signal\_11\_31.

The TwinCAT System Manager reaches the maximum size of an EtherCAT frame (default size 1514 bytes). Hence, it terminates the first frame and starts with the second frame and the System Manager overwrites those signals.

As a consequence those signals cannot be used and must not be linked in the System Manager!

All following signals, i.e. from signal\_12\_0, may properly be used.

Please note also:

- ❑ If signals, which are before the above mentioned signals, are deactivated in the PDO assignment, then signals behind must not be used, depending on when the maximum size of an EtherCAT frame is reached.
- ❑ This restriction takes only effect, when the ibaBM-eCAT slave is configured as first slave after the master and before all other slaves (as recommended by iba).

### 11.2 FO configuration using 32Mbit ibaNet protocol (StaticFO)

The bus monitor ibaBM-eCAT supports basically the ibaNet protocol 32Mbit Flex. The rotary switch position can be 1...15 (1...F) depending on the device address.

When the rotary switch is set to „0“, it is possible to use the FO connection with 32Mbit protocol and copy a fixed signal configuration, which has been predefined in ibaPDA, to the device. This function is also called „StaticFO“ in short.

Using the 32Mbit ibaNet protocol, it is possible to connect to an ibaLogic-V5 system or another iba-hardware in 32Mbit mode, e. g. ibaBM-DP.

#### 11.2.1 Configuration of 32Mbit ibaNet protocol

First of all, the configuration is performed in ibaPDA, when the device is set to 32Mbit Flex ibaNet protocol (rotary switch unequal zero), configuration description see chapter 7.2.4.

It is to be noted, that only the following 32Mbit protocols can be adjusted:

- 32Mbit 50µs (Real32)
- 32Mbit 100µs (Real64)
- 32Mbit 200µs (Real128)
- 32Mbit 400µs (Real256)
- 32Mbit 1000µs (Real512)

Therefore only these values may be used as timebase: 0.05 ms, 0.1 ms, 0.2 ms, 0.4 ms or 1 ms.

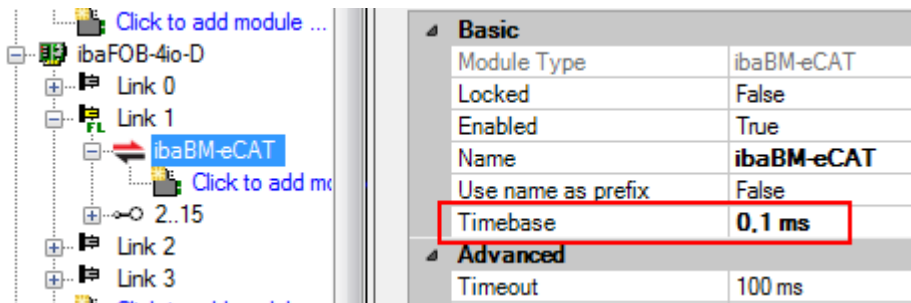


Figure 15: Timebase setting

When the configuration has been successfully completed the rotary switch S1 can be set to zero (S1 = 0) in order to activate the 32Mbit protocol.

A signal list is then created on the device, which shows clearly the signal mapping on the fiber optic cable including the signal names configured in ibaPDA.

### 11.2.2 FTP connection to the device

An FTP connection is required to download the signal list file. In order to establish an FTP connection to the device proceed as follows:

1. Connect the device to the PC via an USB cable.  
The USB interface is located at the bottom of the device. A USB cable of A to B type is required.  
A suitable cable is available at iba on request.
2. As soon as the computer is connected for the first time to the device, the “Found New Hardware Wizard” will show up and the driver for the USB connection has to be installed.  
You find the driver on the DVD delivered with the device in this directory:  
\\02\_iba\_Hardware\ibaBM-eCAT\02\_USB-Driver\
3. After having installed successfully, an additional network connection is available with the device name „IBA AG USB Remote NDIS Network Device“.
4. A fixed IP address must be assigned to this interface. The address has to be from this range: 192.168.0.n with n = 2...254 and the subnetmask 255.255.255.0.

#### Example:

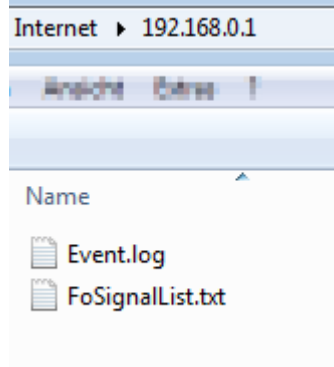
IP: 192.168.0.2  
SubNet: 255.255.255.0

5. Now, you can establish an FTP connection to the device. You may use an FTP client or the Windows File Explorer.  
In both cases, the address is „192.168.0.1“ and the user is „anonym“ without any password.

#### Example: Windows File Explorer:



6. The following files are displayed in the file window:



### 11.2.3 Signal list file

The signal list file contains the FO configuration and the signal mapping including the signal names from the ibaPDA configuration.

The following figure shows an example of a signal list file:

```

*****
*** Fiber optic settings ***
*****
Mode: 32 Mbit Real 128A + 128D, Period: 200 us

*****
***      Signal lists      ***
*****

*** Fiber optic output, list of digital signals (called DI in the modules) ***
Signal|Len|Fiber optic|PDA setting|
|bit|      Signal|Address|bit|
-----+-----+-----+-----+
InSwitch1| 1|      D32| 0x244| 0|
InSwitch2| 1|      D33| 0x244| 1|
InSwitch3| 1|      D34| 0x244| 2|
Signalgruppe_16.Switch 1| 1|      D0| 0x240| 0|
Signalgruppe_16.Switch 2| 1|      D1| 0x240| 1|
Signalgruppe_16.Switch 3| 1|      D2| 0x240| 2|
Signalgruppe_31.TriggerWhenCounterReset| 1|      D3| 0x240| 3|
Signalgruppe_31.CounterZw0und250| 1|      D4| 0x240| 4|
Signalgruppe_31.CounterZw250und500| 1|      D5| 0x240| 5|
Signalgruppe_31.CounterZw500und750| 1|      D6| 0x240| 6|
... - Input From DO 1 (Reset PLC Count)| 1|     D35| 0x244| 3|
...- Input From DO 2 (PLC Ten Task Bit)| 1|     D36| 0x244| 4|

*** Fiber optic output, list of analog signals (called AI in the modules) ***
Signal|Len|Type|Fiber optic |PDA setting|
|bit|      |Signal|Offset |Address|
-----+-----+-----+-----+
SourceSignalSinus| 16| INT| A86|0 Bytes| 0x198|
SourceSignalSinusKBus| 16| INT| A86|2 Bytes| 0x19A|
OutSinus| 16| INT| A0|0 Bytes| 0x40|
PlcSignal01MalEinHalb| 16| INT| A0|2 Bytes| 0x42|
SIGNALGRUPPE_0.PlcSinus| 32| FLOAT| A1|0 Bytes| 0x44|
SIGNALGRUPPE_0.PlcSinus*2| 32| FLOAT| A2|0 Bytes| 0x48|
SIGNALGRUPPE_1.PlcSinus*4| 32| FLOAT| A3|0 Bytes| 0x4C|
SIGNALGRUPPE_1.PlcSinus*8| 32| FLOAT| A4|0 Bytes| 0x50|
SIGNALGRUPPE_15.Counter| 32| FLOAT| A5|0 Bytes| 0x54|
SIGNALGRUPPE_15.Counter+100| 32| FLOAT| A6|0 Bytes| 0x58|

```

Figure 16: Signal list example

The selected ibaNet protocol 32Mbit is displayed under “Fiber optic settings”.

The mapping of the IO signals and the FO configuration is shown in the signal list. The signals are grouped by digital and analog signals.

The column “Fiber optic Signal” (blue frame in the following figure) shows the corresponding allocation on the fiber optic cable for each signal. This may be used for the connectivity to ibaLogic or other iba-hardware.

```

*** Fiber optic output, list of digital signals (called DI in the modules) ***
Signal|Len|Fiber optic|PDA setting|
|bit|      Signal|Address|bit|
-----+-----+-----+-----+
InSwitch1| 1|      D32| 0x244| 0|
InSwitch2| 1|      D33| 0x244| 1|
InSwitch3| 1|      D34| 0x244| 2|

```

Figure 17: Signal mapping in the fiber optic cable



The given address with the corresponding offset, shown in the column „PDA setting (green frame), is an additional information for the use with ibaPDA. The FOB fast module can be configured in advanced mode with this setting.

## 12 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.

---

### Contact

#### Headquarters

iba AG  
Koenigswarterstr. 44  
90762 Fuerth  
Germany

Phone: +49 911 97282-0

Fax: +49 911 97282-33

Email: iba@iba-ag.com

Contact: Mr. Harald Opel

#### Regional and Worldwide

For contact data of your regional iba office or representative please refer to our web site [www.iba-ag.com](http://www.iba-ag.com).