



ibaBM-DDCS

Bus monitor for the DDCS drive bus from ABB

Manual

Issue 1.11

Measurement Systems for Industry and Energy

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The current version is available for download on our website: 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.



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 its own expense.

Issue	Date	Revision	Chapter	Author	Version HW / FW
1.11	01-2021	Supported system, FCC declaration	4.4		

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1 About this manual

This manual describes the structure, use and operation of the device ibaBM-DDCS.

1.1 Target group

This manual particularly addresses qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her specialist training, knowledge and experience and knowledge of the standard regulations.

1.2 Notation

In this manual the following notations are used:

Action	Notation
Menu commands	Menu <i>Logic diagram</i>
Calling the menu commands	<i>Step 1 – Step 2 – Step 3 – Step x</i> Example: Select the menu <i>Logic diagram - Add - New function block</i> .
Keys	<Key name> Example: <Alt>; <F1>
Press keys at the same time	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Graphic keys (Buttons)	<Button name> Example: <OK>; <Cancel>
Filenames, paths	“File name” “Test.doc”

1.3 Symbols used

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!

If you do not observe the safety instructions regarding the process and the system or machine to be controlled, there is a risk of death or severe injury!

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 About this product

2.1 Description

The ibaBM-DDCS device is a bus monitor for the DDCS communication bus from ABB and serves to connect the process data acquisition system ibaPDA.

The device can be used for capturing of signals and their transmission to an ibaPDA measuring system in order to record data continuously or triggered by event.

The purpose of this device is:

- to be able to locate errors quickly
- to be able to assess the quality of the closed-loop control and derive conclusions about the status of the machine
- to optimize the drive.

The ibaBM-DDCS enables free and reactionless access to the drive's parameter and to the communication telegrams between drive and controller. The desired data is selected with the I/O Manager of the ibaPDA software.

The communication between ibaPDA and ibaBM-DDCS is handled by the bidirectional iba fiber optic protocol 32Mbit Flex, which requires an I/O card of the ibaFOB-D generation, e. g. ibaFOB-2io-D. The sampling rate can be up to 40 kHz, whereby up to 4060 Byte can be transmitted over the fiber optics to the ibaPDA computer for recording.

2.2 Areas of use

The device is intended for:

- the permanent connection of an ibaPDA measurement system
- the connection of an ibaPDA measurement system only when needed (errors/problems)
- the temporary connection of a mobile computer or notebook (if necessary, additionally to the existing PC measurement system).

The ibaPDA recording software is optimized for large amounts of data. Depending on the ibaPDA license and computer capacity, any number of analog and/or digital signals can be captured, visualized and recorded. Measurements with a sampling time of down to 25 μ s are possible.

Furthermore, iba has other modules, connections and software components for connecting a variety of PLC systems, which can be connected in parallel to the ibaBM-DDCS.

3 **Scope of delivery**

The scope of delivery includes:

- ibaBM-DDCS device
- Manual
- 2 pin plug for power supply
- See www.iba-ag.com for other accessories not included in the scope of delivery.

4 System requirements in the ibaPDA computer

4.1 Hardware

- PC equipped as follows:
 - a free PCI slot or PCIe slot
 - ExpressCard slot (notebook)

Under www.iba-ag.com you find suitable computer systems with desktop and industry housing.

- A fiber optic interface card of the ibaFOB-D generation with firmware version V2.00 (build 172) or higher:
 - ibaFOB-io-D or -Dexp
 - ibaFOB-2io-D or -Dexp
 - ibaFOB-2i-D or -Dexp with expansion module ibaFOB-4o-D
 - ibaFOB-4i-D or -Dexp with expansion module ibaFOB-4o-D
 - ibaFOB-io-ExpressCard
- An ibaNet fiber optic patch cable (duplex) for connecting ibaBM-DDCS and ibaPDA computer

4.2 Software

- ibaPDA V6.26 or higher for capturing, recording and displaying the measurement data and for configuring the device
- ibaAnalyzer for displaying and analyzing the recorded data (optional)

4.3 ibaBM-DDCS

- Firmware beginning with version v02.06.001
- Hardware beginning with version A7

4.4 Converter and automation systems

- Converter of systems from ABB which support the DDCCS protocol
 - Converters of current design: DCS800, AC80, AC400, AC800, ACS800, ACS6000
 - Converters of older design: DCS600 and ACS600
- NDBU-95 branching unit for connecting ibaBM-DDCS to the DDCCS bus
- Plastic fiber optic cable to connect ibaBM-DDCS and ABB equipment
- For more information, please contact the service of ABB Mannheim.

5 Safety guidelines

CAUTION

Observe the operating voltage range

Stay within the operating voltage range of DC +24 V ($\pm 10\%$)!

CAUTION

Do not open the device!

There are no components requiring maintenance in the device.

Opening the device voids your warranty.



Note

Cleaning

Use a dry or slightly damp cloth to clean the device.

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.
3. Connect the power supply. Observe the correct polarity.
4. Connect the other cables.

6.2 Disassembly

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

7 Description of the device

7.1 Properties

- Bus monitor for the ABB DDCS bus
- Automatic detection of the system configuration
- Logging of data sent to and from the drive control
- Capture of drive's internal measured values and parameters
- Configuration and data recording with ibaPDA via bidirectional fiber optic cables (32Mbit Flex protocol)
- Sampling rate up to 40 kHz and data size up to 4060 Byte
- Additional connection options for computers with DriveWindow
- Rugged design, mounting rail installation
- Connection of up to 15 devices in a fiber optics ring with 32Mbit Flex protocol

7.2 Functions

The device logs DDCS bus signals which are used in ABB drives.

The device offers connections for 3 fiber optic cable pairs in order to realize the following functions:

- Logging of the signals, which are exchanged between controller and drive (data set channel).
- Active querying of additional measurements and parameters from the drives (parameter channel).
- Loophrough of configuration and measurement queries of an external computer with DriveWindow.

7.3 Configuration

The values to be measured are selected via a configuration dialog in the ibaPDA software which is installed on the computer.

The device automatically detects the connected drives with the associated signals. The signals to be recorded can be selected in the I/O Manager of the ibaPDA software.

7.4 Computer side

On the computer side, the iba modules ibaFOB-io-D, ibaFOB-2io-D or ibaFOB-4i-D with the ibaFOB-4o-D supplementary modules are used.

Parallel to this, discrete signals can be coupled via other fiber optic connections, e.g. using ibaPADU or ibaNet750-BM. The option of coupling in signals from other systems using system connections and bus monitors is also available.

The ibaFOB-io-ExpressCard is used to couple notebooks.

7.5 Device layout

Front view

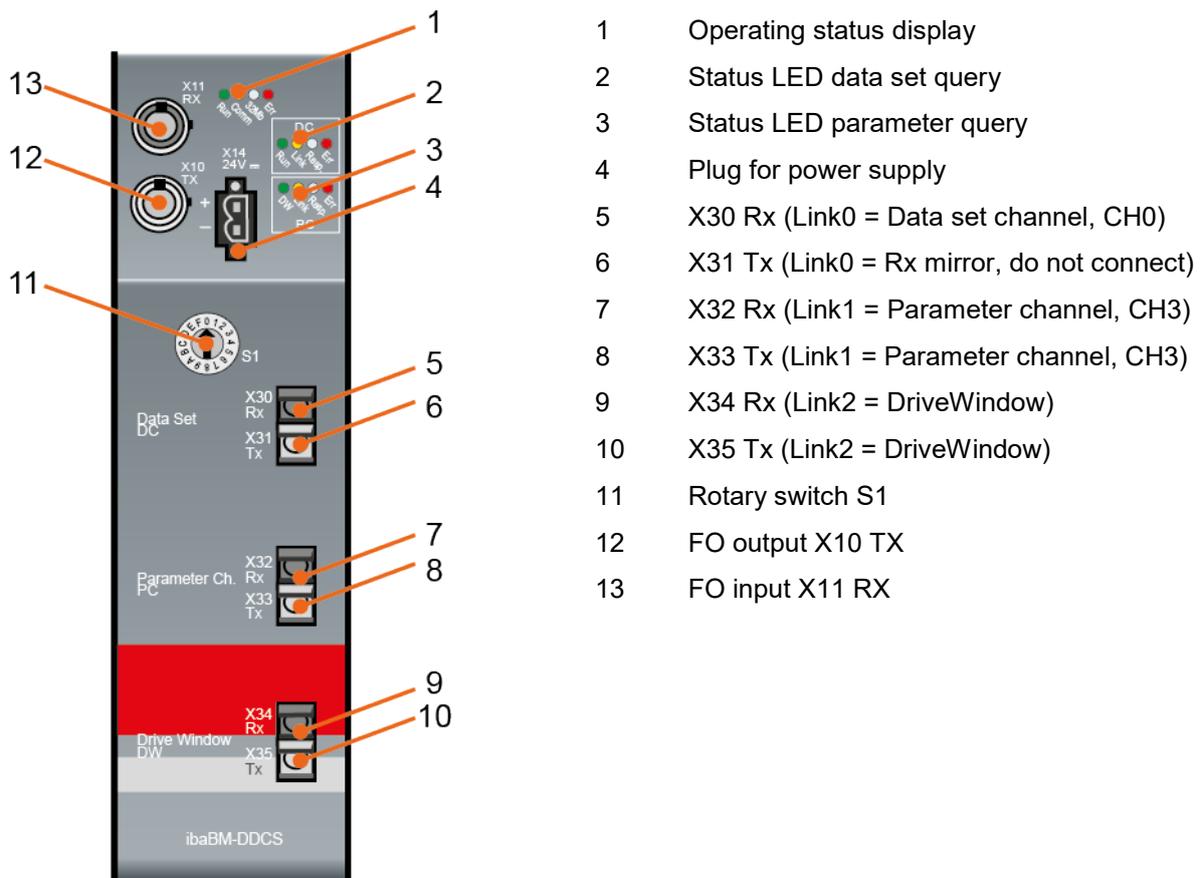


Figure 1: Device layout

7.5.1 Operating status display (status LEDs) (1)

LED	Status	Description
Run (green/red)	red on	Device starting; if the device is booted up, the LED changes to green
	green blinking	Device working
	off	No power
Comm (yellow)	off	No measurement
	on	Measuring
32Mb (white)	off	No data reception 32 Mbit/s on X11
	on	Data reception 32 Mbit/s on X11
	blinking	Data reception 32 Mbit/s on X11 but signal is wrong
Err (red)	off	Normal status, everything is OK
	blinking	Error has occurred within the device

Table 1: Operating status display LEDs

7.5.2 Status LEDs data set query (2)

LED	Status	Description
Run (green)	blinking	Data query OK
	off or on	Function problems / device is defective
Link (yellow)	blinking	Blinks when a message is received (steadily lit when several messages are being received)
Resp (white)	on	Data requested, all data arriving
	blinks quickly	Data requested, data are not arriving
	blinks slowly	Data requested, only some data arriving
	off	No data requested
Err (red)	on	Disrupted message received (possible cause: the topology setting of the drives connected to the NDBU-95 is wrong, see chapter 8.3.2)
	off	Normal status, everything is OK

Table 2: Data set query status LEDs

7.5.3 Status LEDs parameter query (3)

LED	Status	Description
DW (white)	on	Connection for DriveWindow released
	off	Connection for ibaBM-DDCS released
Link (yellow)	blinking	Blinks when a message is received (steadily lit when several messages are being received)
Resp (white)	on	Data requested, all data are arriving
	blinks quickly	Data requested, data are not arriving
	blinks slowly	Data requested, only some data are arriving
	off	No data requested
Err (red)	on	Disrupted message received
	off	Normal status, everything is OK

Table 3: Parameter query status LEDs

7.5.4 24 V power supply (4)

A DC voltage of 24 V (20 V to 30 V) must be applied to the 2-pin Phoenix threaded coupling connector provided for the power supply.



Important note

Make sure the polarity is correct!

7.5.5 X30 Rx (5) and X31 Tx (6)

Interface via X30 (Rx) to the data set channel in the DDCS network (CH0). The data received on X30 is mirrored to the output X31 (Tx).

X31 must not be connected to the input of the branching unit NDBU. This connection leads to malfunctioning.

7.5.6 X32 Rx (7) and X33 Tx (8)

Interface to the parameter channel in the DDCS network (CH3).

7.5.7 X34 Rx (9) and X35 Tx (10)

Connection to the loopthrough of a computer with DriveWindow

7.5.8 Rotary switch S1 (11)

Up to 15 ibaBM-DDCS devices can be interconnected in a ring topology. The devices are addressed via the rotary switch S1.

Device numbers in the cascade	Rotary switch position
Not allowed	0
1 st Device	1
2 nd Device	2
⋮	⋮
14 th Device	E
15 th Device	F

7.5.9 Fiber optic connections X10 TX (12) and X11 RX (13)

X11: fiber optic reception interface (RX)

X10: fiber optic sending interface (TX)

An I/O card of the ibaFOB-D generation must be installed in the ibaPDA computer in order to be able to send and receive data.

➤ See chapter 4 “System requirements in the ibaPDA computer”.

8 ibaBM-DDCS in ABB environment

8.1 Configuration with data set and parameter channel

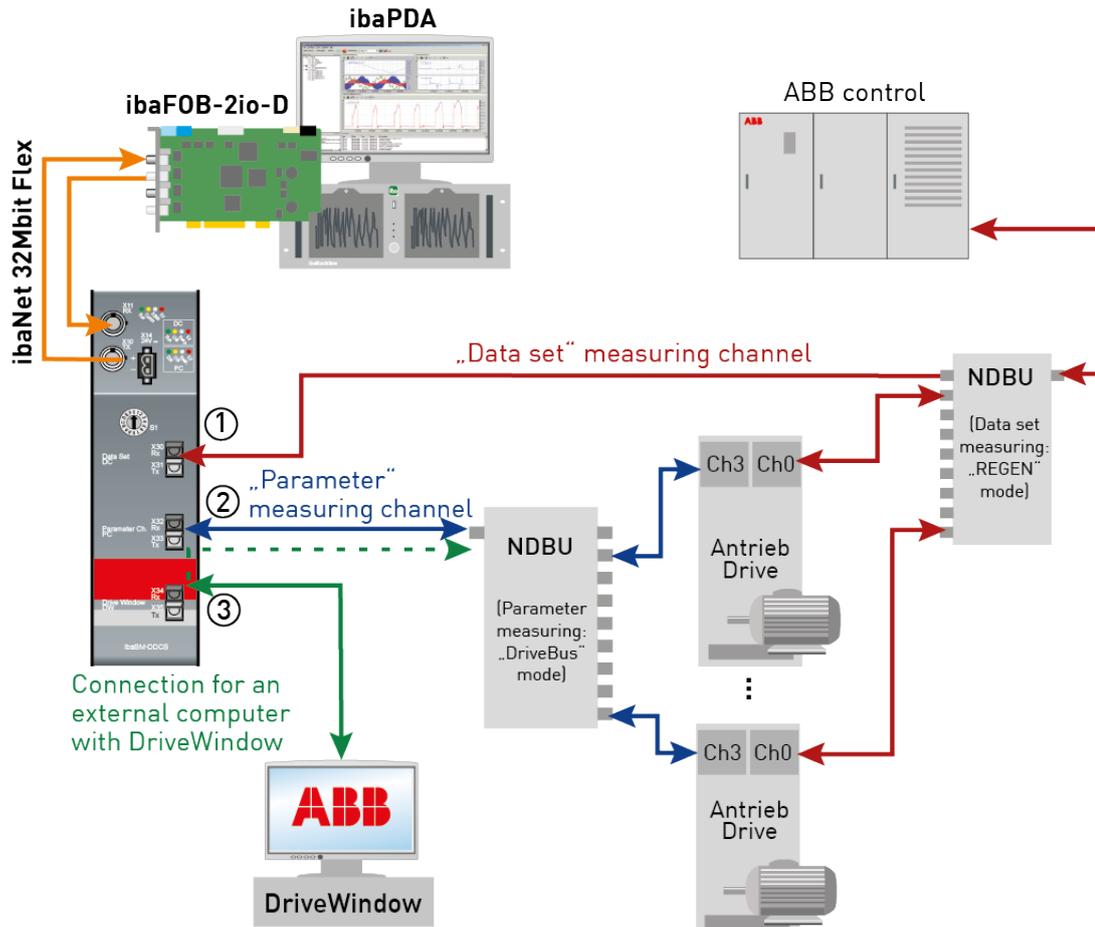


Figure 2: ibaBM-DDCS in the ABB environment with ABB control

ibaBM-DDCS offers 2 options for capturing and recording measured signals:

1. Logging of the signals in the data set channel (CH0 connection of the drives). **Simplex** fiber optic connection between ibaBM-DDCS X30 and an arbitrary channel of the NDBU-95 (NDBU operation mode: "REGEN"). The X31 output must not be connected to the NDBU-95.
Alternative connection: ibaBM-DDCS is integrated in the connection between NDBU-95 and ABB control.
2. Querying of other values from the drives in the parameter data channel (CH3 connection of the drives). **Duplex** fiber optic connection between ibaBM-DDCS X32/X33 and the CH3 port of a drive or the MSTR port of a NDBU-95 (NDBU operation mode: "DDCS/DRIVEBUS").
3. Furthermore, ibaBM-DDCS offers a connection to loopthrough configuration and measurement queries of an external computer with DriveWindow. The DriveWindow computer is connected to the drives via the parameter channel if needed. **Duplex** fiber optic connection between ibaBM-DDCS X34/X35 and the DriveWindow computer.

8.2 Cascading ibaBM-DDCS devices

Up to 15 devices supporting the ibaNet protocol 32Mbit Flex can be connected to each I/O link of an ibaFOB-D card in a fiber optic ring topology (e. g. ibaPADU-S-IT, ibaBM-eCAT). The rotary switch S1 has to be set to a unique device number at each device.

Keep in mind, that the total data rate in the fiber optic ring must be distributed among the connected devices.

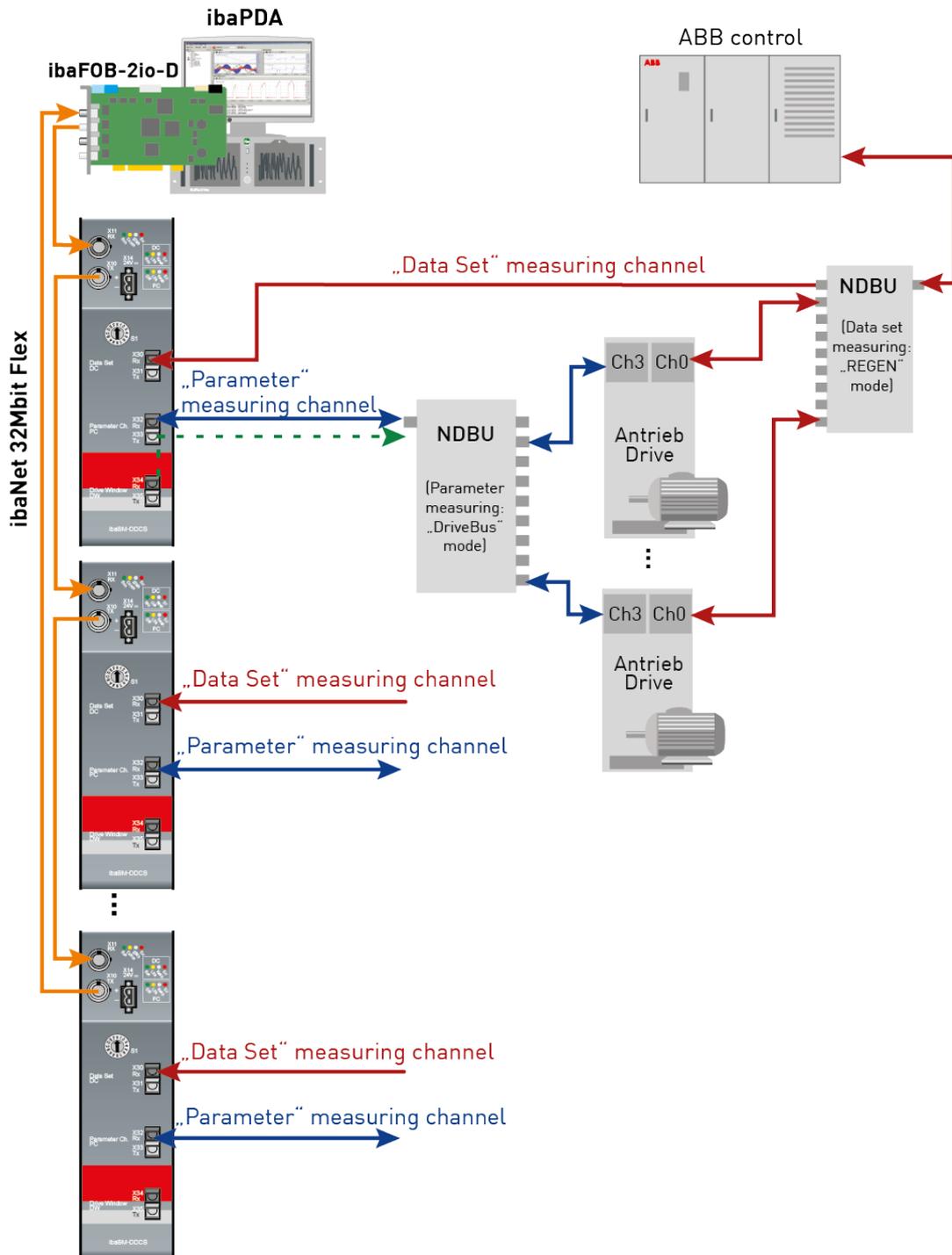


Figure 3: ibaBM-DDCS - cascading



Other documentation

For the description of the 32Mbit Flex protocol refer to the ibaFOB-D manual.

8.3 Data set channel

8.3.1 Data sets

The ABB control uses “data sets” to exchange information with the drives (CH0).

Every data set consists of three 16-bit Integer values (indices). A data set number and the data set index provide a given measurement or status value with ABB.

Data set xx.yy

Value 1	Index 1
Value 2	Index 2
Value 3	Index 3

The ABB control sends even data set numbers ($2n$) to the drives, which answer with the next odd data set number ($2n + 1$).

ABB control	Drive
<i>Query</i>	<i>response</i>
Data set 10 →	Data set 11 ←
Data set 12 →	Data set 13 ←

The desired signals are selected with ibaPDA via the following parameters:

- Node number (drive)
- Data set number
- Index

The device can read all data sets that the control requests from the drives and sends back to them.

8.3.2 Star topology with NDBU mode REGEN

One or more NDBU-95 devices (DDCS branching unit) are used to distribute the DDCS telegrams. 8 drives can be connected to each NDBU-95. Up to 16 NDBU-95 devices can be cascaded.

The device ibaBM-DDCS must be connected via a unidirectional FO cable to that NDBU-95, which is next to the controller. This NDBU-95 must be operated in REGEN mode, then the device can read all telegrams, including the response telegrams sent from the drives.

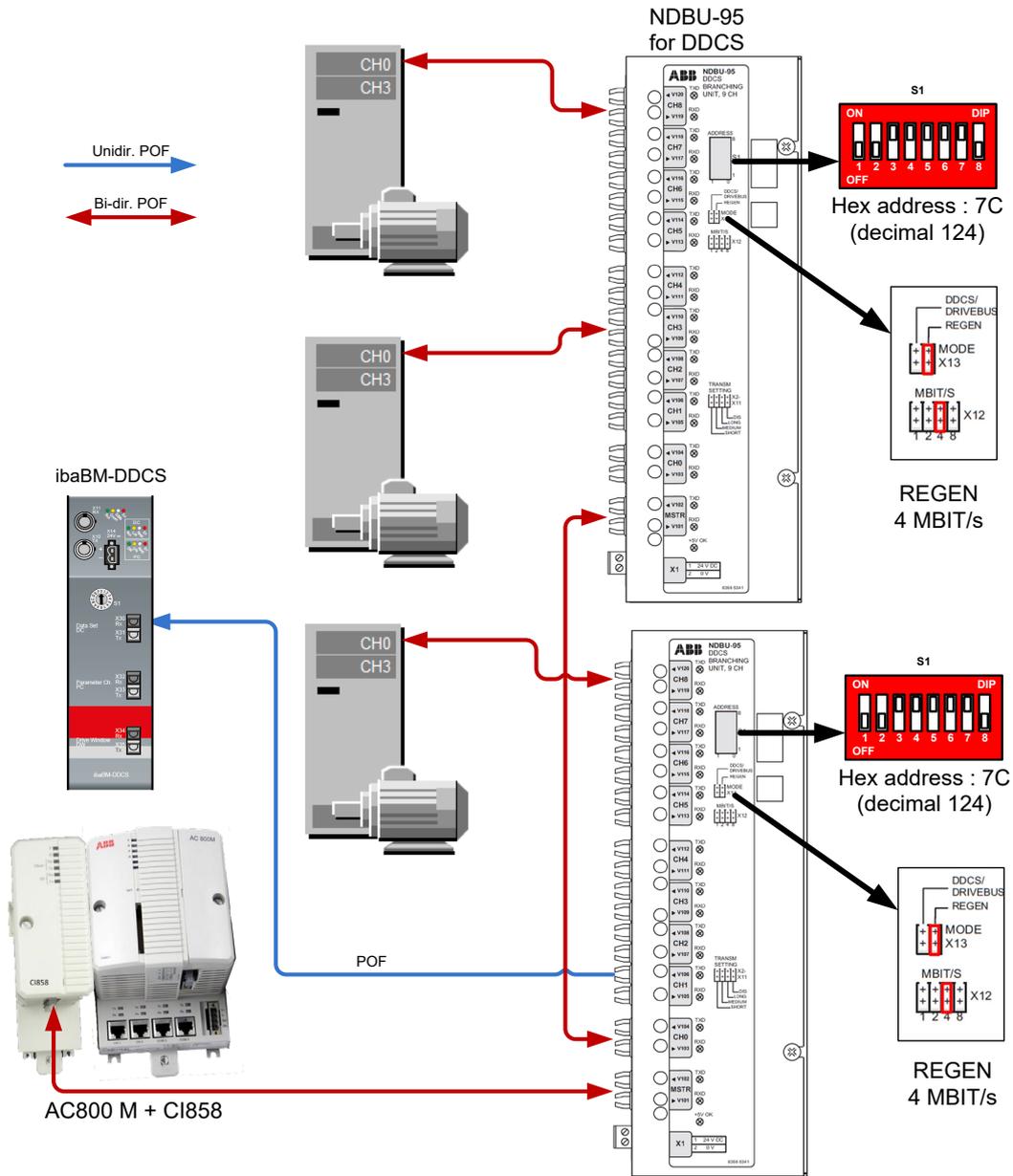


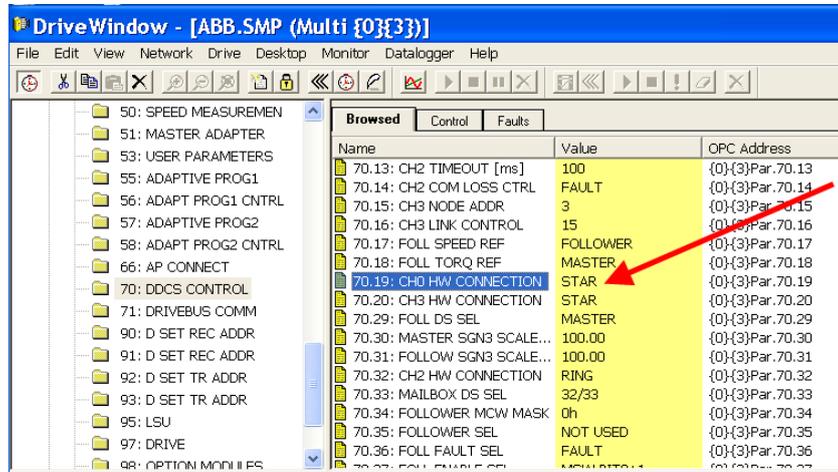
Figure 4: ibaBM-DDCS (data sets) with NDBU-95, REGEN mode



Important note

When acquiring data sets in a star topology, ensure that the connected drives are set to “Star” topology.

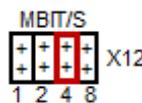
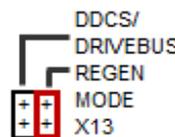
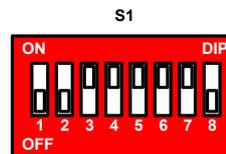
In DriveWindow, the parameter “CH0 HW CONNECTION” in the parameter set “DDCS Control” of each drive has to be checked and set to “STAR”.¹



In some drives, e.g. ACC800, there are several user sets. The topology setting must be set in all used user sets. The user sets can be loaded and saved in the parameter “APPLICATION MACRO” of the set “START-UP DATA” (z.B. Par. 99.03).

Settings at the branching unit NDBU-95

- Address settings (S1):
Address range 76 ... 124
Default setting (01111100) = 0x7C.
- Operating mode selection (X13):
adjust to REGEN mode
- Select transfer rate (X12):
Default value for CH0: 4 Mbit/s



¹ The parameter set is in the protected area (set 105) in some drives, e.g. ACC800. In this case, a 4-digit code has to be entered in the parameter „PASS CODE“ of the set „SYST CTR INPUTS“ (e.g. Par 16.03) in order to have access to the protected area. Please contact ABB, when the code is unknown.

ibaBM-DDCS connection to NDBU-95, REGEN mode

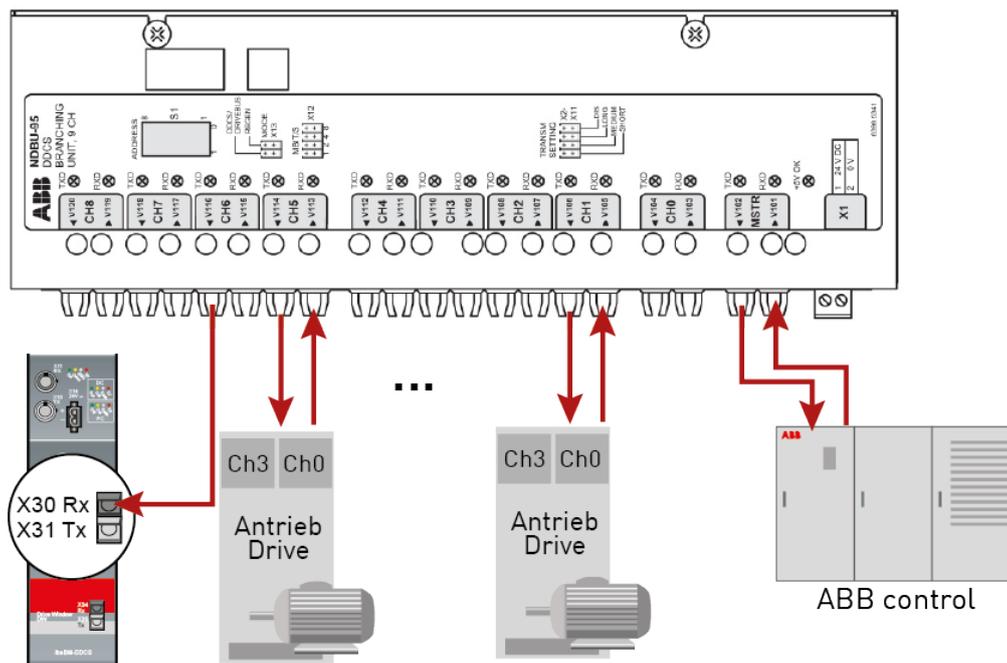


Figure 5: ibaBM-DDCS connection (data sets) to NDBU-95, REGEN mode

8.3.3 Star topology with NDBU mode DDCS/DRIVE BUS

This is an alternative configuration, if the NDBU-95 cannot be adjusted to REGEN mode. One or more NDBU-95 devices (DDCS branching unit) are used to distribute the DDCS telegrams. 8 drives can be connected to each NDBU-95. Up to 16 NDBU-95 devices can be cascaded.

The device ibaBM-DDCS is coupled into the FO connection between NDBU-95 (MSTR.TX) and the controller (DDCS.RX). ibaBM-DDCS can read all telegrams sent from the drives to the controller. In order to read the output telegrams from the controller, a „bridge“ has to be integrated at a free NDBU-95 port, i.e. the TX and the RX port must be connected via a FO cable.

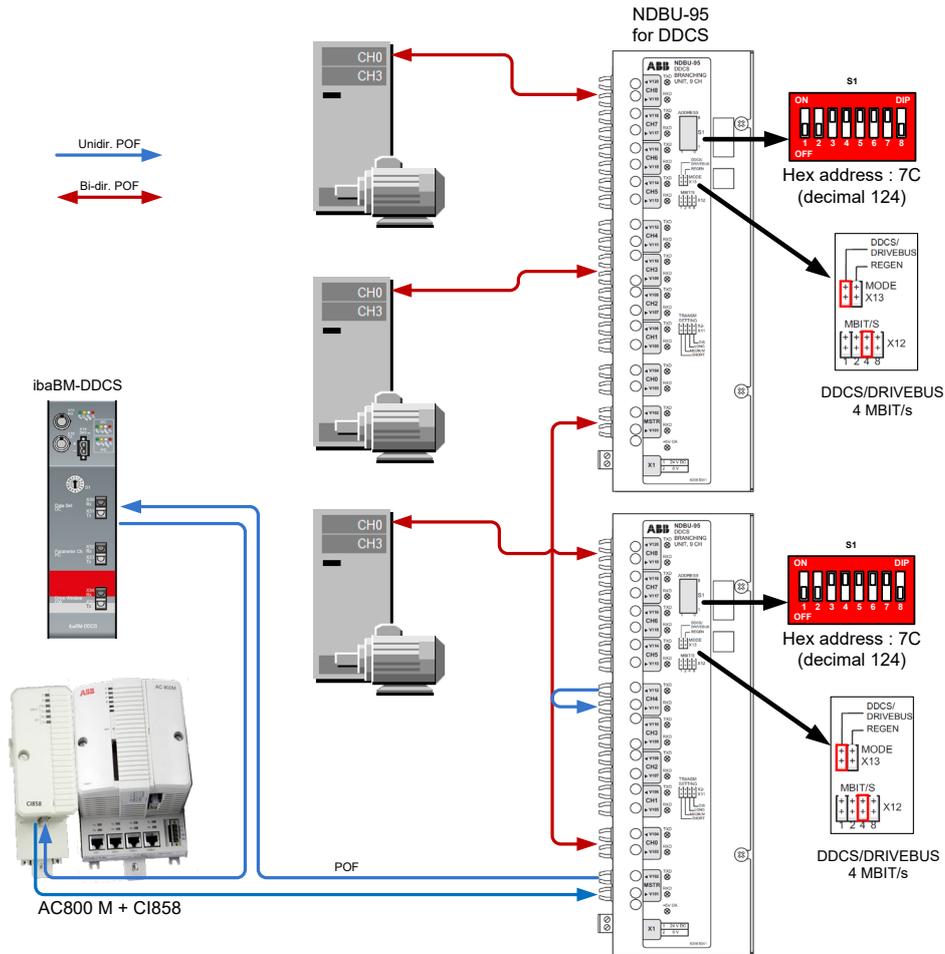


Figure 6: ibaBM-DDCS connection (data sets) to NDBU-95, DDCS/DRIVE BUS mode



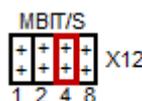
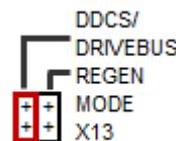
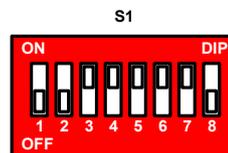
Important note

When acquiring data sets in a star topology, ensure that the connected drives are set to “Star” topology.

In DriveWindow, the parameter “CH0 HW CONNECTION” in the parameter set “DDCS Control” of each drive has to be checked and set to “STAR”².

Settings at the branching unit NDBU-95

- Address setting (S1):
Address range 76 ... 124
Default: (01111100) = 0x7C
- Operating mode selection (X13):
Adjust to DDCS/DRIVEBUS
- Transfer rate (X12):
Default setting CH0: 4 Mbit/s



² See important note and footnote 1 on page 19

ibaBM-DDCS connection to NDBU-95, DDCS/DRIVEBUS mode

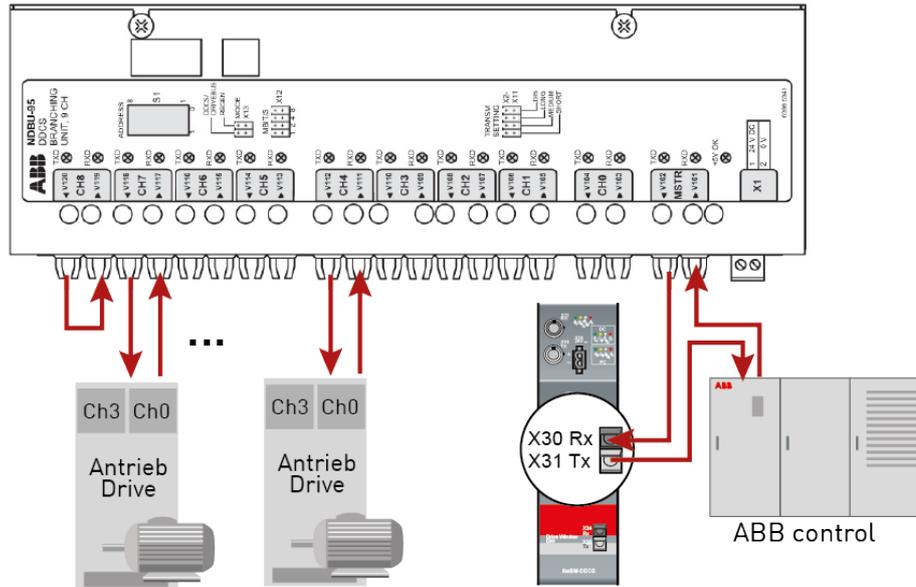


Figure 7: ibaBM-DDCS connection (data sets) to NDBU-95, DDCS/DRIVEBUS mode

8.3.4 Ring topology

A ring topology may often be found in older plants.

The telegrams are sent from one drive (CH0) to the next one via a FO ring. Every drive (CH0) takes the data which are addressed to it from the data stream and sends the reply data to the next drive. The last drive sends back the data to the controller.

The ibaBM-DDCS device is coupled into the ring between the last drive and the controller.

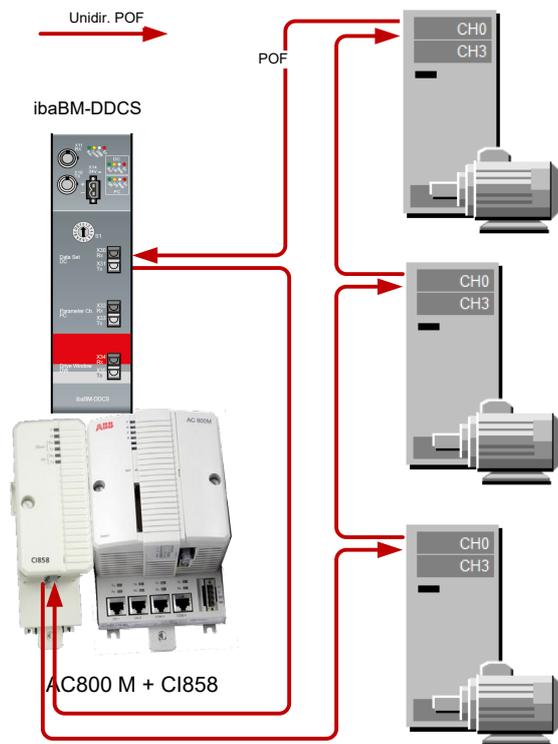


Figure 8: ibaBM-DDCS (data sets) in ring topology



Important note

When acquiring data sets in a ring topology, ensure that the connected drives are set to “Ring” mode.

In DriveWindow, the parameter “CH0 HW CONNECTION” in the parameter set “DDCS Control” of each drive has to be checked and set to “RING”.³

DriveWindow - [ABB.SMP (Multi {0}{3})]

File Edit View Network Drive Desktop Monitor Datalogger Help

50: SPEED MEASUREMENT
51: MASTER ADAPTER
53: USER PARAMETERS
55: ADAPTIVE PROG1
56: ADAPT PROG1 CNTRL
57: ADAPTIVE PROG2
58: ADAPT PROG2 CNTRL
66: AP CONNECT
70: DDCS CONTROL
71: DRIVEBUS COMM
90: D SET REC ADDR
91: D SET REC ADDR
92: D SET TR ADDR
93: D SET TR ADDR

Name	Value	OPC Address
70.13: CH2 TIMEOUT [ms]	100	{0}{3}Par.70.13
70.14: CH2 COM LOSS CTRL	FAULT	{0}{3}Par.70.14
70.15: CH3 NODE ADDR	3	{0}{3}Par.70.15
70.16: CH3 LINK CONTROL	15	{0}{3}Par.70.16
70.17: FOLL SPEED REF	FOLLOWER	{0}{3}Par.70.17
70.18: FOLL TORQ REF	MASTER	{0}{3}Par.70.18
70.19: CH0 HW CONNECTION	RING	{0}{3}Par.70.19
70.20: CH3 HW CONNECTION	STAR	{0}{3}Par.70.20
70.29: FOLL DS SEL	MASTER	{0}{3}Par.70.29
70.30: MASTER SGN3 SCALE...	100.00	{0}{3}Par.70.30
70.31: FOLLOW SGN3 SCALE...	100.00	{0}{3}Par.70.31
70.32: CH2 HW CONNECTION	RING	{0}{3}Par.70.32
70.33: MAILBOX DS SEL	32/33	{0}{3}Par.70.33
70.34: FOLLOWER MAILBOX...	OK	{0}{3}Par.70.34

³ See important note and footnote 1 on page 19

8.4 Parameter channel

8.4.1 Parameter

ibaBM-DDCS can access the service channel (CH3) of the ABB drives and query parameters there, independent from a communication connection to a controller. ibaBM-DDCS acts here as master and reads the current parameter values of the drives.

ibaBM-DDCS is directly connected to the CH3 port of a drive or to the master port of the NDBU-95, which is connected to the drives (CH3).



Important note

The parameter channel is only for acquiring supplementary information from drives or slow values, e.g. temperatures.

This is why we usually recommend for continuous acquisition the access via the data set-channel.



Important note

Since every parameter is requested via handshake (request – response) by the drive, the access cycle depends directly on the number of values, which are requested. A standard value is: approx. 2 ms per analog value and approx. 2 ms per 16 digital values.

Access times become very high, when many drives are connected. In order to improve this behavior, iba recommends using several ibaBM-DDCS devices, see the tip in chap. 8.5

The desired parameters are selected with ibaPDA as follows:

- Node number (drive)
- Parameter group
- Parameter number

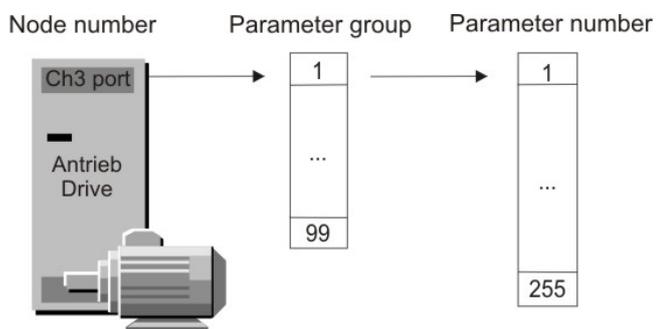


Figure 9: Parameter selection

Like in DriveWindow, the parameters can be selected with a symbolic browser, where the user can see the node names, the parameter groups and the parameters as text.

If DriveWindow and ibaPDA shall be operated in parallel, DriveWindow is connected to the X34 (RX/TX) port of ibaBM-DDCS. The accesses to the drives are looped through ibaBM-DDCS. In contrast to DriveWindow, ibaPDA can only read the parameters.

ibaPDA only supports the acquisition of analog parameter values in 32-bit IEEE-Float format and digital parameter values.



Important note

Analog parameters in other formats, e. g. DINT, are misrepresented in ibaPDA.

When there is only one drive, ibaBM-DDCS can be connected directly to the CH3 port (service channel) of the drive. When there are several drives, the communication can be established using a NDBU-95 in star or ring topology.

8.4.2 Star topology

Several drives can be accessed via one or more NDBU-95 devices (DDCS branching unit). 8 drives can be connected to each NDBU-95. Up to 16 NDBU-95 devices can be cascaded.

ibaBM-DDCS is connected to the MSTR port of the NDBU-95 with a bidirectional FO cable.



Important note

When acquiring parameters in a star topology, ensure that the connected drives are set to “Star” mode.

In DriveWindow, the parameter “CH3 HW CONNECTION” in the parameter set “DDCS Control” of each drive has to be checked and set to “STAR”.⁴

Name	Value	OPC Address
70.10: MASTER SIGNAL 2	0	{0}{3}Par.70.10
70.11: MASTER SIGNAL 3	0	{0}{3}Par.70.11
70.12: CH2 LINK CONTROL	10	{0}{3}Par.70.12
70.13: CH2 TIMEOUT [ms]	100	{0}{3}Par.70.13
70.14: CH2 COM LOSS CTRL	FAULT	{0}{3}Par.70.14
70.15: CH3 NODE ADDR	3	{0}{3}Par.70.15
70.17: FOLL SPEED REF	FOLLOWER	{0}{3}Par.70.17
70.18: FOLL TORQ REF	MASTER	{0}{3}Par.70.18
70.19: CH0 HW CONNECTION	STAR	{0}{3}Par.70.19
70.20: CH3 HW CONNECTION	STAR	{0}{3}Par.70.20
70.29: FOLL DS SEL	MASTER	{0}{3}Par.70.29
70.30: MASTER SGN3 SCALE...	100.00	{0}{3}Par.70.30
70.31: FOLLOW SGN3 SCALE...	100	{0}{3}Par.70.31
70.32: CH2 HW CONNECTION	RING	{0}{3}Par.70.32

⁴ See important note and footnote 1 on page 19

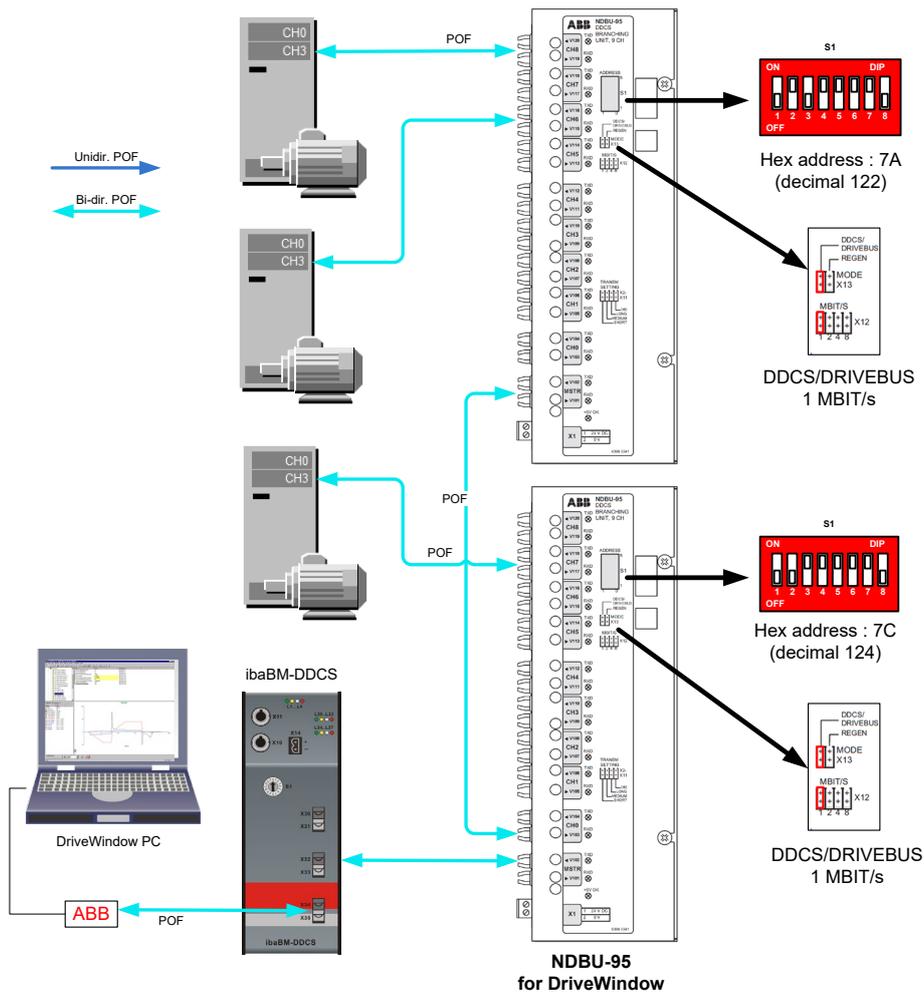


Figure 10: ibaBM-DDCS (parameter) in STAR topology

Settings at the branching unit NDBU-95

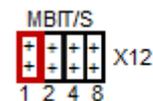
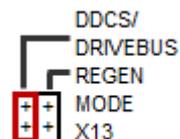
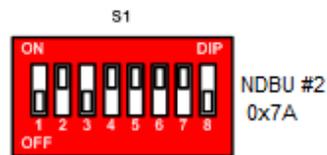
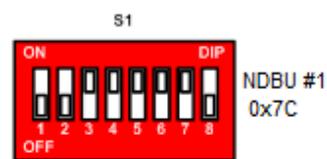
- Address settings (S1):
Address range 76 ... 124
(01001100 ... 01111100) = 0x4C ... 0x7C

Note:

- When NDBU-95 units are cascaded, each unit must have a unique address between 76 and 124
- Units with higher addresses POF must be closer to the ibaBM-DDCS within the cascade
- Use only even-numbered addresses

- Operating mode selection (X13):
adjust to DDCS/DRIVEBUS.

- Select transfer rate (X12):
Default value for CH3: 1 Mbit/s



ibaBM-DDCS connection to NDBU-95 (parameter channel)

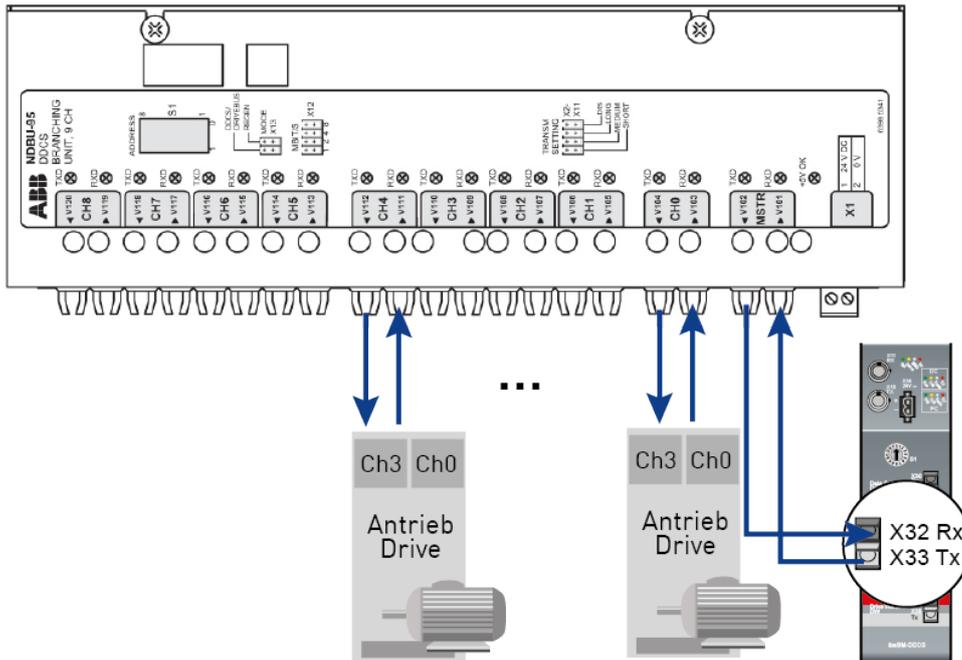


Figure 11: ibaBM-DDCS connection (parameter) to NDBU-95

8.4.3 Ring topology

A ring topology may often be found in older plants.

The telegrams are sent from one drive to the next one via a FO ring. Every drive takes the data which are addressed to it from the data stream and sends the reply data to the next drive.

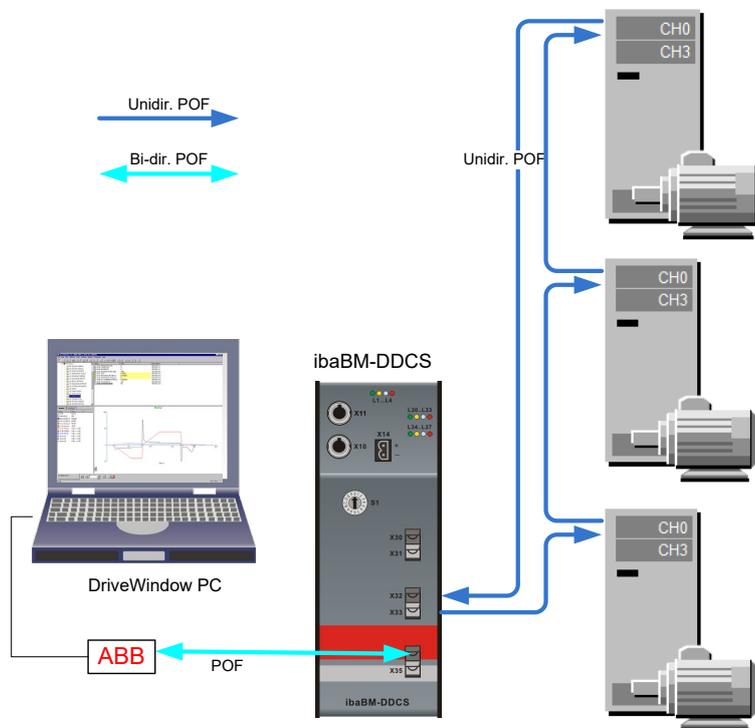


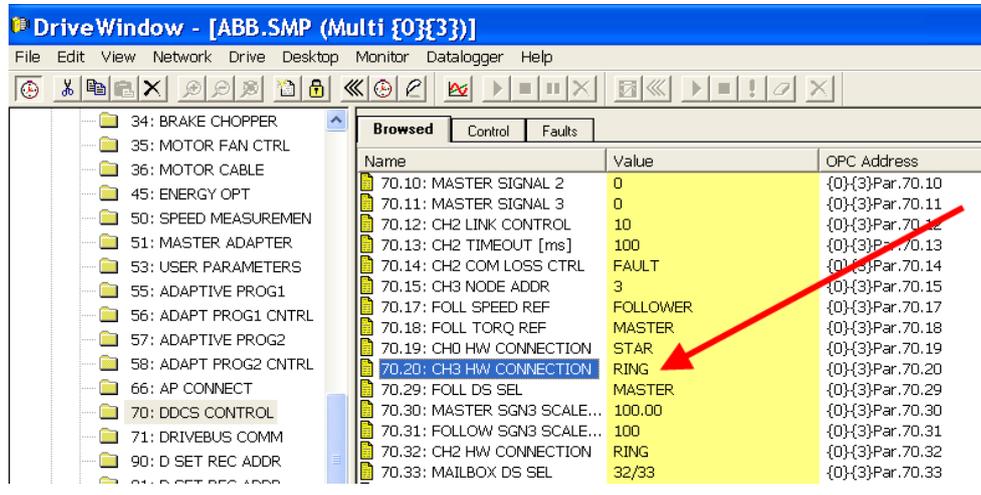
Figure 12: ibaBM-DDCS (parameter) with ring topology



Important note

When acquiring parameters in a ring topology, ensure that the connected drives are set to “Ring” mode.

In DriveWindow, the parameter “CH3 HW CONNECTION” in the parameter set “DDCS Control” of each drive has to be checked and set to “RING”.⁵



8.4.4 Connection of a computer with DriveWindow

ibaBM-DDCS offers a third fiber optic connection for connecting an external computer with DriveWindow software. The communication between the DriveWindow computer and the drives is looped through ibaBM-DDCS, there is no active data exchange with ibaBM-DDCS.



Important note

As long as the DriveWindow computer is active, ibaBM-DDCS slows down the active data query on the parameter channel and passes on the DriveWindow computer query via this connection. The passive logging of the signals (data set query) continues as usual.

⁵ See important note and footnote 1 on page 19

8.5 Time response

The data acquisition cycle depends on the following parameters:

- ❑ Timebase of the ibaBM-DDCS interface in ibaPDA:

Can be set in the ibaPDA I/O Manager under “ibaBM-DDCS - General - Time base”.
Default value: ibaPDA acquisition timebase (I/O Manager – General).

The fastest time that can be set, depends on the number of values that is transferred via the FO connection, including all devices that are connected to the same link via cascade.

The data size is limited to 4060 Byte, the fastest timebase is 0.025 ms. ibaPDA gives a warning note, if the data size is too large or the timebase is too fast. Under “FOB-xx-D - Link x – Info” (connection status), you can see the current number of bytes that are transferred.

- ❑ Access via **data set**:

The data cycle depends on the limitation on the FO side, which is described above.

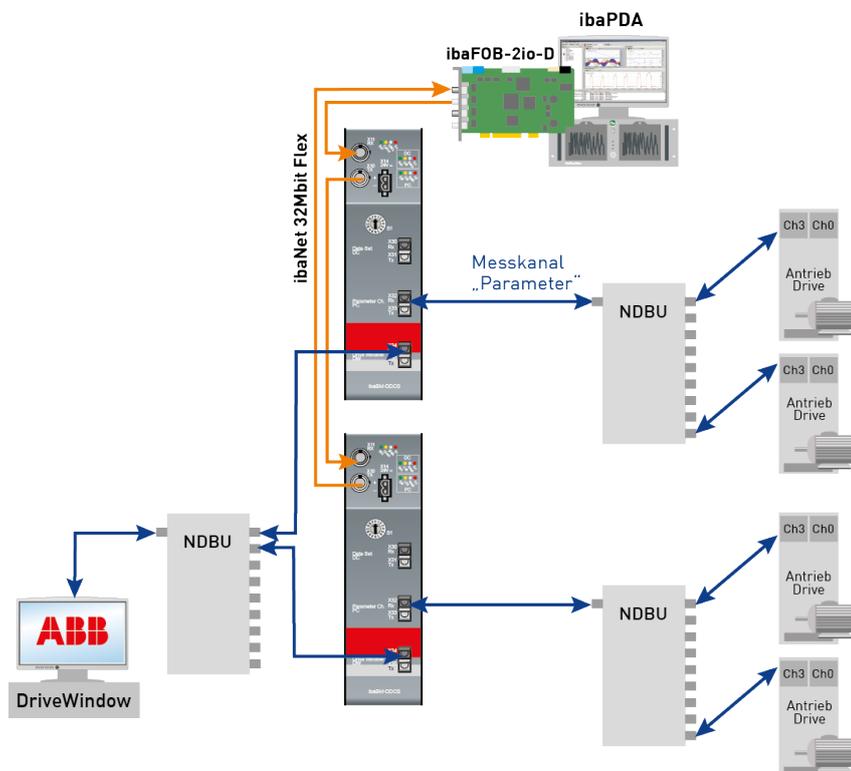
- ❑ Access via **parameter**:

As every variable is requested via handshake (request – response), the data cycle depends on the number of values (approx. 2 ms per analog value and per 16 digital values), i.e. the fastest data cycle for 100 analog values is approx. 200 ms.



Tip

Access times become very high, when many drives are connected. In order to improve this behavior, iba recommends using several ibaBM-DDCS devices.

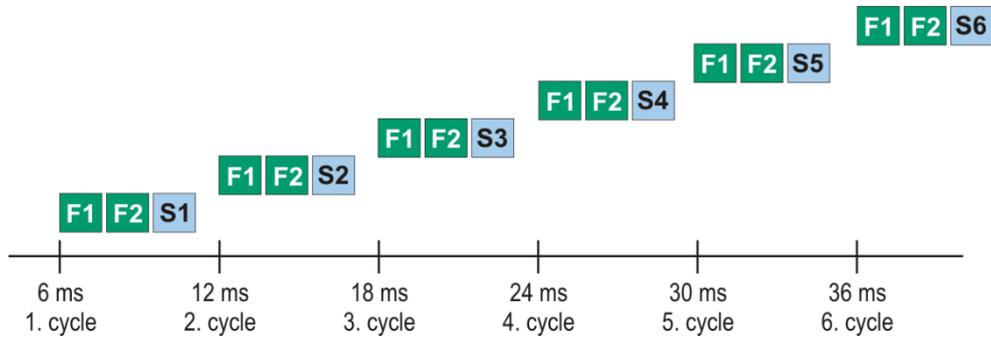


In ibaPDA you can assign the setting “Fast” to the parameter values. The sequence of the requested parameter values can be influenced by this setting. Values which are set to “Fast” are sent in each cycle. Additionally, only one slow parameter value (“Fast” not activated) will be sent with each cycle.

Example:

8 analog parameter values are captured in total: 2 values which are set to “Fast” and 6 slow values. The 2 fast values and 1 slow value are sent with each cycle, in total 3 values. Hence, one cycle takes 6 ms.

Each slow value is captured in every 6th cycle, that means every 36 ms.



Legend:

F1	F2	1 st and 2 nd parameter value „Fast“
S1	... S6	1 st to 6 th parameter value „Slow“

9 Configuration in ibaPDA



Important note

If the firmware version of the ibaFOB-D card is older than V2.00 (build 172), first update the firmware and then install the new version of the ibaPDA software. Please contact the iba support.

9.1 Configuration in the I/O Manager

Find the appropriate link of the FOB-D card to which the ibaBM-DDCS is connected in the I/O Manager. Click on the link with the right mouse button, which opens a submenu. Select “Add module”. Another submenu with all available devices will be displayed. Select “ibaBM-DDCS” from this list. “ibaBM-DDCS” will now be shown below the link of your ibaFOB-D card.

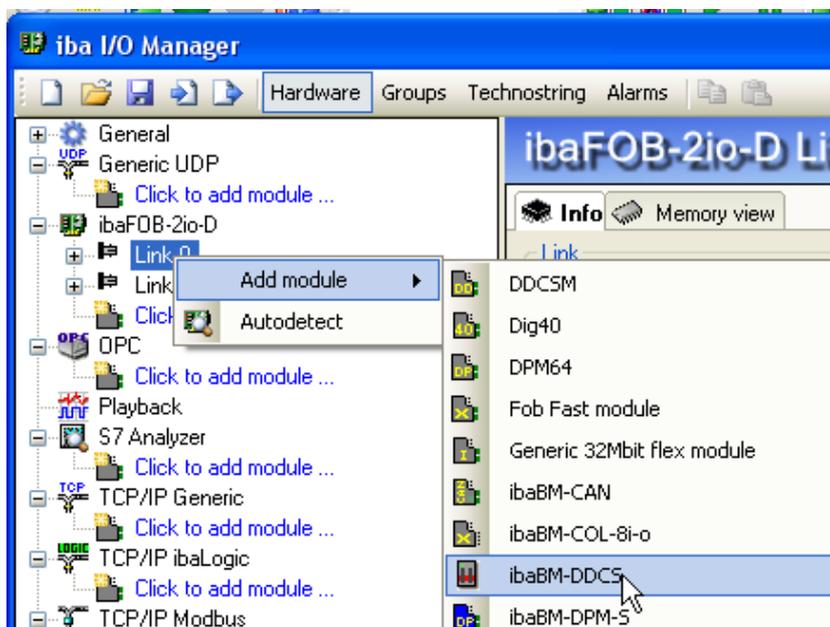


Figure 13: Adding the ibaBM-DDCS module



Tip

When the device has already been connected, select “Auto detect” in the context menu or click on the <New configuration> icon. Then, the connected devices will be automatically detected, the configured data will be read and the corresponding modules will be entered in the I/O Manager.

Now click on the link ibaBM-DDCS with the right mouse button and you can add the modules “Data set”, “Parameter” and “Diagnose”. Beginning with ibaPDA version 6.35, there is also the module type “Data set telegram counters” available.

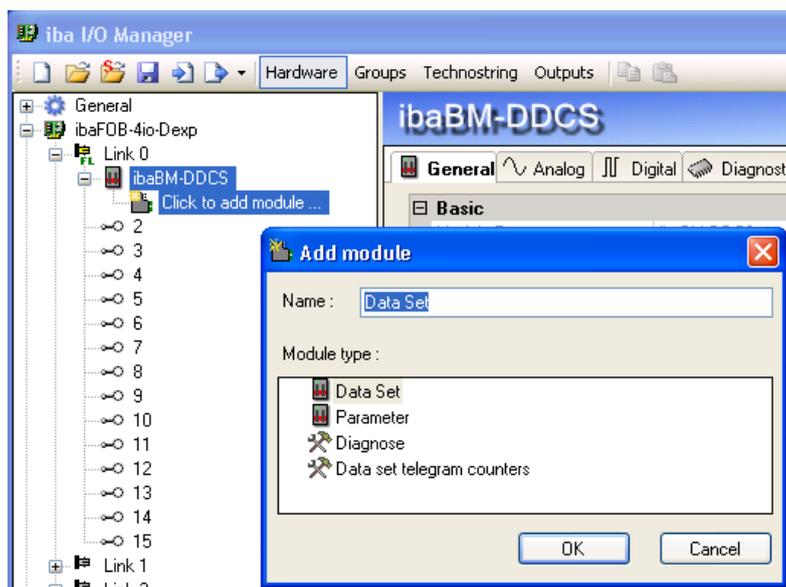


Figure 14: Adding modules

9.1.1 ibaBM-DDCS - General tab

Here you can see the standard settings for the device.

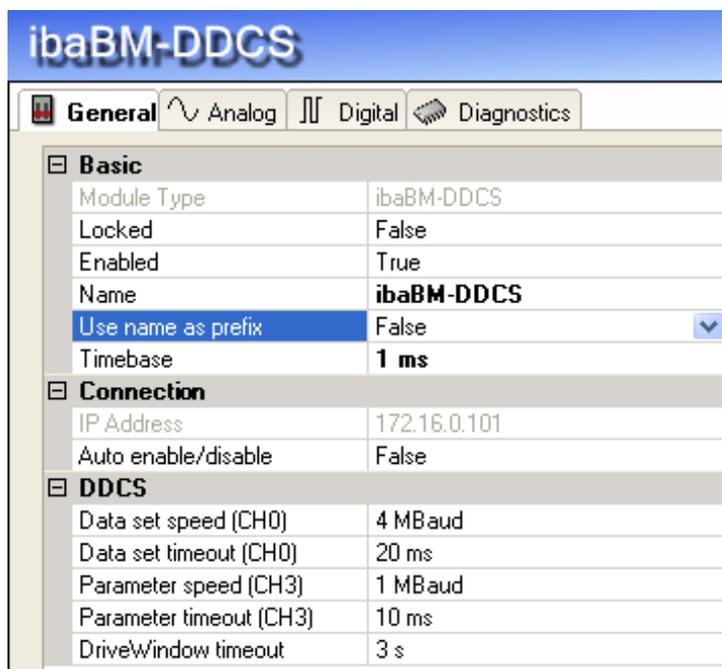


Figure 15: ibaBM-DDCS – General tab

Basic settings

- Module type**
Display of the module type, cannot be modified
- Locked**
True: No changes possible. Only authorized users can unlock modules.
False: Any user can make changes

- Enabled**
True: ibaBM-DDCS module is processed by ibaPDA
False: ibaBM-DDCS module and all submodules are not processed
- Name**
Name of the module
- Use name as prefix**
If TRUE is selected, the module name is placed in front of the signal name as prefix.
- Timebase**
Acquisition timebase used for this module, see chapter 8.5. "Time response".

Connection

- IP Address**
The IP address of the device in the FOB-D network is displayed here. Please refer to the description in the ibaFOB-D manual.
- Auto enable/disable**
TRUE: the data acquisition is started even though the device is missing. During the measurement process, ibaPDA tries to re-establish the connection. If this is successful, the measurement will be restarted.
FALSE: the measurement is not started, if ibaPDA cannot establish a connection to the device.

DDCS

- Data set speed (CH0)**
You can select the speed of the data set channel here, default value: 4 MBaud.
- Data set timeout (CH0)**
You can set a timeout for the data set channel here.
- Parameter speed (CH3)**
You can select the speed of the parameter channel here, default value: 1 MBaud.
- Parameter timeout (CH3)**
You can set a timeout for the parameter channel here.
- DriveWindow timeout**
You can set a timeout for a DriveWindow computer here.



Note

Please make sure that the baud rate, adjusted in ibaPDA, corresponds with the settings of the connected NDBU-95.

A link is available in the bottom field of the *General* tab.

[Read configuration from device](#)

- Read configuration from the device**
With this link, it is possible to read a configuration directly from the device.

9.1.2 ibaBM-DDCS – Diagnostics tab

Here, you find information about the actual versions and the serial number of the device.

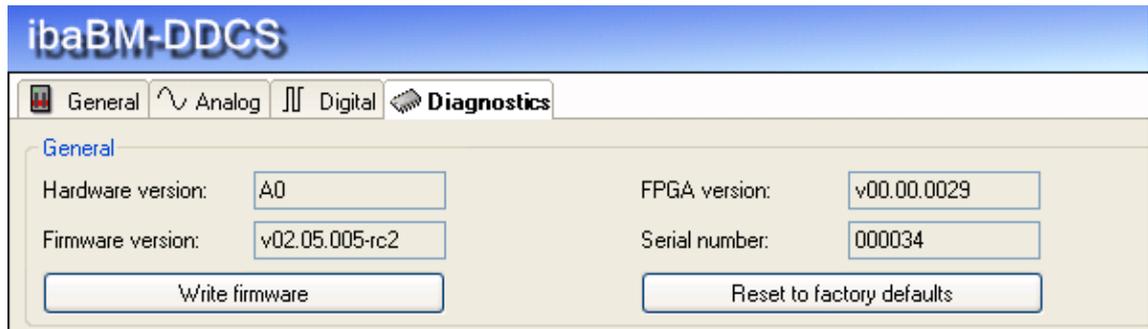


Figure 16: ibaBM-DDCS – Diagnostics tab

Write firmware

With this link, you can update the firmware. Select the update file „bmddcs_vxxx.iba“ in the browser window and start the update with <OK>. The procedure takes several minutes and must not be interrupted.

Reset to factory defaults

Please note that configurations stored in the device are deleted after a reset.

9.1.3 Module type „Data set“

Here you can see the basic settings for the module and select the data set signals.

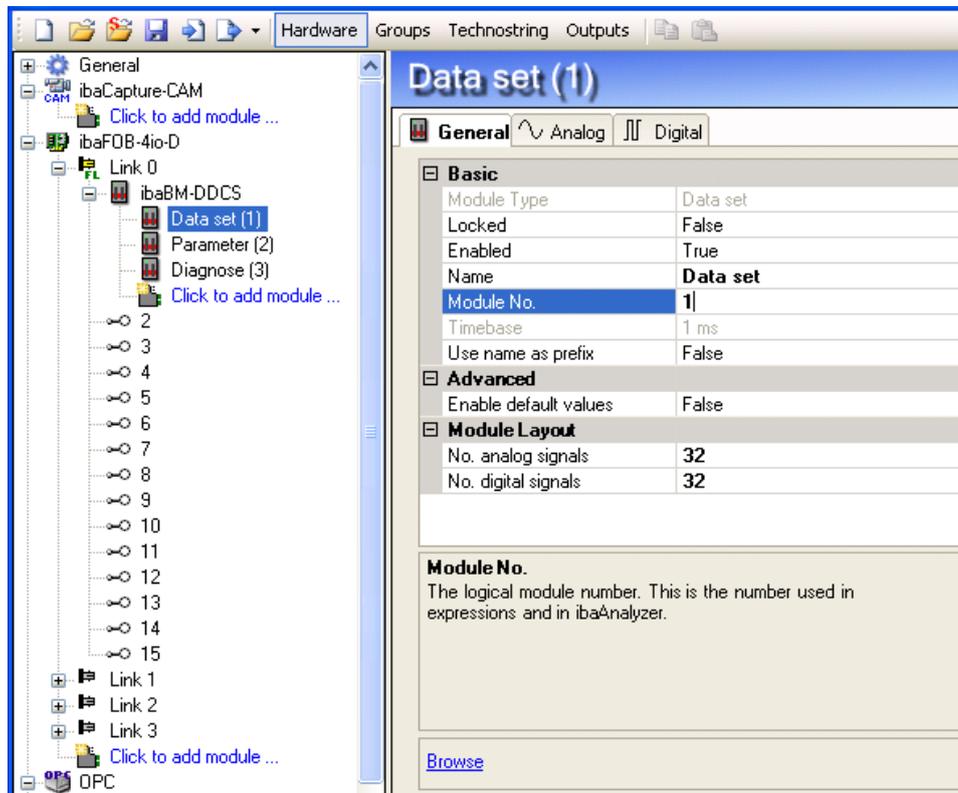


Figure 17: Data set - General tab

Basic settings

Module type

Display of the module type, cannot be modified

- Locked**
True: No changes possible. Only authorized users can unlock modules.
False: Any user can make changes
- Enabled**
True: Data acquisition is enabled for this module
False: Data acquisition is not enabled for this module
- Name**
Name of the module
- Module No.**
Logical number of the module
- Timebase**
Acquisition timebase used for this module
- Use name as prefix**
If TRUE is selected, the module name is placed in front of the signal name as prefix.

Advanced

- Enable default values**
True: In the event of a timeout, the last transmitted value will be overwritten by the default value. The default value can be preset in the *Analog* and *Digital* tabs.
False: In the event of a timeout, the last transmitted value will remain

Module Layout

- No. analog signals:**
Number of lines in the *Analog* tab
- No. digital signals:**
Number of lines in the *Digital* tab

Browse

In order to select the data set signals, click on "Browse" in the bottom field. The data set browser will open and the nodes (drives) will be displayed. The symbols mean:

- Red node: no response received from the node
- Green node: response received from the node

In the tree structure, select the signal via the node number, the data set number and the index. The signal is added to the signal grid by double clicking on the desired signal or clicking on the <Add> button.

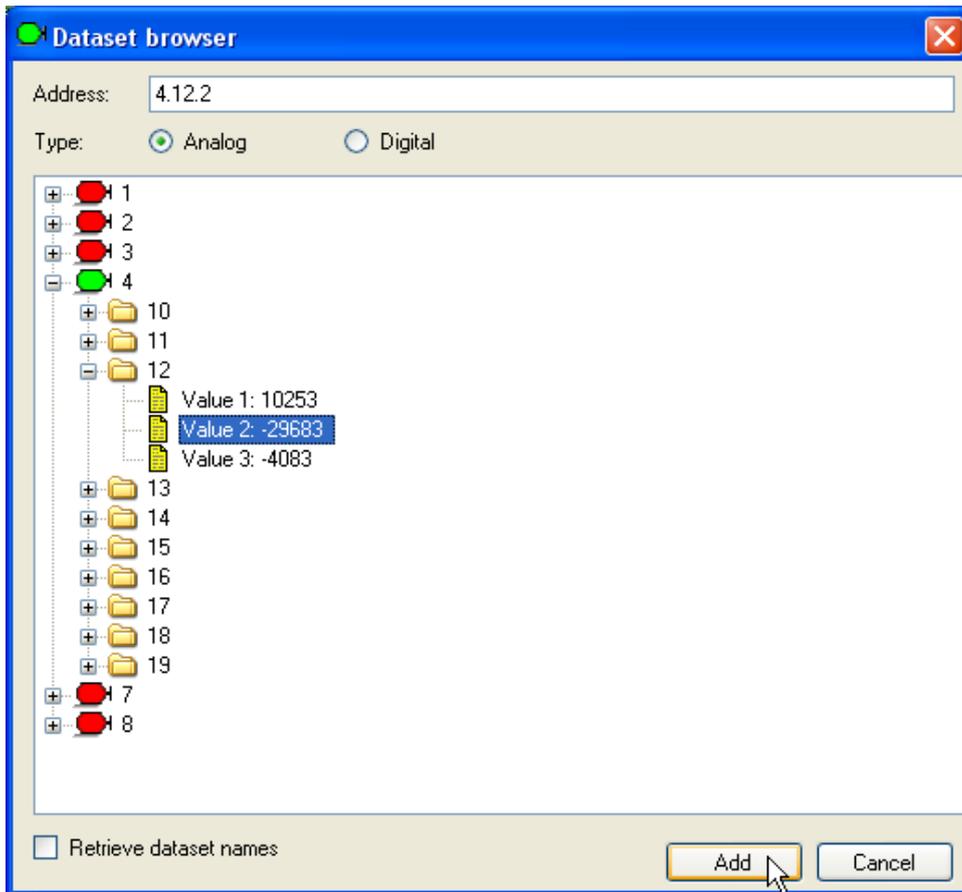


Figure 18: Data set browser

Depending on whether the selected type is analog or digital, the signal will appear on the *Analog* or *Digital* tab. Node number (slave), data set number and index are entered automatically.

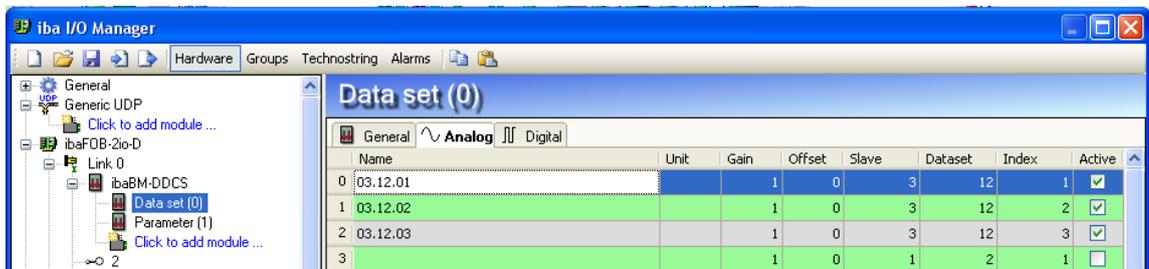


Figure 19: Overview of the data set signals

Complete control words, status words and fault words can be captured as analog value and itemized by 16 bit-decoders in ibaPDA.



Note

Make sure, that a signal is not requested twice. In case of duplicate signals ibaPDA displays an error message when starting the acquisition.

9.1.4 Module type „Parameter“

Here you can see the basic settings for the module and select the parameter signals.

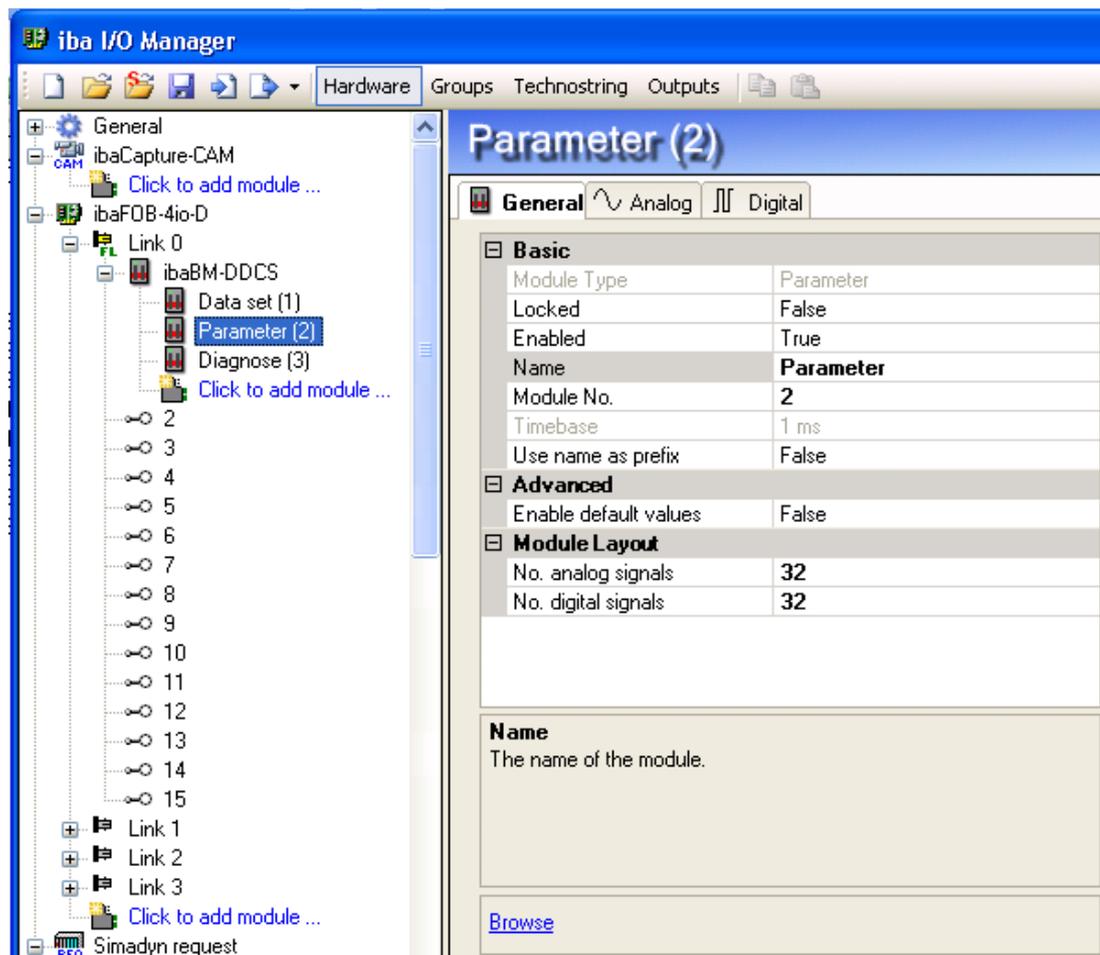


Figure 20: Parameter – General tab

Basic settings

- Module type**
Display of the module type, cannot be modified
- Locked**
True: No changes possible. Only authorized users can unlock modules.
False: Any user can make changes
- Enabled**
True: Data acquisition is enabled for this module
False: Data acquisition is not enabled for this module
- Name**
Name of the module
- Module no.**
Logical number of the module
- Timebase**
Acquisition timebase used for this module
- Use name as prefix**
If “True” is selected, the module name is placed in front of the signal name as prefix.

Advanced

Enable default values

True: In the event of a timeout, the last transmitted value will be overwritten by the default value. The default value can be preset in the *Analog* and *Digital* tabs.

False: In the event of a timeout, the last transmitted value will remain.

Module Layout

No. analog signals:

Number of lines in the *Analog* tab

No. digital signals:

Number of lines in the *Digital* tab

Browse

In order to select the parameter signals, click on “Browse” in the bottom field. The parameter browser will open and the nodes (drives) will be displayed. Only the active nodes (drives) will be displayed here.

In the tree structure, now select the signal via the node number, the parameter group and the index number. The signal is added to the signal table by double clicking on the desired signal or clicking on the <Add> button.

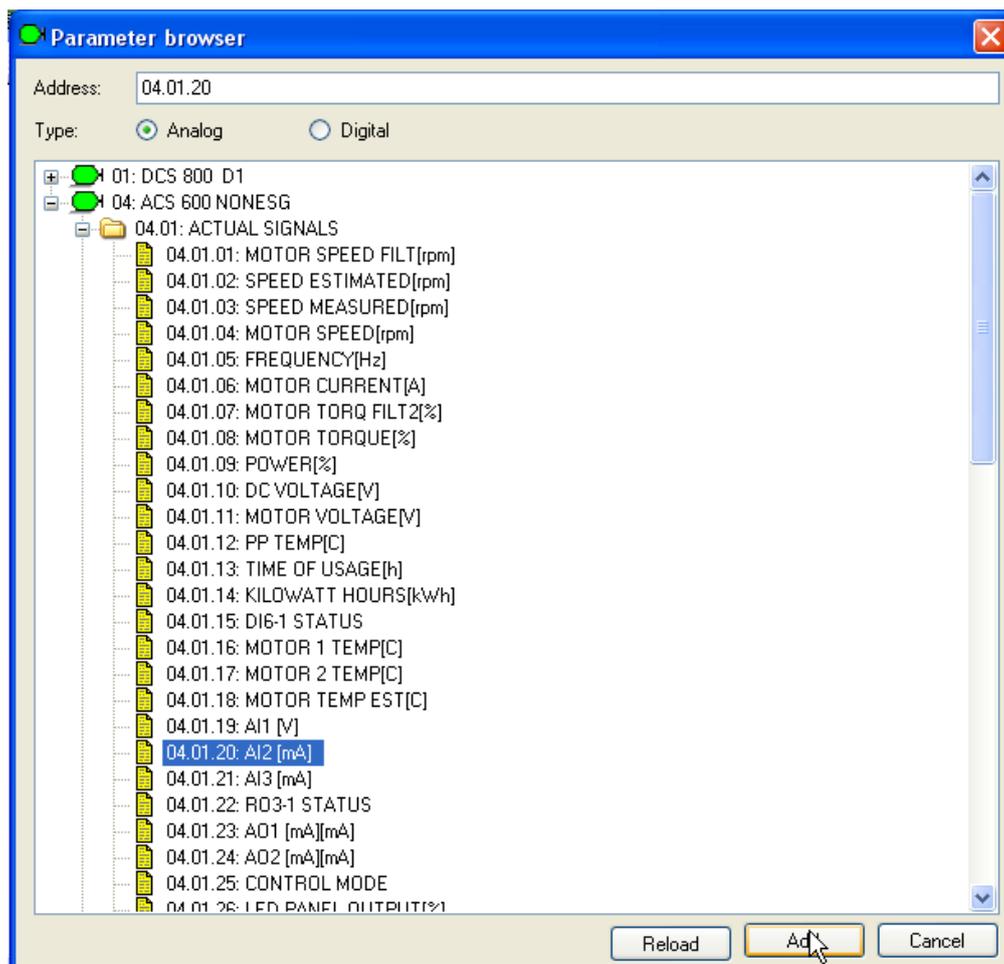


Figure 21: Parameter browser

Depending on whether the selected type is analog or digital, the signal will appear on the *Analog* or *Digital* tab. Node number (slave), parameter number (parameter group) and index are automatically entered.



Figure 22: Overview of parameter signals

A fast sampling rate is enabled by default in the column “Fast”. For signal values which change slowly, this setting can be manually disabled in order to reduce the load.

Complete control words, status words and fault words can be captured as analog value and itemized by 32 bit-decoders in ibaPDA.

By clicking on the <OK> button, all the settings will be applied to the device and the measurement will automatically start.



Note

Make sure, that a signal is not requested twice. In case of duplicate signals ibaPDA displays the an error message when starting the acquisition.

9.1.5 Module type „Diagnose“

Here you can see the basic settings for the module:

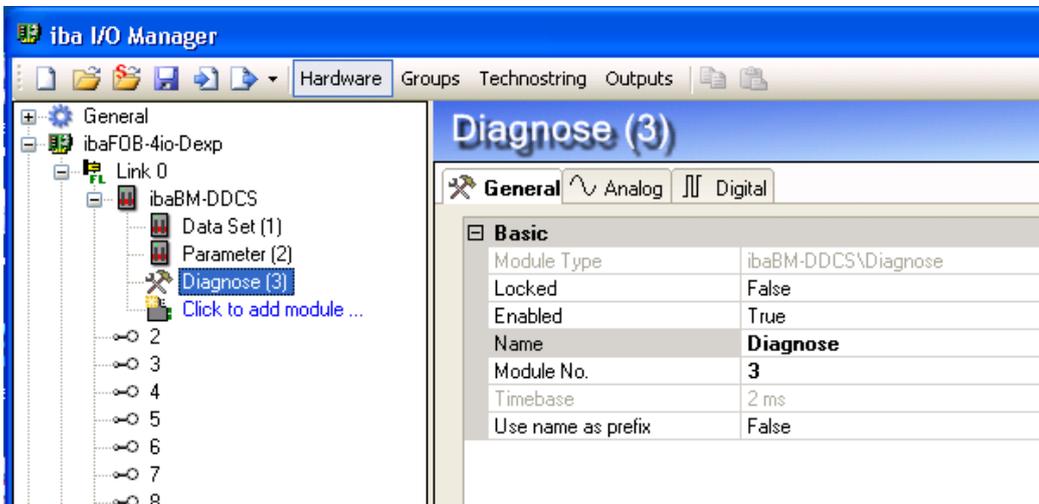


Figure 23 : Diagnose – General tab

Basic settings

- Module type**
Display of the module type, cannot be modified
- Locked**
True: No changes possible. Only authorized users can unlock modules.
False: Any user can make changes
- Enabled**
True: Data acquisition is enabled for this module
False: Data acquisition is not enabled for this module

- Name**
Name of the module
- Module no.**
Logical number of the module
- Timebase**
Acquisition timebase used for this module
- Use name as prefix**
If TRUE is selected, the module name is placed in front of the signal name as prefix.

The diagnose data is pre-defined in the *Analog* and *Digital* tab. The diagnostic data can be visualized and saved like measured values.

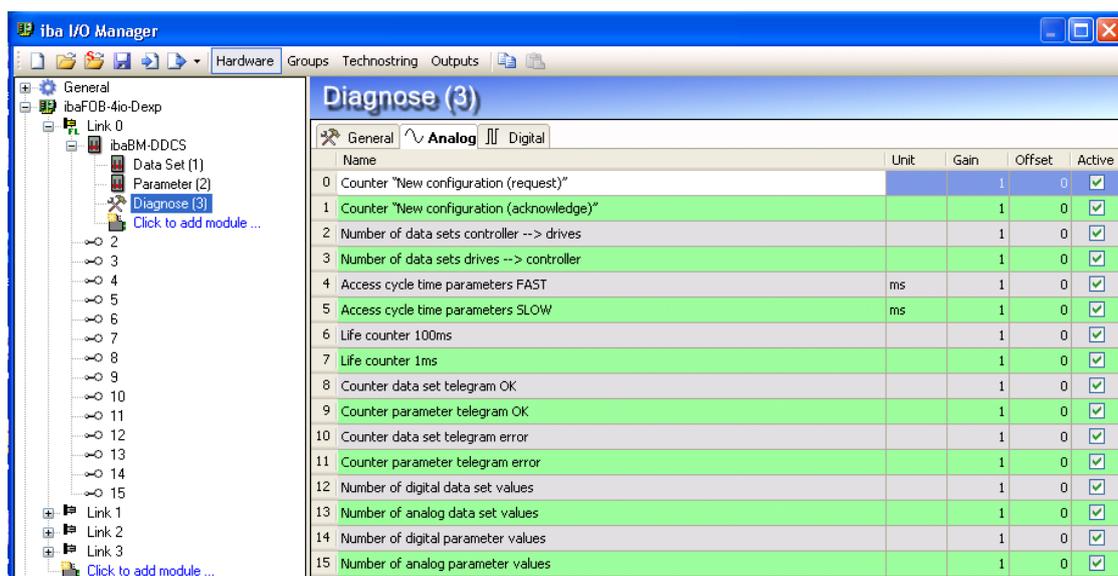


Figure 24 : Diagnose – Analog tab

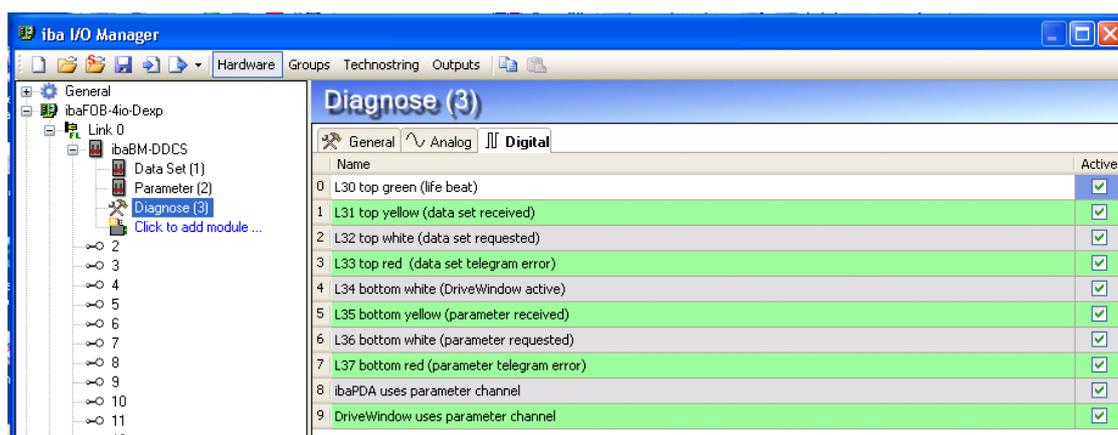


Figure 25 : Diagnose – Digital tab



Note

Beginning with ibaPDA version 6.35, the diagnose data is pre-defined by ibaPDA.

In ibaPDA version 6.34 or older, the user had to manually enter the diagnose data.

In this case, the number of analog and digital signals had to be entered in the *General* tab and the diagnose values with address and designation had to be manually entered in the *Analog* and *Digital* tabs.

For an easier configuration, pre-configured diagnose modules for the most important diagnostic data were available on the DVD “iba Software & Manuals”, which is included in delivery. The modules could be imported in the I/O Manager:

- Module 290: diagnostic counter for data set telegrams drive 1 – 16
- Module 291: diagnostic counter for data set telegrams drive 17 – 32
- Module 299: general diagnostic values, counter, error displays

9.1.6 Module type “Data set telegram counters”

Here you can see the basic settings for the module:

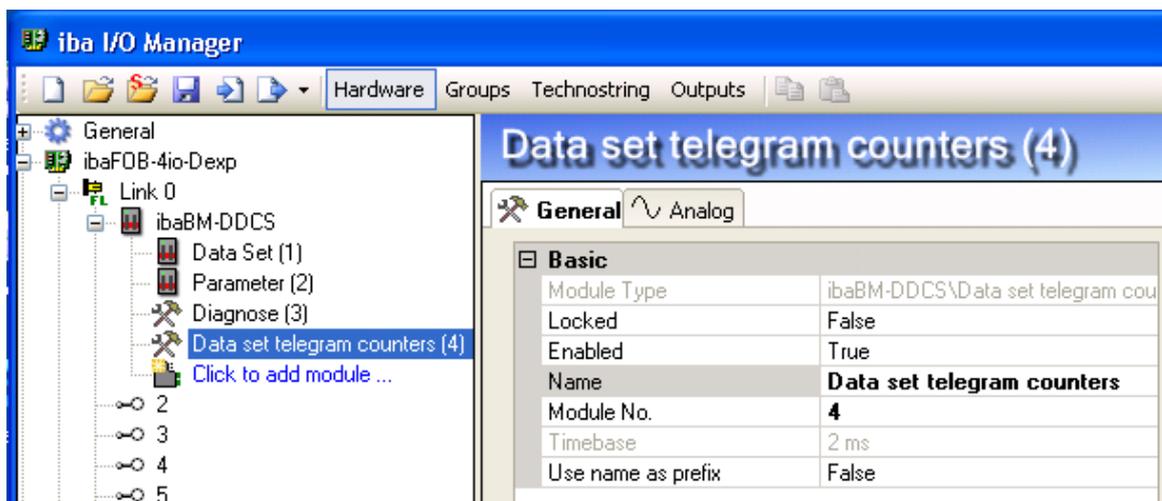


Figure 26 : Data set telegram counters – *General* tab

Basic settings

- Module type**
Display of the module type, cannot be modified
- Locked**
True: No changes possible. Only authorized users can unlock modules.
False: Any user can make changes
- Enabled**
True: Data acquisition is enabled for this module
False: Data acquisition is not enabled for this module
- Name**
Name of the module
- Module no.**
Logical number of the module
- Timebase**
Acquisition timebase used for this module

Use name as prefix

If “True” is selected, the module name is placed in front of the signal name as prefix.

The telegram counters for the data exchange from controller to the drives 1 to 127 are pre-defined in the *Analog* tab. The telegram counters can be visualized and saved like measured values.

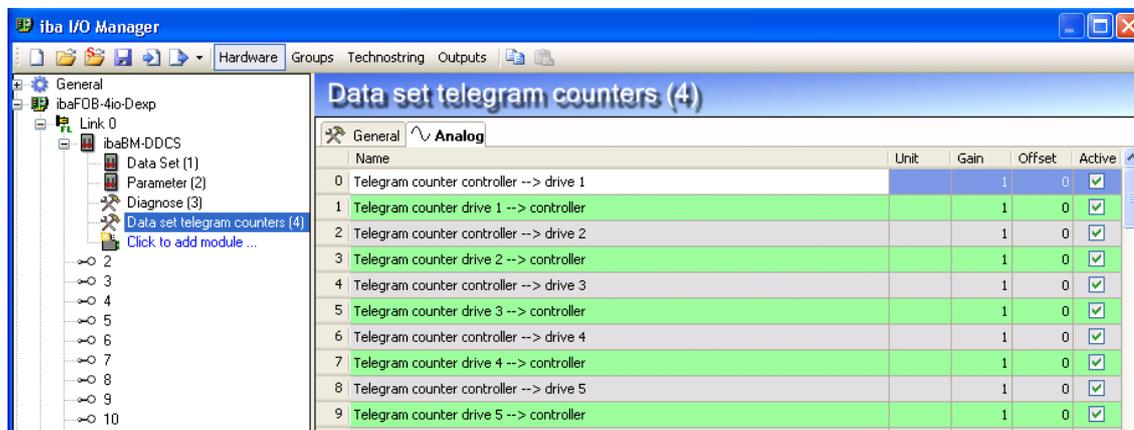


Figure 27 : Data set telegram counters – *Analog* tab

9.1.7 Display of the measured values

The current measurements of analog and digital signals and diagnostic values will be displayed on the *Analog* and *Digital* tab of the ibaBM-DDCS module.

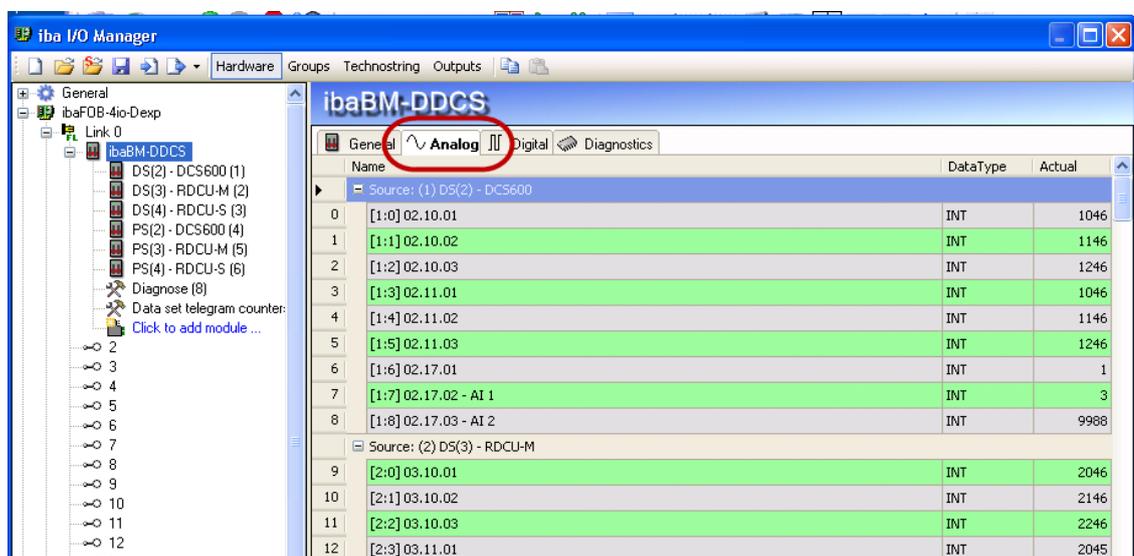


Figure 28: Actual values of the analog signals

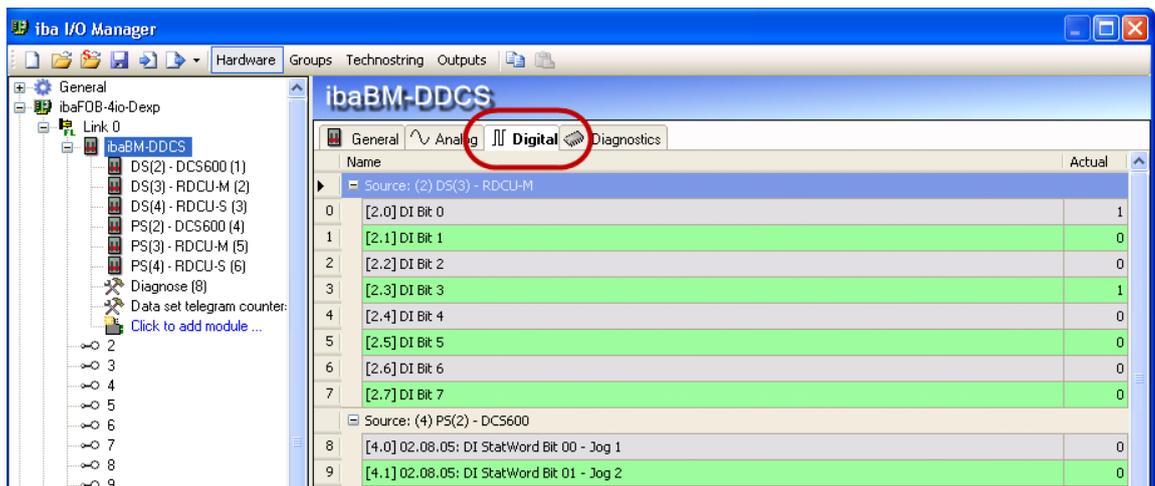


Figure 29: Actual values of the digital signals

All selected signals will be displayed in the ibaPDA signal tree. You can capture and record the measurements as usual.

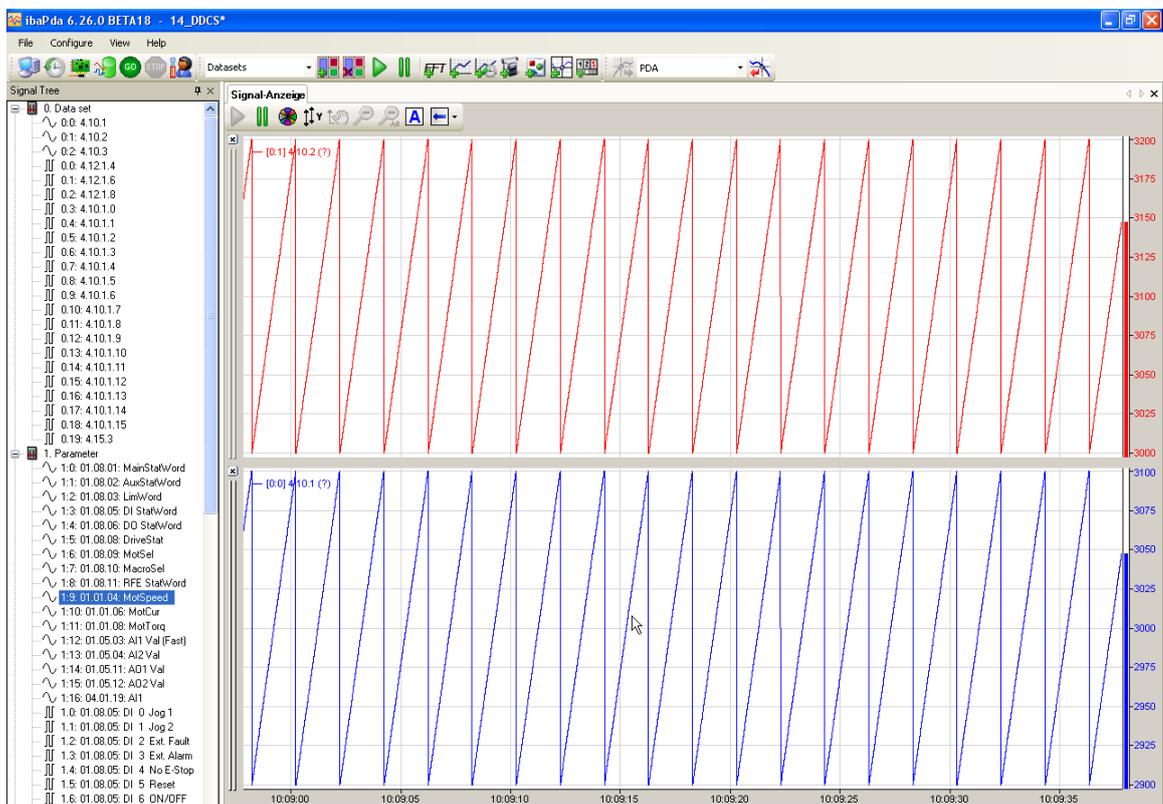


Figure 30: Measurements in ibaPDA

10 Technical data

10.1 Main data

Short description	
Name	ibaBM-DDCS
Description	Bus monitor for DDCS drive bus
Order number	13.120710
DDCS interface	
Number	3 for one DDCS drive bus
Design	2 HBFR Versatile Link connector (1 mm POF) for RX and TX, simplex, duplex, without interlocking (per link)
Typical application	Link0: Connected with control (only Rx is used here) Link1: Connected with measurement interface of the drives Link2: Connected to computer with DriveWindow for configuration and measurement, if required
ibaNet interface	
Number	1 (e.g. connection to ibaPDA)
ibaNet protocol	32Mbit Flex
Data transmission rate	32 Mbit/s
Sampling rate	Up to 40 kHz, freely adjustable
Connection type	2 ST connector (62.5 μm / 125 μm), cable length up to 2000 m without repeater
Power supply, operating and indicating elements	
Power supply	+24 V DC ($\pm 10\%$)
Power consumption	Up to 15 W
Rotary switch	Device address (in a cascade)
Indicators	4 LEDs for the operating status 8 LEDs for the channel status
Operating and environmental conditions	
Cooling	Passive
Operating temperature	32 °F to 122 °F (0° C to 50° C)
Storage and transportation temperature	-13 °F to 158 °F (-25° C to 70° C)
Humidity class according to DIN 40040	F, no condensation
Protection class	IP20
Mounting	DIN rail , vertical
Standards	EMC: IEC 61326-1 FCC part 15 class A

Dimensions and weight	
Dimensions (Width x Height x Depth)	2.1 in x 7.4 in x 5.5 in (54 mm x 188 mm x 140 mm) with mounting rail clip
Weight (incl. packaging and documentation)	Approx. 3.3 lbs (1.5 kg)

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

Unique Identifier: 13.120710 ibaBM-DDCS

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.

Contact

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