ibaPDA-Interface-HPCI-DGM200E

Data Interface for GE HPCi

Manual

Issue 2.0

Measurement Systems for Industry and Energy

www.iba-ag.com

Manufacturer

iba AG

Koenigswarterstrasse 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
Web	www.iba-ag.com

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Content

1 About this Manual

This document describes the function and application of the software interface

ibaPDA-Interface-HPCI-DGM200E.

This documentation is a supplement to the *ibaPDA* manual. Information about all the other characteristics and functions of *ibaPDA* can be found in the *ibaPDA* manual or in the online help.

1.1 Target group and previous knowledge

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

1.2 Notations

In this manual, the following notations are used:

Action	Notation
Menu command	Menu *Logic diagram*
Calling the menu command	*Step 1 – Step 2 – Step 3 – Step x* Example: Select the menu *Logic diagram – Add – New function block*.
Keys	<Key name> Example: <Alt>; <F1>
Press the keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Key name> Example: <OK>; <Cancel>
Filenames, paths	`Filename`, `Path` Example: `Test.docx`

1.3 Used symbols

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

Danger!

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

- Observe the specified measures.

Warning!

The non-observance of this safety information may result in a potential risk of death or severe injury!

- Observe the specified measures.

Caution!

The non-observance of this safety information may result in a potential risk of injury or material damage!

- Observe the specified measures

Note

A note specifies special requirements or actions to be observed.

Tip

Tip or example as a helpful note or insider tip to make the work a little bit easier.

Other documentation

Reference to additional documentation or further reading.

2 System requirements

The following system requirements are necessary for the use of the DGM200E data interface:

- *ibaPDA* v7.2.0 or higher
- License for *ibaPDA-Interface-HPCi-DGM200E*
- Communication board DGM 200-E from GE Energy Power Conversion
- CC100 communication network with appropriate controllers (HPCi/Logidyn D/D2 system)
- ibaPDA-Server computer with at least one dedicated 1000 Mbit network adapter, that supports jubo frames/jumbo packets

ibaPDA-specific constraints

- *ibaPDA* can only read data from CC100 bus

Licenses

Order no.	Product name	Description
31.001009	ibaPDA-Interface-HPCI-DGM200E	Extension license for an *ibaPDA* system, adding a DGM200 interface via the communication board DGM 200-E by GE Power Conversion Number of connections: max. four DGM200 networks with up to 20 controllers each
31.001300	ibaPDA-Request-HPCi	Extension license supplementary to an existing *ibaPDA-Interface-HPCI-DGM200E or -DGM200P* interface for using the Request function (free variable access)

3 DGM200E interface

3.1 General Information

By means of the license *ibaPDA-Interface-HPCI-DGM200E* an *ibaPDA* system can be connected to the CC100 communication network of the HPCi automation system by GE Energy Power Conversion.

The CC100 (Coordination Channel) provides for system-wide communication between HPCi controllers, Logidyn D2 configurations but also *ibaPDA* computers and it allows data exchange between all connected DGM200-stations with a minimal timebase of 1 ms.

The Deterministic Global Memory (DGM200) facilitates the serial deterministic communication with a transmission rate of 200 Mbit/s.

The license *ibaPDA-Interface-HPCI-DGM200E* is the follow-up product of the license *ibaPDA-Interface-HPCI-DGM200P* and allows the use of the communication board DGM 200-E from GE Energy Power Conversion.

The DGM200 components have to be obtained exclusively from GE Energy Power Conversion (http://www.gepowerconversion.com).

Hinweis

Up to four DGM 200-E channels are supported by one *ibaPDA* computer, provided there are enough network adapters available in the *ibaPDA* computer. A DGM 200-E channel corresponds to one DGM 200 network. The DGM 200-E device provides two separat channels.

When the DGM200E interface license is released in the dongle, you may configure the following modules in *ibaPDA*:

- HPCi Lite
  - Access to all data configured on the CC100 bus by the CCM32 tool (Coordination Channel Manager)
  - Access to data of all time classes of the CC100 bus
  - max. 1000 analog + 1000 digital values per module
  - Comfortable data selection via signal browser in the *ibaPDA* I/O Manager (required for this: file `toc.ini` - created by DAS address book generator - and CC100 address book - generated by the CCM32).

Note

With HPCi Lite you can use different address books (one per DGM 200-E device, i.e. per DGM 200 network respectively). Thus, access to separate DGM200 networks is provided.

- DGM200E
  - Access to data of the DGM200E memory by physical addressing (offset / data type)
  - max. 1000 analog + 1000 digital values per module
  - Applies to special cases
- DGM200E dig512
  - Access on data of the DGM200E memory by physical addressing (offset / data type)
  - max. 32 x 16 = 512 bits per module, no analog values
  - Applies to special cases

A maximum of up to 1024 modules are supported per interface.

Total number of signals to be measured is only limited by the *ibaPDA* license and performance of the involved systems.

3.2 Communication board DGM 200-E

DGM 200-E is the most recent development of a communication adapter for connecting a PC or systems without a communication board like DGM 200-V/-P to the CC100 bus. It is considerd to be a full replacement for the outdated DGM 200-P board which was based on PCI technology. The DGM 200-E device provides two separate channels translating the DGM200 protocol towards Gigabit Ethernet. A filter in the device guarantees that only DGM messages pass through in direction from Ethernet to CC100. The connectors are designed using SFP modules.

The DGM 200-E device can exclusively be obtained from GE Energy Power Conversion (http://www.gepowerconversion.com) and is available in two versions:

- With fiber optics (DGM 200) and RJ45 (Ethernet), GE material no. PC000435011
- With fiber optics (DGM 200 and Ethernet), GE material no. PC000435012

Note

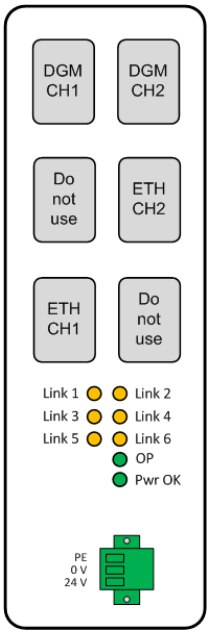
The Ethernet interfaces only support a transmission rate of 1000 Mbit/s, i.e. devices with only 10/100 Mbit/s cannot be connected directly to the device.

Attention!

The connection between the DGM 200-E device and the *ibaPDA* server must be done via a dedicated and isolated network. Failure to do so can lead to broadcast storms on other connected networks.

iba AG cannot be held liable for any damage or operating failures originated by ignoring this advice.

Front plate:



Connectors / LEDs	Status	Comment
DGM CH1, CH2		Fiber optical interface for channel 1 or 2
ETH CH1, CH2		Ethernet interface for channel 1 or 2
Yellow LEDs Link 1 ... 6	bright	Connection established
Green LED OP	bright flashing	Ready for operation Temperature > 80 °C (> 176 °F)
Green LED Pwr OK	bright	Power supply ok

Table 1: DGM 200-E front plate elements

Other documentation

You'll find a full description of the device with detailed technical data and information about the engineering on the HPCi side in the corresponding documentation from GE Energy Power Conversion.

- 547 e DGM 200 Manual (en)
- 547 d DGM 200 Benutzerhandbuch (de)

3.3 System topologies

In the following some typical and possible topologies are depicted. For a better distinction the connections in the images are drawn in different colors:

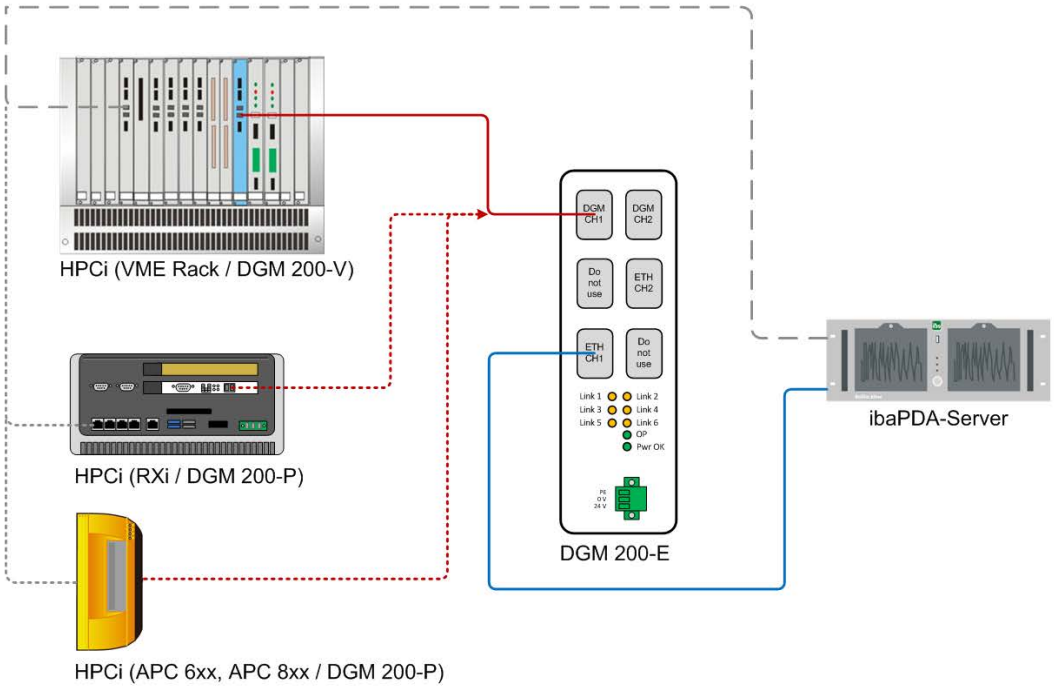
Line style	Connection type	Comment
	Data path CC100/DGM 200	Fiber optic
	Data path Gigabit Ethernet	Twisted Pair or fiber optic
	Control path (TCP/IP)	Is required for using *ibaPDA-Request-HPCi* only.

3.3.1 Peer to peer (P2P) connection

Basically, all HPCi controllers with a DGM 200 communication adapter can be connected to *ibaPDA* over a DGM 200-E device.

Without a data concentrator DGM 200-C, only one controller can be connected to the DGM channel on the communication adapter DGM 200-E.

- VME rack with adapter board DGM 200-V
- RXi-042, RXi-142 with adapter board DGM 200-P
- APC 620, APC 810 (B&R) with adapter board DGM 200-P



Note

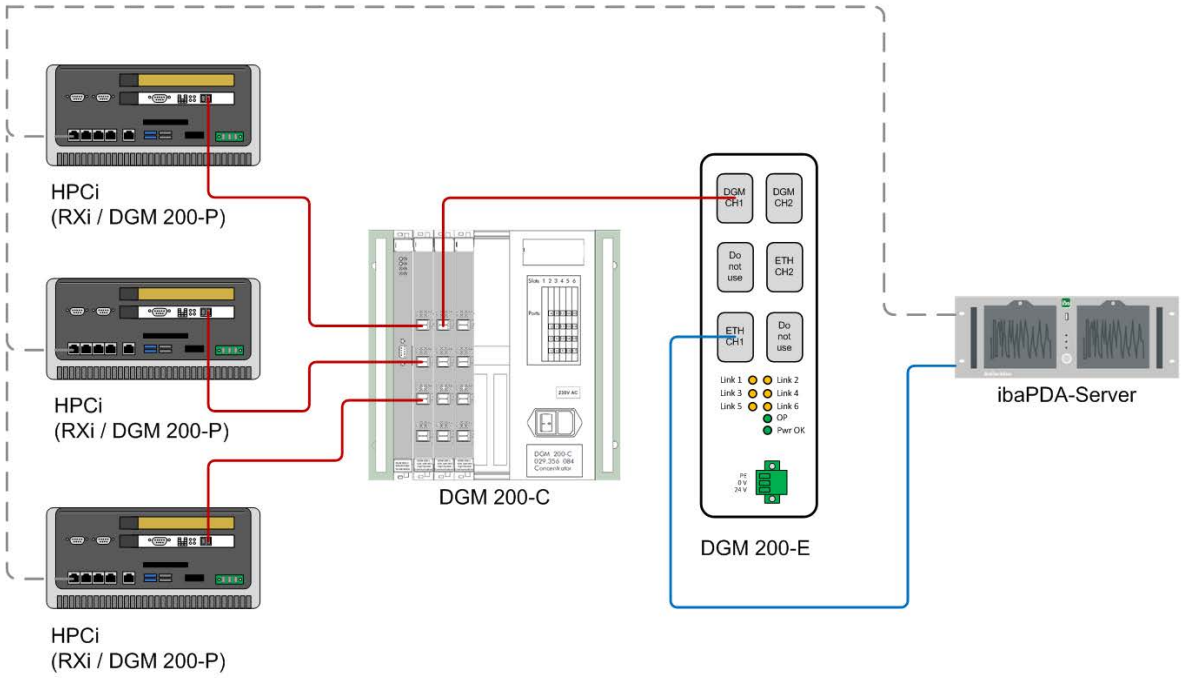
In case of a P2P connection between DGM 200-E and a communication adapter DGM 200-V/-P, this adapter DGM 200-V/-P must be configured as master by a jumper.

3.3.2 Connection over data concentrator DGM 200-C

This is a typical topology for an application in larger automation environments.

Multiple HPCi systems are connected with each other over a data concentrator DGM-200-C. *ibaPDA* can be added as another DGM200 member via the communication adapter.

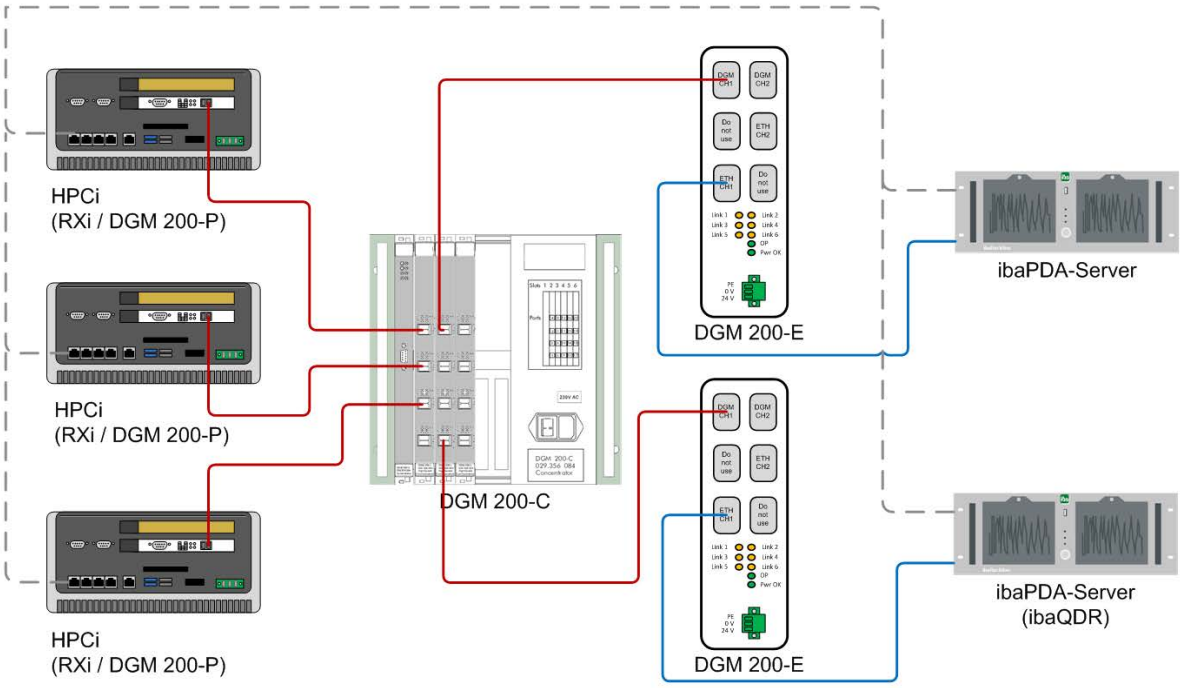
On the HPCi side mixed configurations, comprising different controllers (VME rack, Rxi etc.) apply as well. Legacy Logidyn D2 systems can be connected as well.



3.3.3 DGM200 network with 2 ibaPDA systems

This topology applies when more than one ibaPDA system should acquire data from the same DGM 200 network. This, for instance, is the case when an *ibaPDA* system and an *ibaQDR* system are applied to one production plant.

In the following figure, each *ibaPDA* system uses its own DGM 200-E device:



An economically beneficial alternative would be here to use the second channel in the DGM 200-E device so that only one DGM 200-E device is required.

Note

In this constellation only one ibaPDA system can use *ibaPDA-Request-HPCi*. The second (and each additional system) can only use HPCi Lite.

Note

Both *ibaPDA* systems must use the same CC100 address book and should preferably use the Link 0 on the DGM200E interface in the *ibaPDA* I/O Manager.

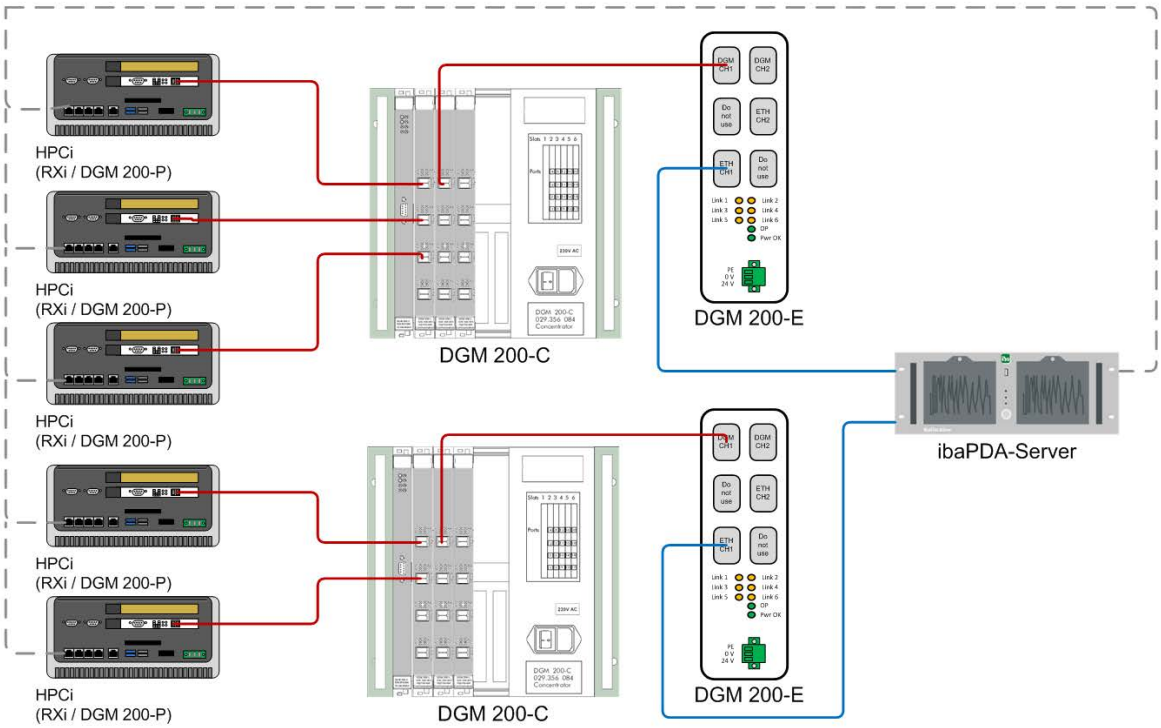
If this is not the case, the CC100 address books need to be renamed:

If, for instance, the address book file is referred in the `toc.ini` file by name CC100.tsv, then the address book file names of the second, third,... adapter or link must be renamed to CC100_1.tsv, CC100_2.tsv etc.

3.3.4 Multiple DGM 200 networks and one ibaPDA system

This topolgy is rather unusual. It may occur in case of a revamping project, when a new HPCi system is added to an automation structure but not supposed to be connected to the existing DGM 200 network. Also, two or more P2P connections to an *ibaPDA* system belong to this category, if no data concentrator is available. Up to four DGM 200 connections are supported.

In the following figure the *ibaPDA* computer needs two Ethernet network adapters:



An economically beneficial alternative would be here to use both channels in one DGM 200-E device so that only one DGM 200-E adapter is required. However, two Ethernet network adapters are still required in the *ibaPDA* computer.

Note

In this constellation *ibaPDA-Request-HPCi* is only posible on one link, i. e. on one DGM 200 network. HPCi controllers connected to this link will be eligible for HPCi request. On the other (and each additional) link only HPCi Lite must be used.

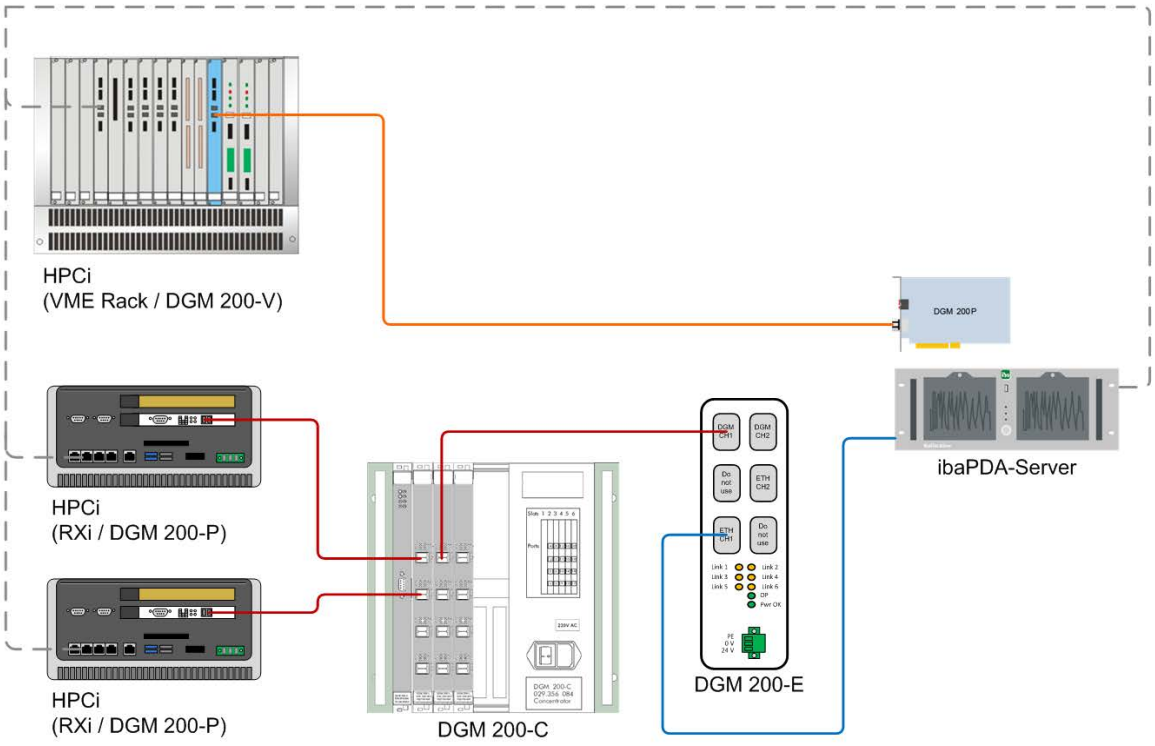
Note

If, for instance, the address book file of the first link is referred in the `toc.ini` file by name CC100.tsv, then the address book file names of the second, third,... adapter or link must be renamed to CC100_1.tsv, CC100_2.tsv etc.

3.3.5 Mixed use of DGM 200-P and DGM 200-E

This topology may occur in case of a revamping project, when an existing *ibaPDA* system with DGM 200-P is to be extended by a new DGM 200 connection (new DGM 200 network or P2P).

In the following figure, the "old" connection via DGM 200-P and the“new” connection via DGM 200-E is displayed:



Note

Also in this case, only one of the DGM 200 connections (-P or -E) of the *ibaPDA* computer can use *ibaPDA-Request-HPCi*. On the other connections only HPCi Lite modules can be used.

Note

When using a DGM 200-P board and a DGM 200-E adapter together, note that the CC100 address book file CC100.tsv is reserved for the DGM 200-P board. The file CC100_1.tsv is reserved for Link #1 on the interface DGM200E. In this case the Link #0 on the DGM200E-interface cannot be used and all modules must be assigned Link #1.

3.3.6 Unsupported topologies

Below you'll find mentioned two out of many imaginable topologies which are not supported and therefore **forbidden**.

1. Connecting multiple DGM 200 networks via a DGM 200-E adapter each with an Ethernet network switch and connecting the *ibaPDA* computer over one Ethernet link to this switch. (Merging the ETH links from different DGM 200-E adapters on one network interface of the *ibaPDA* computer via network switch)

   Reason: Each DGM 200-E adapter must be linked to exactly one physical network adapter in the *ibaPDA* computer.

2. Connecting both DGM 200-P and DGM 200-E to the same DGM 200 network when they are used together in the same *ibaPDA* computer.

   Reason: *ibaPDA* does not support 2 links to the same DGM 200 network or to the same HPCi controller (P2P) respectively.

4 Configuration and engineering HPCi

If you want to acquire data over the DGM200E interface without Request-HPCi, i.e. by means of the modules DGM200E, DGM200E dig512 or HPCi Lite, the signals to be measured must be configured on the CC100 bus.

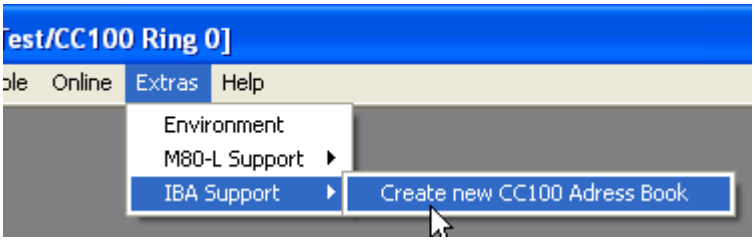
When configuring the modules DGM200E and DGM200E dig512 in *ibaPDA* the signals to be measured are physically addressed. Hence, the memory addresses of the data must be known.

With HPCi Lite you can configure the signals by using their symbolic name. This applies only to signals which have been configured on the CC100 bus.

No DAS agents are needed on the HPCi side. These agents are only required for using the Request HPCi function. The related configuration steps are described in the manual of *ibaPDA-Request-HPCi*.

An address book, containing all the signals on the CC100 bus is the only thing which is required for HPCi Lite. This address book can be created with the tool CCM32.

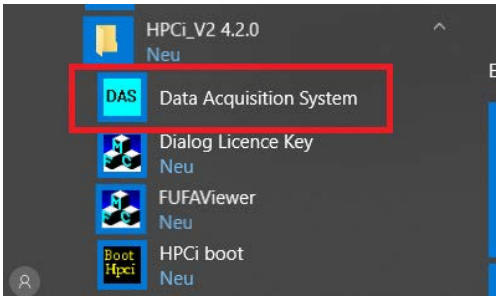
In the CCM32 engineering tool, select menu *Extras - IBA Support - Create new CC100 Address Book*. You will have to select the directory where the `toc.ini` file for the system is. If you haven't created a `toc.ini` file yet then first create one with the DAS address book builder.

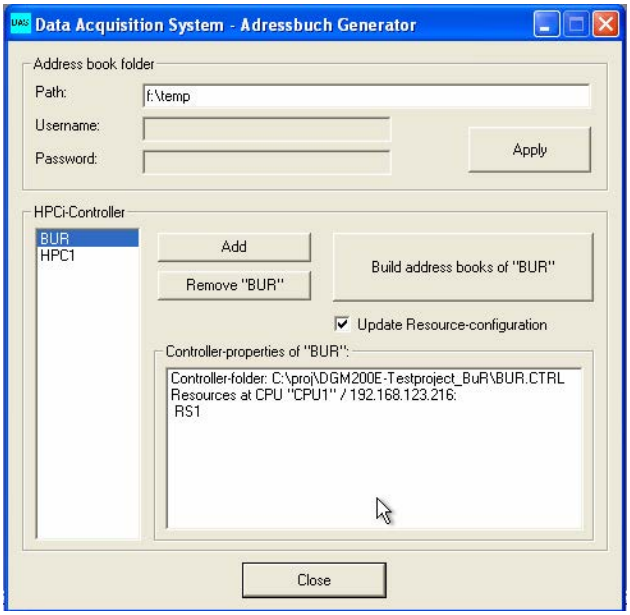


In case *ibaPDA* has no access to the folder where the address book files are being created, copy the file `toc.ini` and the address book file(s) `*.tsv` into a folder, which can be accessed by the *ibaPDA*-Server.

4.1 DAS address book builder

The DAS address book builder is a program developed by GE Energy Power Conversion. It generates a system overview file called `toc.ini` and address book files for all controllers in the HPCi system. The executable file `DAS_ADDRESSBOOKBUILDER.exe` can be started via the Windows start menu:





The first thing you should do is selecting a directory where the address book files generated by the address book builder need to be stored. This directory should also be accessible from the PC where the *ibaPDA* server is installed. When you have selected the directory then click the <Apply> button. This will check the directory and generate an initial `toc.ini` file if there wasn't one in the directory or read it when it finds a `toc.ini` file.

Now you can add the controllers that make up your complete system. You do this by clicking on the <Add> button. This opens an *Open file* dialog. You have to select the requested controller there.

When you select a controller from the list on the left you can build its address books. If the number of resources or the names of the resources have changed then you must check the *Update Resource-configuration* checkbox. Click the <Build address books…> button to create the address books for the selected controller. There is one address book file `xx.tsv` created per resource in the controller plus one `toc.ini` file for the configuration data.

5 Configuration and engineering ibaPDA

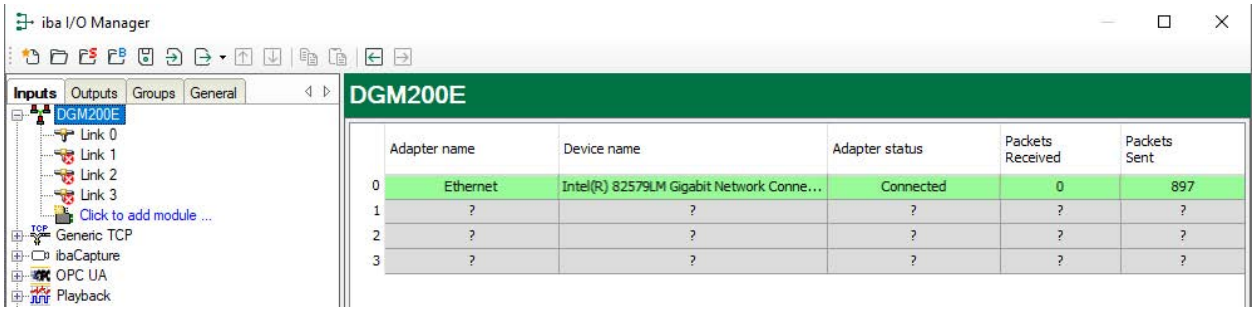
This document describes the basic configuration steps for using the DGM200E interface without *ibaPDA-Request-HPCi*.

When using the Request function some other configuration steps apply, which are described in the manual about *ibaPDA-Request-HPCi*.

5.1 Interface settings

Open the I/O manager, e.g. via the toolbar .

If all the system requirements are met, the interface “DGM200E” will be displayed in the signal tree.



This node shows an overview of the configured connections to max. 4 communication adapters DGM 200-E.

No settings required at this stage.

5.2 Connection settings

On the next level you can configure the connections to the DGM 200-E devices.

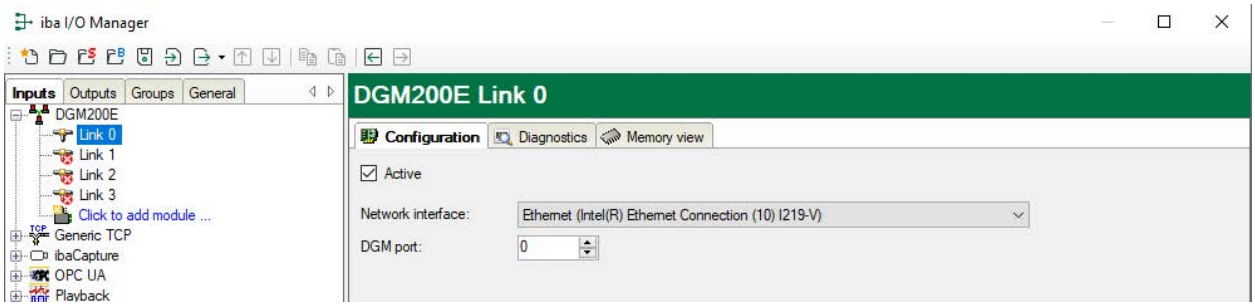
Click on a link node (e.g. Link 0).

In the right window of the I/O Manager you'll find three tabs which are used for configuration and diagnostics of the connection.

Later, you can add the modules for signal acquisition to the connection.

5.2.1 Configuration tab

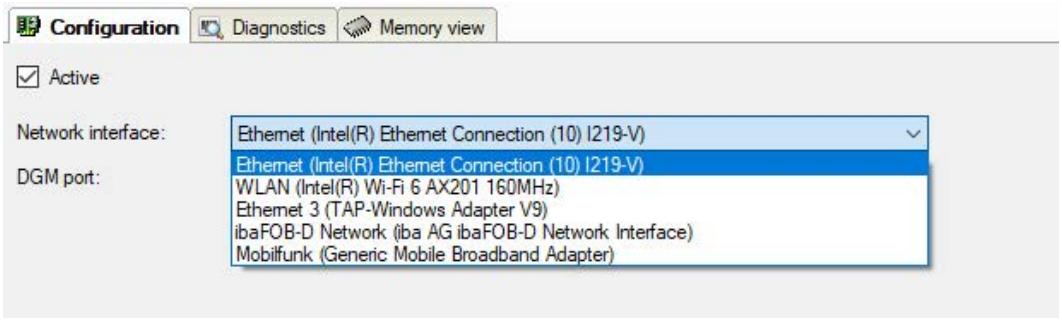
In this tab you carry out the basic configuration of the connection for DGM200E.



Active
Check this option if you want to use this connection.

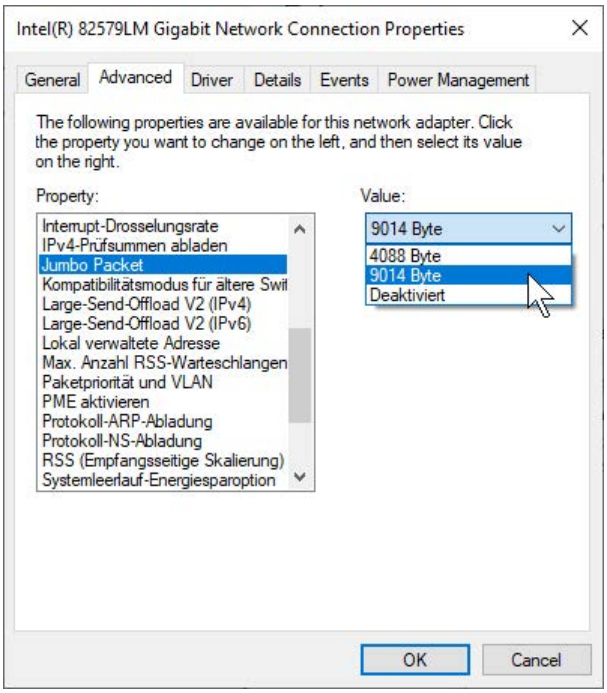
Network interface
Here, select the network adapter in the *ibaPDA* computer which is connected with the DGM 200-E device in question. If multiple DGM 200-E devices are used for different DGM 200 networks, a dedicated physical network adapter must be assigned to each connection. The network adapters must support the 1000 Base T standard (Gigabit Ethernet).

All available Ethernet adapters of the computer are listed in the drop-down list.



Note

Messages used for communication over DGM200E can contain more than 1518 bytes. In order that *ibaPDA* being able to acquire all the data, the *Jumbo packets* should be enabled in the properties settings of the computer's selected network adapter. Depending on the adapter type sizes up to 4088 bytes or 9014 bytes are possible. If available select 9014 bytes.



Access in Windows 10: *Network & Internet settings - Change adapter options - Properties (of the network adapter in question) - <Configure...> - Advanced*.

For step-by-step instructions on how to enable the jumbo frames see ↗ *Network adapter: How to enable Jumbo Frames*, page 41.

DGM port

The DGM port setting should always be 0!

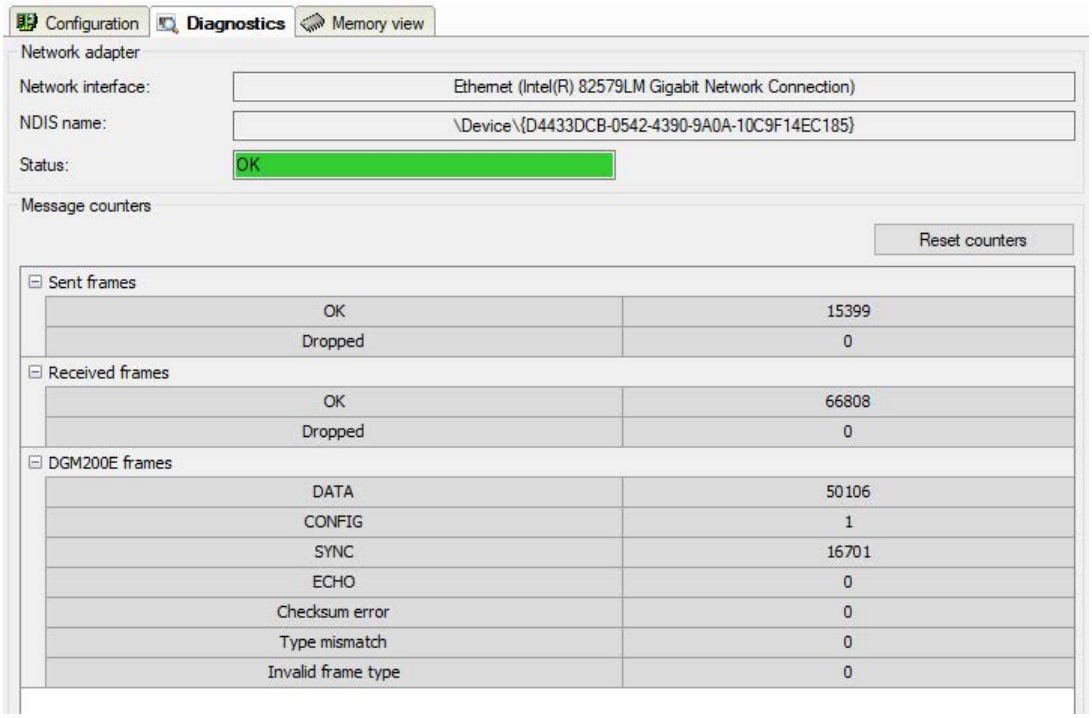
The DGM port setting has been prepared for future extension of the DGM network (DGM over Ethernet). As soon as the extended functions will have been realized you should enter or adjust the DGM port here, which is used for communication to the DGM200 by *ibaPDA*.

Possible values: 0 to 19

Up to 20 stations can be connected to a DGM 200 network.

5.2.2 Diagnostics tab

This tab shows information of the interface driver.



In the upper part you find the description of the network adapter which has been selected beforehand in the *Configuration* tab, its NDIS name and the status.

The status refers to the communication between the *ibaPDA* driver and the network adapter only. It does not indicate whether a connection to a DGM 200 network is working or not. The status is “OK” when the communication between *ibaPDA* and the network adapter is running, even if no DGM 200 network or DGM 200-E device is connected.

In the message counter area you see the counters of the total number of sent and received messages (frames) as well as the DGM 200-specific frame counters (reception only).

There is a differentiation of the DGM200E frames.

Frame/Information	Explanation	Diagnostics
DATA	Frame with data of all 4 time classes TC1, TC2, TC3 and TC4. On reception the data is written in a “Shared Global Memory” (SGM). ibaPDA fetches the data from there.	Frames should always run, i.e. the counter should increment continuously.

Frame/Information	Explanation	Diagnostics
CONFIG	Frame is sent by DGM 200-C and contains the time class information (ratio to base clock TC1) and the names of all channels (max. 128). For DGM 200-E only 20 channels are used. The 20 channels correspond to the channels 0 to 19 in the channel status diagnostics module. ibaPDA waits until it has received a CONFIG frame before processing the DATA frame. On reception of a CONFIG frame ibaPDA replies with an ECHO frame.	Frame should only occur once.
SYNC	Frame is sent by DGM-200-C and contains the sync counter for TC2, TC3 and TC4. Frame is being sent with TC1 clock, i.e. every 1 ms.	Frames should always run, i.e. the counter should increment continuously (same clock like TC1).
ECHO	Frame is used for acknowledge of a CONFIG frame or in case of a timeout when receiving a CONFIG frame. ibaPDA sends an ECHO frame in order to receive a CONFIG frame. ECHO frames are ususally not received by ibaPDA	No frames should occur. Else, something is wrong with the network.
Checksum error	For the purpose of detecting errors that may have been introduced during transmission, each DGM 200-E frame is terminated by a checksum which is checked by ibaPDA. A checksum error occurs when the checksum computed by ibaPDA on the receiving end doesn't match the transmitted value.	Counter must always remain at 0.
Type mismatch	Each DGM 200-E frame starts with a header. The message type is specified twice in this header. These two values must be identical at the receiving end, if not, it is called a type mismatch error.	Counter must always remain at 0. If not, this indicates a message of unknown origin or a corrupt frame.
Invalid frame type	The received message type (as explained above) is invalid and known.	Counter must always remain at 0.

Table 2: Meaning of the DGM200E frames and other information

All above mentioned counter values are also available in the *Link diagnostics* module, which can be added below the DGM 200E interface. Thus, you can display, record and/or provide the data to a higher-level monitoring system (e.g. over OPC UA, SNMP).

For information about extended diagnostics with diagnostic modules see ↗ *Module type Link diagnostics*, page 37.

5.2.3 "Memory view" tab

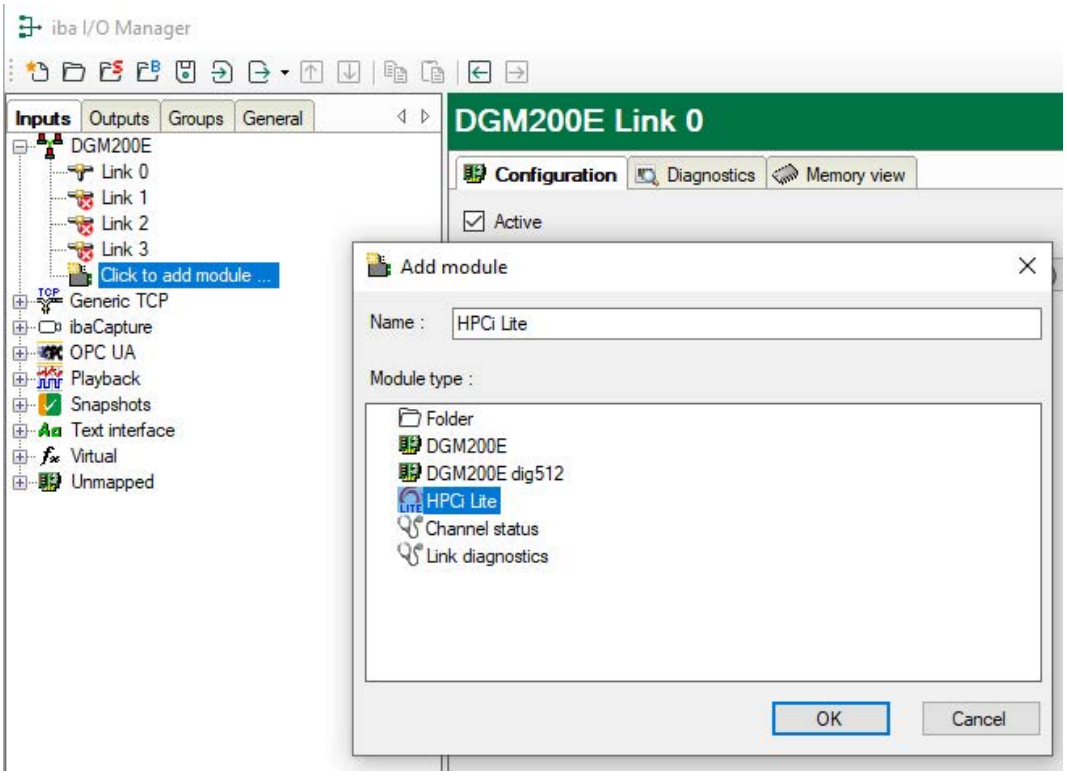
The memory view in this tab is used for service and diagnostic purposes. It can be of valuable help when trouble-shooting communication problems.

Usually there is no need to access this dialog. The blinking green light indicates a running system. The offset addresses equal the address entries in the signal tables of the data modules. You can identify the format of the incoming data (swap mode). Make a right mouse click in order to switch the address mode from hexadecimal to decimal (or vice versa) and to freeze the display.

5.3 Add module

Procedure

1. Click on the blue command *Click to add module…* located under each data interface in the *Inputs* or *Outputs* tab.
2. Select the desired module type in the dialog box and assign a name via the input field if required.
3. Confirm the selection with <OK>.



Module types

There are different types of modules, which can be added to the DGM200E interface.

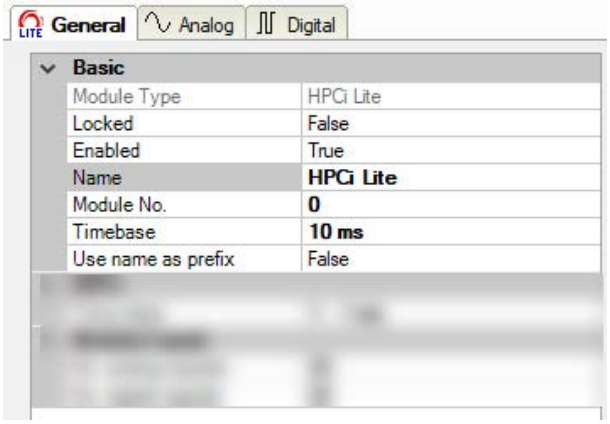
- DGM200E
- DGM200E dig512
- HPCi Lite

The configuration of the different module types is described in the following.

5.4 General module settings

To configure a module, select it in the tree structure.

All modules have the following setting options.



Basic settings

Module Type (information only)
Indicates the type of the current module.

Locked
You can lock a module to avoid unintentional or unauthorized changing of the module settings.

Enabled
Enable the module to record signals.

Name
You can enter a name for the module here.

Module No.
This internal reference number of the module determines the order of the modules in the signal tree of *ibaPDA* client and *ibaAnalyzer*.

Timebase
All signals of the module are sampled on this timebase.

Use name as prefix
This option puts the module name in front of the signal names.

5.5 Module type DGM200E

The DGM200E module type is used for the acquisition of up to 1000 analog and 1000 digital signals over a DGM 200 connection.

The module size, i.e. the number of signals, can be specified. Default setting is 32 analog and 32 digital signals. If more signals are required, they can either be added to the module or another module can be added.

This module type uses physical memory addresses (offsets), which have to be configured by the user.

The data to be measured should be configured correspondingly on side of the HPCi -/ DGM 200. The use of module type DGM200E is therefore rather exceptional, e.g. when communicating over DGM 200 without the HPCi control system.

5.5.1 DGM200E – "General" tab

Basic settings

For description of basic settings see ↗ *General module settings*, page 26.

Advanced

Swap analog signals

Set the swap mode according to the signal source.
You can choose between the following 4 options:

Mode	16 bit	32 bit
No swap	AB	ABCD
Depending on data type	BA	DCBA
Swap 16 bit	AB	CDAB
Swap 8 bit	BA	BADC

The swap mode to be selected depends on the swap mode of the signal source.

Module layout

Number of analog and digital signals

Here, you can increase or decrease the number of signals in the module. By default, 32 signals are preset. You may enter any value between 0 and 1000. The signal tables will be adjusted accordingly.

5.5.2 DGM200E – "Analog" tab

General columns in the signal table

Other documentation

For a description of the columns, please see the *ibaPDA* manual.

Address
In this column, you should specify the offset of the first byte of the value within the raw data stream. The offset can be entered as hexadecimal or decimal values by selecting the appropriate option from the context menu. For a default allocation of the addresses within the column, just click on the column header. Based on the address offset and starting with the value in the first row or in the field the cursor is currently placed in, the address values are filled in automatically according to the previously selected data types.

Data type
In the fields of this column, you can select the relevant data type used for each signal. Click in the corresponding field and select the data type from the drop-down list. The address space depends on the data type. Therefore, an adjustment of address entries might be necessary after changing the data types.

Available data types:

Data type	Description	Value range:
BYTE	8 bit without positive or negative sign	0 … 255
INT	16 bit with positive or negative sign	-32768 … 32767
WORD	16 bit without positive or negative sign	0 … 65535
DINT	32 bit with positive or negative sign	-2147483647 … 2147483647
DWORD	32 bit without positive or negative sign	0 … 4294967295
FLOAT	IEEE754; single precision; 32 bit floating point	±3,402823 E+38 ... 1.175495 E-38
DOUBLE	IEEE754; Double Precision; 64-bit floating point value	±1,798 E+308 ... ±2,225 E-308
FP_REAL	Fixed point real; Q15.16; 15 integer bits and 16 fractional bits;	-32768 … 32767.9999

Note

It is recommended to configure the data to be transmitted in consecutive memory regions, i.e. the signals should have consecutive addresses. Otherwise, the performance might decrease considerably.

5.5.3 DGM200E – "Digital" tab

General columns in the signal table

Other documentation

For a description of the columns, please see the *ibaPDA* manual.

As for digital signals, it is possible to read 16 single bits out of an INTEGER (WORD) or 32 single bits out of a DINT (DWORD).

Address
In this column, you should specify the offset of the first byte of the data-carrying binary signal within the raw data stream. The offset can be entered as hexadecimal or decimal values by selecting the appropriate option from the context menu. For a default allocation of the addresses within the column, just click on the column header. Based on the address offset and starting with the value in the first row or in the field the cursor is currently placed in, the address values are filled in automatically according to the previously selected data types.

Bit no.
This number (0...15 or 0...31) specifies the position of the desired digital signal in a 16-bit or 32-bit block in the data stream with regard to the related offset address. Increase of bit no. by 1 up to 15 (31), then increase of address by 2 (4).

Note

It is recommended to configure the data to be transmitted in consecutive memory ranges, i.e. the signals should have consecutive addresses. Otherwise, the performance might decrease considerably.

5.6 Module type DGM200E dig512

The DGM200E dig512 module type is used for the acquisition of up to 512 digital signals over a DGM 200 connection, with the digital signals being packed in 32 16-bit integer signals.

This module type uses physical memory addresses (offsets), which have to be configured by the user.

The data to be measured should be configured correspondingly on side of the HPCi -/ DGM200. The use of module type DGM200E dig512 is therefore rather exceptional, e.g. when communicating over DGM 200 without the HPCi control system.

5.6.1 DGM200E dig512 – "General" tab

Basic settings

For description of basic settings see ↗ *General module settings*, page 26

Advanced

Swap analog signals
Set the swap mode according to the signal source.
You can choose between the following 4 options:

Mode	16 bit	32 bit
No swap	AB	ABCD
Depending on data type	BA	DCBA
Swap 16 bit	AB	CDAB
Swap 8 bit	BA	BADC

The swap mode to be selected depends on the swap mode of the signal source.

Swap digital signals
If required you can also swap the digital signals. If you set this parameter on TRUE, the bytes of a 16 bit integer will be swapped (AB --> BA).

5.6.2 DGM200E dig512 – "Digital" tab

The signal tables for modules with dig512 format consist of two levels. The first level shows the so-called decoders and activation attributes. If you click on the small plus symbols in the table rows, the second level of the signal table opens and you can see the actual signals (16 per decoder).

Decoder level

Decoder
The different signal groups are called “decoders”. One decoder corresponds to an integer data item with 16 bits.

You can extend or hide the signal tables for each decoder by click on the small + (or -) symbol at the decoder name. You may also enter a name for the decoder in the “Decoder” column. This name is used for engineering assignment. Under each decoder, 16 digital signals are grouped on the second level of the signal table.

Address
In the address column (decoder line), the byte offset in the range of every single decoder (= integer package) may be specified by the user. The offset can be entered as hexadecimal or decimal values by selecting the appropriate option from the context menu. Usually, the default values need to be adjusted. Consecutive addresses count in steps of 2 according to the size of the 16-bit integer package.

After you have entered the address in the first row and clicked on the column header, all following addresses are updated automatically.

Active
Activating the decoders

A click on the "Active" column heading enables (check mark) or disables (no check mark) all the decoders for the measurement at the same time. Individual decoders can be activated in the corresponding selection box. No acquisition takes place for deactivated decoders, so that such

decoders are neither available for display nor storage. When enabling/disabling a decoder's activation attribute in the parent table, all the channels it contains are enabled/disabled.

If you want to activate/deactivate the signals individually, go to the second level. If enabling of the signals of a decoder is not uniform, the "Activation" selection box of the decoder is grayed out.

Furthermore, disabled signals will not be taken into account in the signal statistics.

5.7 HPCi Lite module

The HPCi Lite module type is used, in particular, for the acquisition of up to 1000 analog and 1000 digital signals from a GE HPCi system over DGM 200.

This module type can also be used in combination with an HPC ("Logidyn D2").

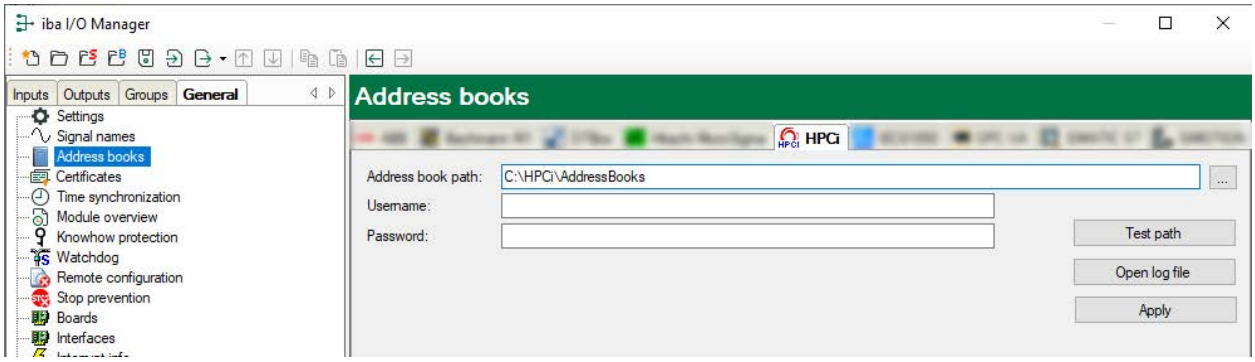
The HPCi Lite module type is included in the license for the DGM200P and DGM200E interface and supports a convenient signal selection by browser in the *ibaPDA* I/O Manager.

The selection of signals is limited to the signals configured in the HPC/HPCi for communication over the DGM 200 network ("CC100 signals"). A request function with access on all variables in the HPCi system is therefore not possible.

Preconditions for using this module type are a connection to the HPC/HPCi system over DGM 200-V, DGM 200-C, DGM 200-P or DGM 200-E as well as a data configuration for the CC100 bus with the CCM32 (Coordination Channel Manager) by GE Energy Power Conversion.

5.7.1 HPCi Lite general preferences

If the licence DGM200E (without HPCi request) is unlocked, the *HPCi Lite* tab is displayed in the I/O Manager under *General - Address books*. If you are using an *HPCi Request* license, this tab is not visible.



Important information for the HPCi Lite function should be entered here.

Address book path
Enter the complete path name where the `toc.ini` configuration file and the address book files `*.tsv` are stored.

User name and password
If the `toc.ini` file is not stored on the local drive of the *ibaPDA* computer but on a network drive then here you have to enter the credentials (user name and password) for the remote computer. This user must be registered on the remote computer with appropriate rights for reading data.

<Test path> button.
Click on this button in order to check the accessibility of the specified path.

<Open log file> button
Click on this button in order to open a system log file which shows all relevant activities and events regarding the connection to the HPCi systems.

<Apply> button
If changes were made in this dialog, confirm them with this button. The changes will be applied and the driver restarted.

5.7.2 HPCi Lite – General tab

Basic settings

For description of basic settings see ↗ *General module settings*, page 26.

HPCi

Time class
Here, select the time class (from 1 to 4) which applies to the refresh rate of the signals to be measured on the DGM 200. A module can only be assigned to one time class. This setting is used to filter the signals assigned to this time class in the signal browser.

Module layout

Number of analog and digital signals
Here, you can increase or decrease the number of signals in the module. By default, 32 signals are preset. You may enter any value between 0 and 1000. The signal tables will be adjusted accordingly.

Hyperlink

Select analog HPCi symbols
A click on this link will open the browser for selecting the signals to be measured from the DGM 200 address book. You have access to all symbols available on the DGM 200 network.

The selected signals will be entered automatically in the appropriate signal table of the module (next available free row).

So you can select several signals in combination whereas the browser is not closed after each selection. The browser will stay open until you press <OK>.

You also may open the browser directly from the signal tables ("HPCi symbol" column).

Select digital HPCi symbols
According to function, as with analog symbols.

5.7.3 HPCi Lite – Analog tab

General columns in the signal table

Other documentation

For a description of the columns, please see the *ibaPDA* manual.

HPCi symbol

This column has the symbolic name of the signal, as it was configured in the HPCi system.

You may enter the symbol name manually. However, it is recommended using the signal browser, being easier and safer.

In compliance with the naming rules in the HPCi system, the full symbol path is indicated.

Two different methods are available:

a) via the link in the *General* tab of the module. With this method, the signals selected from the signal browser will be put into the next free row of the signal table. This is helpful if you fill the signal table for the first time or if you want to fill up a partially filled signal table.

b) via the small browser button  in the HPCi symbol field of the desired signal. With this method, you determine exactly the position where a symbol is to be entered in the table.

Tip

When using the modules HPCi Lite (also HPCi Request), even the comments are taken from the HPCi system, as long as they were configured there.

When selecting a signal from the signal browser, the HPCi symbol name is entered into the "Name" column. You may change the name manually afterwards.

Moreover, the *Update signal names with comments from address books* command in the context menu allows you to use "Comment 1" as signal name. This command will swap the positions of the current signal name and Comment 1.

You may also use the context menu command *Update signal names with symbols from address books.* This will enter the HPCi symbol in the name field and the HPCi signal comment 1 in the "Comment 1" field.

5.7.4 HPCi Lite – Digital tab

Note

In the DGM200 system there is no direct support for digital signals. Normally 32 digital signals are packed into one DINT that is put on the DGM 200. So when you want to select digital signals in the browser you have to select DINT values. *ibaPDA* adds 32 digital signals for each DINT value you select by using the link in the *General* tab of the module.

General columns in the signal table

Other documentation

For a description of the columns, please see the *ibaPDA* manual.

HPCi symbol
This column has the symbolic name of the signal, as it was configured in the HPCi system.

You may enter the symbol name manually. However, it is recommended using the signal browser, being easier and safer.

In compliance with the naming rules in the HPCi system, the full symbol path is indicated.

Two different methods are available:

a) via the link in the *General* tab of the module. With this method, the signals selected from the signal browser will be put into the next free row of the signal table. This is useful if you fill the signal table for the first time or if you want to fill up a partially filled signal table.

b) via the small browser button  in the HPCi symbol field of the desired signal. With this method, you determine exactly the position where a symbol is entered in the table.

Bit no.
The default allocation is 0, because "real" binary signals are initially assumed (e.g. flags).

In the case of packed bits, the number (bit index 0...31) can be entered here within the HPCi symbol variable. Applies to data formats INT, WORD, DINT, DWORD.

You can enter the value directly or set it using the arrow keys in the field.

Tip

When using the modules HPCi Lite (also HPCi Request), even the comments are taken from the HPCi system, as long as they were configured there.

When selecting a signal from the signal browser, the HPCi symbol name is entered into the "Name" column. You may change the name manually afterwards.

Moreover, the *Update signal names with comments from address books* command in the context menu allows you to use "Comment 1" as signal name. This command will swap the positions of the current signal name and Comment 1.

You may also use the context menu command *Update signal names with symbols from address books*. This will enter the HPCi symbol in the name field and the HPCi signal comment 1 in the "Comment 1" field.

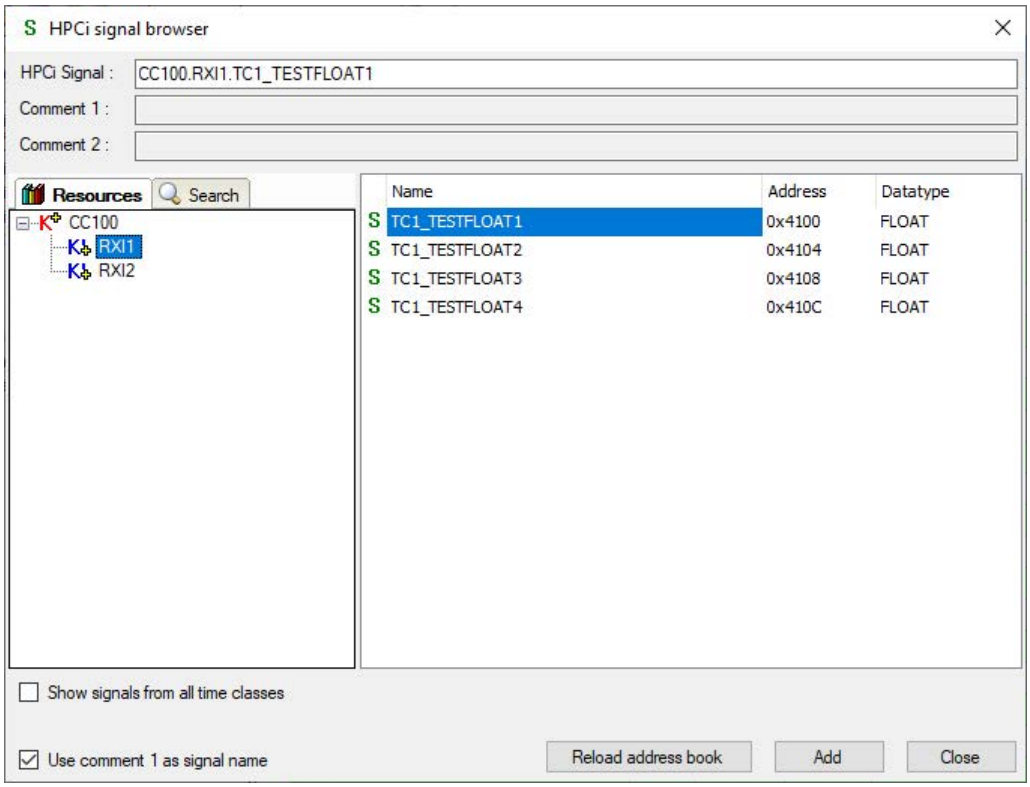
5.7.5 HPCi signal browser

Use the HPCi signal browser for selecting the signals to be measured.

In order to display the signals in the browser, make sure that the path of an address book file has been entered in the field *Address book path*, in the *HPCi Lite* tab on the node *General* in the I/O Manager. In this path, there should be a valid file `toc.ini` as well as the corresponding address book files (`*.tsv`) of the HPCi stations.

The signal browser can be opened in different ways:

- In the *General* tab of an HPCi Lite module click on one of the hyperlinks *Select analog HPCi symbols* or *Select digital HPCi symbols*.
- Click on the little browser button < ... > in the *Analog* tab of an HPCi Lite module, in the fields of column *HPCi Symbol*.
- Click on the little browser button < ... > in the *Digital* tab of an HPCi Lite module, in the fields of column *HPCi Symbol*.



On the left side, in the *Resources* tab, a tree structure will appear containing the signal sources parsed from the address book file. For HPCi Lite, the top-level node is CC100, comprising the station nodes which finally contain the signals.

If you select a station node, you can see the signals on the right.

In the upper part of the dialog you find the name of the selected signal and - if available - the comment(s).

You can double-click on a signal to add it to the module. You can also select multiple signals by holding <CTRL> or <SHIFT> while selecting. When you click the <Add> button all selected signals are added to the module.

Search function
With the text based search function you can look for available signals by their name.

Click on the <Search> button in the *Search* tab and enter the complete text or a part of it into the *Search signal* dialog. Optionally, you can extend the search on the comments. Alternatively, you can look for KK'S names.

The search result is again a tree structure in the *Search* tab, which contains only the signals matching the search criteria. Proceed in the same way like in the *Resources* tab in order to add the requested signals to the signal table.

Option "Show signals from all time classes"
If you enable this option, the signals from all time classes of a resource will be shown. If this option is disabled (default), only the signals of the time class selected in the *General* tab of the module settings will be shown.

Option "Use comment 1 as signal name"
When selecting a signal from the signal browser, the HPCi symbol name will be automatically transmitted into the "Name" column. You may change the name manually afterwards. If you enable this option, the comment 1 will be used for signal name instead of the symbol name.

If required, you can reverse this in the signal table by using the context menu any time.

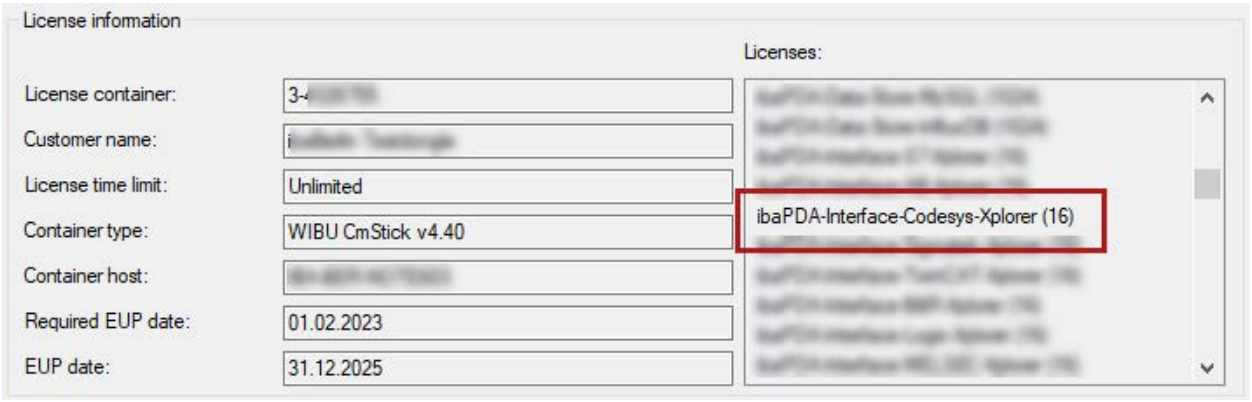
Button <Reload address book>
If no signals are shown in the browser or if the contents is obviously outdated, click on this button in order to reload the address book. If still no signals appear, then there is probably something wrong with the format or the path name of the supplied address book file.

6 Diagnostics

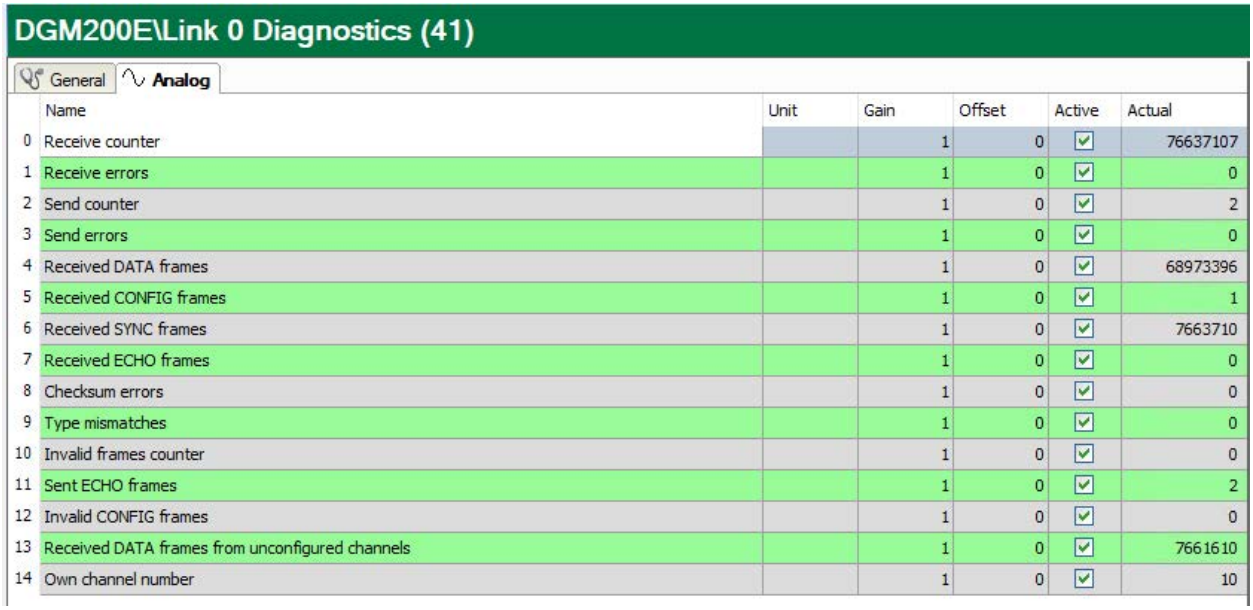
6.1 License

If the interface is not displayed in the signal tree, you can either check in *ibaPDA* in the I/O Manager under *General – Settings* or in the *ibaPDA* service status application whether your license for this interface has been properly recognized. The number of licensed connections is shown in brackets.

The figure below shows the license for the *Codesys Xplorer* interface as an example.



6.2 Module type Link diagnostics



	Name	Unit	Gain	Offset	Active	Actual
0	Receive counter		1	0	☑	76637107
1	Receive errors		1	0	☑	0
2	Send counter		1	0	☑	2
3	Send errors		1	0	☑	0
4	Received DATA frames		1	0	☑	68973396
5	Received CONFIG frames		1	0	☑	1
6	Received SYNC frames		1	0	☑	7663710
7	Received ECHO frames		1	0	☑	0
8	Checksum errors		1	0	☑	0
9	Type mismatches		1	0	☑	0
10	Invalid frames counter		1	0	☑	0
11	Sent ECHO frames		1	0	☑	2
12	Invalid CONFIG frames		1	0	☑	0
13	Received DATA frames from unconfigured channels		1	0	☑	7661610
14	Own channel number		1	0	☑	10

By using this module type you can acquire, display and record the communication status of the DGM 200 connection. A part of it is the same information you can find in the *Diagnostics* tab, *Message counters* area, when you click on the link node in the I/O Manager.

For information about the values in rows 0 to 10 see chapter ↗ *Diagnostics tab*, page 22 .

Moreover, additional values are displayed in the rows 11 to 14, which have their meaning as follows:

Frame/Information	Explanation	Diagnostics
Sent ECHO frames	ECHO frames sent by ibaPDA An ECHO frame is sent once as a request for a CONFIG frame and again as acknowledgement for a received CONFIG frame. Also in case of a timeout when receiving a CONFIG frame ibaPDA sends an ECHO frame. ECHO frames are ususally not received by ibaPDA	Ideally, number should be 2 or at least on very low level. If value increases, something may be wrong with the network.
Invalid CONFIG frames	Received CONFIG frames which are incomplete or come without prior request (ECHO).	Counter should remain at 0. If value increases, something may be wrong with the network or the configuration of DGM200E and DGM200V/-P (peer-to-peer) or DGM200E and DGM200C (with concentrator) does not match. Troubleshooting: Reload configuration with CCM32 in DGM200V/-P or -C.
Received DATA frames from unconfigured channels	DATA frames which have been sent over a channel, which is not part of the configuration but received by ibaPDA. These DATA frames are ignored by ibaPDA	Usually, counter is 0 but may increase. For example, this counter can increment if another passive participant such as a DGM200-P or -E in another ibaPDA system is connected to the same DGM200-C.
Own channel number	This is the number of the channel on a DGM 200-C which is connected with ibaPDA.	Value should match physical connection on DGM 200-C.

Table 3: Extended diagnostic signals

6.3 Module type Channel status diagnostics

By using this module type you can get an impression of the status of the DGM 200 network and its stations. Beside a global status value for the DGM 200 network the distinct status values for all DGM 200 channels (max. 20) are available in the *Analog* tab of the module.

The status is coded in hexadecimal status values.

By means of this module type the status information can be acquired, displayed and recorded by *ibaPDA*. As any other signal value, the status values can be used in e-mail notifications.

General module settings

The general module settings comprise only the basic settings which are the same for all module types. See also ↗ *General module settings*, page 26.

"Analog" tab

The tab is preconfigured with 21 status values. You may change the name, if needed, and you can edit the comments 1 and 2. The address values are fixed an cannot be altered.

Status values which are not needed (e.g. unused channels) can be disabled.

Status	Status code	Description
SIMULATED_DATA	0x8000	data of this channel is simulated
NO_SEND_REL	0x2000	no send release for this channel
TC4_NOT_CONFIGURED	0x0800	no channel configured for TC4 at this ch.-number
TC3_NOT_CONFIGURED	0x0400	no channel configured for TC3 at this ch.-number
TC2_NOT_CONFIGURED	0x0200	no channel configured for TC2 at this ch.-number
TC1_NOT_CONFIGURED	0x0100	no channel configured for TC1 at this ch.-number
TC4_DATA_NOT_VALID	0x0080	data of TC4 not yet initialized (e.g. after reset)
TC3_DATA_NOT_VALID	0x0040	data of TC3 not yet initialized (e.g. after reset)
TC2_DATA_NOT_VALID	0x0020	data of TC2 not yet initialized (e.g. after reset)
TC1_DATA_NOT_VALID	0x0010	data of TC1 not yet initialized (e.g. after reset)
TC4_DATA_OLD	0x0008	data of TC4 is old or left at least one cycle
TC3_DATA_OLD	0x0004	data of TC3 is old or left at least one cycle
TC2_DATA_OLD	0x0002	data of TC2 is old or left at least one cycle
TC1_DATA_OLD	0x0001	data of TC1 is old or left at least one cycle

Table 4: Error codes and their meaning

6.4 Log files

If connections to target platforms or clients have been established, all connection-specific actions are logged in a text file. You can open this (current) file and, e.g., scan it for indications of possible connection problems.

You can open the log file via the button <Open log file>. The button is available in the I/O Manager:

- for many interfaces in the respective interface overview
- for integrated servers (e.g. OPC UA server) in the *Diagnostics* tab.

In the file system on the hard drive, you can find the log files of the *ibaPDA* server (...\ProgramData\iba\ibaPDA\Log). The file names of the log files include the name or abbreviation of the interface type.

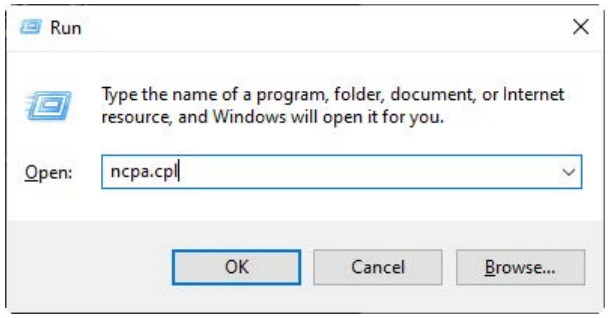
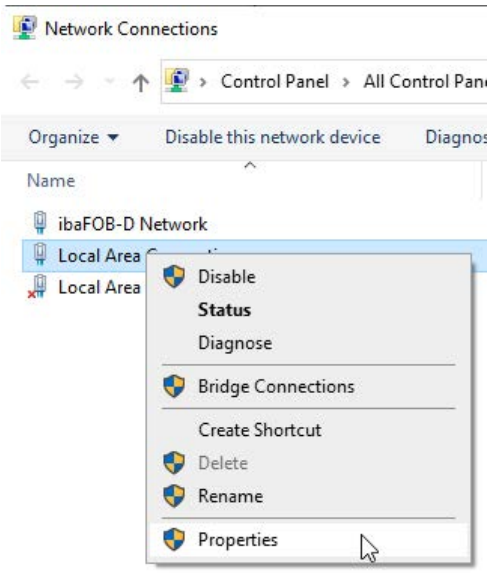
Files named `interface.txt` are always the current log files. Files named `Interface_yyyy_mm_dd_hh_mm_ss.txt` are archived log files.

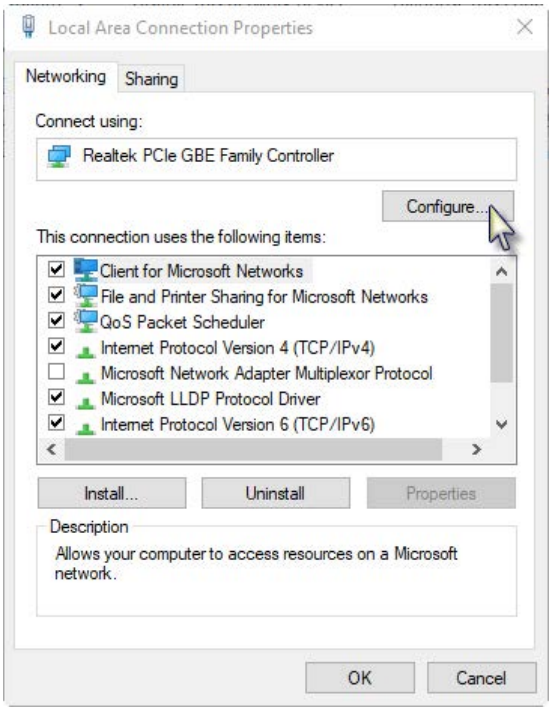
Examples:

- `ethernetipLog.txt` (log of EtherNet/IP connections)
- `AbEthLog.txt` (log of Allen-Bradley Ethernet connections)
- `OpcUAServerLog.txt` (log of OPC UA server connections)

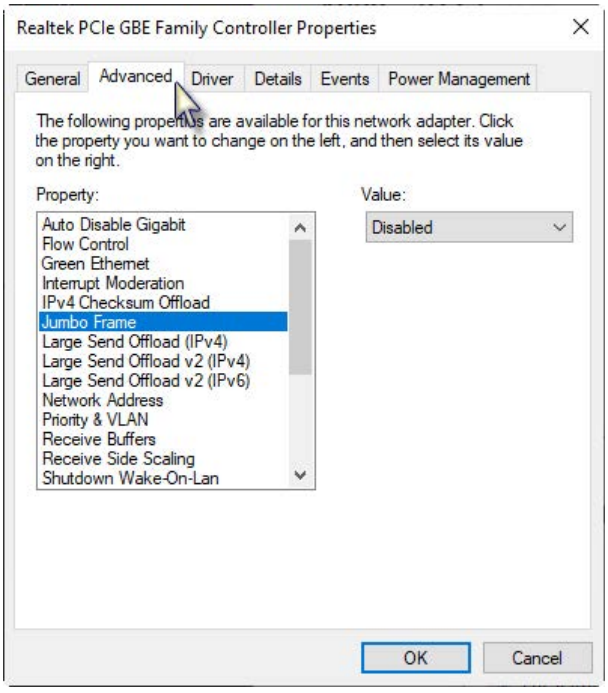
7 Appendix

7.1 Network adapter: How to enable Jumbo Frames

	Open the Windows Network Connections Control Panel by pressing <Windows Logo> + <R>. Then enter **ncpa.cpl** and press <Return>.
	Right-click on the network adapter to be used for DGM200-E and click on *Properties*.



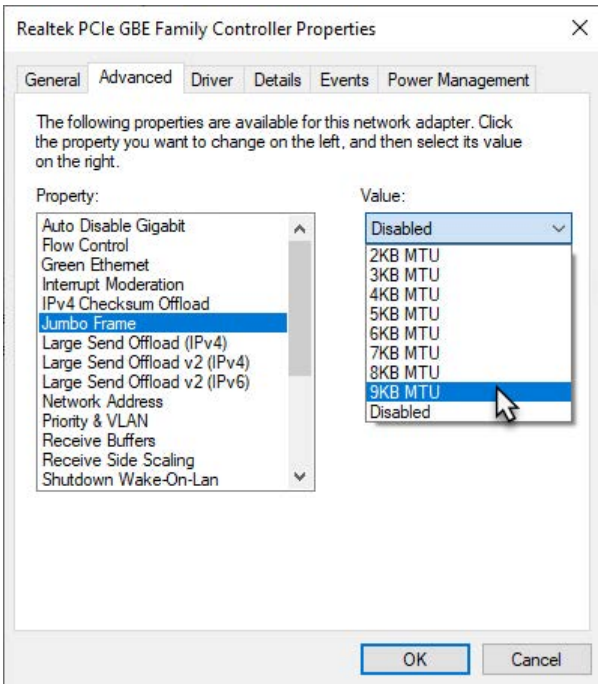
Click <Configure...>.



Select the *Advanced* tab.

Look for an entry “Jumbo Frame” or “Jumbo Paket” in the list and click on it.

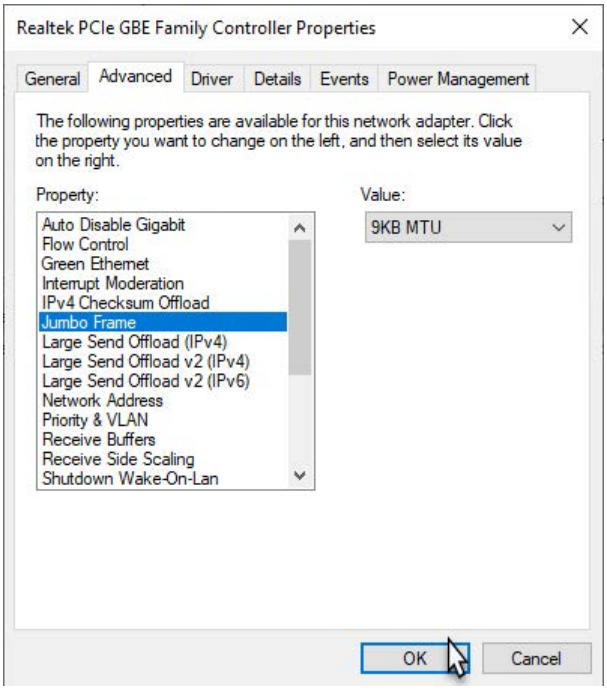
Depending on the network adapter, the designation may differ, e.g. "Jumbo MTU".



In the field *Value* change the size to **9014** or the appropriate size for the network (example here **9KB MTU**).

The offered values depend on the network adapter. Instead of values like 4088 Byte or 9014 Byte other values may be offered, such as 4KB MTU or 9KB MTU.

(MTU = Maximum Transmission Unit)



Then click <OK> to save the changes and close the dialog.

8 Support and contact

Support

Phone: +49 911 97282-14

Fax: +49 911 97282-33

Email: support@iba-ag.com

Note

If you need support for software products, please state the number of the license container. For hardware products, please have the serial number of the device ready.

Contact

Headquarters

iba AG
Koenigswarterstrasse 44
90762 Fuerth
Germany

Phone: +49 911 97282-0

Fax: +49 911 97282-33

Email: iba@iba-ag.com

Mailing address

iba AG
Postbox 1828
D-90708 Fuerth, Germany

Delivery address

iba AG
Gebhardtstrasse 10
90762 Fuerth, Germany

Regional and Worldwide

For contact data of your regional iba office or representative please refer to our web site

www.iba-ag.com.