ibaPDA-Interface-GH180-Xplorer

Data Interface to Innomotics Perfect Harmony GH180

Manual

Issue 1.0

Measurement Systems for Industry and Energy

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Version	Date	Revision	Author	Version SW
1.0	08/2024	First issue	rm	8.8.0

Contents

1 About this documentation

This documentation describes the function and application of the software interface *ibaPDA-Interface-GH180-Xplorer*.

Other documentation

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 documentation 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.

This documentation in particular addresses persons, who are concerned with the configuration, test, commissioning or maintenance of Programmable Logic Controllers of the supported products. For the handling *ibaPDA-Interface-GH180-Xplorer* the following basic knowledge is required and/or useful:

- Basic knowledge of *ibaPDA*
- Knowledge of configuration and operation of the relevant drive system

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 data interface:*ib aPDA-Interface-GH180-Xplorer*required:

- *ibaPDA* v8.8.0 or higher
- Base license for *ibaPDA* + license for *ibaPDA-Drive-Xplorer* or *ibaPDA-Interface-GH180-Xplorer*
- If you need to connect more than one drive, you will require additional one-step-up-Interface-GH180-Xplorer licenses.
- Innomotics Perfect Harmony GH180 Medium Voltage Drive

For further requirements for the used computer hardware and the supported operating systems, refer to the *ibaPDA* documentation.

License information

Order no.	Product name	Description
31.001044	ibaPDA-Drive-Xplorer	Extension license for an *ibaPDA* system that adds the data interfaces SINAMICS-Xplorer, SIMOTION-Xplorer and GH180-Xplorer
31.001051	ibaPDA-Interface-GH180-Xplorer	Extension license for an *ibaPDA* system that adds the data interface: GH180-Xplorer (interface for one GH180 drive)
31.101051	one-step-up-Interface-GH180-Xplorer	Extension license for one further GH180 drive, (a maximum of 254 permissible)

3 About GH180-Xplorer

The GH180-Xplorer interface can be used to measure data from Innomotics Perfect Harmony GH180 medium voltage drives.

The communication between *ibaPDA* and the drives is established via the standard network interface which is also used by the GH180 debug tool.

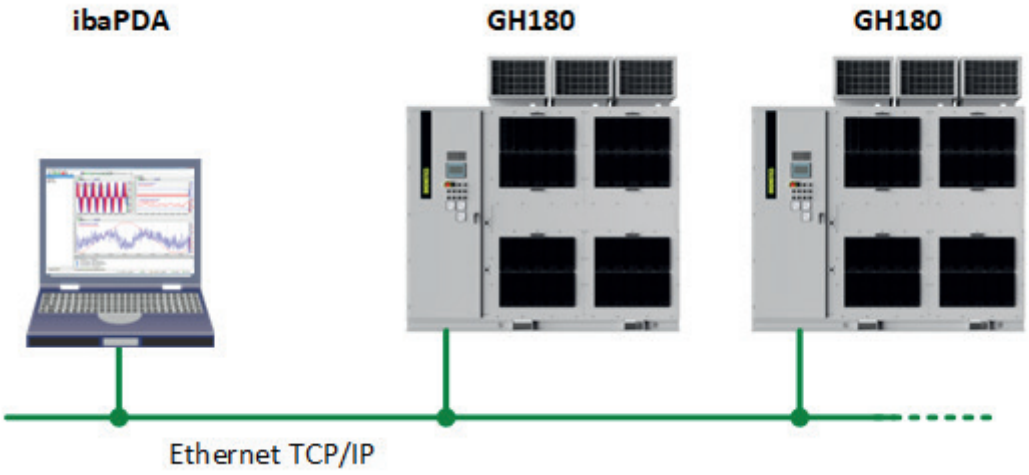
The access is transparent for the drive controller. It is not necessary to configure or program the drive's side separately.

This is an "Xplorer" interface, i. e. the data is not sent actively by the drive controller but requested and read cyclically by *ibaPDA*.

The selection of the signals to be measured is then realized by entering the parameter indexes and data types in the I/O Manager of *ibaPDA*.

4 System topologies

The connection to the drives is established via the standard network interface of the computer.



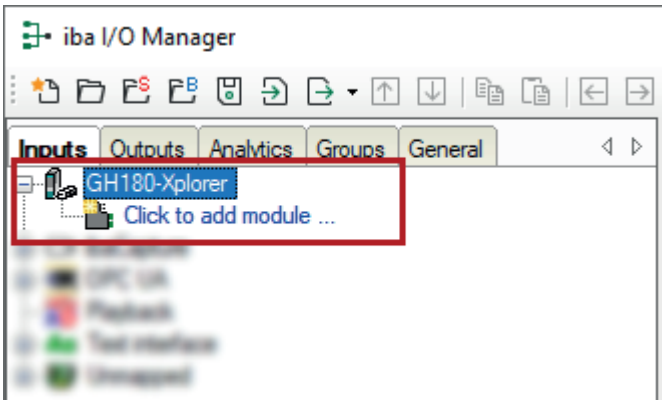
5 Configuration and engineering GH180 drive

On the drive’s side no special engineering or programming is required to use the GH180-Xplorer interface.

6 Configuration and engineering in ibaPDA

The engineering for *ibaPDA* is described in the following.

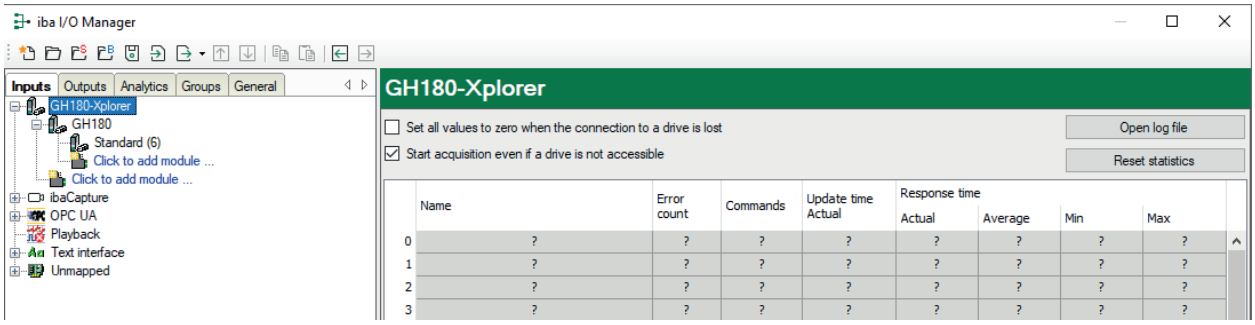
If all system requirements are fulfilled (see ↗ *System requirements*, page 7), *ibaPDA* displays the *GH180-Xplorer* interface in the interface tree of the I/O Manager.



6.1 General interface settings

If you select the data interface in the tree, you see an overview with diagnostic information about the connections between *ibaPDA* and the drives.

The interface provides the following functions and configuration options:



Set all values to zero when the connection to a drive is lost.
If enabled, all measured values of the drive are set to zero as soon as the connection is lost. If this option is disabled, *ibaPDA* will keep the last valid measured value at the time the connection was lost in the memory.

Start acquisition even if a drive is not accessible.
If this option is enabled, the acquisition will start even if a drive is not accessible. Instead of an error, a warning is prompted in the validation dialog. If the system has been started without a connection to the drive, *ibaPDA* will try to connect to the drive at regular intervals.

Connection table
For each connection, the table shows the connection status, the current values for the update time (actual value, average, min. and max.) as well as the data size. In addition, there is an error counter for the individual connections during the acquisition.

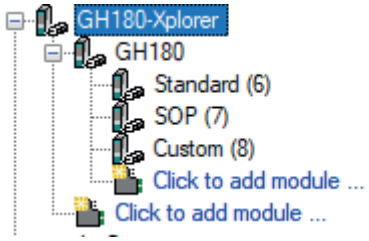
See ↗ *Connection table*, page 21.

<Open log file>
If connections to controllers have been established, all connection specific actions are recorded in a text file. Using this button, you can open and check this file. In the file system on the hard disk, you find the log files of this interface in the path …\ProgramData\iba\ibaPDA\Log. The file name of the current log file is InterfaceLog.txt; the name of the archived log files is InterfaceLog_yyyy_mm_dd_hh_mm_ss.txt.

<Reset statistics>
Click this button to reset the calculated times and error counters in the table to 0.

6.2 Available modules

The interface GH180-Xplorer provides a hierarchic module structure.



On the first level under the interface you create main modules for the drives. Create at least one module (default name “GH180”) per drive. You may create multiple main modules which access the same drive (connect to the same IP address). In this case multiple connections to the same drive count as one in terms of licenses.

For the configuration of the measured data, there are three different types of submodules available for selection under each main module:

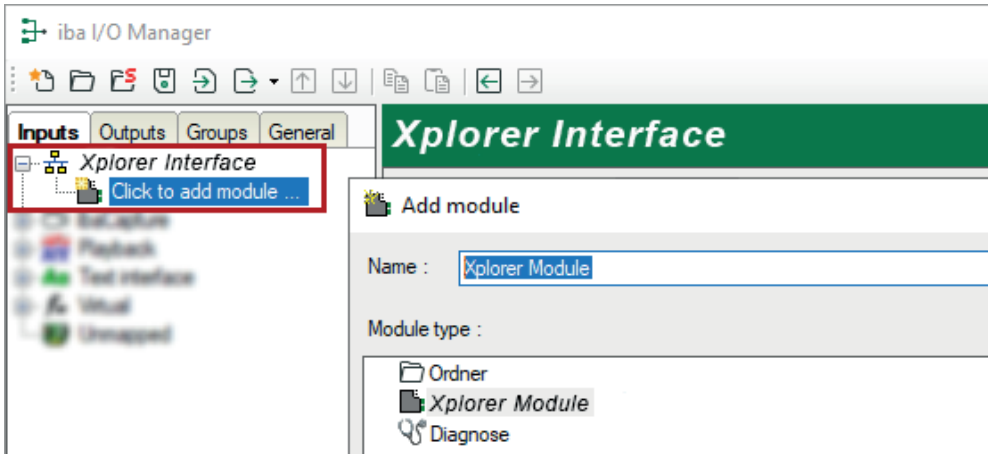
- Standard
- SOP
- Custom

Each of these submodules can have its own time base. The time base determines the transmission cycle of commands to retrieve the data. All submodules under a main module use the same connection.

The modules and their configuration are described in the following.

6.3 Adding a module

1. Click on the blue link *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>.



6.4 GH180 drive module - general settings

Use this module type to establish the connection from *ibaPDA* to the drive.

This module type has no module number and no time base setting and rather serves as a parent node for the submodules.

General tab

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.

Comment
You can enter a comment or description of the module here. This will be displayed as a tooltip in the signal tree.

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

6.5 GH180 drive module - connection settings

Address
Enter the IP address of the desired drive.

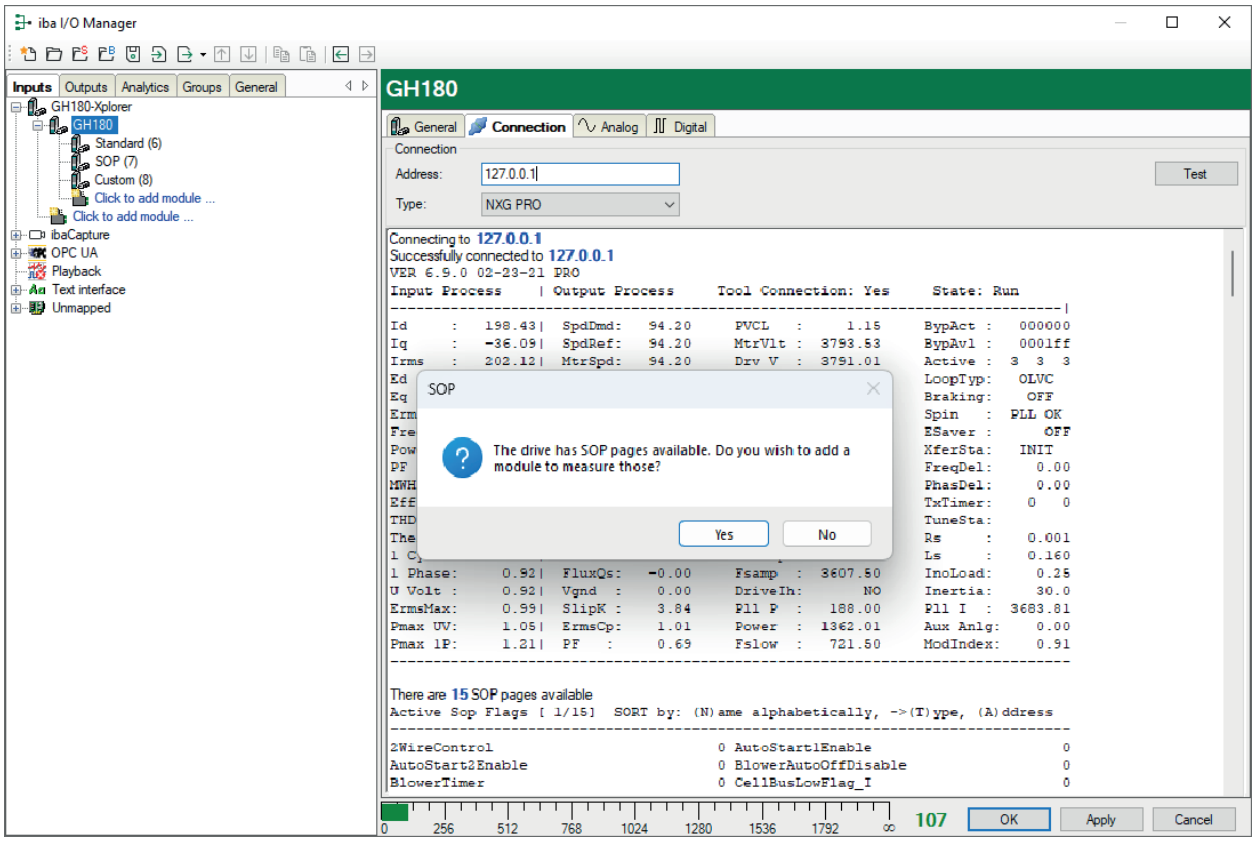
Type
Select the correct controller type of the drive from the drop-down list.

The following controller types or generations are available for selection:

- NXG
- NXG PRO
- NXG PRO+

<Test>
Click on this button to test the connection to the drive. If *ibaPDA* can establish the connection, it displays some information of the drive in the status view window.

First, *ibaPDA* retrieves the version information. Then it executes the “advanced” command and thus retrieves the so called SOP pages (System Oprating Program).



On the SOP pages you can find information such as inputs, outputs, timers and counters, which are used by the system program of the drive. Up to 38 items can be placed on one page. If there is more than one page configured in the drive, further commands need to be executed to retrieve this information. ibaPDA automatically offers to create modules for the SOP pages.

At first, the module has no *Analog* and *Digital* tabs. As soon as you have configured submodules with signals and applied the I/O configuration, the tabs will be added. In these tabs you’ll find

the signals grouped by submodules, providing information about name, command, address and actual value.

Continue with the creation of submodules in order to configure the signals to be measured.

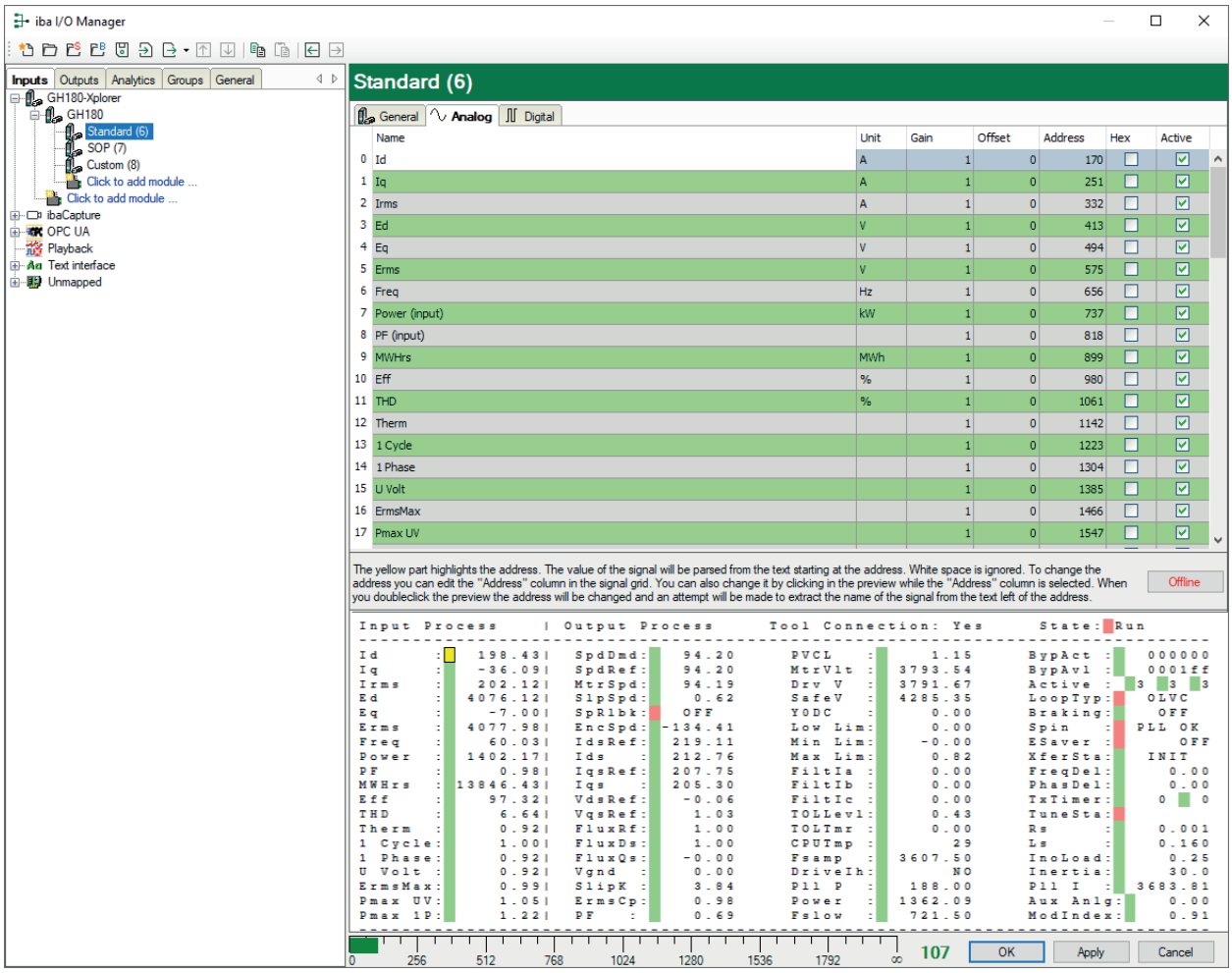
6.6 GH180 Standard submodule

When you create a GH180 main module, a standard submodule will be created automatically.

Module settings
The module settings in the *General* tab of the module correspond to the usual basic settings. In contrast to the main module, this module has a module number and a time base.

Signal configuration
The standard module is preconfigured and uses the “advanced” command to retrieve the most important data of the drive and cast it into analog and digital signals.

According to the drive’s standard response to the “advanced” command, you get a data set which contains 71 analog signals and 36 digital signals.



The figure shows for example the signal table *Analog* in the upper part and the response of the drive (textual information) in the lower part.

< Online>/< Offline>
Using this button you can establish a diagnostic connection to the drive in order to see the current response of the drive to the “advanced” command. Green boxes indicate that the address is used only once. Red boxes indicate that the address is used multiple times, e.g. for digital signals.

Understanding the drive data
Analog signals always have an “Address”-property and a “Hex”-property. The “Address”-property (address) is an index in the response where to start parsing a value. Blank characters are ignored. As you can see in the figure, the address starts just behind the colon by default. The “Hex”-property determines whether a value is decimal oder hexadecimal. The response to the “advanced” command contains only two hex-values: *BypAct* and *BypAvl*.

Digital signals have the properties “Address”, “Enum” and “EnumValue”. The “Address”-property corresponds to the same property of analog signals. The “Enum”-property determines whether a signal is part of an enumeration or just a simple digital signal.

General | Analog | **Digital**

	Name	Address	Enum	Enum Value	Active
0	TuneSta: Empty	1123	☑		☑
1	TuneSta: RS_DONE	1123	☑	RS_DONE	☑
2	TuneSta: LS_DONE	1123	☑	LS_DONE	☑
3	State: Idle	69	☑	Idle	☑
4	State: Mag	69	☑	Mag	☑
5	State: Load	69	☑	Load	☑
6	State: Run	69	☑	Run	☑
7	State: Fault	69	☑	Fault	☑
8	State: CR3	69	☑	CR3	☑
9	State: Coast	69	☑	Coast	☑
10	State: Tune1	69	☑	Tune1	☑
11	SpRlbk: OFF	513	☑	OFF	☑

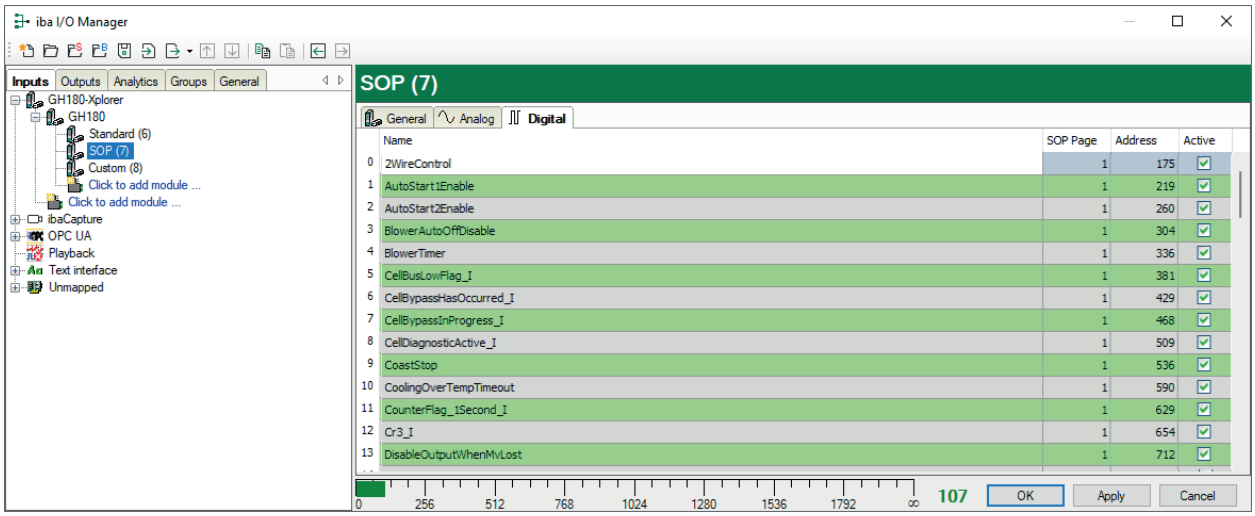
The response to the “advanced command contains several enumerations. One example is the “State” enumeration. "State" can have different values such as "Idle", "Mag", "Load", "Run" etc. For each possible value there is a dedicated digital signal. The “EnumValue” property (*EnumValue* column) determines for which value of “State” the digital signal is 1 (true). Accordingly, the signal “State: Run” is true when the text “Run” is written behind “State:” in the response of the drive.

6.7 GH180 SOP submodule

A SOP submodule retrieves data from the so called SOP pages of a drive. The additional “SOP Page”-property determines on which page a signal can be found.

The module settings in the *General* tab of the module correspond to the usual basic settings.

The following figure shows for example the digital signals of a SOP module.



If you quit the dialog box asking for creating SOP modules right after creation of a main module with “Yes”, *ibaPDA* creates automatically a SOP module. Signal names and page numbers are configured automatically and cannot be changed later. You only are allowed to enable or disable the signals.

You can create SOP modules by yourself manually and retrieve the desired data by entering page number and address.

Please note, that the update time increaes the more pages you use.

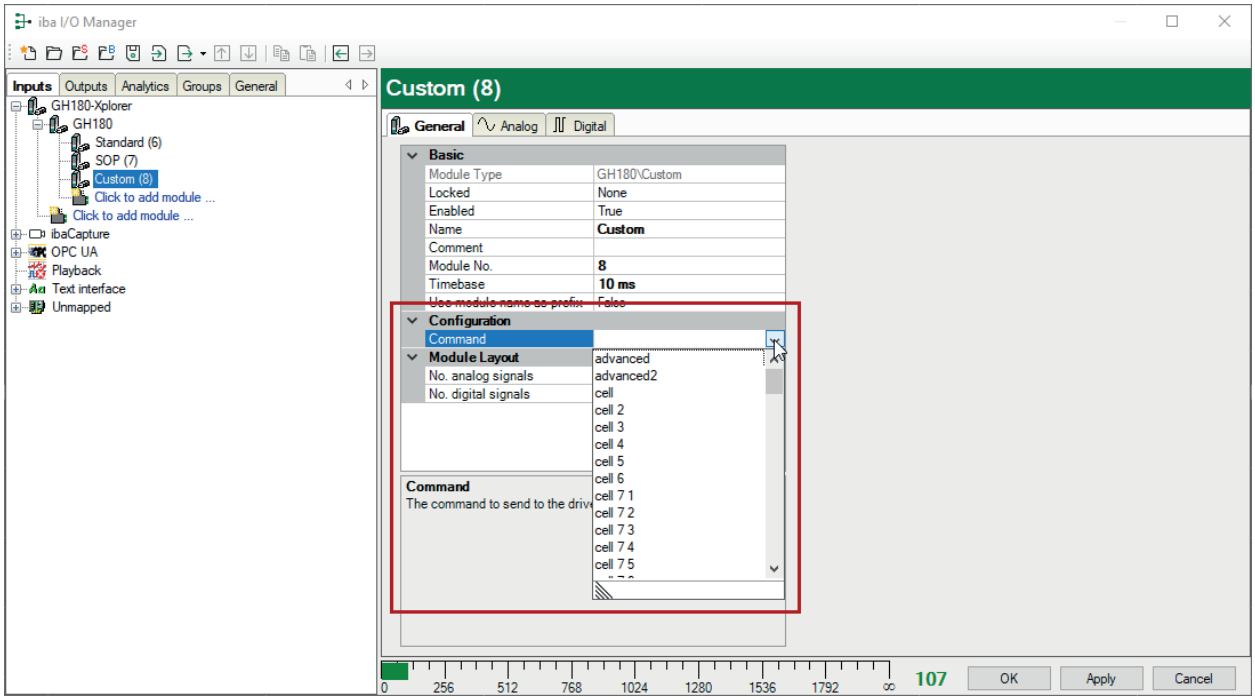
6.8 GH180 Custom submodule

Using the *Custom* submodule type you can retrieve more data by executing other commands than just “advanced” oder “SOP”.

Module settings

Beside the usual basic settings and the settings for the number of analog and digital signals, the *Custom* module type has another property *Configuration*.

Under *Configuration* you’ll find a drop-down list with many commands to choose from. The list contains the most common commands but you may enter any other command in the *Command* field.



For more detailed information about the commands please refer to the documentation of the drive.

Signal configuration

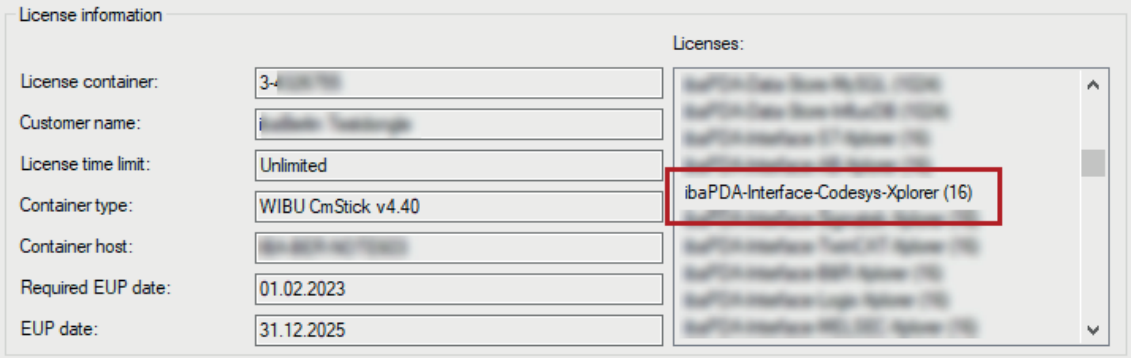
Configure all signals to be measured in the *Analog* and *Digital* tabs. If you are connected with the drive, i.e. if you are “online”, you can add a signal automatically by double clicking on the corresponding spot in the preview window. *ibaPDA*, in this case, tries to generate a signal name based on the text which can be found left of the address you clicked on. Moreover, *ibaPDA* selects automatically the next empty signal row. Thus, you can add several signals just by double-clicking.

7 Diagnostics

7.1 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 the interface *ibaPDA-Interface-GH180-Xplorer* 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.



7.2 Visibility of the interface

If the interface is not visible despite a valid license, it may be hidden.

Check the settings in the *General* tab in the *Interfaces* node.

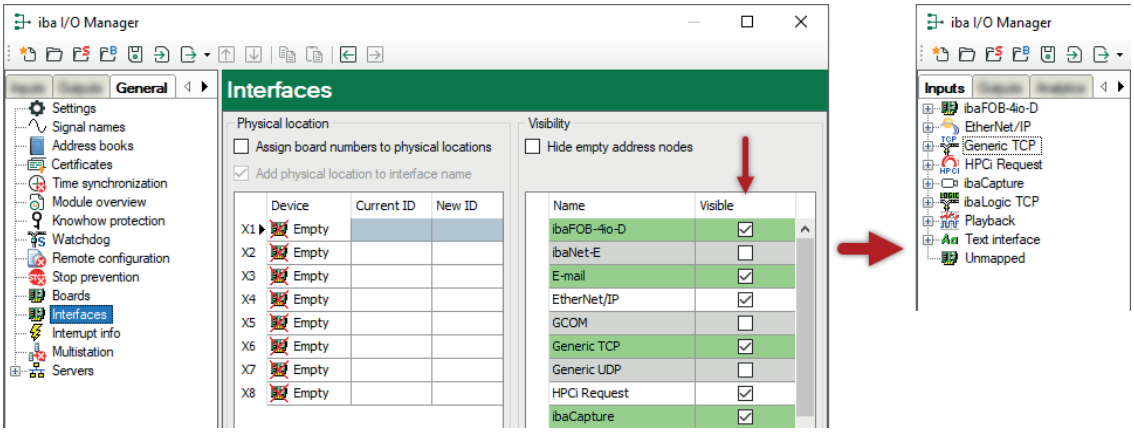
Visibility

The table *Visibility* lists all the interfaces that are available either through licenses or installed cards. These interfaces can also be viewed in the interface tree.

You can hide or display the interfaces not required in the interface tree by using the checkbox in the *Visible* column.

Interfaces with configured modules are highlighted in green and cannot be hidden.

Selected interfaces are visible, the others are hidden:



7.3 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.

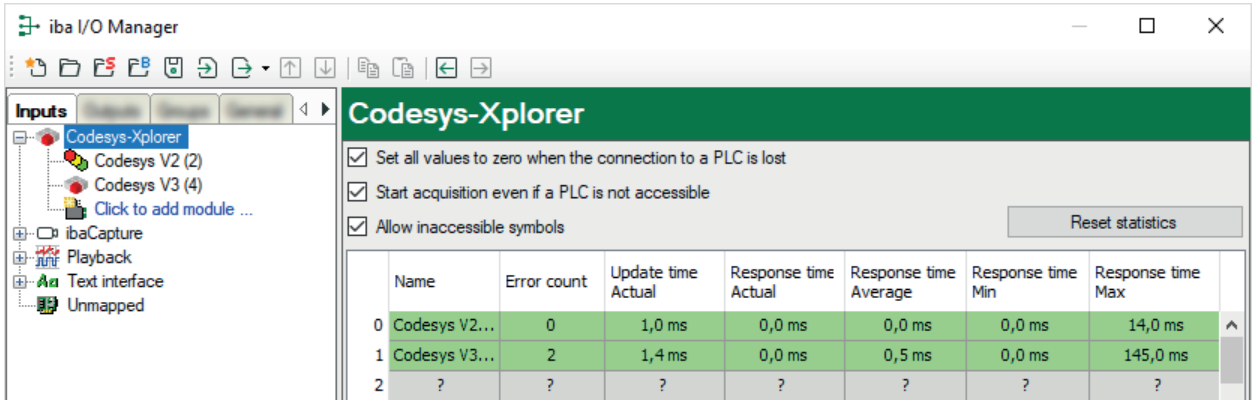
Files named `interface.txt` are always the current log files. Files named `Interface_yyyy_mm_dd_hh_mm_ss.txt` are archived log files.

Examples:

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

7.4 Connection table

For every Ethernet-based interface, there is a table available in the I/O Manager which shows the status of each connection. Each line represents one connection. The following figure shows, as an example, the connection table of the Codesys-Xplorer interface:



The connected target systems (controllers) are identified by their name or IP address in the first (left) column.

Depending on the interface type the table shows error counters, read counters and/or data sizes, as well as the cycle times, refresh times and/or update times of the different connections during the data acquisition.

Click the <Reset statistics> button to reset the error counters and the calculation of the response times.

Additional information is provided by the background color of the table rows:

Color	Meaning
Green	The connection is OK and the data are read.
Yellow	The connection is OK, however the data update is slower than the configured update time.
Red	The connection has failed.
Gray	No connection configured.

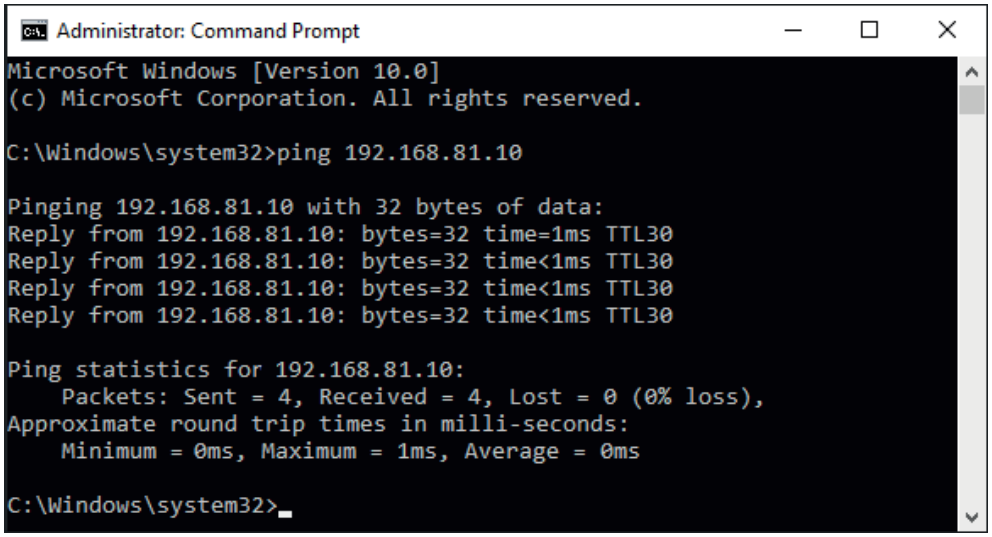
7.5 Connection diagnostics with PING

PING is a system command with which you can check if a certain communication partner can be reached in an IP network.

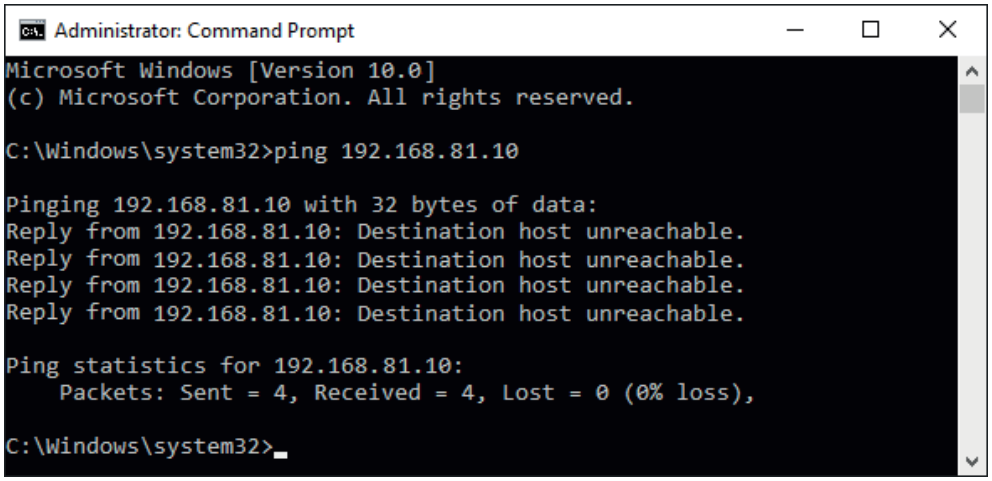
1. Open a Windows command prompt.

2. Enter the command "ping" followed by the IP address of the communication partner and press <ENTER>.

→ With an existing connection you receive several replies.



→ With no existing connection you receive error messages.



7.6 Diagnostic modules

Diagnostic modules are available for most Ethernet based interfaces and Xplorer interfaces. Using a diagnostic module, information from the diagnostic displays (e.g. diagnostic tabs and connection tables of an interface) can be acquired as signals.

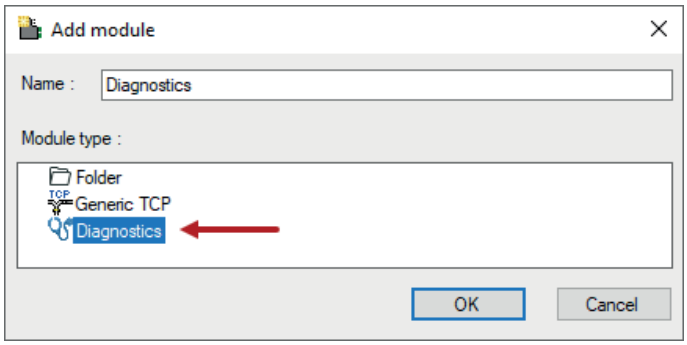
A diagnostic module is always assigned to a data acquisition module of the same interface and supplies its connection information. By using a diagnostic module, you can record and analyze the diagnostic information continuously in the *ibaPDA* system.

Diagnostic modules do not consume any license connections because they do not establish their own connection but refer to another module.

Example for the use of diagnostic modules:

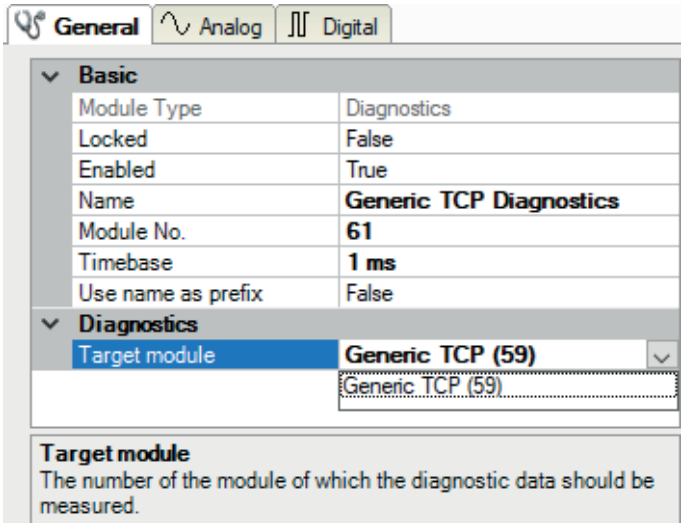
- A notification can be generated, whenever the error counter of a communication connection exceeds a certain value or the connection gets lost.
- In case of a disturbance, the current response times in the telegram traffic may be documented in an incident report.
- The connection status can be visualized in *ibaQPanel*.
- You can forward diagnostic information via the SNMP server integrated in *ibaPDA* or via OPC DA/UA server to superordinate monitoring systems like network management tools.

In case the diagnostic module is available for an interface, a "Diagnostics" module type is shown in the "Add module" dialog (example: Generic TCP).



Module settings diagnostic module

For a diagnostic module, you can make the following settings (example: Generic TCP):



The basic settings of a diagnostic module equal those of other modules.

There is only one setting which is specific for the diagnostic module: the target module.

By selecting the target module, you assign the diagnostic module to the module on which you want to acquire information about the connection. You can select the supported modules of this interface in the drop-down list of the setting. You can assign exactly one data acquisition module to each diagnostic module. When having selected a module, the available diagnostic signals are immediately added to the *Analog* and *Digital* tabs. It depends on the type of interface, which signals exactly are added. The following example lists the analog values of a diagnostic module for a Generic TCP module.

General | Analog | Digital

	Name	Unit	Gain	Offset	Active	Actual
0	IP address (part 1)		1	0	☑	
1	IP address (part 2)		1	0	☑	
2	IP address (part 3)		1	0	☑	
3	IP address (part 4)		1	0	☑	
4	Port		1	0	☑	
5	Message counter		1	0	☑	
6	Incomplete errors		1	0	☑	
7	Packet size (actual)	bytes	1	0	☑	
8	Packet size (max)	bytes	1	0	☑	
9	Time between data (actual)	ms	1	0	☑	
10	Time between data (min)	ms	1	0	☑	

For example, the IP (v4) address of a Generic TCP module (see fig. above) will always be split into 4 parts derived from the dot-decimal notation, for better reading. Also other values are being determined, as there are port number, counters for telegrams and errors, data sizes and telegram cycle times. The following example lists the digital values of a diagnostic module for a Generic TCP module.

General | Analog | Digital

	Name	Active	Actual
0	Active connection mode	☑	
1	Invalid packet	☑	
2	Connecting	☑	
3	Connected	☑	

Diagnostic signals

Depending on the interface type, the following signals are available:

Signal name	Description
Active	Only relevant for redundant connections. Active means that the connection is used to measure data, i.e. for redundant standby connections the value is 0. For normal/non-redundant connections, the value is always 1.
Buffer file size (actual/avg/max)	Size of the file for buffering statements
Buffer memory size (actual/avg/max)	Size of the memory used by buffered statements
Buffered statements	Number of unprocessed statements in the buffer
Buffered statements lost	Number of buffered but unprocessed and lost statements
Connected	Connection is established
Connected (in)	A valid data connection for the reception (in) is available
Connected (out)	A valid data connection for sending (out) is available
Connecting	Connection being established
Connection attempts (in)	Number of attempts to establish the receive connection (in)
Connection attempts (out)	Number of attempts to establish the send connection (out)
Connection ID O->T	ID of the connection for output data (from the target system to *ibaPDA*). Corresponds to the assembly instance number
Connection ID T->O	ID of the connection for input data (from *ibaPDA* to target system). Corresponds to the assembly instance number
Connection phase (in)	Status of the ibaNet-E data connection for reception (in)
Connection phase (out)	Status of the ibaNet-E data connection for sending (out)
Connections established (in)	Number of currently valid data connections for reception (in)
Connections established (out)	Number of currently valid data connections for sending (out)
Data length	Length of the data message in bytes
Data length O->T	Size of the output message in byte
Data length T->O	Size of the input message in byte
Destination IP address (part 1-4) O->T	4 octets of the IP address of the target system Output data (from target system to *ibaPDA*)
Destination IP address (part 1-4) T->O	4 octets of the IP address of the target system Input data (from *ibaPDA* to target system)
Disconnects (in)	Number of currently interrupted data connections for reception (in)
Disconnects (out)	Number of currently interrupted data connections for sending (out)
Error counter	Communication error counter
Exchange ID	ID of the data exchange
Incomplete errors	Number of incomplete messages

Signal name	Description
Incorrect message type	Number of received messages with wrong message type
Input data length	Length of data messages with input signals in bytes (*ibaPDA* receives)
Invalid packet	Invalid data packet detected
IP address (part 1-4)	4 octets of the IP address of the target system
Keepalive counter	Number of KeepAlive messages received by the OPC UA Server
Lost images	Number of lost images (in) that were not received even after a retransmission
Lost Profiles	Number of incomplete/incorrect profiles
Message counter	Number of messages received
Messages per cycle	Number of messages in the cycle of the update time
Messages received since configuration	Number of received data telegrams (in) since start of acquisition
Messages received since connection start	Number of received data telegrams (in) since the start of the last connection setup. Reset with each connection loss.
Messages sent since configuration	Number of sent data telegrams (out) since start of acquisition
Messages sent since connection start	Number of sent data telegrams (out) since the start of the last connection setup. Reset with each connection loss.
Multicast join error	Number of multicast login errors
Number of request commands	Counter for request messages from *ibaPDA* to the PLC/CPU
Output data length	Length of the data messages with output signals in bytes (*ibaPDA* sends)
Packet size (actual)	Size of the currently received message
Packet size (max)	Size of the largest received message
Ping time (actual)	Response time for a ping telegram
Port	Port number for communication
Producer ID (part 1-4)	Producer ID as 4-byte unsigned integer
Profile Count	Number of completely recorded profiles
Read counter	Number of read accesses/data requests
Receive counter	Number of messages received
Response time (actual/average/max/min)	Response time is the time between measured value request from *ibaPDA* and response from the PLC or reception of the data. Actual: current value Average/max/min: static values of the update time since the last start of the acquisition or reset of the counters.
Retransmission requests	Number of data messages requested again if lost or delayed

Signal name	Description
Rows (last)	Number of resulting rows by the last SQL query (within the configured range of result rows)
Rows (maximum)	Maximum number of resulting rows by any SQL query since the last start of acquisition (possible maximum equals the configured number of result rows)
Send counter	Number of send messages
Sequence errors	Number of sequence errors
Source IP address (part 1-4) O->T	4 octets of the IP address of the target system Output data (from target system to *ibaPDA*)
Source IP address (part 1-4) T->O	4 octets of the IP address of the target system Input data (from *ibaPDA* to target system)
Statements processed	Number of executed statements since last start of acquisition
Synchronization	Device is synchronized for isochronous acquisition
Time between data (actual/ max/min)	Time between two correctly received messages Actual: between the last two messages Max/min: statistical values since start of acquisition or reset of counters
Time offset (actual)	Measured time difference of synchronicity between *ibaPDA* and the ibaNet-E device
Topics Defined	Number of defined topics
Topics Updated	Number of updated topics
Unknown sensor	Number of unknown sensors
Update time (actual/average/ configured/max/min)	Specifies the update time in which the data is to be retrieved from the PLC, the CPU or from the server (configured). Default is equal to the parameter "Timebase". During the measurement the real actual update time (actual) can be higher than the set value, if the PLC needs more time to transfer the data. How fast the data is really updated, you can check in the connection table. The minimum achievable update time is influenced by the number of signals. The more signals are acquired, the greater the update time becomes. Average/max/min: static values of the update time since the last start of the acquisition or reset of the counters.
Write counter	Number of successful write accesses
Write lost counter	Number of failed write accesses

8 Support and contact

Support

Phone: +49 911 97282-14

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.

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