ibaPDA-Interface-AB-Xplorer

PLC-Xplorer Data Interface to Allen-Bradley Systems

Manual

Issue 1.4

Measurement Systems for Industry and Energy

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The content of this publication has been checked for compliance with the described hardware and software. Nevertheless, discrepancies cannot be ruled out, and we do not provide guarantee for complete conformity. However, the information furnished in this publication is updated regularly. Required corrections are contained in the following regulations or can be downloaded on the Internet.

The current version is available for download on our web site www.iba-ag.com.

Version	Date	Revision	Author	Version SW
1.4	12/2023	DH+ routing	RM	8.5.0

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Contents

1 About this documentation

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

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-AB-Xplorer* the following basic knowledge is required and/or useful:

■ Windows operating system

■ Basic knowledge of *ibaPDA*

■ Knowledge of configuration and operation of the relevant control 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 AB-Xplorer

The following system requirements are necessary when using the AB-Xplorer data interface:

- *ibaPDA* v8.5.0 or higher

- Base license for *ibaPDA* + license for *ibaPDA-Interface-PLC-Xplorer* or *ibaPDA-Interface-AB-Xplorer*

- With more than 16 connections you need additional *one-step-up-Interface-AB-Xplorer* licenses for each additional 16 connections.

Note

The *ibaPDA-Interface-PLC-Xplorer* license contains, among others, the license for this interface.

- Allen-Bradley PLC-5

- Allen-Bradley SLC 500 (5/05) or MicroLogix

- Ethernet interface, Ethernet module or 1761-NET-ENI-Gateway
  Please contact Rockwell Automation, where required, to get information on Ethernet modules for the different controllers.

- Alternatively, Rockwell ControlLogix with DH+ module (1756-DHRIO) as connection to PLC-5 and/or SLC 50

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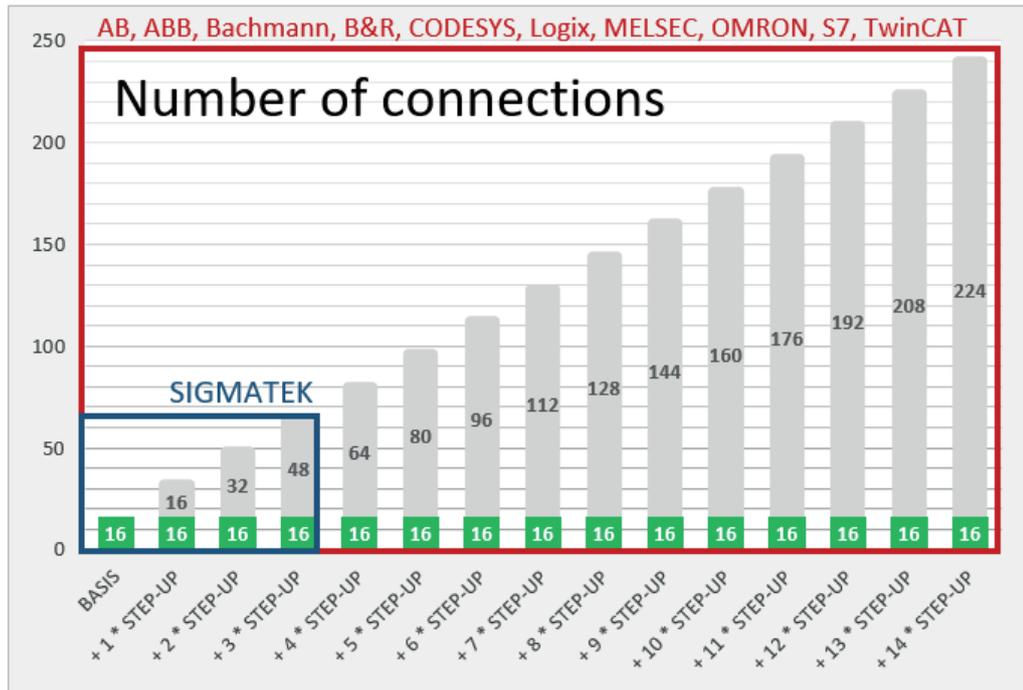
License information

Order no.	Product name	Description
31.001042	ibaPDA-Interface-PLC-Xplorer	Extension license for *ibaPDA* system. All additional Xplorer data interfaces are added. (Complete specifications under www.iba-ag.com)
31.000003	ibaPDA-Interface-AB-Xplorer	Extension license for an *ibaPDA* system adding the data interface: + AB-Xplorer (16 connections)
31.100003	one-step-up-Interface-AB-Xplorer	Extension license for 16 additional AB-Xplorer connections (max. 14 extension licenses)

Table 1: Available AB-Xplorer-licenses, as at ibaPDA-V6.39.0

Note

To use more than 16 data connections per interface, you can purchase the one-step-up-… extension licenses separately for each interface. Up to 16 further connections to PLCs can be established on each one-step-up-license. Up to 240 connections can be configured and used per data interface with the multiple purchase or multiple release of these licenses (up to 15 in total).

Exception of SIGMATEK: Here, only up to 4 licenses (64 connections) can be activated.

Consider the limitation of the number of signals by the *ibaPDA* base license.

3   PLC-Xplorer interface to Allen-Bradley controllers

3.1   General information

The AB-Xplorer interface is suitable for the acquisition of measured data with *ibaPDA* from an Allen-Bradley controller via an Ethernet connection.

Allen-Bradley controllers have two ways to communicate via Ethernet:

- CIP (EtherNet/IP)

- CSP (Client Server Protocol, also known as AB/Enet)

Other documentation

More information on the Ethernet/IP protocol can be obtained from the *ibaPDA-Interface-EtherNetIP* manual.

The AB-Xplorer interface uses CSP.

CSP or AB/Enet is used to connect an *ibaPDA* system with an AB controller via an AB-Ethernet module. CSP is a legacy TCP protocol for the PLC5E series which uses the port 2222 and is closely connected with DH+ (Data Highway Plus Industrial LAN) and DF1 (serial protocol for device communication). Basically, CSP contains the PCCC protocol embedded in the Ethernet header.

ibaPDA works as client and sends request telegrams to the controller. The controller of the Allen-Bradley PLC works as server and waits for request telegrams from the *ibaPDA* driver.

In the Allen-Bradley controller, no programming or configuration is required to establish a connection between *ibaPDA* and a controller with defined IP address and to send the corresponding signals. Also, no further Rockwell Automation software is required to transfer measurement data.

Useable, analog and digital signals are all measurable, global operands (O, I, S, B3, T4, C5, R6, N7, F8, …) of the Allen-Bradley controller.

In *ibaPDA*, all standard features are available.

The communication via the AB-Xplorer interface with the PLC-5 system has been successfully tested with a shortest sampling time of 20 ms.

3.2   System topologies
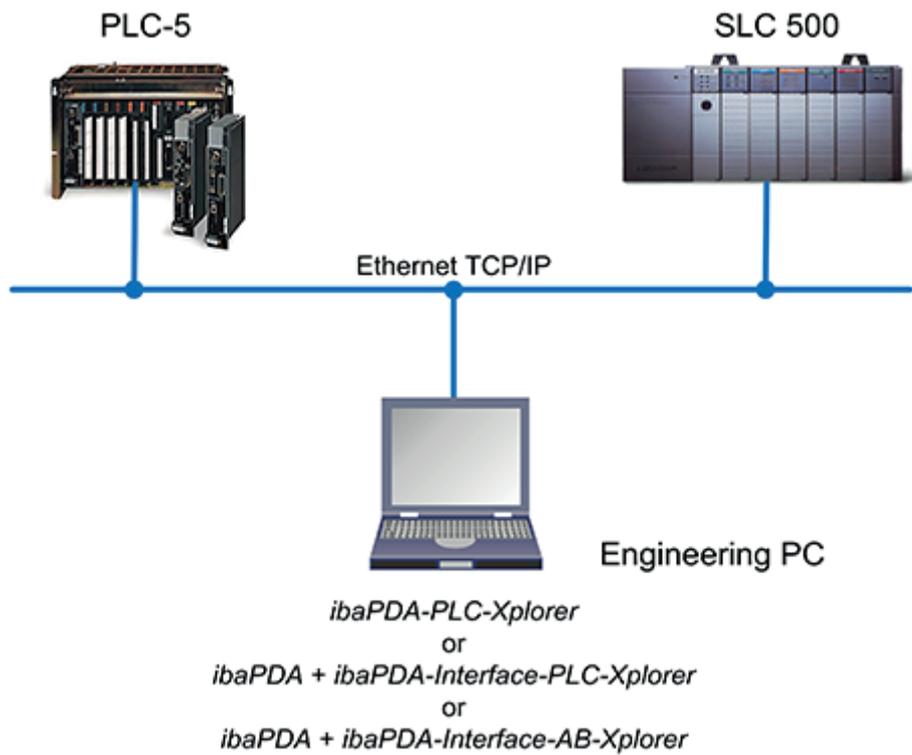
Physically, the connection is established between the *ibaPDA* computer and the PLC-5 or SLC 500 controller via the standard network interface of the computer or an additional network interface card.

Topology for access via DH+ (Data Highway Plus) routing

Note

i
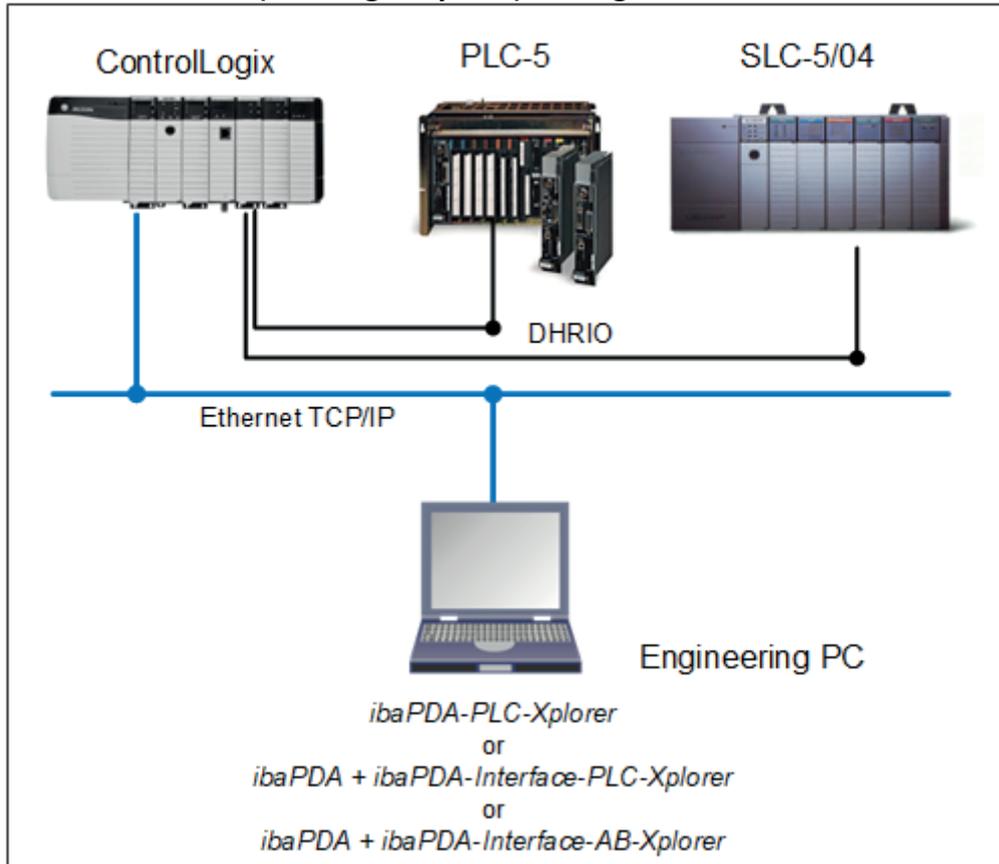
It is recommended carrying out the TCP/IP communication on a separate network segment to exclude a mutual influence by other network components.
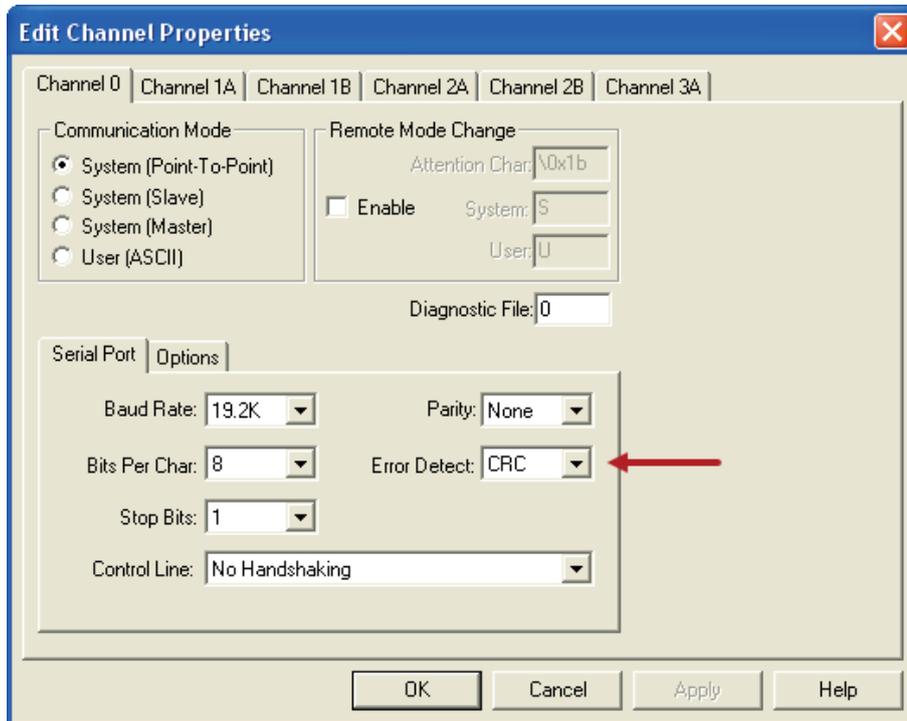
3.3   Configuration and engineering Allen-Bradley

Generally, no particular engineering and programming is required on the controller side. In particular, it is not necessary to call up any program modules.

Note

|	
i	If you are using a 1761-NET ENI gateway with a PLC-5 controller, ensure the channel 0 of the PLC-5 is set to RS232 and CRC is selected as the error detection.

3.4 Configuration and engineering ibaPDA

The engineering for *ibaPDA* is described in the following. If all system requirements are fulfilled, *ibaPDA* displays the *AB-Xplorer* interface in the interface tree of the I/O Manager.

3.4.1 Interface settings

If the Xplorer interface is selected in the tree, you can see an overview of diagnostics information on the configured connections between *ibaPDA* and the controllers.

The interface has the following features and configuration options.
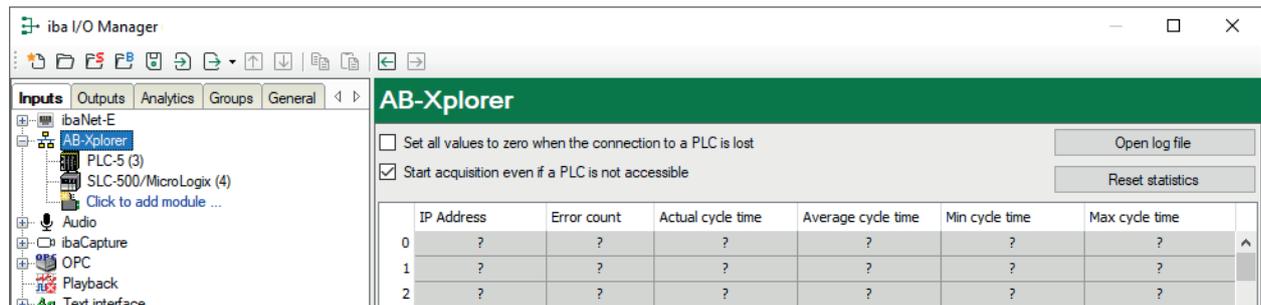
Set all values to zero when the connection to a PLC is lost
If this option is enabled, all measured values of the PLC are set to zero as soon as the connection is lost. If this option is disabled, *ibaPDA* keeps the last valid measured value in memory when the connection is lost.

Start acquisition even if a PLC is not accessible
If this option is enabled, the acquisition starts even if the controller is not accessible. A warning is prompted in the validation dialog, not an error. If the system was started without a connection to the controller, *ibaPDA* periodically tries to connect to the PLC.

Connection table
For each connection, the table shows the connection status, the current values for the update time (current, real 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 the *ibaPDA* server (`…\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.

Note

i	For TCP/IP connections, the RSLinx software does not have to be installed on the *ibaPDA* computer.

3.4.2   Adding a module

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.
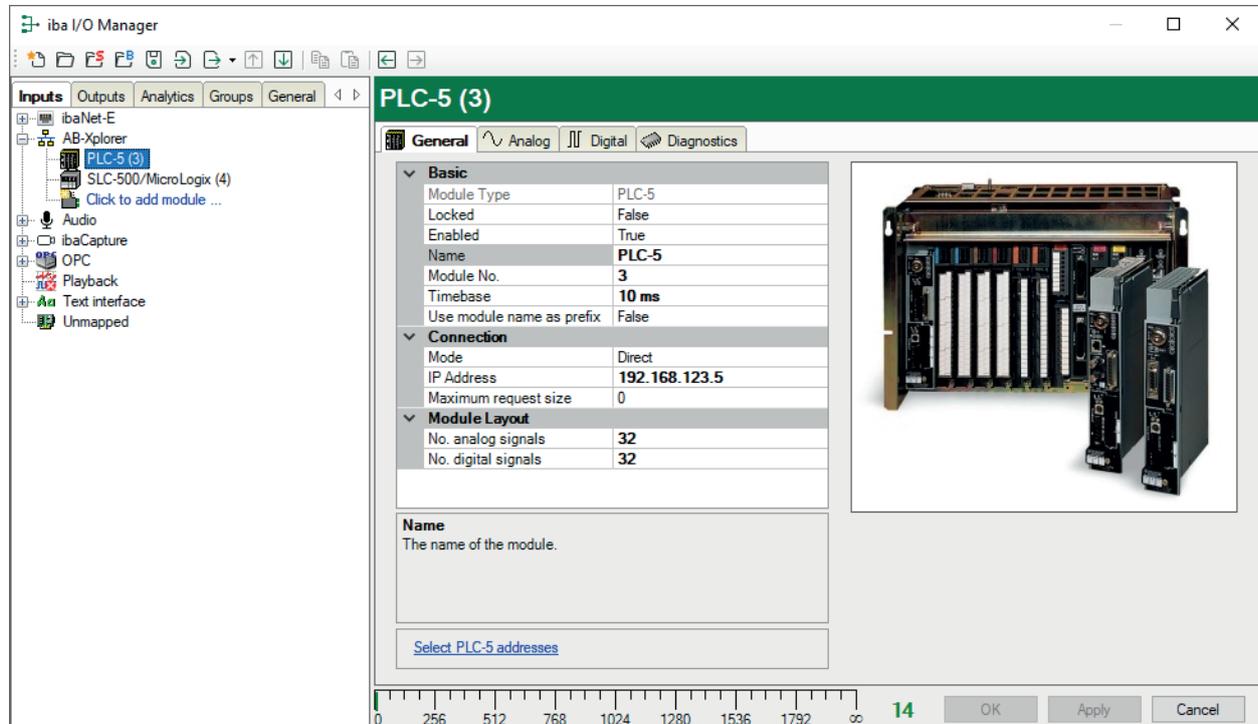
3. Confirm the selection with <OK>.
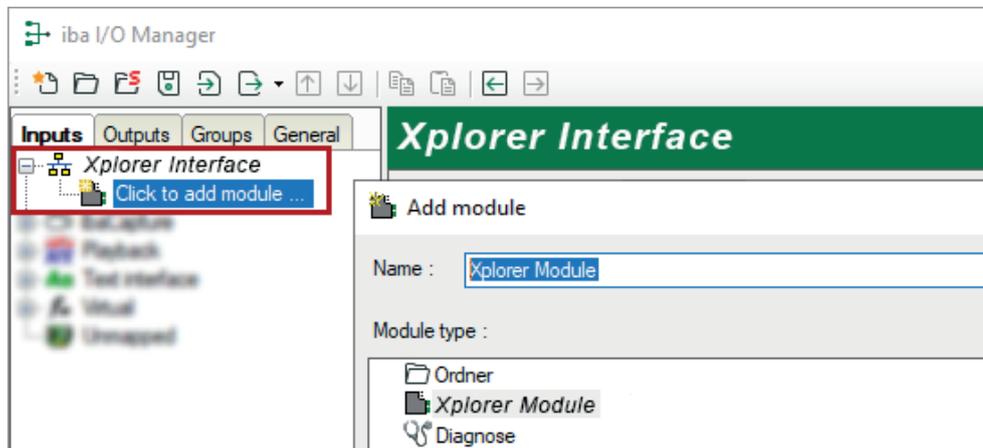
3.4.3   General module settings

The explanations referring to the PLC-5 example also apply analogously to SLC-500/MicroLogix.

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

Module Layout

No. of analog signals/digital signals
Define the number of configurable analog and digital signals in the signal tables. The default value is 32 for each. The maximum value is 1000. The signal tables are adjusted accordingly.

Connection

Mode
Please make sure that a connection to the controller is established either via 1761-NET-ENI-gateway, EtherNet/IP, DH+ gateway or directly.

■ Direct: Choose this option for controllers with Ethernet onboard like e.g. SLC-5/05 or PLC-5 with 1785-ENET.

■ via 1761-NET-ENI: Choose this option for 1761-NET-ENI adapters connected to the DH1 port of SLC-500, PLC-5 or MicroLogix. If you use a 1761-NET-ENI-gateway please pay attention to the note under ➚ *Configuration and engineering Allen-Bradley*, page 11.

■ via EtherNet/IP: Choose this option for MicroLogix 1100 and 1400.

■ via DH+ gateway: Choose this option for SLC-5/04 and PLC-5 connected via DH+ to a Control-Logix. If this option is enabled another parameter *Path* appears below.

IP address
Enter the IP address or the computer name of the PLC-5 controller here. If you have selected the mode *via DH+ gateway*, then enter the IP address of the ControlLogix, which is connected with the PLC-5 or SLC-5/04 via DH+.

Path (only available with mode "via DH+ gateway")
The path describes how to access a PLC-5 over a ControlLogix controller by *ibaPDA*.

Maximum request size
The setting determines how many words can be requested with one telegram to the PLC.
0 (Default) = unlimited
Depending on the processor type and its firmware version, there might be limitations regarding the number of words that can be requested by one message.

3.4.4   Signal configuration

The principle behind the signal configuration is the same for all modules.

The selection of the signals to be measured is carried out in the I/O Manager by means of the absolute operand address supported by the operand address constructor.

In the *Analog* or *Digital* tab you configure the signals to be measured. In the *General* tab under *Module Layout* you define the length of the signal tables or the number of signals per table.

Note

i	Observe the maximum number of signals permitted by your license.

Note

<table>
<tr>
<td>

i

</td>
<td>

Take into consideration that the number of signals, which are read by a CPU, influences the minimum achievable read cycle. The more signals recorded, the slower the reachable reading cycle.

</td>
</tr>
</table>

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ibaPDA supports the following operand types:

- all measurable global operands of the PLC
  (O, I, S, B3, T4, C5, R6, N7, F8, …)

Selection of the signals to be measured

You have two options to select the signals to be measured:

- In the module's *General* tab, click on the *Select PLC-5 addresses* hyperlink or *Select SLC-500. addresses*.

The PLC-5 Address Constructor or SLC-500 Address Constructor opens.

Click <OK> to enter the address into the corresponding table (analog/digital). The address constructor remains open.

- In the *Analog* or *Digital* tab, click in a cell in the *Address* column.

The button <…> appears. Click the <…> button to open the PLC-5 Address Constructor or SLC-500 Address Constructor.

Click <OK> to enter the selected address into the selected row. The address constructor closes.
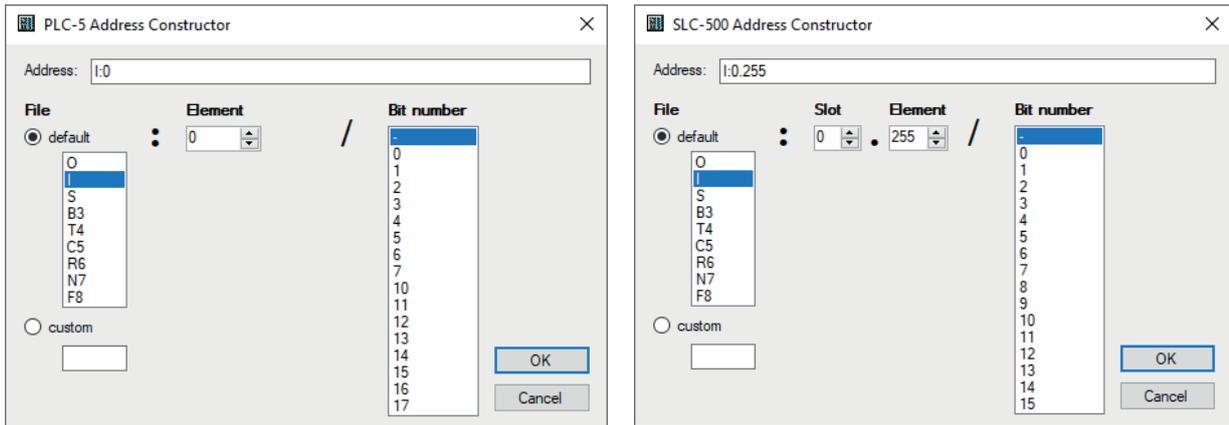
You can select the file types in a default table or enter a custom file name. After selecting a file, you can select the corresponding bit numbers or members of the element, too.

You can enter the desired address also directly in the *Address* column without using the address constructor.

3.4.5   Module diagnostics

After applying the configuration the actual values of the analog and digital signals are displayed in the *Diagnostics* tab of the relevant module.

Inactive signals are grayed out.

4 Diagnostics

4.1 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.
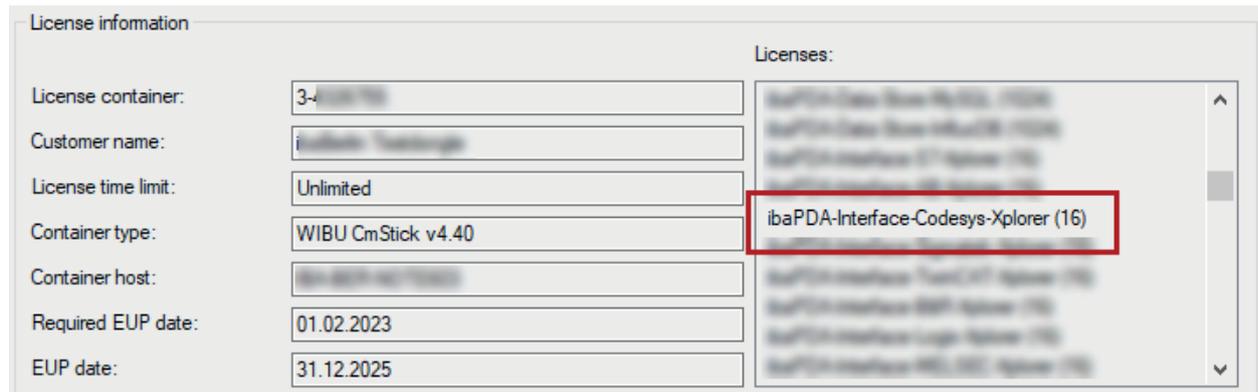
4.2 Visibility of the interface

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:
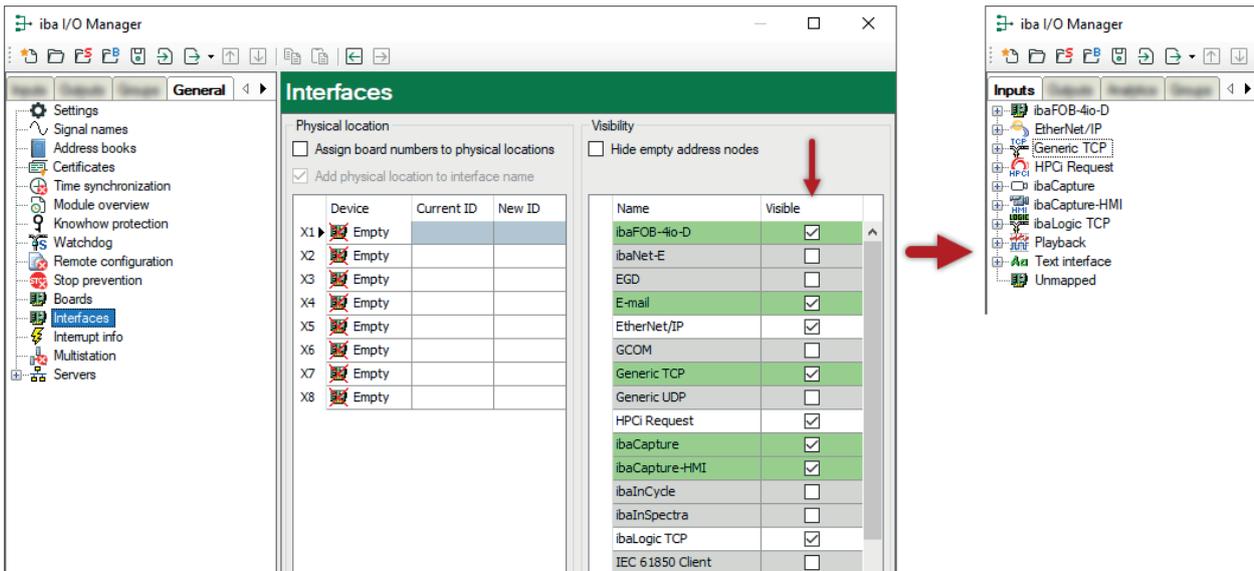
4.3   Log files

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.

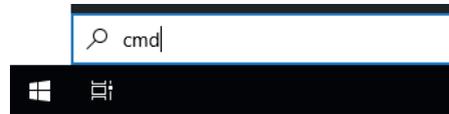Examples:

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

4.4 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.

4.5   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:
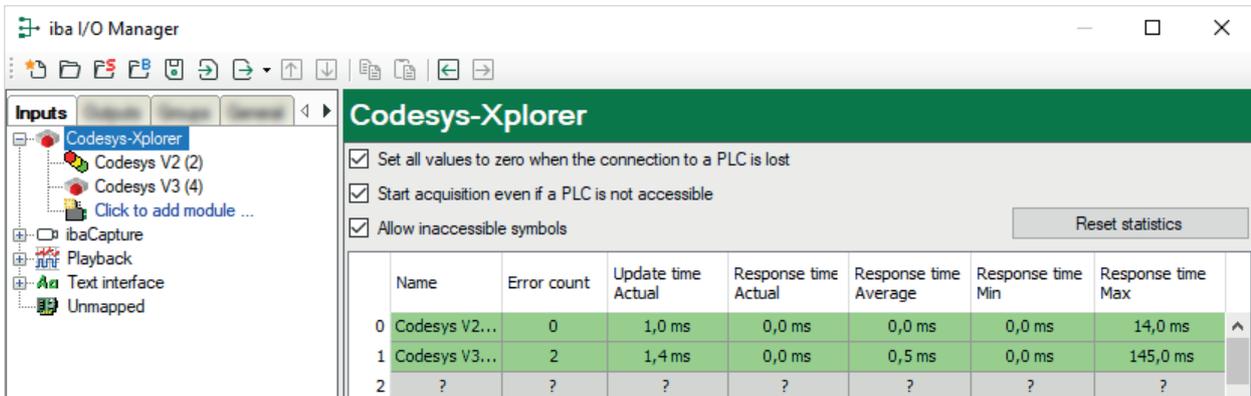
The connected target systems (controllers) are identified by their name or IP address in the first (left) column.

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.

5 Support and contact

Support

Phone: +49 911 97282-14

Email: support@iba-ag.com

Note

[i]	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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