ibaPDA-Interface-Logix-Xplorer
PLC-Xplorer Data Interface for Rockwell Logix PLCs

Manual
Issue 1.3

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

<table>
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<th>Date</th>
<th>Revision - Chapter / Page</th>
<th>Author</th>
<th>Version SW</th>
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<td>08-2020</td>
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1 About this Manual

This document describes the function and application of the software interface
ibaPDA-Interface-Logix-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 addresses qualified professionals, who are familiar with handling electrical
and electronic modules as well as communication and measurement technology. A person is
regarded as a professional if he/she is capable of assessing the work assigned to him/her and
recognizing possible 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 prod-
ucts. For the handling ibaPDA-Interface-Logix-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:

<table>
<thead>
<tr>
<th>Action</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu command</td>
<td>Menu Logic diagram</td>
</tr>
<tr>
<td>Calling the menu command</td>
<td>Step 1 – Step 2 – Step 3 – Step x</td>
</tr>
<tr>
<td></td>
<td>Example: Select the menu Logic diagram - Add - New function block.</td>
</tr>
<tr>
<td>Keys</td>
<td>&lt;Key name&gt;</td>
</tr>
<tr>
<td></td>
<td>Example: &lt;Alt&gt;; &lt;F1&gt;</td>
</tr>
<tr>
<td>Press the keys simultaneously</td>
<td>&lt;Key name&gt; + &lt;Key name&gt;</td>
</tr>
<tr>
<td></td>
<td>Example: &lt;Alt&gt; + &lt;Ctrl&gt;</td>
</tr>
<tr>
<td>Buttons</td>
<td>&lt;Key name&gt;</td>
</tr>
<tr>
<td></td>
<td>Example: &lt;OK&gt;; &lt;Cancel&gt;</td>
</tr>
<tr>
<td>File names, paths</td>
<td>&quot;Filename&quot;, &quot;Path&quot;</td>
</tr>
<tr>
<td></td>
<td>Example: &quot;Test.doc&quot;</td>
</tr>
</tbody>
</table>
1.3 Used symbols

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

---

**Danger!**

![Danger symbol]

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

- Observe the specified measures.

---

**Warning!**

![Warning symbol]

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

- Observe the specified measures.

---

**Caution!**

![Caution symbol]

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

- Observe the specified measures

---

**Note**

![Note symbol]

A note specifies special requirements or actions to be observed.

---

**Tip**

![Tip symbol]

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

---

**Other documentation**

![Book symbol]

Reference to additional documentation or further reading.
2 System requirements Logix-Xplorer

The following system requirements are necessary for the use of the Logix-Xplorer data interface:

- *ibaPDA* V6.37 or more recent
- *ibaPDA* base license + license for *ibaPDA-Interface-PLC-Xplorer* or *ibaPDA-Interface-Logix-Xplorer*

If you need more than 16 connections, you will require additional one-step-up-*Interface-Logix-Xplorer* licenses for each additional 16 connections.

**Note**

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

The following Allen-Bradley controllers with Ethernet interface or Ethernet module (EtherNet/IP) are supported:

- 1756 ControlLogix
- 1756 GuardLogix
- 1768 CompactLogix
- 1769 CompactLogix
- 1789 SoftLogix
- 1794 FlexLogix

If you require more information about the Ethernet modules for the different controllers, please contact Rockwell Automation directly.

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

**License information**

<table>
<thead>
<tr>
<th>Order no.</th>
<th>Product name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.001.042</td>
<td><em>ibaPDA-Interface-PLC-Xplorer</em></td>
<td>Extension license for an <em>ibaPDA</em> system adding all available Xplorer data interfaces. (Full specification under <a href="http://www.iba-ag.com">www.iba-ag.com</a>)</td>
</tr>
<tr>
<td>31.000.007</td>
<td><em>ibaPDA-Interface-Logix-Xplorer</em></td>
<td>Extension license for an <em>ibaPDA</em> system adding the data interface: + Logix-Xplorer (interface to Allen-Bradley)</td>
</tr>
</tbody>
</table>
Table 1: Available Logix-Xplorer-licenses

<table>
<thead>
<tr>
<th>Product name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>one-step-up-Interface-Logix-Xplorer</td>
<td>Extension license for 16 further Logix-Xplorer-connections, a maximum of 14 is permissible</td>
</tr>
</tbody>
</table>

**Note**

The license for individual data interfaces can be enabled multiple times on one dongle, so that it is possible to use more than 16 connections per interface. To this end, 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: Exception of SIGMATEK: here, only up to 4 licenses (64 connections) can be activated.

You have to take into consideration the limitation of the number of signals by the ibaPDA base license.
3 PLC-Xplorer data interface to Logix systems

3.1 General information

The Logix-Xplorer interface is suitable for the recording of measured data with ibaPDA on an Allen Bradley Controller, type ControlLogix, or CompactLogix using an EtherNet/IP connection.

Other documentation

For more information about the EtherNet/IP protocol, see the ibaPDA-Interface-EtherNetIP manual.

The data is cyclically read by ibaPDA instead of being sent by the PLC.

In the Logix controller, no programming and configuration is necessary for establishing a connection between ibaPDA and a controller with defined IP address and for sending the respective signals. For transferring measurement data, no additional software of Rockwell Automation is necessary.

The module type Logix-Xplorer supports CIP-routing, i.e. a connection even through different bus systems (EtherNet/IP, ControlNet, DeviceNet) if the target CPU cannot be connected directly by ibaPDA.

3.2 System topologies

Fig. 1: Topology for using the Logix-Xplorer interface
Physically, the connection between the ibaPDA computer and the Logix controller is established via the standard network interface of the computer or via an additional network card.

**Note**

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 Logix PLC

No particular configuration and programming is required on the controller side as a matter of principle. In particular, it is not necessary to call any program modules.

### 3.4 Configuration and engineering ibaPDA

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

If all system requirements are met, the "Logix-Xplorer" interface will be displayed in the signal tree.

**Fig. 2: Logix-Xplorer interface in the I/O manager**

#### 3.4.1 Interface settings

If you have marked the Logix-Xplorer interface in the tree, an overview with diagnostic information about the configured connections between *ibaPDA* and the controllers will be displayed.

The interface itself has the following functions and configuration options:

**Fig. 3: Overview Logix-Xplorer interface**
Set all values to zero when the connection to a PLC is lost
If enabled, all measured values of the PLC are set to zero as soon as the connection was lost. If this option is disabled, ibaPDA will keep the last valid measured data in memory at the time the connection was lost.

Start acquisition even if a PLC is not accessible
If this option is enabled, the acquisition will start even if a Logix controller is not accessible. Instead of an error, a warning is indicated in the validation dialog. If the system has been started without a connection to the Logix controller, ibaPDA will periodically try to connect to the PLC. As long as the PLC is not connected, the measured values will be at 0.

Allow inaccessible symbols.
Enable this option if you wish to start acquisition even if symbols are not accessible. The inaccessible symbols are issued as warnings in the validation dialog box, not as errors.

This can only occur if the address book is not up-to-date.

If you do not enable this option, measurement will not start when inaccessible symbols are present.

Connection table
The table shows the current values for the update time (current value, actual value, average, min. and max.) as well as the file size. Furthermore you have an error counter here for the individual connections during measurement.

See also chapter "Connection table, page 20"

<Reset counters> button
To reset the calculated times and error counters to zero, simply click on the <Reset counters> button.

<Open log file> button
If connections to Logix controllers have been established, all connection-specific actions are recorded in a text file. Using this button, you can open and see this file. In the file system on the harddisk, you will find the log file in the program path of the ibaPDA server (...Programs\iba\ibaPDA\Server\Log\). The file name of the current log file is LogixLog.txt, the name of the archived log files is LogixLog_yyyy_mm_dd_hh_mm_ss.txt.

Note
For TCP/IP connections, the RSLinx software does not have to be installed on the ibaPDA computer.
3.4.2 Add module

Add a module by clicking below the interface.

![Fig. 4: Logix-Xplorer, add module](image1)

Select the desired module type and click on <OK>.

3.4.3 General module settings

All modules have the following common settings:

![Fig. 5: Logix-Xplorer, general module settings](image2)
**Basic settings**

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

**Locked**
A module can be locked to avoid unintentional or unauthorized changing of the module settings.

**Enabled**
Disabled modules are excluded from signal acquisition.

**Name**
The plain text name should be entered here as the module designation.

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

**Time base**
All signals of the module will be sampled on this time base.

**Use name as prefix**
Puts the module name in front of the signal names.

**Module Layout**

**Number of analog and digital signals**
Defines the number of configurable analog and digital signals in the signal tables. The default value is 32 for each. You can change the number. The maximum value is 1000.

**PLC**

**Update time**
The update time is the time in ms between two reading operations. You can configure the value. With the update time, you determine the speed with that *ibaPDA* tries to request the data from the PLC. The resulting update time can be higher than the specified value, depending on the CPU load, the communication load etc. Check the diagnostics overview for the measured update rates; in case of an overload, samples might get lost.

**Read Mode**
There are three different modes available for accessing the data to be measured:

- **Symbolic**
  This is the most general but also the least powerful method. The symbols are being addressed in each reading cycle with their full symbolic path. This method creates an enormous overhead, as the PLC has to resolve this path into a memory address for each symbol and in each reading cycle. By creating groups, *ibaPDA* automatically tries to optimize the reading process. If possible, e.g. whole structures are requested instead of individual "Members".
Address

For PLCs with a firmware version lower than 21, you can use the address mode. With this method, the addresses of all tags are retrieved in course of the address book creation, yet. As the tags are requested with their address and the PLC does not have to resolve the symbol names for each reading cycle, this is the most powerful method. Possibly, some PLC types do not support this read mode.

Instance

This read mode is an alternative option to the "Symbolic" mode for PLCs with firmware version 21 or higher.
This method does not address the symbols with their complete path. The symbols are addressed via the ID of their instance. The instance ID is being retrieved in course of the creation of the address books.

3.4.4 Connection settings

On the Connection tab of the module settings, you can configure the connection to the PLC, create address books and test the connection.

IP address
Enter the IP address of the Logix PLC. The pre-defined default value is just an example.

Mode
Select the mode "Routed connection" if the target CPU cannot be reached directly by ibaPDA. The access can be established through different bus systems. If the target CPU can be connected directly with ibaPDA, select the mode "Direct connection".

CPU slot/Path
If the mode "Direct connection" is enabled, enter the slot no. of the CPU, which should be connected with ibaPDA. If the mode "Connection via Routing" is enabled, enter the connection path, which describes how to reach the CPU. It consists of different segments separated by a comma. Each segment consists of 2 parts also separated by a comma: the port and the desti-
nation address on the port. The port can be a Backplane, A, B or a number. The destination address can be a backplane slot, a DH+ address, ControlNet address or an IP address.

Example: Backplane,1,A,192.168.200.154,Backplane,0.

**Timeout**
The timeout refers to the establishment of the connection at the beginning of the measurement process, for testing the connection and for re-establishing a lost connection during the measurement process. The default value is 5 s. In case the establishment of the connection should take too long and is considered to have failed, you can adapt this value for giving the setup of the connection more time.

**<Test Connection> button**
After having done the settings mentioned above, please click on this button. *ibaPDA* retrieves some basic information from the PLC and displays it in the large text field.

**<Create address book> button**
If you click on this button *ibaPDA* reads the list of the tags from the PLC and stores it in an address book for later use in the symbol browser.

### 3.4.5 Signal configuration

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

Supported by the symbol browser, you select the signals you want to measure in the I/O manager by means of their symbol name.

The signals to be measured are configured in the signal tables of the Analog and Digital tabs.

The length of the signal tables, i.e. the number of signals per table, is specified in the general module settings, module layout (see General module settings, page [General module settings](#), page 11).

**Note**

Observe the maximum number of signals permitted by your license.

**Note**

Take into consideration that the number of signals, which are read by a CPU, influences the minimum achievable update cycle. The more signals acquired, the longer the achievable update time.

You can configure tags and tag members, i.e. individual values, arrays or structures.

*ibaPDA* supports the following data types:

- BOOL
- SINT (8 bit)
- INT (16 bit)
- DINT (32 bit)
- LINT (64 bit)
- REAL (32 bit)
- DWORD (32-bit array of BOOLs)
- STRING (32 bit)

**Selection of the signals to be measured**

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

1. Click on the *Select symbols* hyperlink in the module's *General* tab.

![Fig. 7: General module settings for the Logix-Xplorer](image)

Clicking on the link opens the Logix-Xplorer symbol browser.

- You can see analog values and digital values.
- With a double-click or with the <Add> button, you copy the marked variable to the current row of the analog or digital tab.
  The marker in the symbol browser jumps to the next variable and the marker in the signals table jumps to the next row.
- The browser can only be closed with the <Close> button.

**Note**

You can hide all unsupported data types by checking the "Hide symbols with an unsupported datatype" checkbox.
2. Clicking on a field in the "Symbol" column of the Analog or Digital tab.

The icon 🔄 becomes visible. A click on the icon opens the Logix-Xplorer symbol browser.

- Depending on the tab you open the browser with, you can only see analog or digital values.
- With a double-click or <OK>, you adopt the marked variable to the signal table and the browser will be closed.

![Fig. 8: Analog signal table](image)

![Fig. 9: Digital signal table](image)

![Fig. 10: Symbol browser](image)

On the Search tab, you can search symbols by name. The search result tree works in the same way as the complete symbol tree.
3.4.6 Module diagnostics

During the measurement process, you can see the current values of the analog and digital signals in the **Diagnostics** tab of the module.

![Diagnostics Tab](image)

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Datatype</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLOBAL.FromArgb[0, 0.25]</td>
<td>GLOBAL.FromArgb[0, 0.25]</td>
<td>REAL</td>
<td>2.5</td>
</tr>
<tr>
<td>GLOBAL.FromArgb[0, 0.25]</td>
<td>GLOBAL.FromArgb[0, 0.25]</td>
<td>REAL</td>
<td>2.6</td>
</tr>
<tr>
<td>GLOBAL.FromArgb[0, 0.27]</td>
<td>GLOBAL.FromArgb[0, 0.27]</td>
<td>REAL</td>
<td>2.7</td>
</tr>
<tr>
<td>GLOBAL.FromArgb[0, 0.28]</td>
<td>GLOBAL.FromArgb[0, 0.28]</td>
<td>REAL</td>
<td>2.8</td>
</tr>
<tr>
<td>GLOBAL.FromArgb[0, 0.29]</td>
<td>GLOBAL.FromArgb[0, 0.29]</td>
<td>REAL</td>
<td>2.9</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.30]</td>
<td>GLOBAL.GlideArray[0, 0.30]</td>
<td>REAL</td>
<td>3</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.31]</td>
<td>GLOBAL.GlideArray[0, 0.31]</td>
<td>REAL</td>
<td>3.1</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.32]</td>
<td>GLOBAL.GlideArray[0, 0.32]</td>
<td>REAL</td>
<td>3.2</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.33]</td>
<td>GLOBAL.GlideArray[0, 0.33]</td>
<td>REAL</td>
<td>3.3</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.34]</td>
<td>GLOBAL.GlideArray[0, 0.34]</td>
<td>REAL</td>
<td>3.4</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.35]</td>
<td>GLOBAL.GlideArray[0, 0.35]</td>
<td>REAL</td>
<td>3.5</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.36]</td>
<td>GLOBAL.GlideArray[0, 0.36]</td>
<td>REAL</td>
<td>3.6</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.37]</td>
<td>GLOBAL.GlideArray[0, 0.37]</td>
<td>REAL</td>
<td>3.7</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.38]</td>
<td>GLOBAL.GlideArray[0, 0.38]</td>
<td>REAL</td>
<td>3.8</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.39]</td>
<td>GLOBAL.GlideArray[0, 0.39]</td>
<td>REAL</td>
<td>3.9</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.40]</td>
<td>GLOBAL.GlideArray[0, 0.40]</td>
<td>REAL</td>
<td>4</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.41]</td>
<td>GLOBAL.GlideArray[0, 0.41]</td>
<td>REAL</td>
<td>4.1</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.42]</td>
<td>GLOBAL.GlideArray[0, 0.42]</td>
<td>REAL</td>
<td>4.2</td>
</tr>
<tr>
<td>GLOBAL.GlideArray[0, 0.43]</td>
<td>GLOBAL.GlideArray[0, 0.43]</td>
<td>REAL</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Fig. 11: Module diagnostics, analog values
4  Diagnostics

4.1  License

If the "Logix-Xplorer" interface is not displayed in the signal tree, you can either check in ibaPDA under General - Settings - License info in the I/O manager or in the ibaPDA service status application, whether your license "Interface-Logix-Xplorer" has been properly recognized. The number of licensed connections is indicated in brackets.

![License displayed in the ibaPDA I/O manager, example of the Logix-Xplorer license](image)

4.2  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.

The log file can be opened 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 will find the log files in the program path of the ibaPDA server (\Programs\iba\ibaPDA\Server\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)
4.3 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.

Open a Windows command prompt.

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

With an existing connection you receive several replies.

![Fig. 13: PING successful](image)

With no existing connection you receive error messages.

![Fig. 14: PING unsuccessful](image)
4.4 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:

![Connection table example](image)

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 counters> 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:

<table>
<thead>
<tr>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>The connection is OK and the data are read.</td>
</tr>
<tr>
<td>Yellow</td>
<td>The connection is OK, however the data update is slower than the configured update time.</td>
</tr>
<tr>
<td>Red</td>
<td>The connection has failed.</td>
</tr>
<tr>
<td>Gray</td>
<td>No connection configured.</td>
</tr>
</tbody>
</table>

Table 2: Meaning of background colors

4.5 Module diagnostics

You will find another diagnostic aid with a tabular display of the actual analog and digital values and the data types on the Diagnostics tab of each Xplorer module.

For further information, see Module diagnostics, page 17
4.6 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, since 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.

![Add diagnostic module, example Generic TCP](image)

Fig. 16: Add diagnostic module, example Generic TCP
Module settings diagnostic module

For a diagnostic module, you can make the following settings:

![Module settings diagnostic module, example TCP Generic](image)

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.

![Example: Analog values of a diagnostic module for a TCP Generic module](image)

For example, the IP (v4-) address of a TCP Generic 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.
Fig. 19: Example: Digital values of a diagnostic module for a TCP Generic module
5 Support and contact

Support

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Note

If you require support, indicate the serial number (iba-S/N) of the product or the license number.

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