ibaPDA-Interface-MELSEC-Xplorer
PLC-Xplorer Data Interface for Mitsubishi
MELSEC controllers

Manual
Issue 1.2

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<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Revision - Chapter / Page</th>
<th>Author</th>
<th>Version SW</th>
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<tr>
<td>1.2</td>
<td>04-2019</td>
<td>New screenshot, chap. 3.4.4</td>
<td>RM</td>
<td>6.39.0</td>
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1 About this Manual

This document describes the function and application of the software interface ibiaPDA-Interface-MELSEC-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 products. For the handling ibaPDA-Interface-MELSEC-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!

⚠️ 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 MELSEC-Xplorer data interface:

- *ibaPDA* V6.39.0 or more recent
- *ibaPDA* base license + license for *ibaPDA-Interface-PLC-Xplorer* or *ibaPDA-Interface-MELSEC-Xplorer*
- If you need more than 16 connections, you will require additional one-step-up-Interface-MELSEC-Xplorer licenses.

**Note**

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

- The following MELSEC controller families are supported:
  - MELSEC-A
  - MELSEC FX3U
  - MELSEC-Q
  - MELSEC-L
  - MELSEC iQ-R
  - MELSEC iQ-F

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>31.001042</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>31.000008</td>
<td><em>ibaPDA-Interface-MELSEC-Xplorer</em></td>
<td>Extension license for an <em>ibaPDA</em> system adding the data interface: + MELSEC-Xplorer (interface to MELSEC controllers)</td>
</tr>
<tr>
<td>Order no.</td>
<td>Product name</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>31.100008</td>
<td>One-step-up-Interface-MELSEC-Xplorer</td>
<td>Extension license for 16 further MELSEC-Xplorer connections, a maximum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of 14 is permissible</td>
</tr>
</tbody>
</table>

Table 1: Available MELSEC-Xplorer interface licenses, as of ibaPDA-V6.39.0

**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: 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 MELSEC-Xplorer

3.1 General information

The MELSEC-Xplorer interface can be used to measure data from Mitsubishi MELSEC PLCs. It is an Xplorer interface which means that the data is cyclically read by ibaPDA instead of being sent by the PLC.

3.2 System topologies

The connections between the devices and ibaPDA can be established via the computer’s standard Ethernet ports.

No further software is necessary for operation.

**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 GX works

For access to the MELSEC controllers, the Mitsubishi MC Protocol is used. It can be activated in the PLC parameters on the controller side.

Apart from that no further configuration and programming is required on the controller side. 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 (see above), the MELSEC-Xplorer interface will be displayed in the signal tree.
3.4.1 Interface settings

The interface itself has the following functions and configuration options:

- 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 is 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 the PLC is not accessible. In case of an error, a warning is indicated in the validation dialog. If the system has been started without a connection to the PLC, ibaPDA will periodically (every 10 s) try to connect to the PLC during the acquisition. As long as the PLC is disconnected the values will remain at zero.

- Allow inaccessible operands
  If enabled, ibaPDA will start the acquisition even if an operand is not accessible when validating the I/O configuration. If this option is disabled, the acquisition will not start.

<Open log file>
Click on this button to open the most recent log file related to MELSEC-Xplorer connections.

<Reset counters>
Click on this button to clear the counters for all connections, including calculated times and error counters.

Connection table
The table shows the available connections as an diagnostic overview, including cycle times and error counters for the individual connections during data measurement.

- Data size
  The data size shows how much data is read per read operation; in between brackets, the number of commands used to request the data is displayed.
Response time
The time it takes to read the data for a connection. The table shows the actual, average, minimum and maximum values of the response time.

Update time
The update time indicates the time between 2 read operations.
Refer to chapter Connection table, page 20

3.4.2 Adding a module
Add a module by clicking below the interface. Select the desired module type and click <OK>.

![Fig. 4: Adding MELSEC-Xplorer module](image-url)
3.4.3  General module settings

In the *General* tab the following module settings can be configured:

![General settings of a MELSEC module](image)

**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.
MELSEC module settings

Update time
Apart from the standard options, the "Update time" has to be configured. The update time determines how fast *ibaPDA* tries to retrieve data from the MELSEC PLC, i.e. the time in milliseconds (ms) between two read operations. The actual resulting update time can be higher depending on the CPU load, communication load, etc.

**Note**
It is recommended to check the diagnostic overview (connection table) for measured update rates as overload will result in lost samples.

Read mode
The read mode defines how data is read from the PLC.

- **Batch read:** Most generic way of reading data. Neighbouring operands are grouped into a single request message; otherwise a single message per operand is used. This is the least performant method but supported by most PLC types.
- **Random read:** Most suited for situations where a lot of non-neighbouring operands are requested. Not supported by all PLC types.
- **Monitor:** Most performant method. The requested operands are registered once and the data is requested periodically. Limited to 192 operands and can only be used in one module per PLC. Not supported by all PLC types.

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.

**Link "Add operands"**
Click on this link after the connection has been successfully established in order to configure the signals to be measured.

For more information, see chapter «Signal configuration», page 15
3.4.4 Connection settings

In the Connection tab, all parameters that are necessary to establish a proper connection to the PLC have to be configured:

![Connection tab of MELSEC-Xplorer module](image)

**Protocol**
You can select either "TCP/IP" or "UDP". Note that some PLC types only support TCP/IP.

The used protocol has to be enabled within the PLC parameters settings of GX works (see chapter "Configuration and engineering GX works, page 9").

**Other documentation**
Refer to the particular PLC manual for more information.

**Encoding**
You can select either "Bytes" or "ASCII", depending on the configuration of your PLC. If possible, it is recommended to use the bytes-encoding method. This way, the data request message size is smaller and the processing is more efficient at the PLC side.

**IP address**
Enter the IP address at which the network interface of the PLC is located.

**Timeout (s)**
The period of time in seconds after which a connection attempt will be aborted.

**PLC type**
Here is specified to which MELSEC series the PLC is assigned to.
Port
The TCP or UDP port the PLC refers to for incoming requests.

PC number
The network module station number of the access target. Default value: FF

Network number
The network number of the access target. Default value: 00

Request destination module I/O number
When accessing a multidrop connection station, the start input/output number of a multidrop connection source module is to be specified. Default value: 03FF

Request destination module station number
When accessing a multidrop connection station, the station number of an access target module is to be specified. Default value: 00

Other documentation
Refer to the Mitsubishi MELSEC documentation for more information on "PC number", "Network number", "Request destination module I/O number" or "Request destination module station number".

<Test>
When clicking this button, ibaPDA will try to establish a connection to the PLC and to read the PLC model name and type. If this option is not supported by the PLC, a warning message will be generated. However, this does not imply that requesting data will not work.

3.4.5 Signal configuration
The variables to be measured are configured in 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 12).

Note
Observe the maximum number of signals permitted by your license.
Selection of the signals to be measured

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

1. Click on the "Add operands" hyperlink in the module's General tab. Clicking on the link opens the MELSEC Operand Constructor.

2. Click on a field in the MELSEC Operand column of the Analog or Digital tab and the icon is displayed. Clicking on the icon opens the MELSEC Operand Constructor.

Using the MELSEC Operand Constructor, analog as well as digital signals can easily be added to the MELSEC-Xplorer module. Depending on which signal tab is selected (Analog or Digital) and the PLC type configured in the Connection tab (refer to chapter Connection settings, page 14), a list of accessible operands will be available. In the digital operand type list, the analog operand types are listed as well.
Address
Apart from the operand type, you also have to enter the address.

Bit
Since the digital operands are still analog data types in the PLC, you also have to specify the bit number you want to use for the digital signal.

The figure below shows an example of an Analog tab of a MELSEC-Xplorer module. Apart from the standard properties of an analog signal, there is a column for editing the "MELSEC Operand". The "Data Type" of the requested operand can also be configured here. The following data types are supported: BYTE, INT, WORD, DINT, DWORD and FLOAT.

![Fig. 7: MELSEC-Xplorer Analog tab](image)

The Digital tab shows a similar grid for the digital signals.

3.4.5.1 Module diagnostics

All the configured signals are listed in tabular format with their datatype and current actual value in the Diagnostics tab of each MELSEC-Xplorer module.

![Fig. 8: MELSEC-Xplorer Diagnostics tab](image)

The MELSEC-Xplorer interface supports diagnostic modules.

For more information see chapter Diagnostic modules, page 21.
4 Diagnostics

4.1 License

If the "MELSEC-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 MELSEC-Xplorer" has been properly recognised. The number of licensed connections is indicated in brackets.

![License of the MELSEC-Xplorer displayed in the ibaPDA I/O manager](image)

4.2 Log files

For many interfaces, there is an <Open log file> button in the specific interface overview in the I/O Manager.

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

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)
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.

With no existing connection you receive error messages.
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:

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 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 analyse the diagnostic information continuously in the *ibaPDA* system.

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.

![Fig. 13: Add diagnostic module, example Generic TCP](image-url)
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.
<table>
<thead>
<tr>
<th>Name</th>
<th>Active</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invalid packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connected</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 16: Example: Digital values of a diagnostic module for a TCP Generic module
5   Support and contact

Support

Phone: +49 911 97282-14
Fax: +49 911 97282-33
Email: support@iba-ag.com

Note

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

Contact

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Fax: +49 911 97282-33
Email: iba@iba-ag.com
Contact: Harald Opel

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