ibaPDA-Interface-AN-X-DCSNet

AN-X-DCSNet interface to Reliance DCS network

Manual

Issue 2.0

Measurement Systems for Industry and Energy

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2.0	04-2026	Update for ibaPDA v8.x	nm	8.6.0

Contents

1 About this documentation

This documentation describes the function and application of the software interface *ibaPDA-Interface-AN-X-DCSNet*.

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 they are capable of assessing safety and recognizing possible consequences and risks on the basis of their 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-AN-X-DCSNet* the following basic knowledge is required and/or useful:

- Windows operating system
- Basic knowledge of *ibaPDA*
- Knowledge of configuration and operation of the relevant measuring device/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 when using the AN-X-DCSNet interface:

Software

- *ibaPDA* v7.3.0 or higher
- License for *ibaPDA-Interface-AN-X-DCSNet* (supports up to 4 devices)

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

Hardware

- AN-X-DCSNet module for the physical access to the network

Note

iba highly recommends to operate the AN-X-DCSNet communication on a separate network. An additional network interface card may be needed in order to avoid interferences of the AN-X-DCSNet UDP messages with the Ethernet traffic from the *ibaPDA* system to other network nodes, e.g. file servers or users consulting data files.

License information

Order no.	Product name	Description
31.001026	ibaPDA-Interface-AN-X-DCS-Net	ibaPDA data interface for communication via Automax DCS Network with Rockwell (Reliance) automation systems

3 AN-X-DCSNet interface

With the AN-X-DCSNet interface you can measure on a Reliance DCS network using an AN-X-DCSNet device (Quest Technical Soulutions).

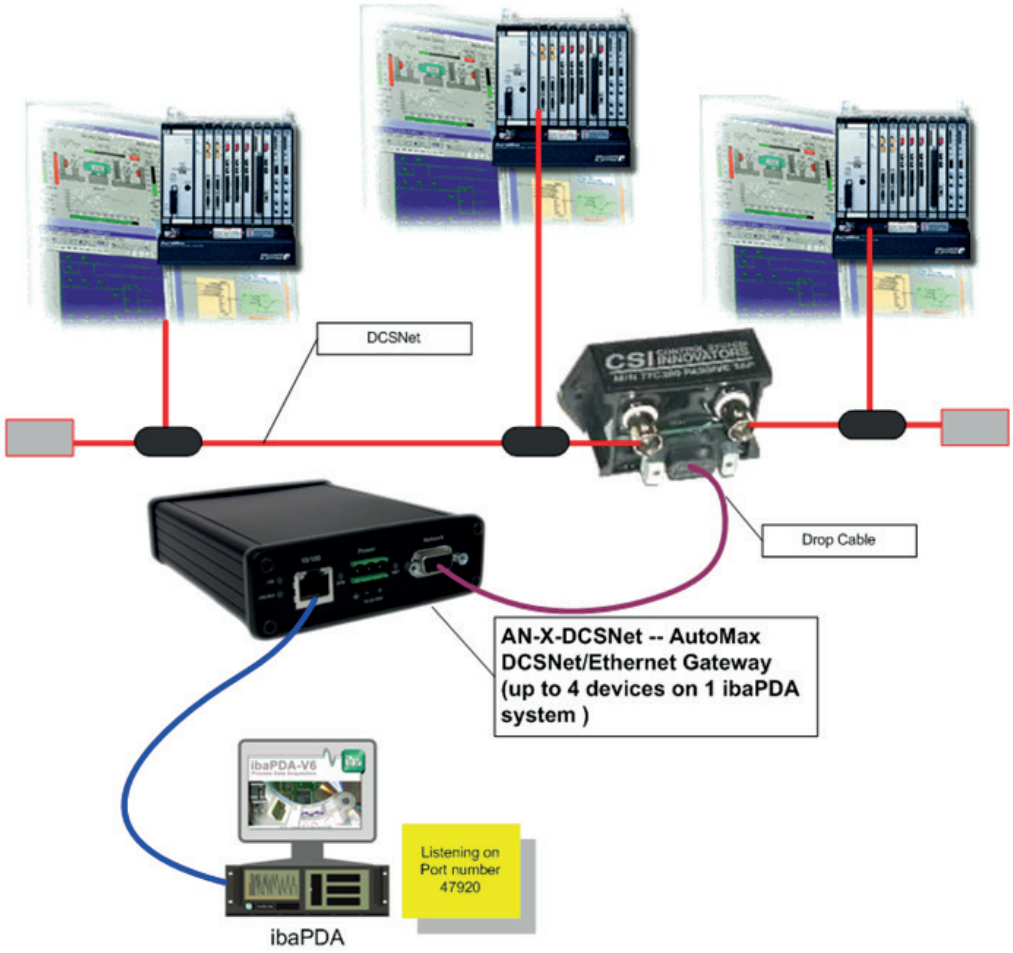
Other documentation

For more detailed information on the device and the AN-X-DCS network refer to the manufacturers manual.

3.1 System topology

The AN-X-DCSNet device connects to the DCS network through a passive tap. Depending on the application requirements, the device can operate either as a master or as a slave on the DCS network. In this role, it continuously monitors the input and output data of all drops present on the network.

ibaPDA communicates with the AN-X-DCSNet device via Ethernet and configures it to cyclically transmit the requested drop data back to *ibaPDA*. Up to four AN-X-DCSNet devices can be connected and processed simultaneously.



3.2 Communication and protocol

The data communication between *ibaPDA* and the AN-X-DCSNet device is done via UDP multicast. Each AN-X-DCSNet device can send up to 10 blocks of data. Each block is sent to a different UDP multicast address. The multicast address has the following form:

224.<block id>.<device ip address byte 1>.<device ip address byte 0>

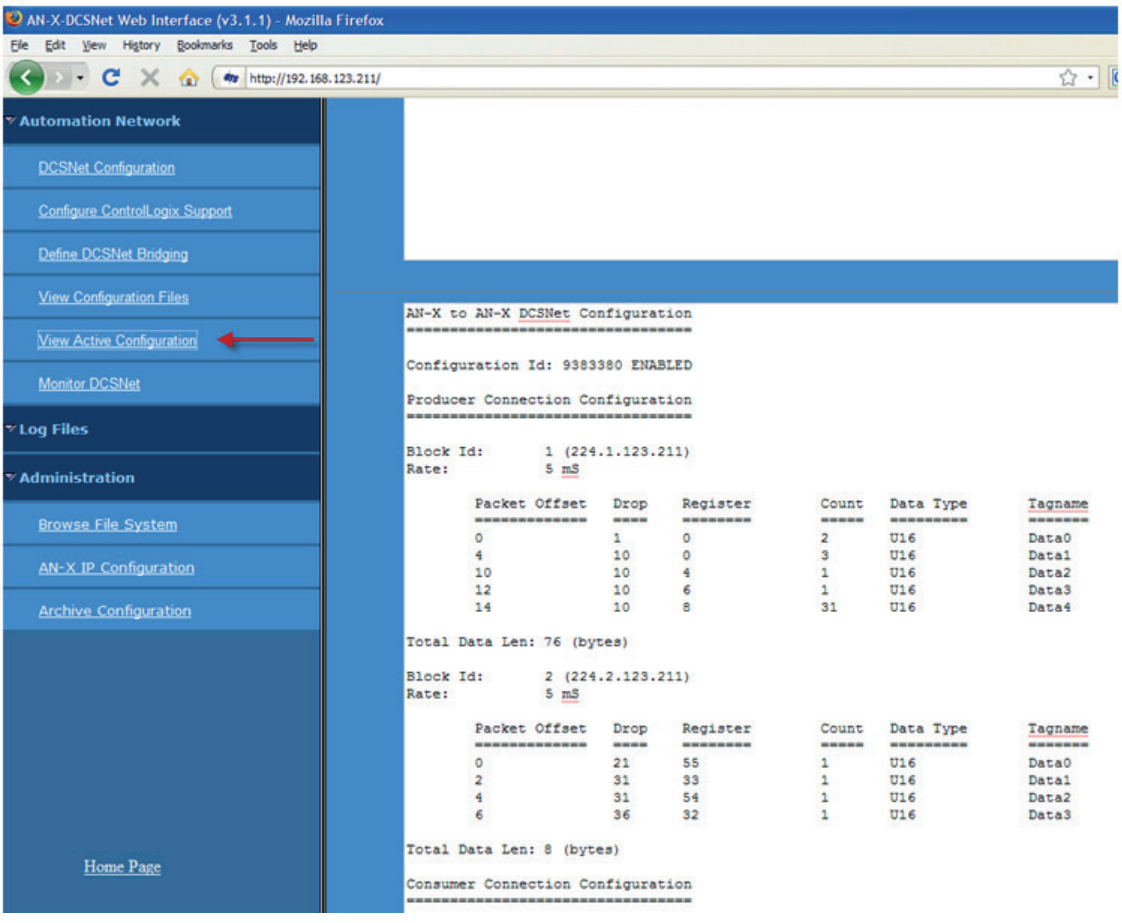
The block id counts from 1 to 10. So the multicast address for block 1 of the device with IP address 192.168.123.211 will be 224.1.123.211.

A block corresponds with a module in *ibaPDA* and the block id corresponds with the position of the module under the device. The block itself has the following structure:

Datatype	Name	Description
DWORD	Configuration ID	A user defined 32 bit configuration number that identifies the structure of the data.
DWORD	Data length	The length of the data that follows.
BYTE[1400]	Data	The data can be maximum 1400 bytes long which corresponds to 700 word registers.

The block configuration is written by *ibaPDA* in a text file. This text file is sent to the device via the web interface of the device. At the same time ibaPDA gives a list of expected UDP connections to the driver. The driver will join the required multicast groups and it will start listening for incoming messages.

You can checkout the current configuration in the device by going to the web interface and selecting the *View Active Configuration* link.



You can consult the AN-X to AN-X communication chapter in the AN-X-DCSNet device user manual for more information about the configuration file and the UDP communication.

3.3 Configuration of an AN-X-DCSNet device

To configure the AN-X-DCSNet device, proceed as follows:

1. Configure the IP address of the AN-X-DCSNet device as described in the device manual.
2. Access he device's web interface and navigate to the *DCSNet Configuration* section.

3. Configure the device mode according to the DCS network setup.
   - If no master is present on the network, set the device to *Master* mode.
   - If a master already exists, set the device to *Slave* mode.
4. If the device is set to *Slave* mode, configure the drops on the device by specifying:
   - Start drop number (*Drop Number*)
   - *Drop Depth* (number of drops mapped on the device)

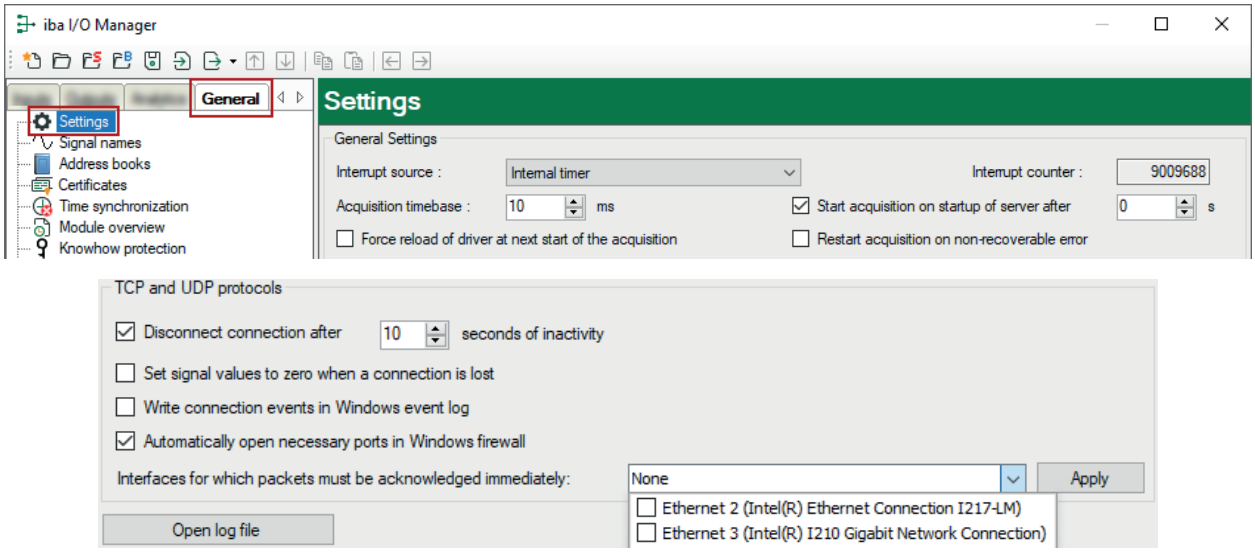
   Increasing the number of configured drops will slow down the DCS network. The device can still monitor data from all drops on the network, regardless of whether they are mapped.
5. To write the configuration to the device, click <SUBMIT>.

3.4 Configuration and engineering ibaPDA

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

3.4.1 General settings

The "Alive timeout" is configured jointly for all TCP/IP and UDP protocols supported by *ibaPDA*.



Disconnect connection after … seconds of inactivity
Behavior and timeout duration can be specified.

Set signal values to zero when a connection is lost
If this option is disabled, the value read last will be kept.

Write connection events in Windows event log
Current events are logged in Windows.

Automatically open necessary ports in Windows firewall
If this option is enabled, all ports required for the currently licensed interfaces are automatically opened in the firewall by the *ibaPDA* server service.

If this option is disabled, the required ports can be opened manually in the I/O Manager of the licensed interfaces via <Allow port through firewall>.

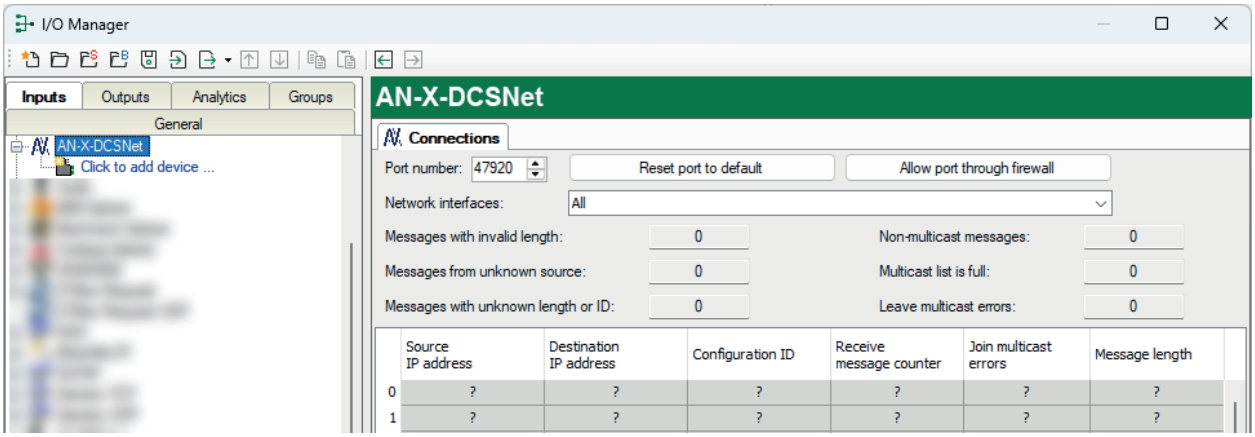
Interfaces for which packets must be acknowledged immediately
Selection of required interfaces.

Note

If *ibaPDA* is the active partner (Client), *ibaPDA* reestablishes the connection after only a few seconds. Thus, it gives to the passive partner the possibility to send data again.

3.4.2 Interface settings

The interface itself has the following functions and configuration possibilities:



Port number
UDP port number that *ibaPDA* listens to for messages from an AN-X-DCSNet device.

Normally, you can use the default port number "47920".

<Reset port to default>
Use this button to reset the port to the default port number.

<Allow ports through firewall>
When installing *ibaPDA*, the default port numbers of the used protocols are automatically entered in the firewall. If you change the port number or enable the interface subsequently, you have to enable this port in the firewall with this button.

Network interfaces
Using this drop-down list, you can select which network adapters on your computer are used for this interface. The sockets will be opened for communication only on the selected network adapters. In case a network adapter has multiple IP addresses configured, a socket will be opened for all of these IP addresses. At least one network adapter should be selected to get the interface configuration validated. If you select *None*, an error message will be displayed when validating the I/O configuration. By default, the option *All* is selected.

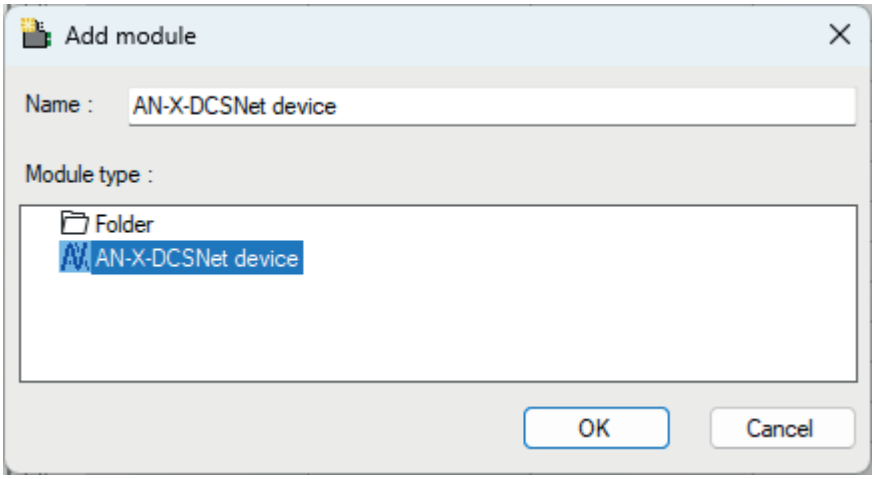
Error counters
For a description of the error counters, see ↗ *Connection table and error counters, page 21*.

Connection table
The table shows the currently connected AN-X-DCSNet devices

3.4.3 Adding and configuring an AN-X-DCSNet device

Below you will learn how to add a device to the AN-X-DCSNet interface and configure the required modules for the device. For detailed information on the device settings, see ↗ *General device and module settings, page 14*.

1. Click on the blue link *Click to add device…* located under the AN-X-DCSNet interface in the *Inputs* tab.
2. Select *AN-X-DCSNet device* in the dialog box and assign a name via the input field if required.



3. Confirm the selection with <OK>.
4. Enter the IP address of the device, see ↗ *Connection (device only), page 15*.
5. To add a module, click the blue *Click to add module…* link.

   You can add up to 10 modules to the device.

→ The *Add module* dialog box opens again.

6. Select the desired module type in the dialog box and assign a name via the input field if required.

   There are 2 types of modules that you can add to the device: Generic DCS and Symbolic DCS.

7. Confirm the selection with <OK>.
8. Configure the settings of the module, see ↗ *General device and module settings, page 14*.

   Each module has its own UDP connection to the device. For each module you can specify which data has to be monitored on the DCS network and how fast the AN-X-DCSNet device has to send data messages to *ibaPDA*. This allows you to optimize the available bandwidth.

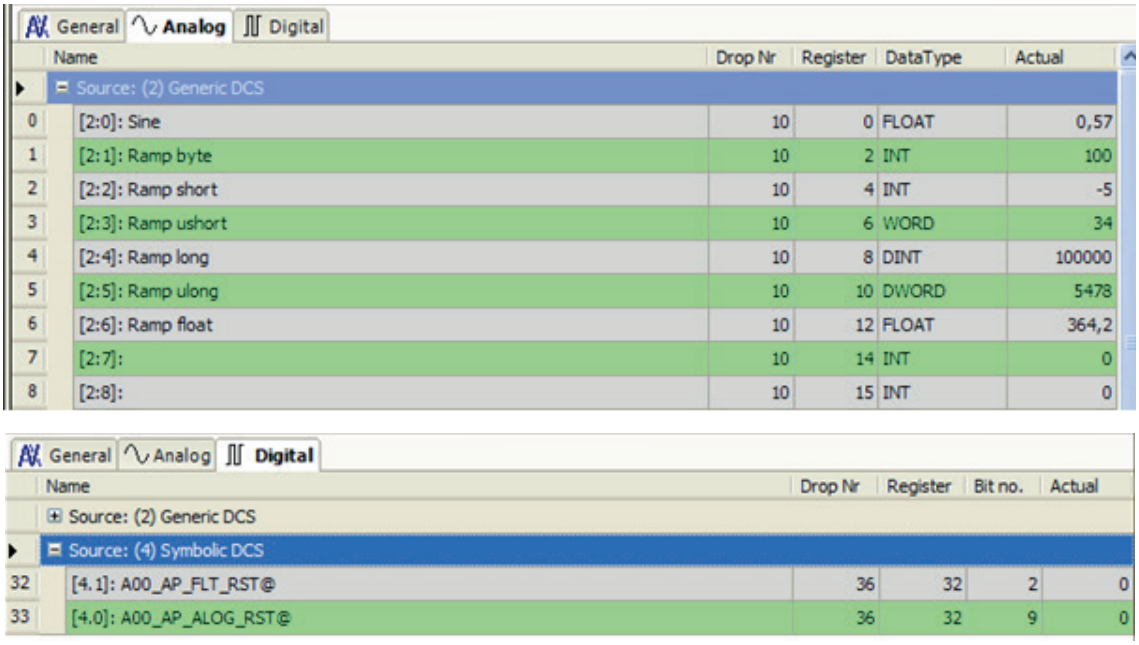
9. Continue with the signal configuration.

   When using modules of the Generic DCS type, see ↗ *Signal configuration – Generic DCS module, page 16*. When using Symbolic DCS modules, see ↗ *Signal configuration – Symbolic DCS module, page 17*.

10. When all modules are configured, apply the configuration by clicking on the *Write configuration to device link*.

    Manually saving the configuration is not really necessary. *ibaPDA* automatically writes the new configuration to the device(s) as soon as data collection begins.

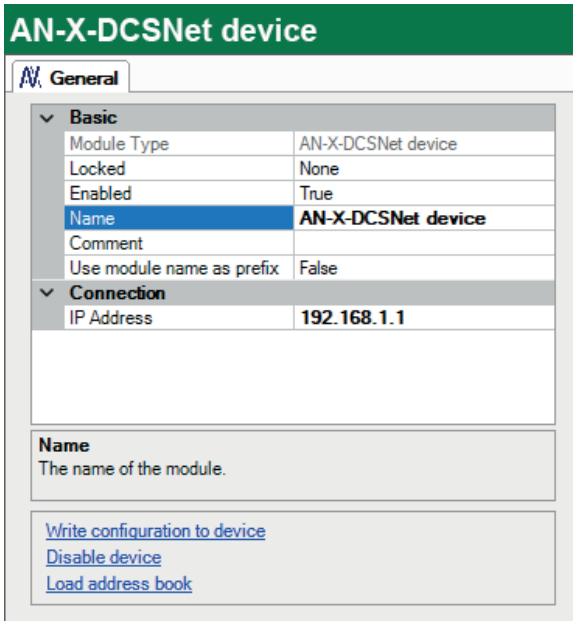
→ Once the configuration has been written to the device, the device begins sending data messages to *ibaPDA*. You can view the actual signal values on the *Analog* and *Digital* tab of the AN-X-DCSNet device.

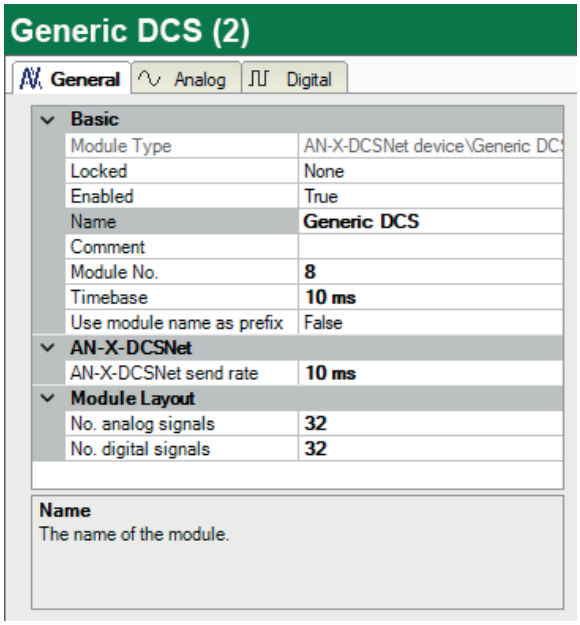


3.4.4 General device and module settings

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

All devices and 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.

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

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.

Connection (device only)

IP Address
Enter the IP address of the AN-X-DCSNet device.

AN-X-DCSNet (modules only)

AN-X-DCSNet send rate
Determines how fast the AN-X-DCSNet device sends data to *ibaPDA*.

Module Layout

No. analog signals, No. digital signals
Define the number of configurable analog and digital signals in the signal tables. The default value is 32 for each. The signal tables are adjusted accordingly. Note that the total amount of data must not exceed 16384 bytes for analog and digital signals together.

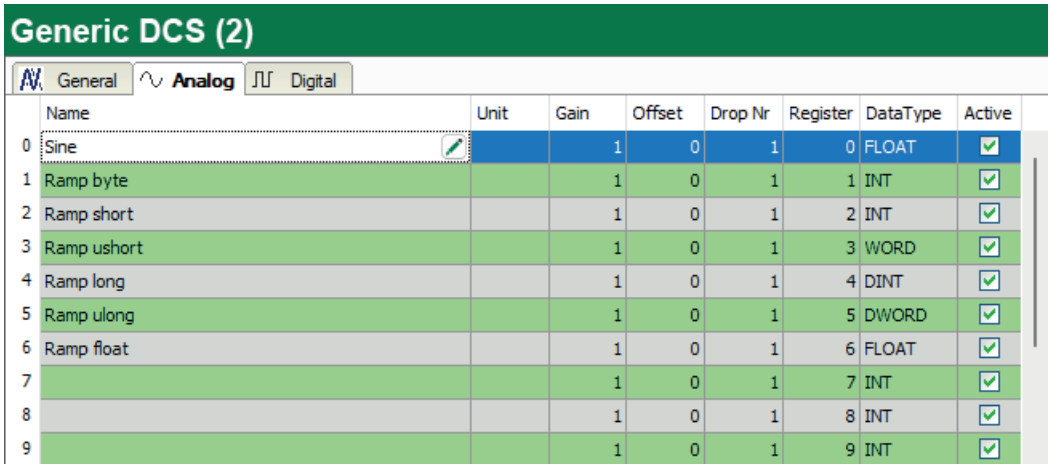
Other documentation

You can find further information in the *ibaPDA* manual.

3.4.5 Signal configuration – Generic DCS module

On the General tab you can specify the number of analog and digital signals of this module. The AN-X-DCSNet send rate property determines how fast the AN-X-DCSNet device will send the data for this module to *ibaPDA*, see↗ *General device and module settings, page 14*.

The DCS network consists of 1 master and up to 55 slaves called drops. The master has drop number 0, while the slaves have drop numbers 1 to 55. Each drop provides 64 registers: the first 32 serve as inputs to the master, and the remaining 32 serve as outputs from the master. Each register is 2 bytes long.



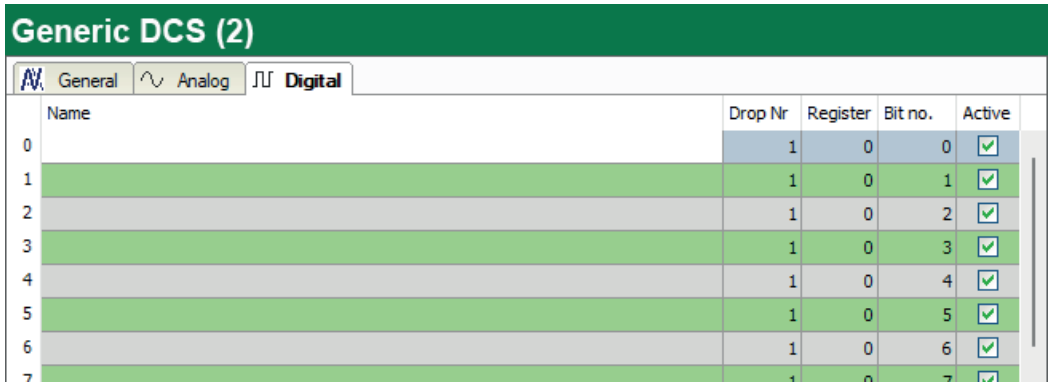
	Name	Unit	Gain	Offset	Drop Nr	Register	DataType	Active
0	Sine		1	0	1	0	FLOAT	☑
1	Ramp byte		1	0	1	1	INT	☑
2	Ramp short		1	0	1	2	INT	☑
3	Ramp ushort		1	0	1	3	WORD	☑
4	Ramp long		1	0	1	4	DINT	☑
5	Ramp ulong		1	0	1	5	DWORD	☑
6	Ramp float		1	0	1	6	FLOAT	☑
7			1	0	1	7	INT	☑
8			1	0	1	8	INT	☑
9			1	0	1	9	INT	☑

Specify the drop number, register number and data type for each analog signal. The supported data types are:

- INT: 16 bit signed integer (1 register)
- WORD: 16 bit unsigned integer (1 register)
- DINT: 32 bit signed integer (2 registers)
- DWORD: 32 bit unsigned integer (2 registers)
- FLOAT: 32 bit floating point (2 registers)

When you click on the *Drop Nr* or *Register* column header, *ibaPDA* automatically calculates the correct register and drop number for the signals below the currently selected signal.

Each digital signal requires a drop number, register number and bit number. The bit number can be between 0 and 15. You can click the *Bit no.* column header to automatically fill in the bit numbers.

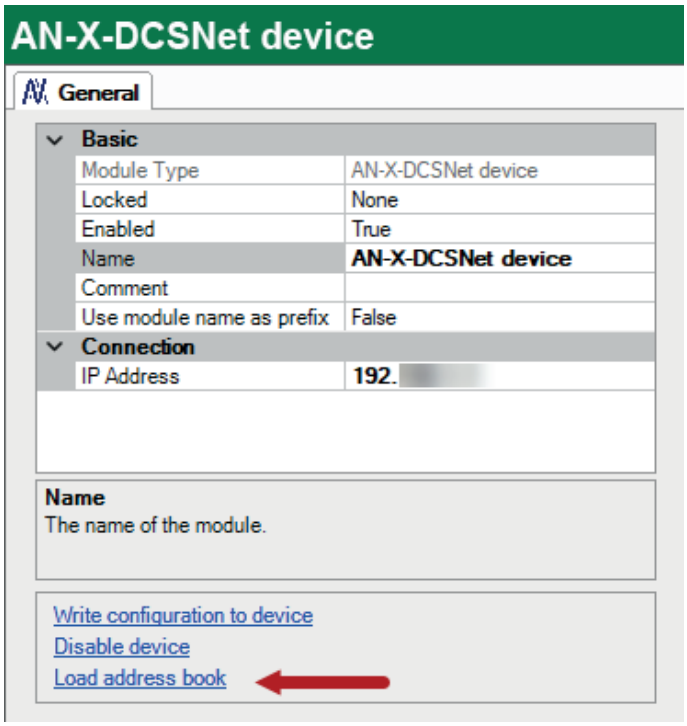


	Name	Drop Nr	Register	Bit no.	Active
0		1	0	0	☑
1		1	0	1	☑
2		1	0	2	☑
3		1	0	3	☑
4		1	0	4	☑
5		1	0	5	☑
6		1	0	6	☑

3.4.6 Signal configuration – Symbolic DCS module

Some systems have a database with all the signals available across the DCS network. This database can be loaded by *ibaPDA*.

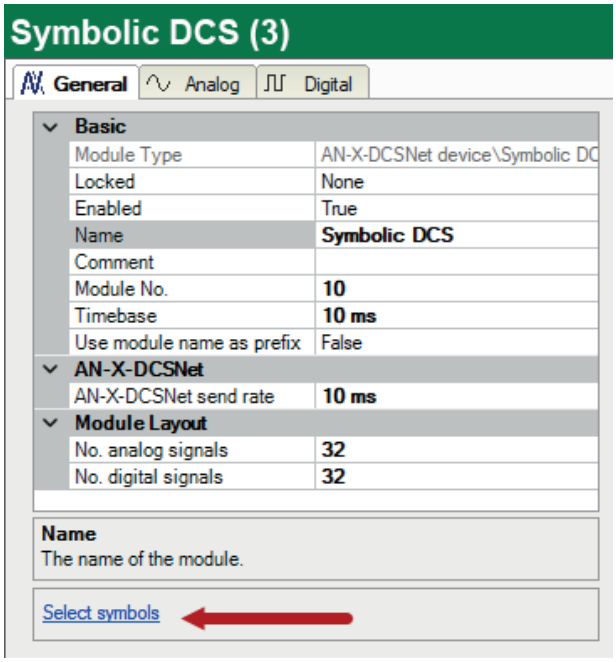
1. Go to the AN-X-DCSNet device and click the *Load address book* link.



→ This will open a file browser where you can select the correct database file. This file is typically called `$NET.dbf`.

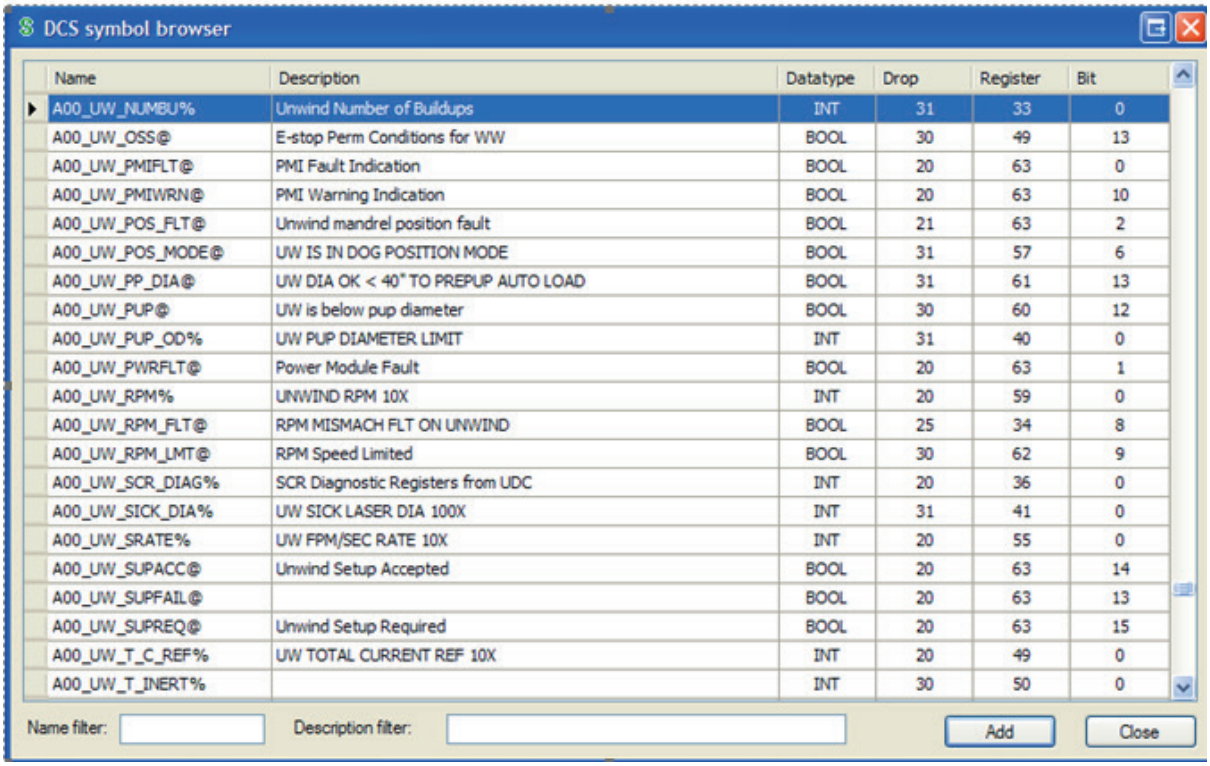
2. Add a Symbolic DCS module, see ↗ *Adding and configuring an AN-X-DCSNet device, page 13*.

3. Click the *Select symbols* link.

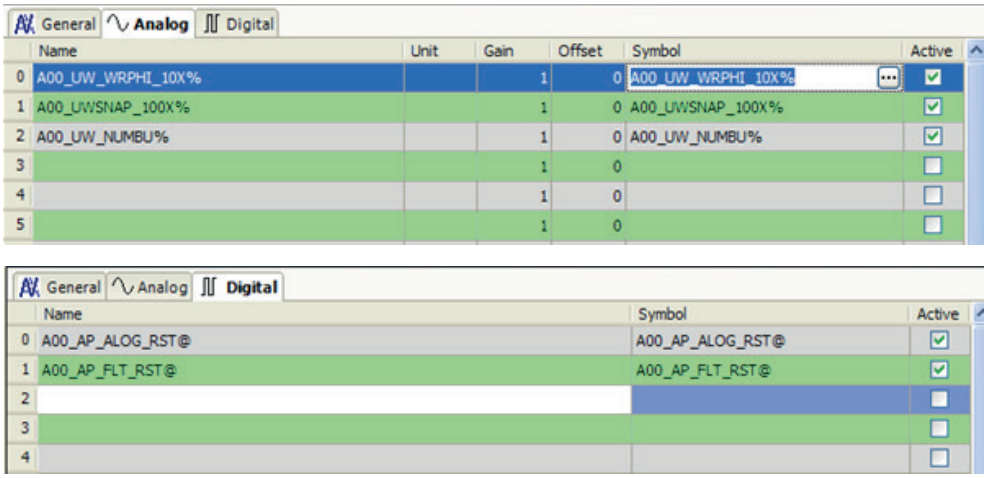


→ The symbol browser opens and lists all the symbols in the address book.

4. To add symbols to the module, double-click the symbols or select the desired symbol and click <Add>.



→ The analog symbols will be added to the *Analog* tab and the digital symbols to the *Digital* tab. You can use the name filter and description filter to search for symbols.



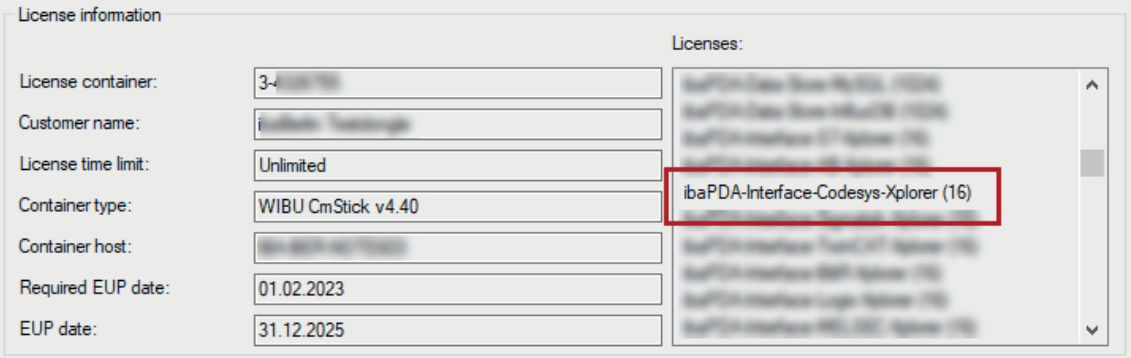
So instead of specifying drop number, register number and bit number like in the Generic DCS module you just select the symbol and *ibaPDA* fills in the address information automatically.

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 the interface *ibaPDA-Interface-AN-X-DCSNet* 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.



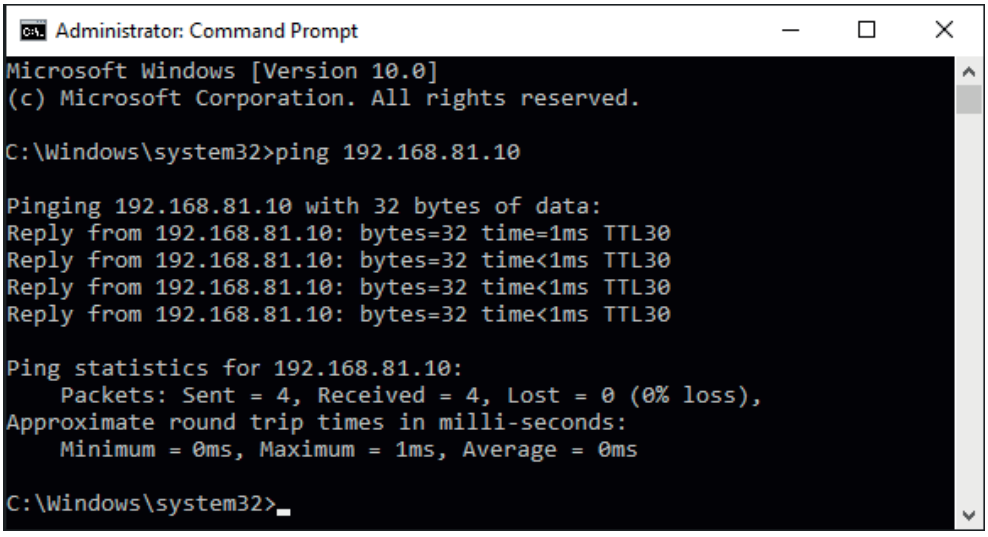
4.2 Connection diagnostics with PING

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

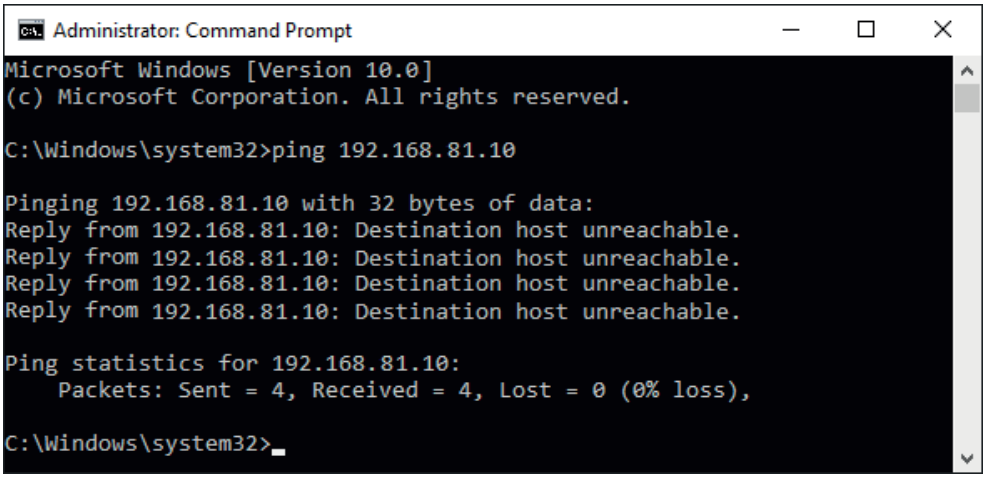
1. Open a Windows command prompt.

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.

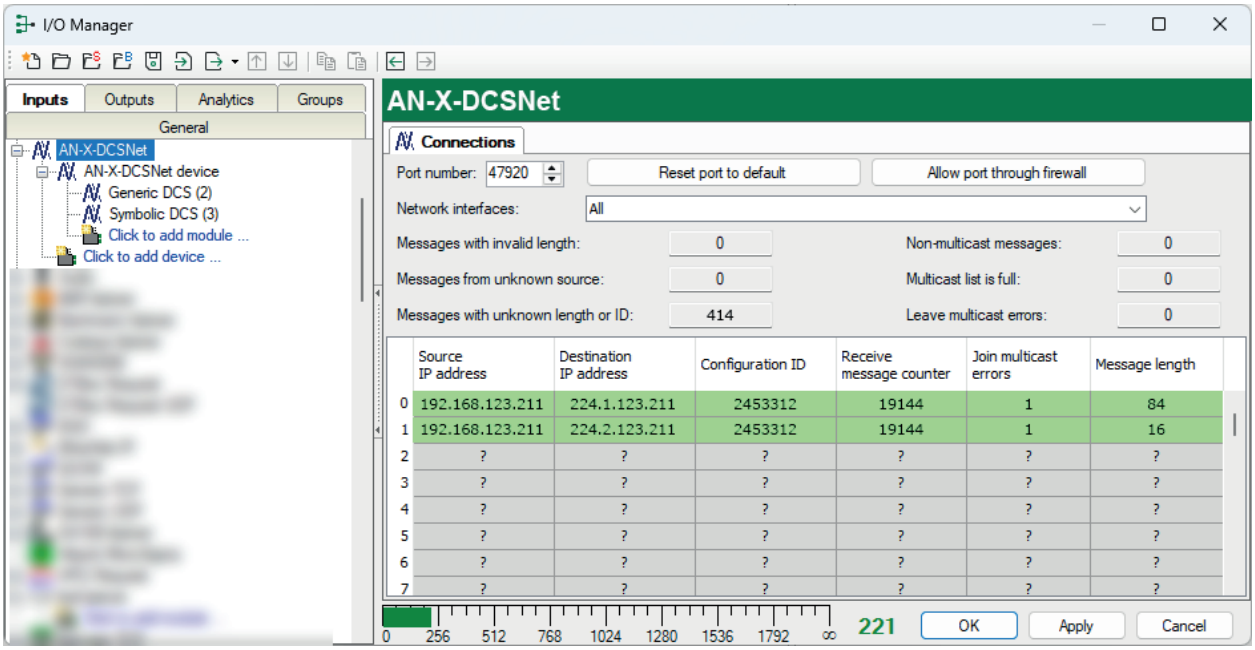


→ With no existing connection you receive error messages.



4.3 Connection table and error counters

The connection table on the AN-X-DCSNet interface node shows the status of each device. Error counters provide additional information for diagnosis and troubleshooting.



Error counters

There are 6 global error counters:

Messages with invalid length

This error counter will increment each time an UDP message is received with a size that is either smaller than 8 bytes or larger than 1408 bytes.

Messages from unknown source

ibaPDA gives the driver a list of expected UDP connections when a new configuration is written to the AN-X-DCSNet device. This error counter will increment each time an UDP message is received from a source address that is not known by the driver.

Messages with unknown length or ID

This error counter will increment each time an UDP message is received from a known source address but with an unexpected configuration ID or unexpected length. See the protocol information paragraph for more information.

Non-multicast messages

This error counter will increment each time an UDP message is received that is not sent to a multicast address.

Multicast list is full

The driver can join a maximum of 40 multicast groups. If the driver is asked to join more than 40 groups then this error counter is incremented. You can solve this situation by just starting the acquisition. If that doesn't work then try reloading the driver. You can reload the driver by setting the *Force reload of driver* checkbox on the *General* tab in the I/O Manager.

Leave multicast errors
This error counter will increment each time an error occurs when the driver tries to leave a multicast group.

Connection table
The table shows the status of the 40 possible connections (maximum 4 devices and 10 connections per device). An active connection is colored green.

The columns contain the following information:

- Source IP address
- Destination IP address (multicast!)
- Configuration ID
- Receive message counter
- Join multicast error counter

  The driver attempts to join the multicast group on every available network interface of the *ibaPDA* server PC. If any of these interfaces is not connected, the error counter increases. This is not relevant as long as the disconnected interface is not the one used to communicate with the AN-X-DCSNet device.
- Received message length

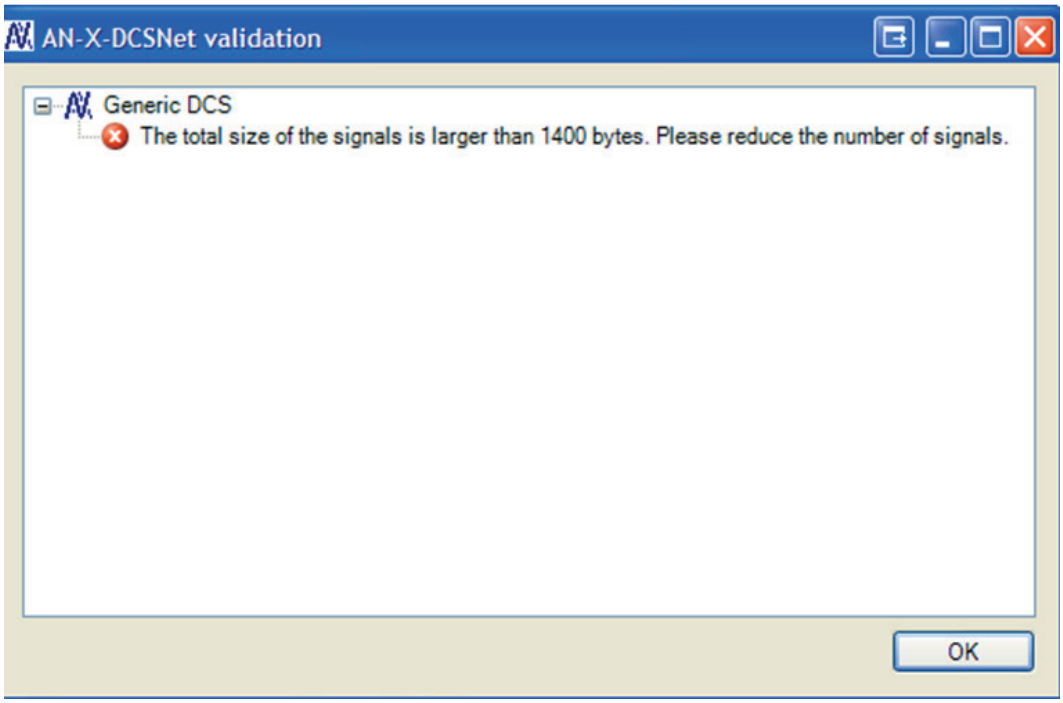
  Total length of the received message so it includes the 8 byte header.

5 Troubleshooting

In the following you will find help on possible errors when using *ibaPDA-Interface-AN-X-DCSNet*. If you have any further questions, please contact the iba support.

5.1 Troubleshooting configuration

When *ibaPDA* creates the AN-X-DCSNet device configuration, it verifies that the configuration does not violate any AN-X-DCSNet limitations. If a violation is detected, an error message is shown to the user.



The possible errors are:

The total size of the signals is larger than 1400 bytes
The AN-X-DCSNet device can only send 1400 bytes of data in a message. If the total size of all the signals in a module is more than 1400 bytes then you get this error. You will have to reduce the number of signals to resolve this error.

The current configuration requires more than 64 data lines
The AN-X-DCSNet block configuration consists of data lines. Each data line defines how many contiguous bytes should be read from a drop, starting at a specific register. The block configuration is limited to 64 data lines. If a module contains signals that read data from many drops or from non-contiguous registers within a drop, more than 64 data lines may be required. In that case, this error is shown. To resolve it, you must either reduce the number of signals or reconfigure them to read more contiguous registers instead of widely spread registers. Alternatively, you can create an additional module and move some signals to it.

6 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.

Contact

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