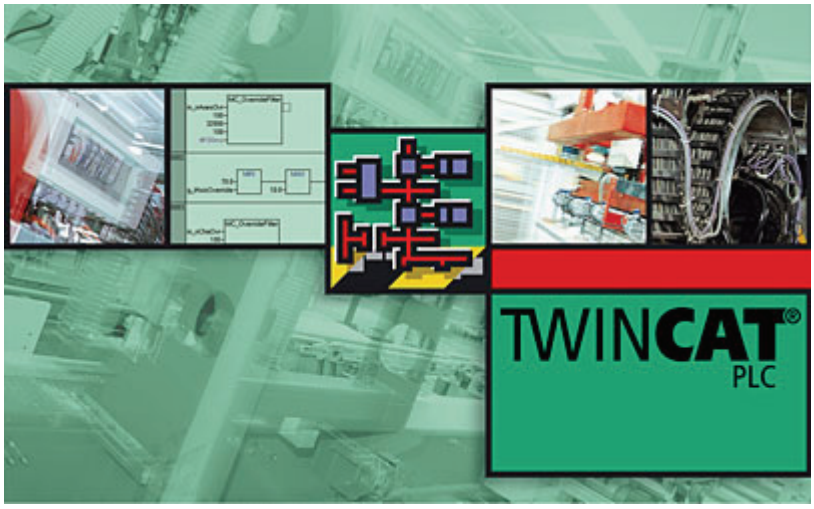
How to configure an Anybus EtherCAT slave module with a Beckhoff PLC



More info about the network and products

This document gives a brief description of how to configure an Anybus Slave product for EtherCAT. For further information about the products, please consult the HMS homepage, www.anybus.com. The latest manuals etcetera can be downloaded from that location.

The EtherCAT user organisation has a homepage on the Internet, http://www.ethercatcat.org/. Several technical guides are available in or via this page.

History

Revision	Date	Description	Author
1.00	2007-10-30	Created	Thorbjörn Palm
1.01	2007-11-07	Minor revision	Thorbjörn Palm
1.02	2007-12-06	Updated layout	Thorbjörn Palm
1.03	2008-01-10	Minor correction	Thorbjörn Palm
1.04	2008-03-13	Updated layout	Thorbjörn Palm

Contents

1. Solution overview

This application note describes how to configure an Anybus EtherCAT Slave product with a Beckhoff PLC. Below you can find an overview of the system described in this document. Other nodes may be attached to the network, but are not necessary.

The configuration is described in two steps.

1. At first the PLC configuration is explained.
2. Secondly the configuration of the I/O data of the Anybus module is described.

Note: This document is valid for all Anybus EtherCAT products, however sections marked with *italics* describe the configuration of a specific product.

The contents describe step by step how a configuration is done. This document assumes the reader is familiar with industrial communication, EtherCAT networks, HMS Communicator and X-gateway.

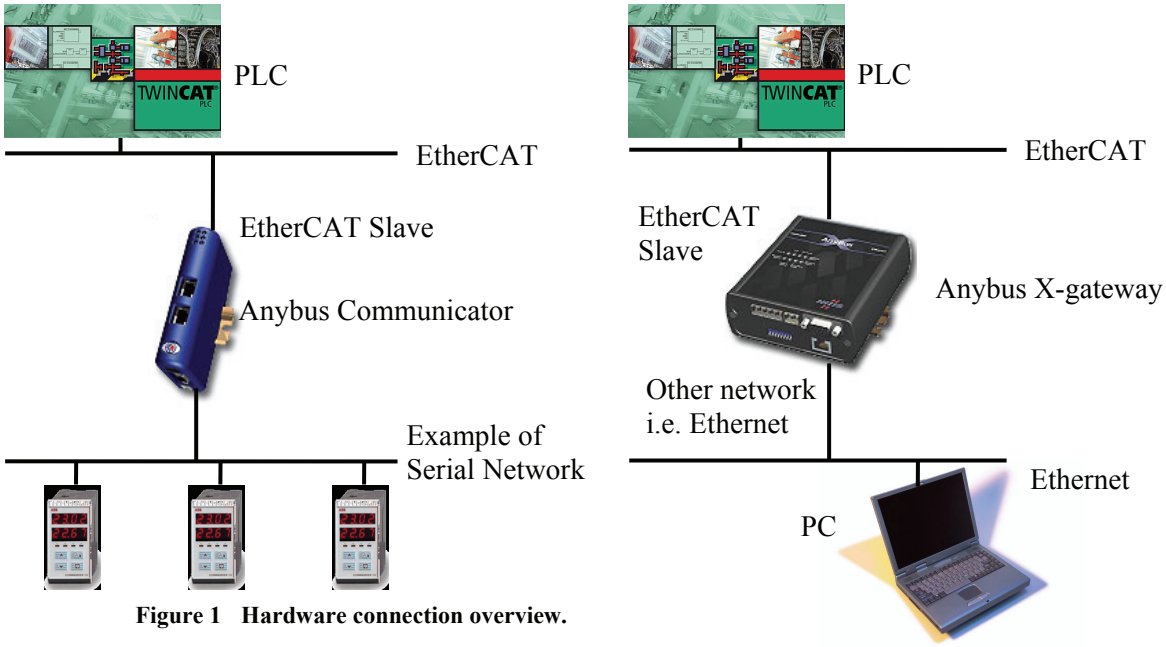


Figure 1 Hardware connection overview.

2. Applicable Anybus products

The following table specifies the relevant Anybus products for this document.

Description	Name / Type
Anybus Communicator	EtherCAT
Anybus X-gateway	EtherCAT
Anybus Slave	EtherCAT

3. Requirements

The following equipment is needed to setup a successful configuration.

Description	Name / Type	Version
Beckhoff PC PLC	TwinCAT System Control	2.10.0
Communicator configuration software	ABC Config Tool	2.32
Communicator User Manual	Anybus Communicator for EtherCAT, User Manual	2.01
X-gateway Interface Addendum	X-gateway Interface Addendum EtherCAT Slave	1.00
Slave Field bus Appendix	Anybus-S EtherCAT, Field bus Appendix	1.0
Power supply 24VDC	n.a.	n.a
Configuration cables	n.a.	n.a.

4. EtherCAT configuration

In this case the Beckhoff PC PLC has been used as a master on the EtherCAT network. To configure the PLC and the EtherCAT network the tool TwinCAT System Control is used. Start the program and follow the steps below.

4.1. Installing the TwinCAT master

The first step is to install the Beckhoff TwinCAT software. A fully functional demo version is available for download from Beckhoffs webpage[1]. Then copy the XML file to the directory: "C:\Program files\TwinCAT\Io\EtherCAT\", where C is the letter of your local drive.

Note: The XML-file is unique for each product and can be downloaded at HMS website[2].

After installing the software start the TwinCAT System manager.

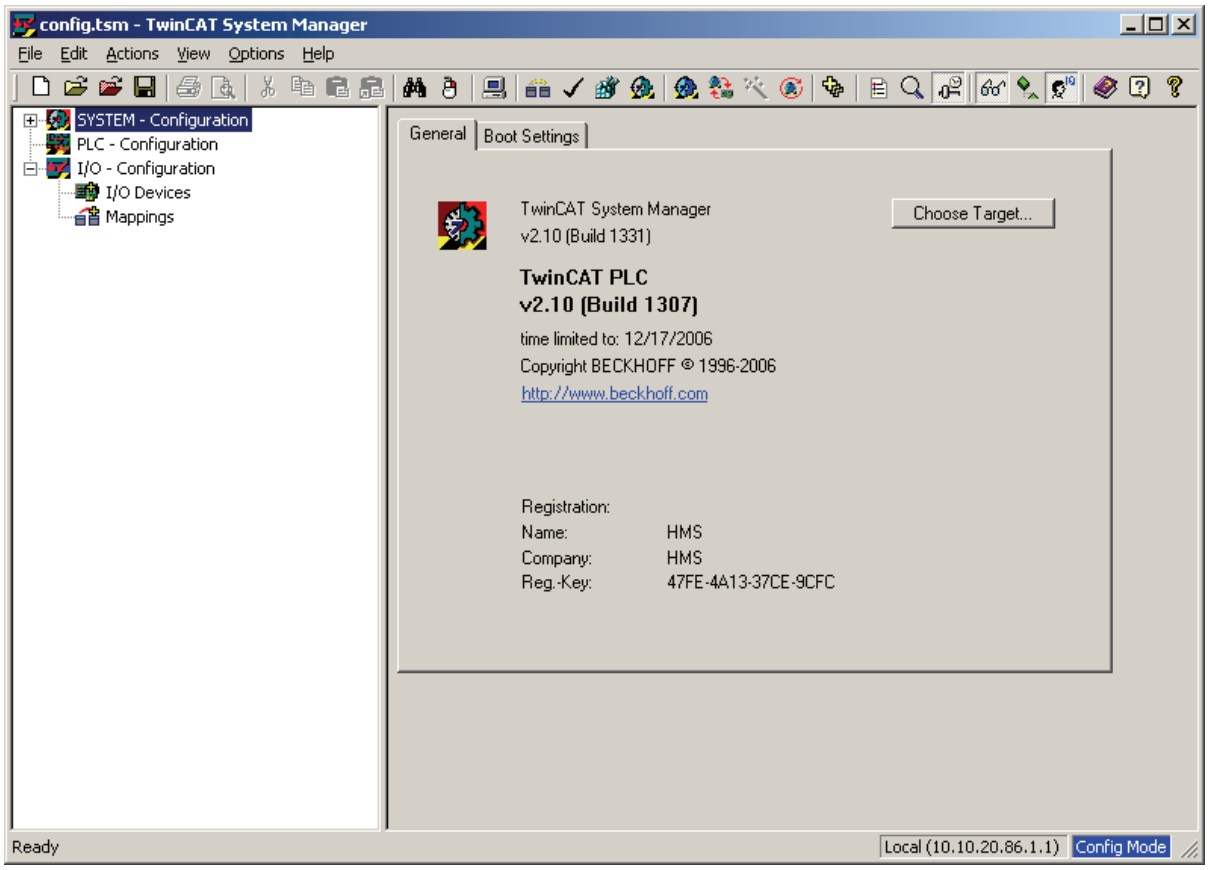


Figure 2 The start screen in the TwinCAT System Manager.

[1] www.beckhoff.com

[2] www.anybus.com

To configure the network card in the computer select “Options->Show Real Time Ethernet Compatible Devices”.

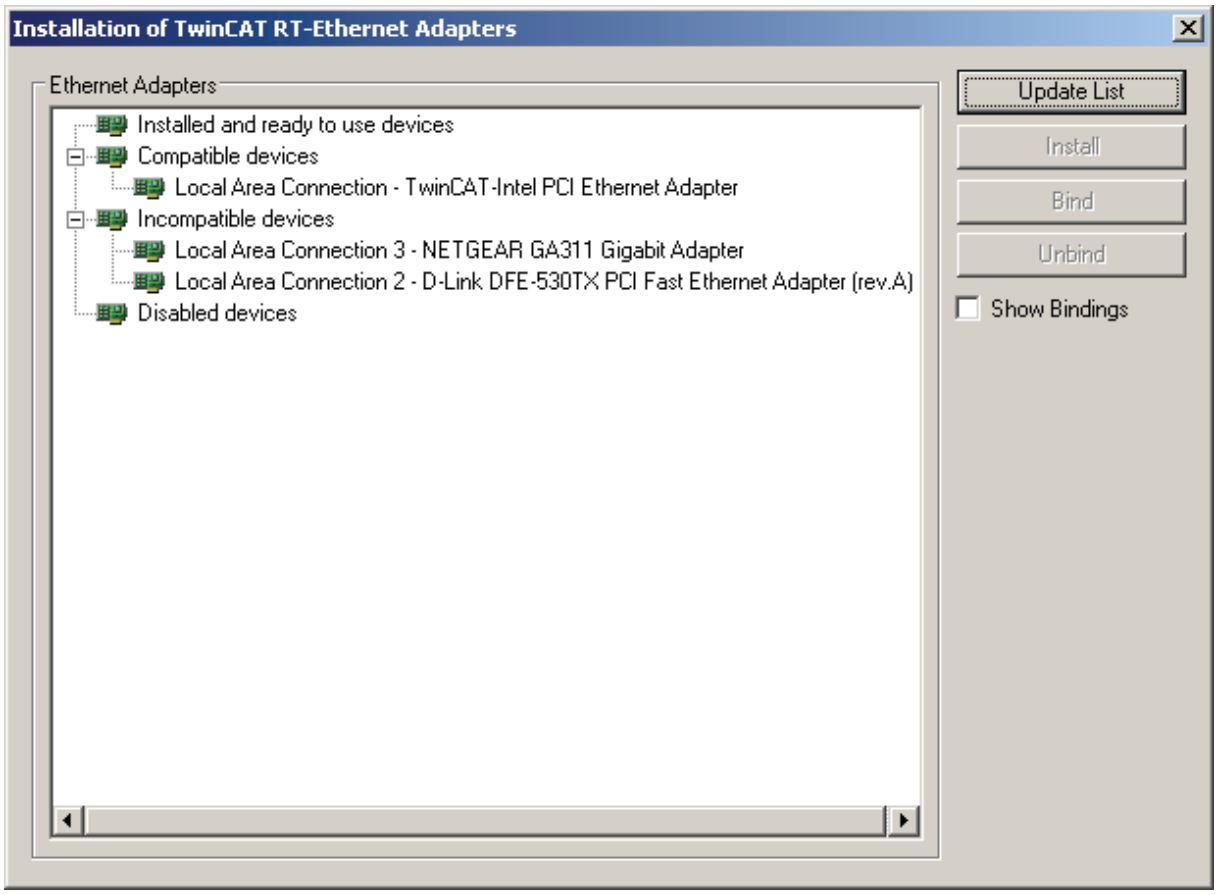


Figure 3 Selecting the network card to use for the EtherCAT communication.

Select the Ethernet device you wish to use for EtherCAT and press “Install”. Both “Compatible” and “Incompatible” devices can be used. They only differ in performance.

Note: If you are using a compatible network card the IP-traffic in that sub-network can be blocked.

4.2. Configuring the Anybus module

In this case the Anybus Slave is used for the configuration. The configuration in the TwinCAT software is the same for all Anybus products.

Note: To be able to configure the Anybus module the module needs to be configured and connected to the EtherCAT network. For configuring the Anybus module see chapter 5 Anybus configuration.

1. Scanning for sub devices:

Select “I/O Devices” and press the “Scan sub devices” button.

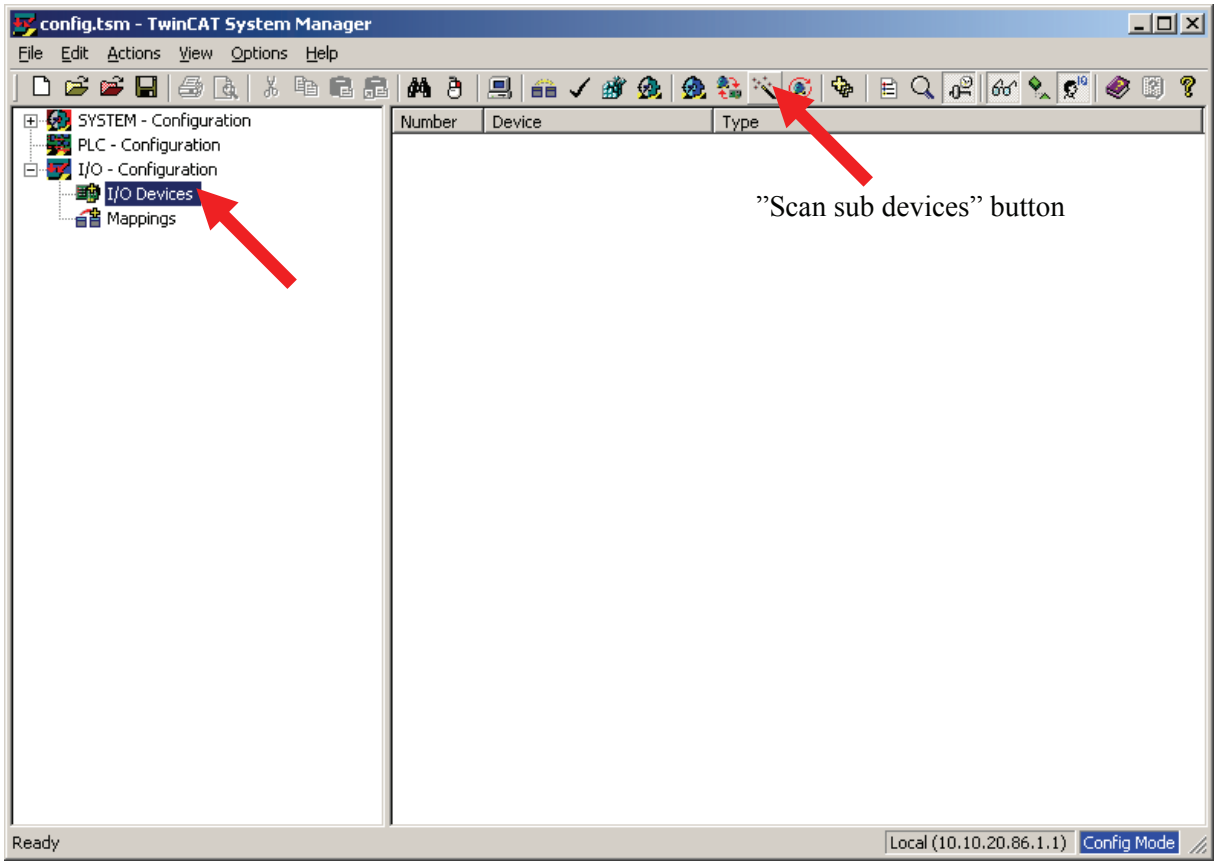


Figure 4 Scanning for sub devices, Ethernet interfaces.

Select the Ethernet interface you wish to use and click “OK”.

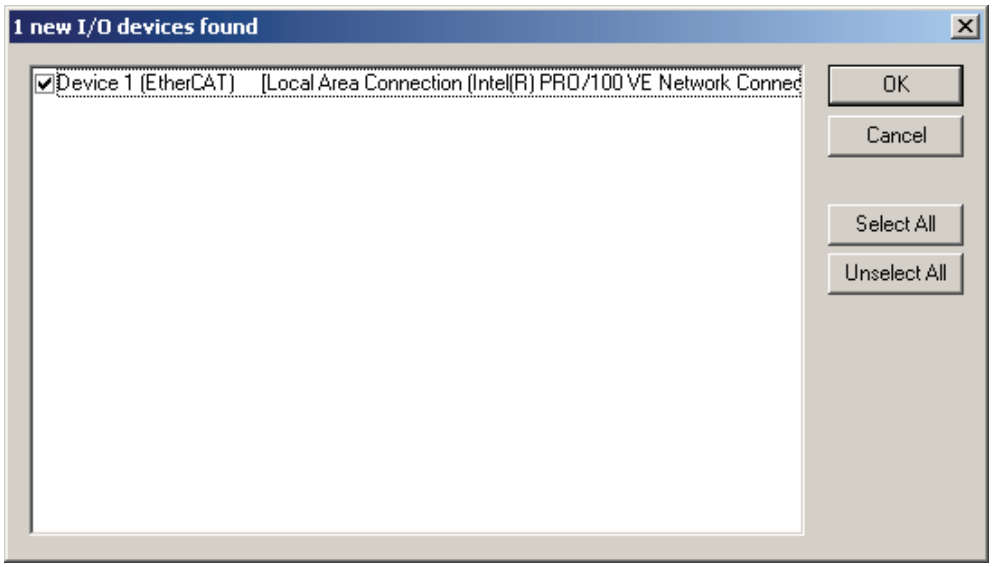


Figure 5 Selecting the Ethernet interface.

Select “**Yes**” when asked if you wish to scan for boxes. Boxes in this case refer to slaves.

Figure 6 Scanning for boxes, i.e. slaves on the EtherCAT network

2. Free run options:

The next dialogue asks if you want to Activate Free Run, i.e. go into operational mode. Select **No** in this dialogue.

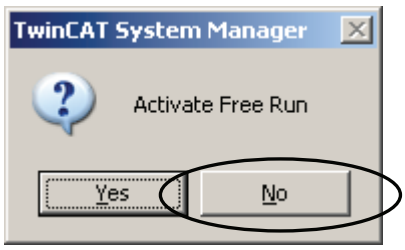


Figure 7 Selecting if to go into Operational mode.

Note: If the Anybus module is used together with a custom .XML file, edited to contain the configured I/O sizes, select "**Yes**". The configuration is then complete. The I/O sizes can be seen as in Figure 11 viewing Input and Output data.

The TwinCAT system manager should now look like this.

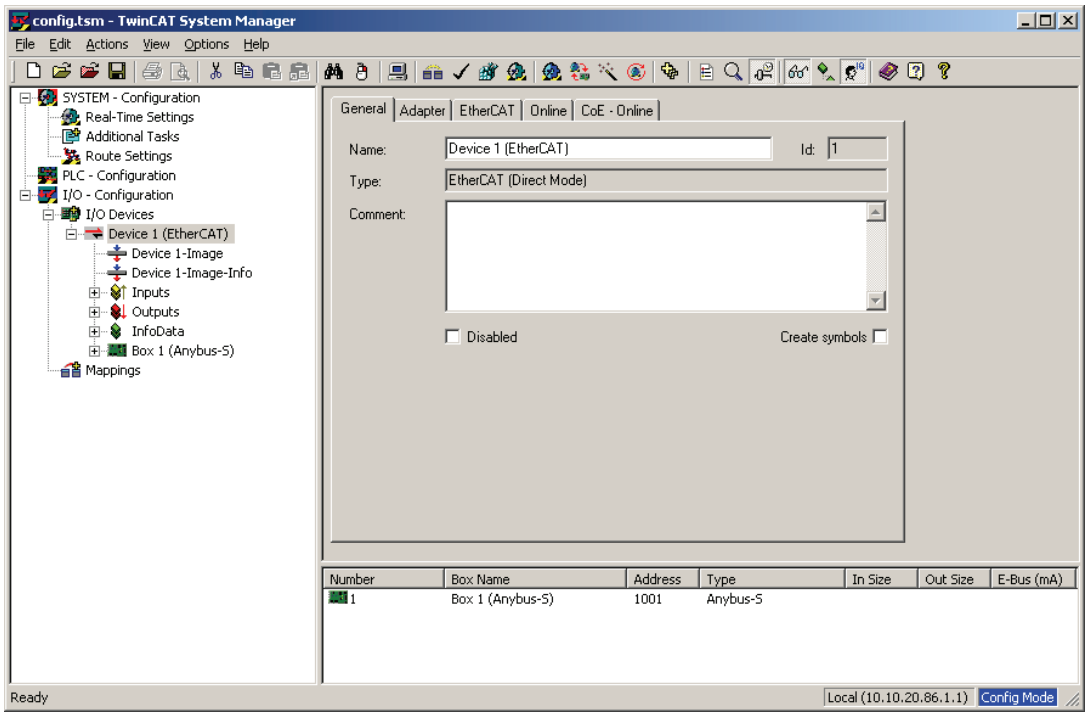


Figure 8 Adding the Anybus module.

3. Configuring the process data:

Select the Anybus module and press “Process data”.

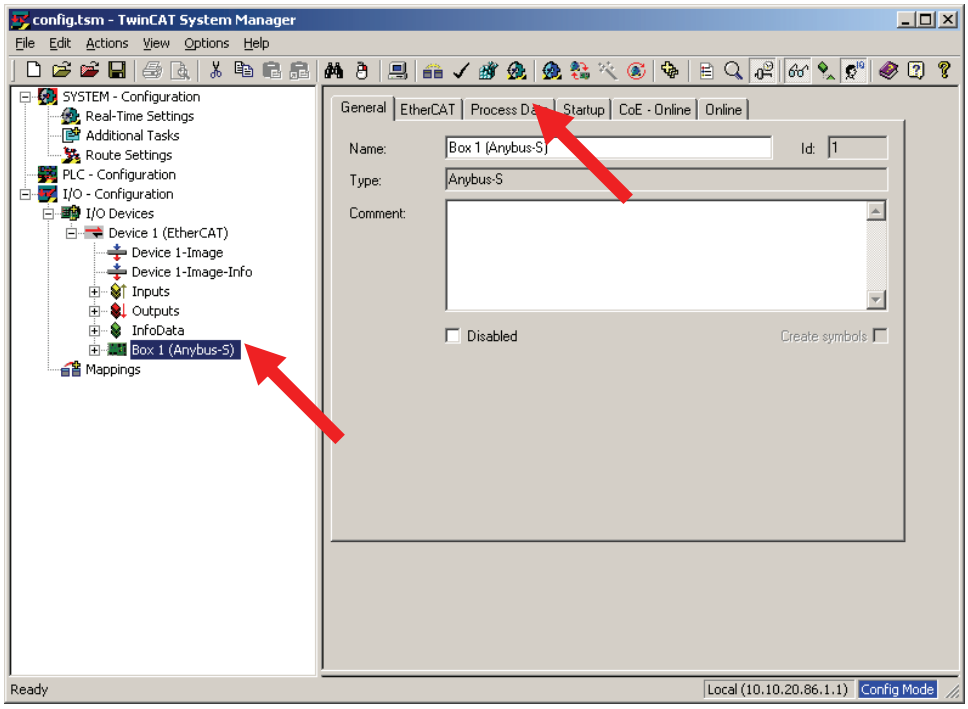


Figure 9 Configuring the process data

As we can see in the window below, the TwinCAT software does not know how much I/O data the Anybus-S has been configured for. Both input and output sizes are set to default zero. Press “Load PDO info from device”. (This may take a minute). The program now loads the I/O configuration from the module, see chapter 5, Anybus configuration, for configuring the Anybus module.

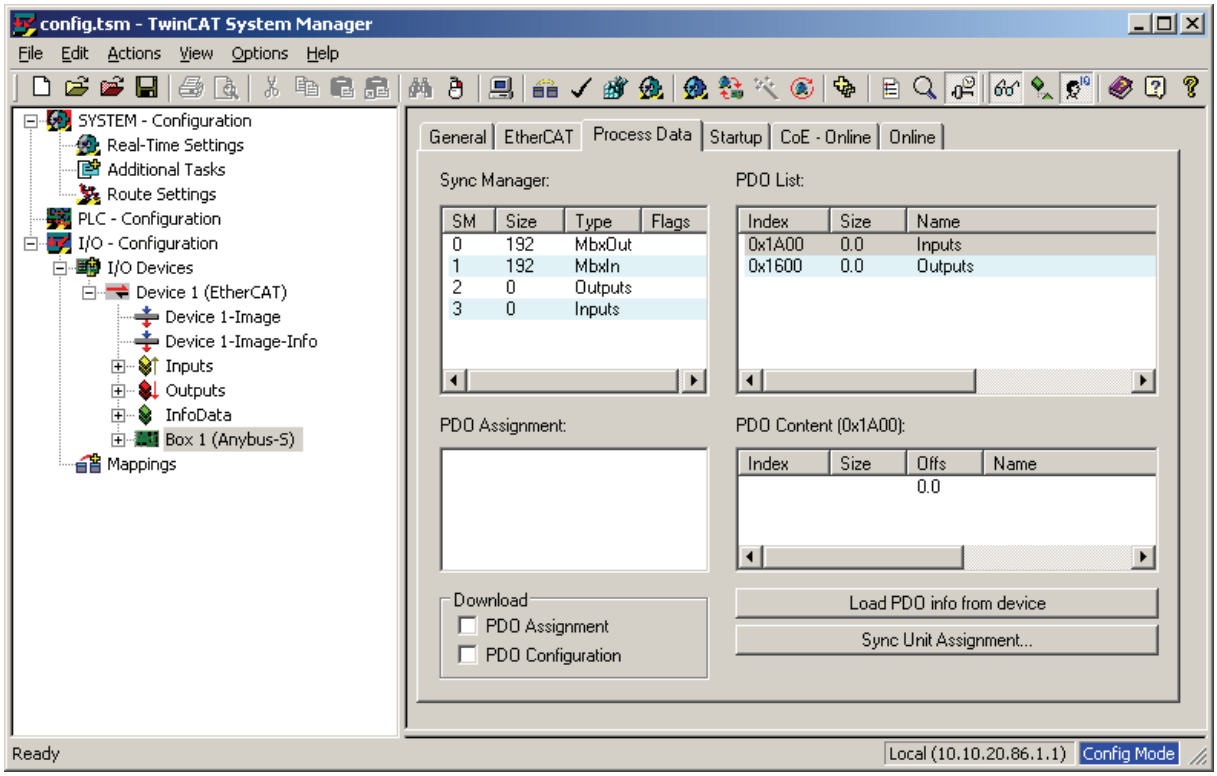


Figure 10 Viewing the Input and Output I/O data before loading the PDO info from the device.

4. Loading the PDO info from device:

After pressing the “Load PDO info from device” button the screen will look like below.

Note: The sizes for the MbxOut and MbxIn does not need to be changed. The size indicates the number of bytes used for the command accessing the data and not the size of the parameter data itself.

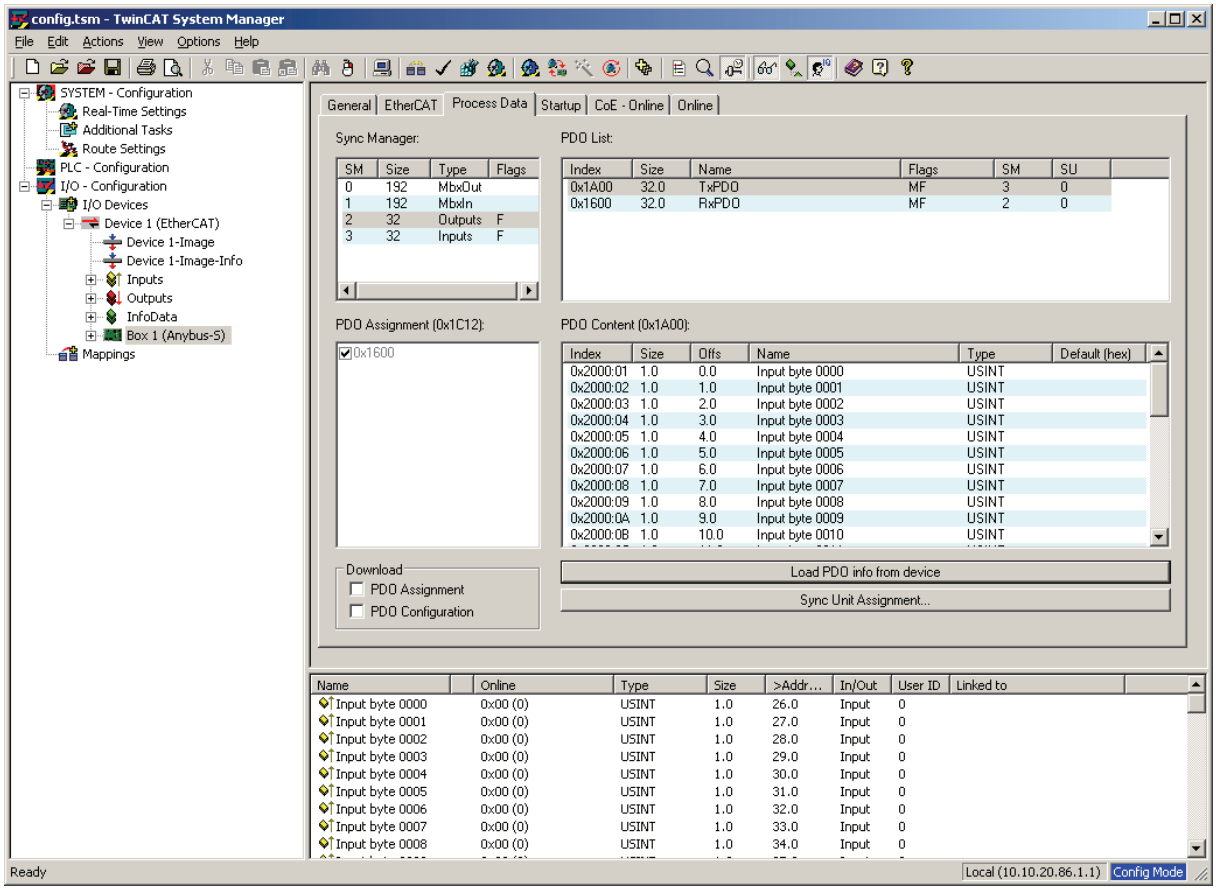


Figure 11 Viewing the Input and Output I/O data.

5. Reloading I/O devices:

To use the new configuration, press “Reload I/O Devices” as shown below.

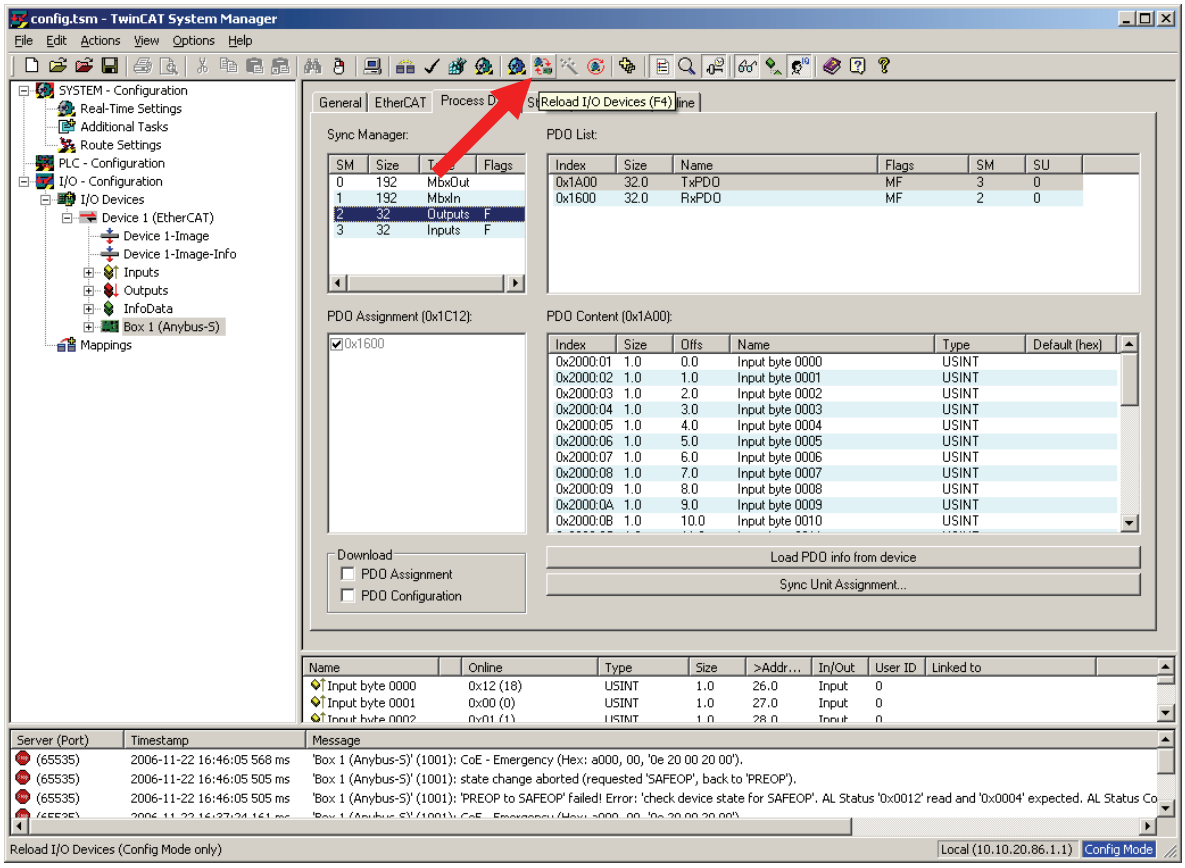


Figure 12 Reloading the I/O devices.

Select “**Yes**” when asked if you wish to activate free run and go into Operational mode.

Figure 13 The Activate Free Run Dialogue.

TwinCAT is now running and I/O data to and from the Anybus-S can be manually monitored. See chapter 6 Testing.

5. Anybus configuration

The Anybus product has to be configured for the same I/O sizes as set up in the EtherCAT master configuration. The configuration procedure is depending on the type of module. See the sections below.

The I/O size is depending on the application, the configured I/O size in this case, 20 bytes, is just an example.

Note for the Anybus Slave Interface:

The Anybus Slave Interface is configured by mailbox commands. The maximum data exchange is 2048 bytes in each direction. Refer to the Anybus-S Fieldbus Appendix for details.

Note for the Anybus Communicator and the X-gateway:

The configuration of the Anybus Communicator and X-gateway is described in a separate sections below. The maximum data exchange is 512 bytes in each direction. For a more detailed description see the Communicator User Manual and X-gateway Addendum.

5.1. Communicator configuration

To configure the Communicator start the ABC Config Tool and start a new project. Select the fieldbus EtherCAT and IO size Automatic.

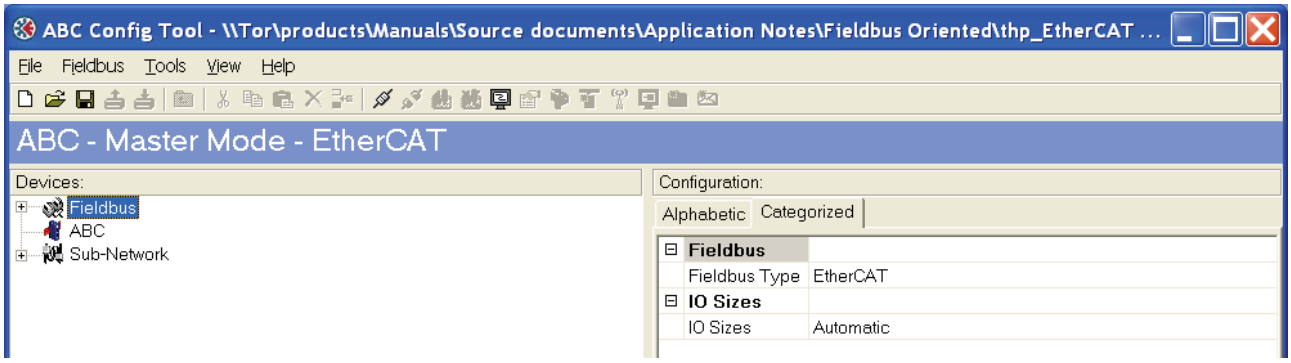


Figure 14 Configuring the Fieldbus.

Note: *Using the Automatic setting for the IO size, the amount of data configured for the fieldbus is depending on the sub-network configuration. The fieldbus I/O data will in that case be of the same size as configured for the sub-network.*

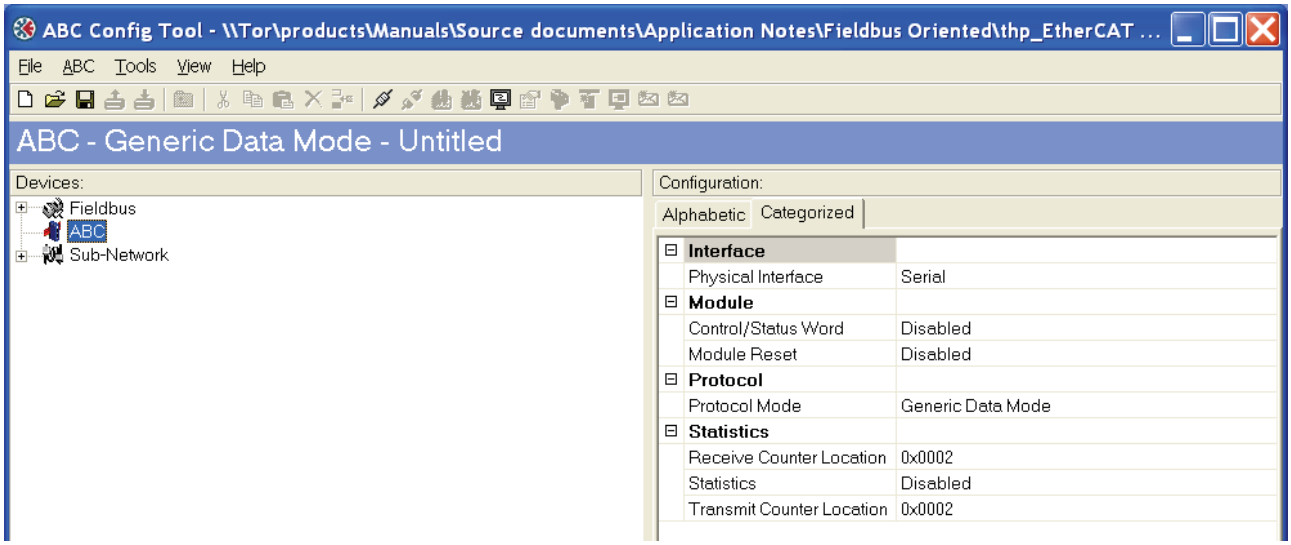


Figure 15 Configuring the Communicator.

The next step is to configure the sub-network. The configuration is depending on the application, in other words what nodes are connected. In this case a loop back dongle at the serial connection of the Communicator is connected. Therefore a test configuration is used to loop data. For this purpose the generic data mode is selected; all other values are left at their defaults.

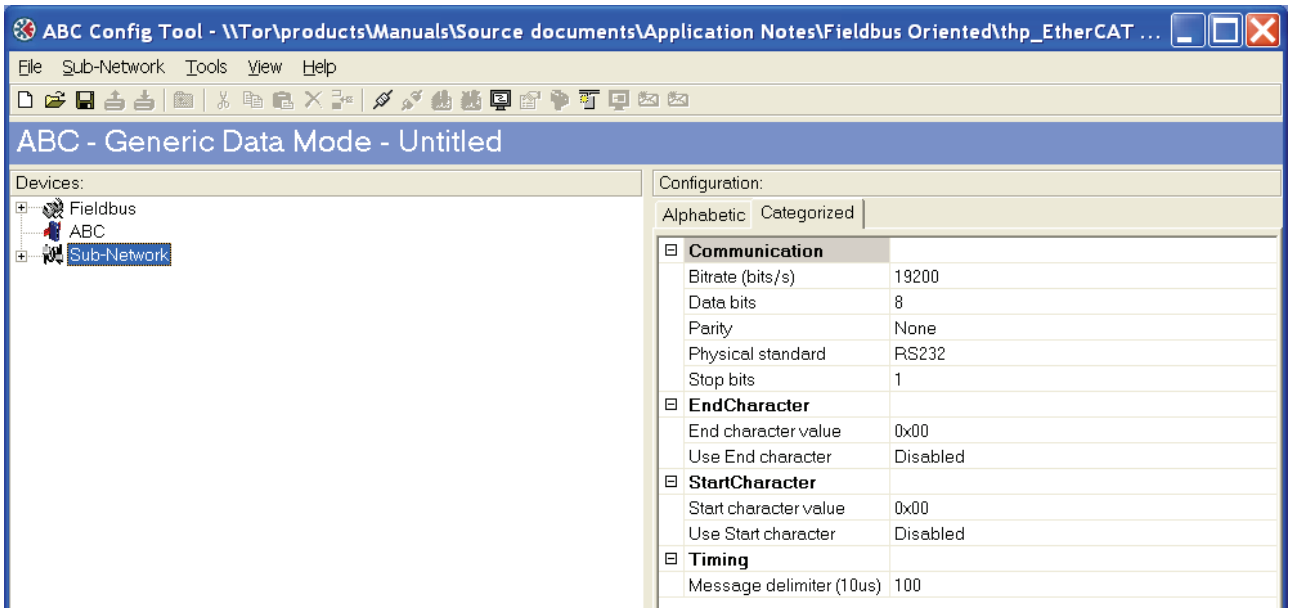


Figure 16 Configuring the sub network.

Right click on new node and add a consume and a produce transaction as shown below

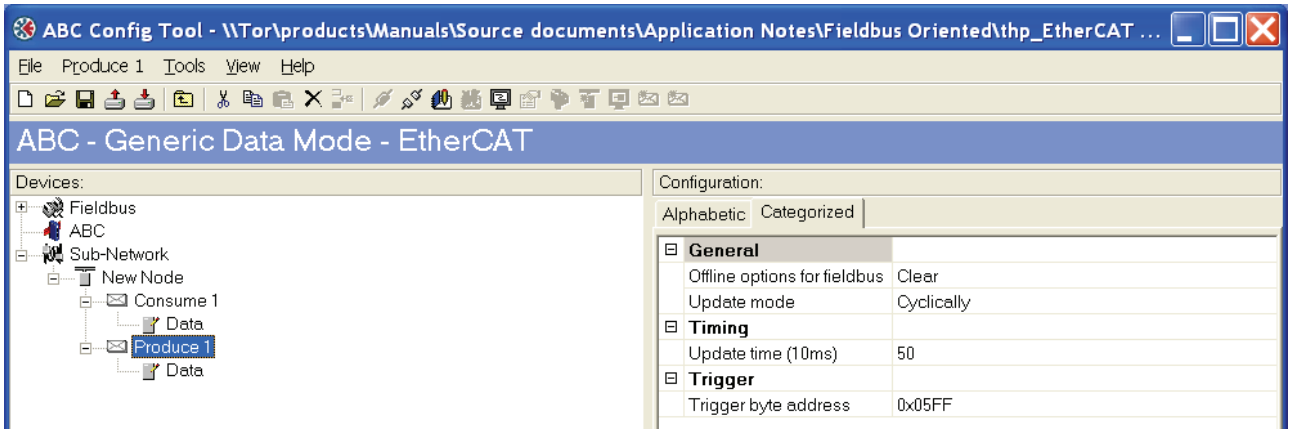


Figure 17 Configuring the Produce data.

Change the Update time to 500ms and leave the settings for the Consume transaction at the defaults. Right click on the produce and consume transaction respectively and select add data. In this case 20 bytes of data is used.

***Note:** The update time for the produce transaction is to be set to less than the offline timeout time for the consume transaction; in this case the update time is set to 500ms and the offline timeout time to 1000ms.*

For a more detailed description see the Communicator User Manual.

5.2. X-gateway configuration

Use the HyperTerminal on a PC and configure the X-gateway. Connect a serial cable between the PC and the config port on the X-gateway. Start the HyperTerminal and open the "File" menu and click on new, choose the desired COM port and then click on OK. The following window will appear.

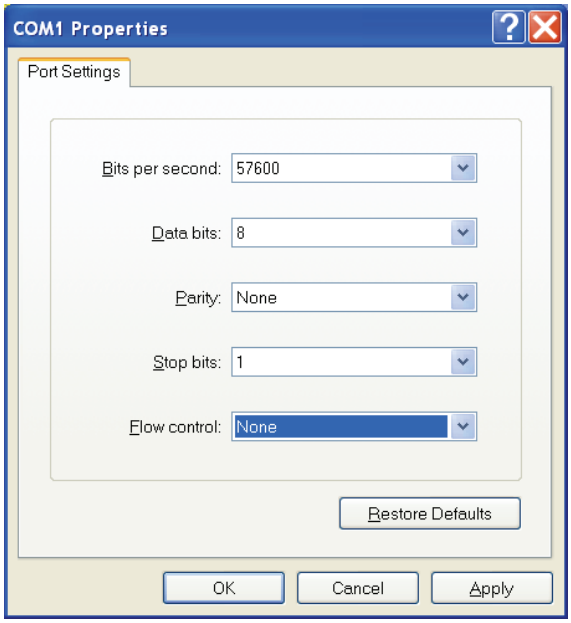


Figure 18 Configuring the connection in the HyperTerminal.

Make sure the settings are identical to those shown in the window above. Alternatively download a HyperTerminal session file from the HMS website[3], double click on it and select COM port.

[3] www.anybus.com

Connect and press ESC and the following menu will appear.

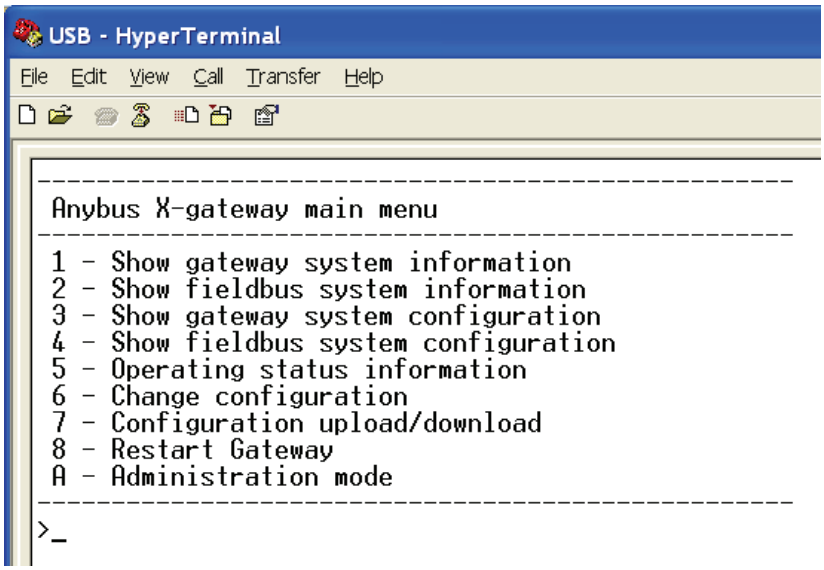


Figure 19 Anybus X-gateway Main menu.

Press 6 and enter the desired configuration.

The figure below shows an example; in this case an EtherCAT to Profibus X-gateway is used and 20 bytes of I/O data is configured.

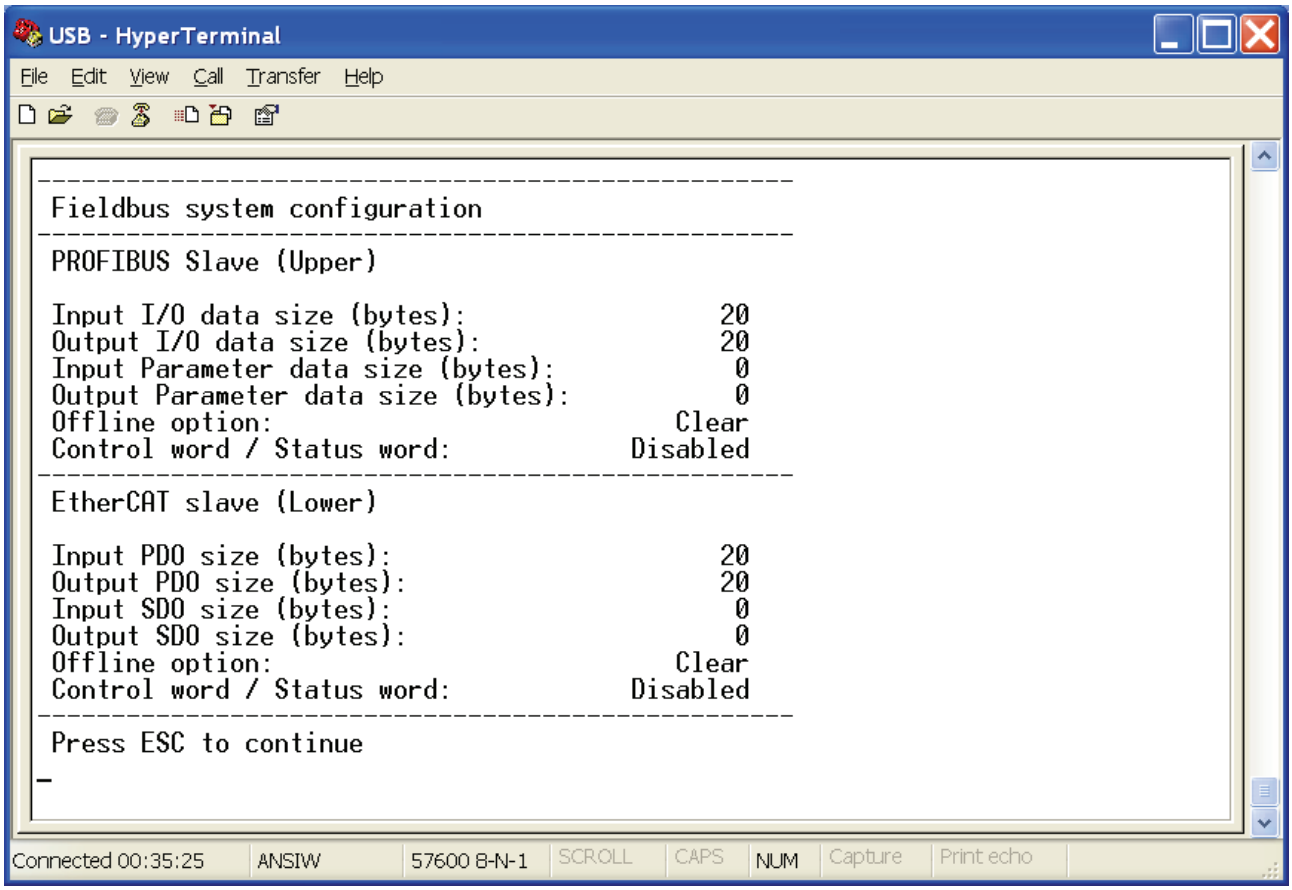


Figure 20 The X-gateway configuration.

6. Testing

The testing of the network can be done after finishing the configuration. In this case the Anybus Communicator with a loop dongle at the sub-network connector is used for test purpose.

Open the RxPDO and mark the Output byte 0000. Then open the “Online” tab to manually modify the I/O data as indicated in the window below.

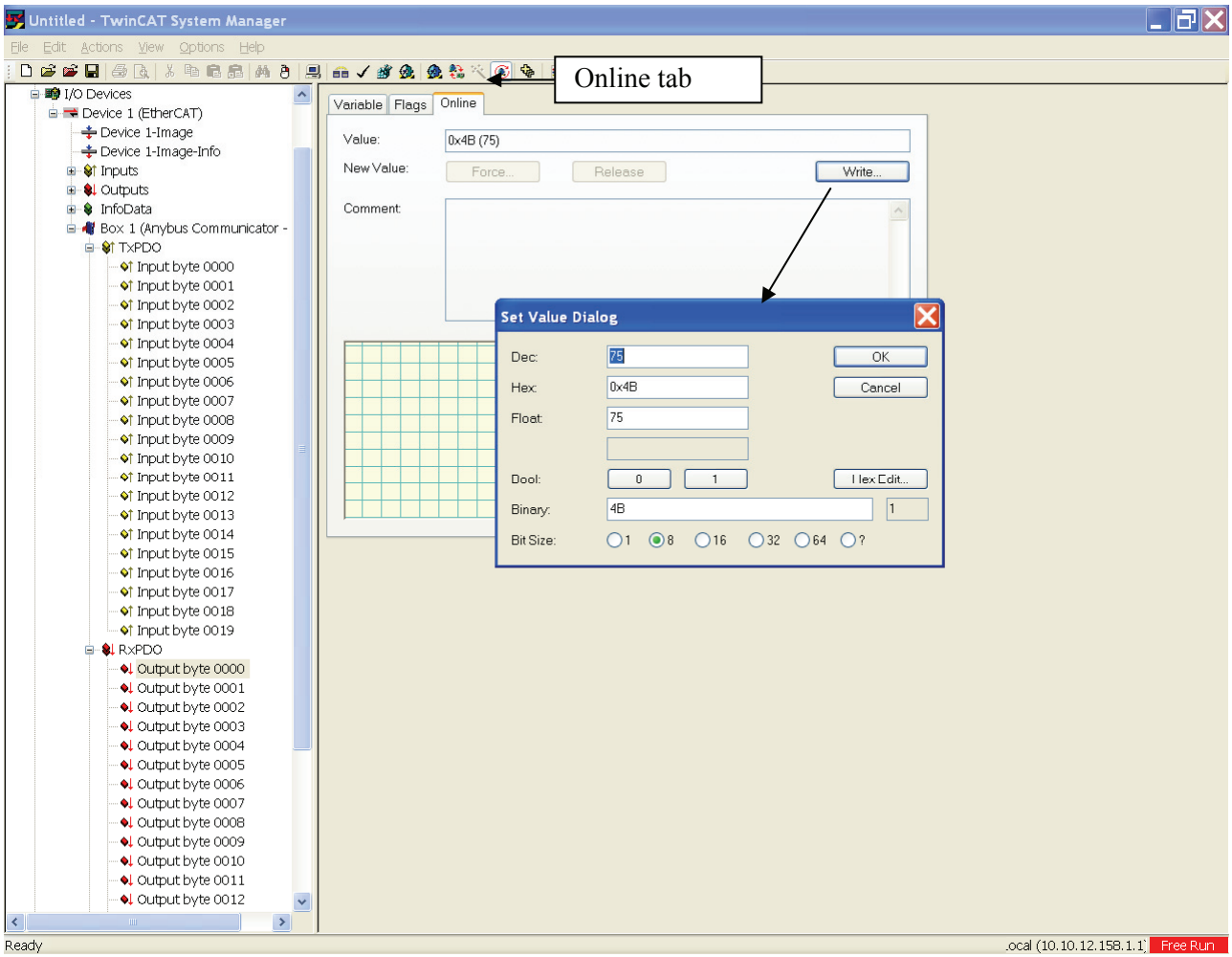


Figure 21 Editing the Output byte.

Click on write to modify the Output data. In this test the value 75 is written to the Output byte 0000. The corresponding Input will then be seen as shown below.

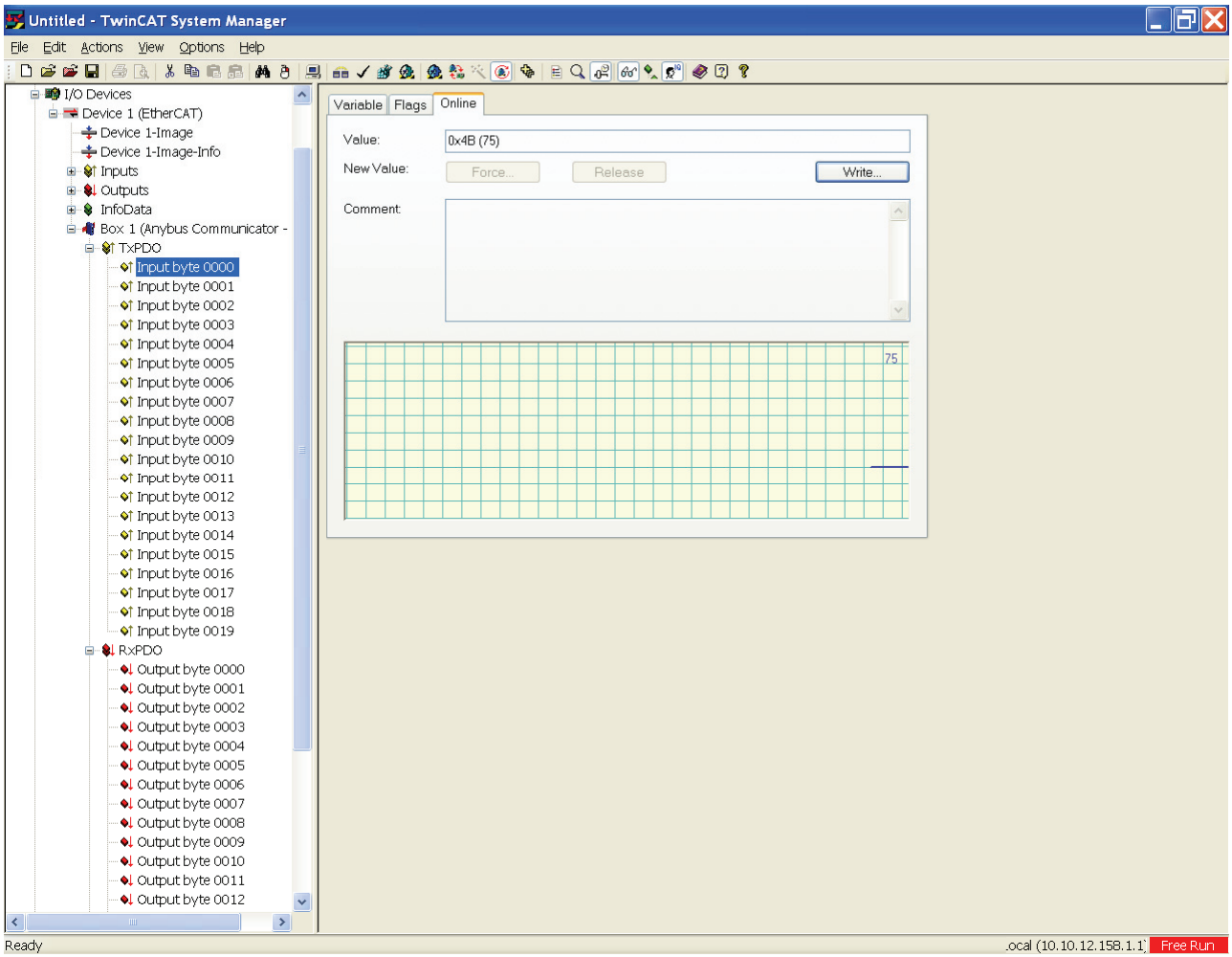


Figure 22 Monitoring the Input byte 0000.

The Input can be seen as above.