HMS

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Rev 2.03

How to configure an Anybus ControlNet Adapter/Slave module with RSNetWorx for ControlNet.

Anybus®

More information about the network and products

For further information about the Anybus products, please consult the HMS webpage, www.anybus.com. The latest manuals, EDS-files etcetera can be downloaded from that location.

The ControlNet user organisation has a webpage on the Internet, www.controlnet.org. Several technical guides are available in or via this page.

For information concerning the PLC and ControlNet canner refer to the Rockwell Automation Allen-Bradley webpage www.ab.com.

History

Revision	Date	Description	Responsible
0.10	2003-04-16	Document created	Joakim Wiberg
0.20	2003-07-30	Updated layout	Joakim Wiberg
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Contents

1. Applicable Anybus products

Description	Name / Type
Anybus X-gateway	ControlNet
Anybus Communicator	ControlNet
Anybus-S Slave	ControlNet

Note. The configuration of the Anybus X-gateway and the Anybus Communicator is described in this document. In the case with the remaining Anybus products this document is applicable, but the configuration is depending on the type of application.

2. Requirements

Description	Name / Type	*Version*
Rockwell PLC	Allen Bradley ControlLogix 5000 with 1756-CNB ControlNet Scanner card,	n.a.
Rockwell communication software	RSNetWorx for ControlNet	8.00.00
PLC software	RSLogix 5000	13.04.00
EDS-file for the Anybus-S ControlNet interface and the Anybus X-gateway ControlNet adapter	83-7278-EDS_ABS_CNT_V_1_7.eds	1.7
EDS file for the Anybus Communicator ControlNet	111-2644-abc-cnt.eds	1.0
X-gateway Network Interface Addendum	Anybus X-gateway ControlNet Adapter Interface, Network Interface Addendum	1.00
X-gateway User Manual	X-gateway Generic , User Manual	1.10
Communicator User Manual	Anybus Communicator for ControlNet, User Manual	2.53
Adapter Fieldbus Appendix	Anybus-S ControlNet, Fieldbus Appendix	2.00
Power supply 24VDC	n.a.	n.a
Configuration cables	n.a.	n.a.
Null modem cable (Supplied with the Anybus X-gateway)	n.a.	n.a.

Note: The EDS files can be downloaded at the website www.anybus.com.

3.   Solution overview

This application note describes how to configure an Anybus product with a Rockwell PLC using RSLogix 5000 and RSNetWorx for ControlNet. 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 several steps.

1.   At first the configuration of the PLC and the Scanners I/O list are explained.

2.   Secondly the scheduling on the network is described.

3.   Finally the configuration of the Anybus module is explained.

Note: This document is valid for all Anybus ControlNet slave/adapter products, however sections written in *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, ControlNet networks and Anybus Communicator and X-gateway.
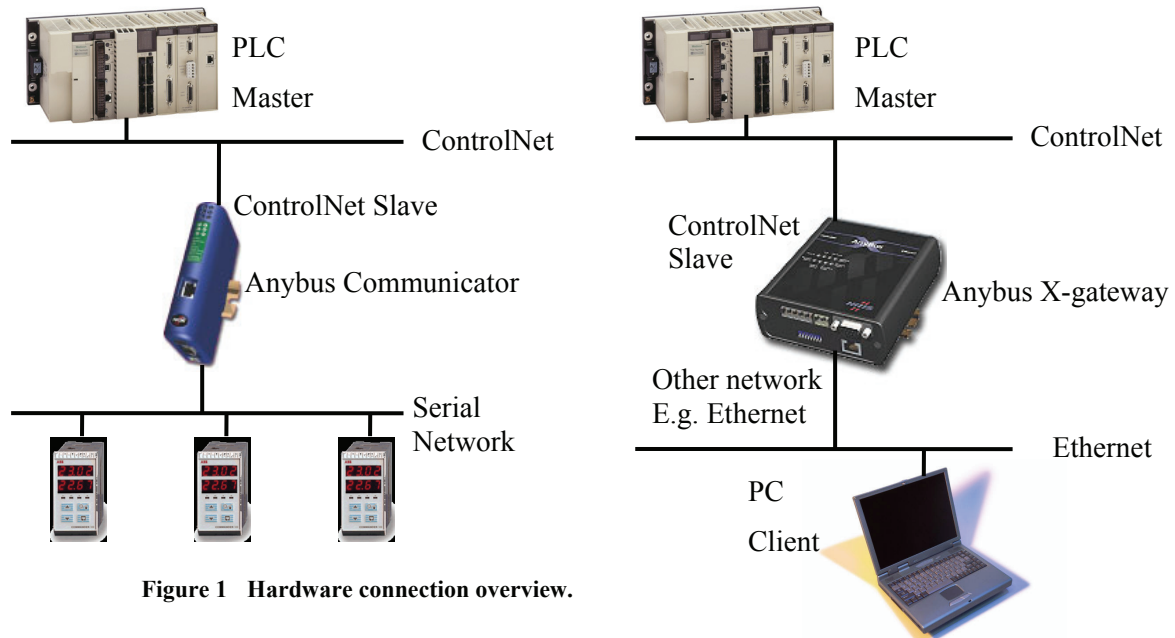

Figure 1   Hardware connection overview.

3.1.   Hardware Settings

The MAC ID of the Anybus and the scanner module has to be configured. In this case the scanner is configured for node ID 1 and the Anybus module for node ID 9, see the notes below.

Note for the Anybus X-gateway and Communicator:
The switches will be found next to the power connection on the X-gateway and next to the indication LEDs on the Communicator. Rotary switches 1-2 set the MAC ID. For further instructions see the Anybus Communicator User Manual and the X-gateway Manual Addendum.

Note for the Anybus-S Slave module:
For the Anybus-S Slave module for ControlNet the configuration is depending on the application. The MAC ID is set by the application process or by switches if mounted. See the Fieldbus Appendix for details.

Note for the scanner module:
The scanner module used by the PLC can be configured by the RSNetWorx for ControlNet software. When configuring the network double click on the scanner module in the network and select the desired node ID, see the Figure 19 Browsing the network.

4. ControlNet configuration

4.1. Configuring the PLC using RSLogix 5000

This chapter describes adding the Anybus-S Slave module to the configuration in the PLC, the Anybus-S Slave module will appear as a sub-device to the ControlNet scanner.

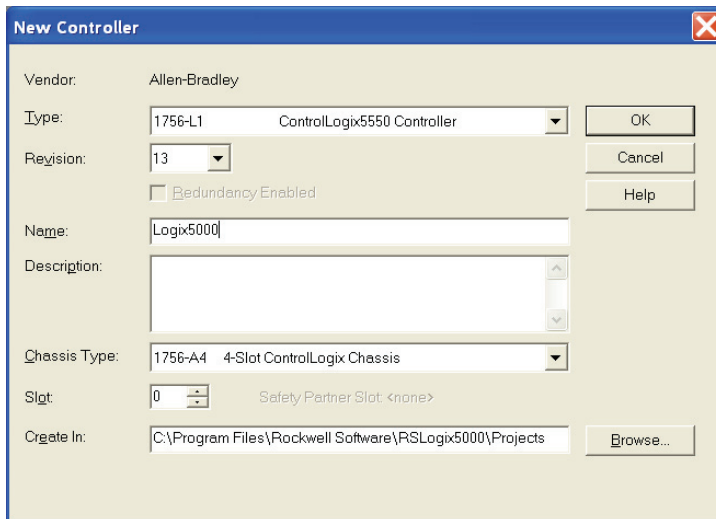Firstly, start the program and open the file menu. Select new and the following dialogue will appear.

Figure 2   Starting a new project.

Select the desired type of PLC and chassis. Give the project a name and press OK.

Start by right click the I/O configuration, and select "New Module".
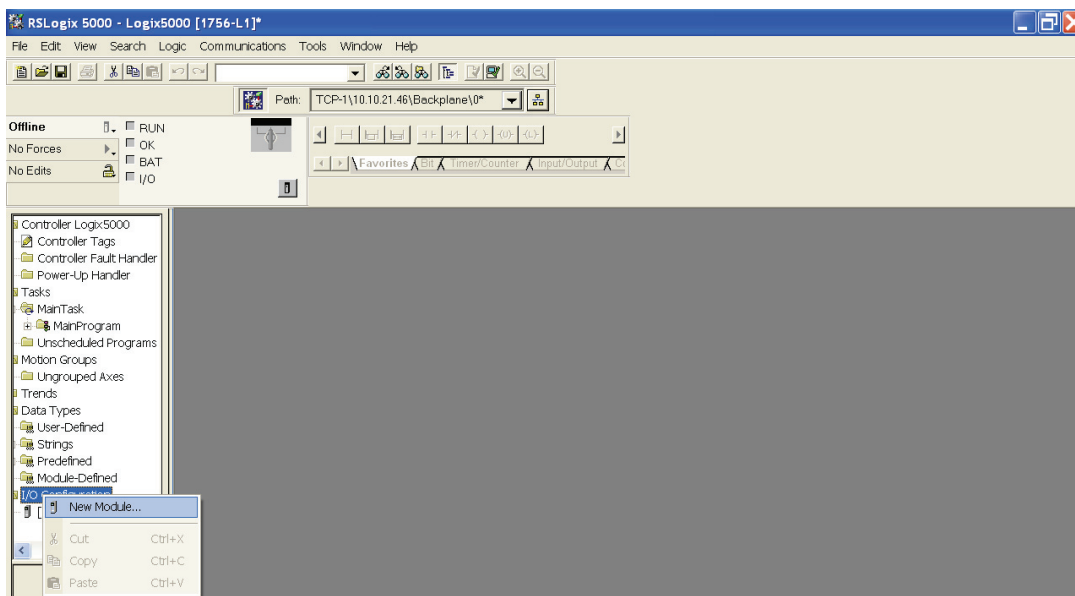
Figure 3   Adding the Anybus module.

Now a dialogue window will appear.

 Scroll down and select "1756 ControlNet Bridge" and press OK. This module is the scanner module in the PLC.
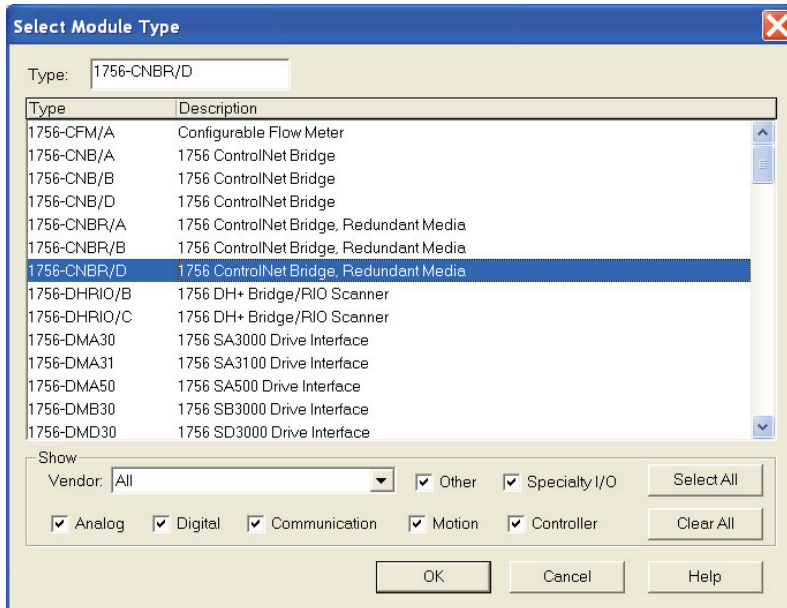

Figure 4   Adding the ControlNet scanner module.

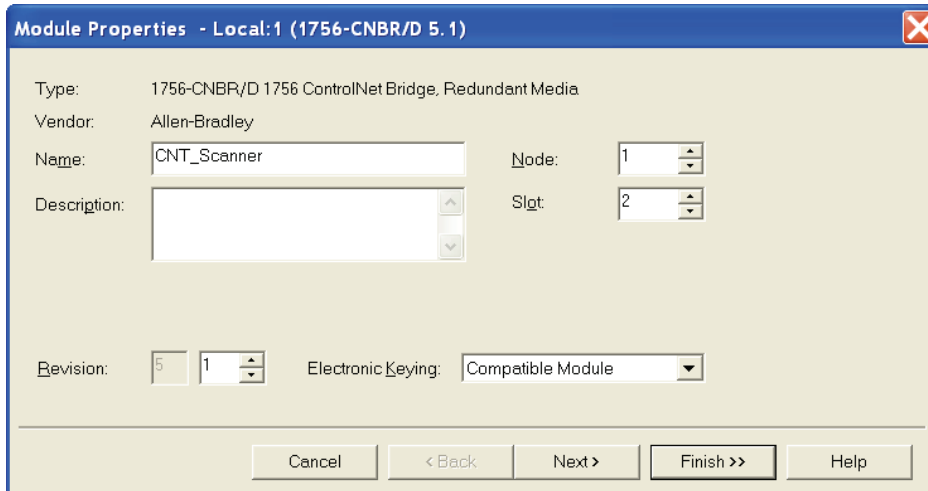Then enter a name for the module and select the node and slot number. Then press finish.

Figure 5   Configuring the scanner module.

It is also necessary to add the Anybus module. Right click on the ControlNet module and select New Module. In the following window scroll down and select "Generic ControlNet Module" and press OK.
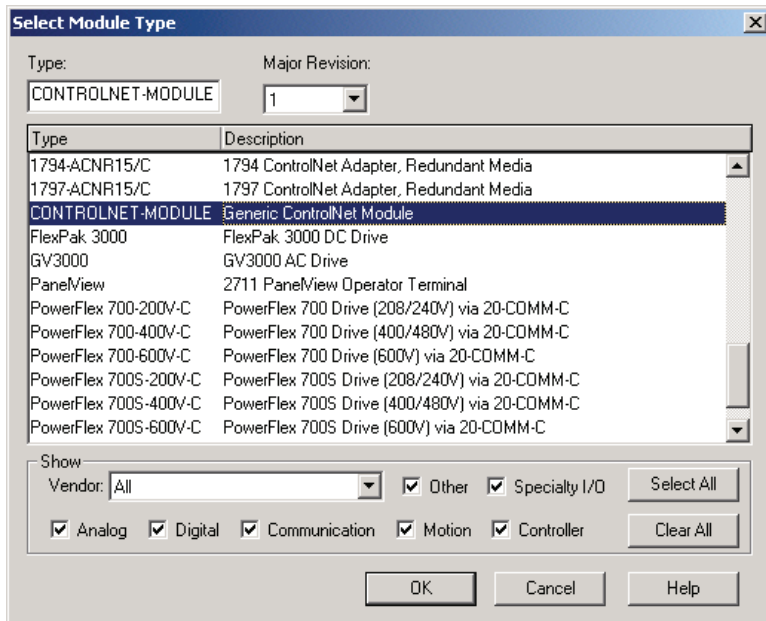

Figure 6   Selecting the Generic ControlNet Module.

In the next dialogue window, RSLogix 5000 will ask for information regarding the communication to the Anybus-S Slave module. First enter a name for the Anybus-S Slave module❶. In the example below we call it "ANYBUS". This name will create a tag in RSLogix 5000, which can be used to access the memory location in the PLCs memory where the data for the Anybus-S Slave module will be stored. A description can also be added, but that is optional.
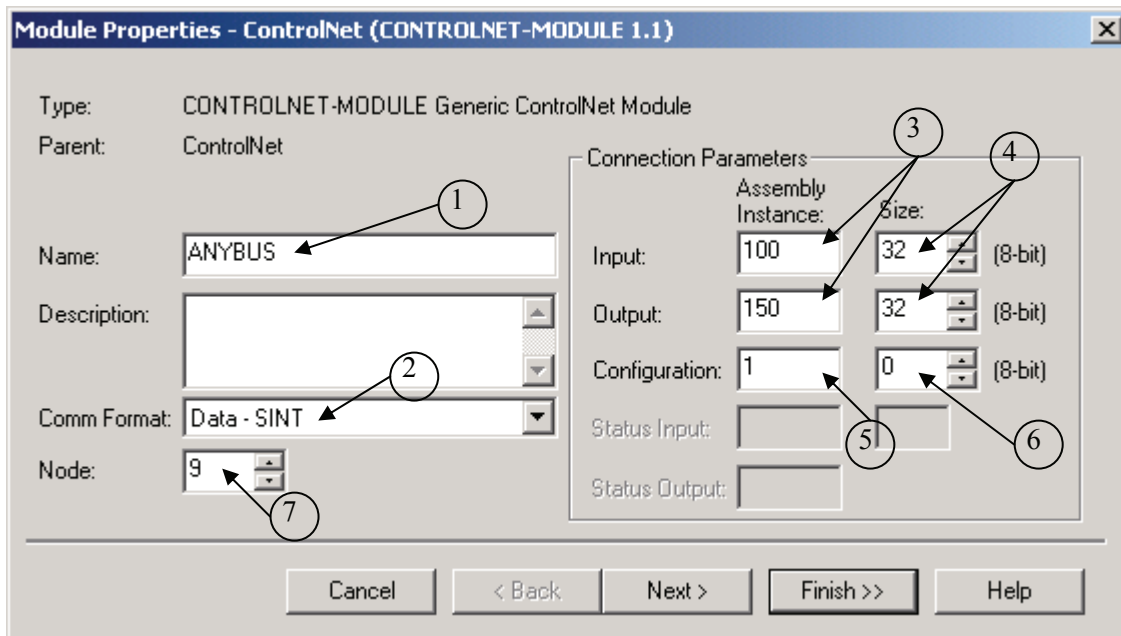

Figure 7   Configuring the Generic Data Module properties.

Next step is to select the "Comm Format", which tells RSLogix5000 the format of the data❷. In our example, we have selected Data-SINT, which will represent the data in the Anybus-S Slave module as a field of 8-bit values. It is also possible to select Data-INT, which will represent the data as 16-bit values, and Data-DINT, which will represent it as 32 bit values.

I/O data is accessed in input instance 100 and output instance 150, so these values have to be entered as the instance values for input and output❸. The size of the input connection and the output connection shall correspond to the size that we configure the Anybus-S Slave module for. In our case we are using 32 bytes of input and output data including the run/idle Header, see the note below, so that is the size that we enter❹. 32 in this case stands for 32 instances of 8 bits. If we had been using Data-INT or Data-DINT, we would have to recalculate the size to match the data type, so Data-INT would have been 16 16-bit values, and Data-DINT would have been 8 32 bit-values.

Note: 4 bytes have to be added for the run/idle Header to the Input data size. The 4 bytes are added to the Input data by the Anybus module as the run/idle Header.

The Anybus module does not have a configuration assembly instance, but RSLogix 5000 requires a value for this anyway. An instance value of 0 is not a valid instance number, but any non-zero value will work, we have selected the value 1 in this case❺. The data size of the configuration instance has to be set to 0, otherwise the configuration instance will be accessed and the connection will be refused❻. There will always be a configuration tag of type AB:ANYBUS:C:0 created for this module, which has one member called Data, of type SINT[400]. This SINT[400] tag is created regardless of the configuration size, which can range from 0 to 400 bytes (SINTs). Since a data size of zero is specified, no data will be sent to the module.

Also set the node ID number to the value that has been assigned to the Anybus-S Slave module. It is set to 9 in this example❼. When we are finished here, press next.

In the next dialogue we will enter a value for the time between each scan of the module, called requested packet interval (RPI). In this example, we have changed the RPI from 5ms to 10ms. Make sure that "Inhibit Module" isn't checked. After this, press finish.
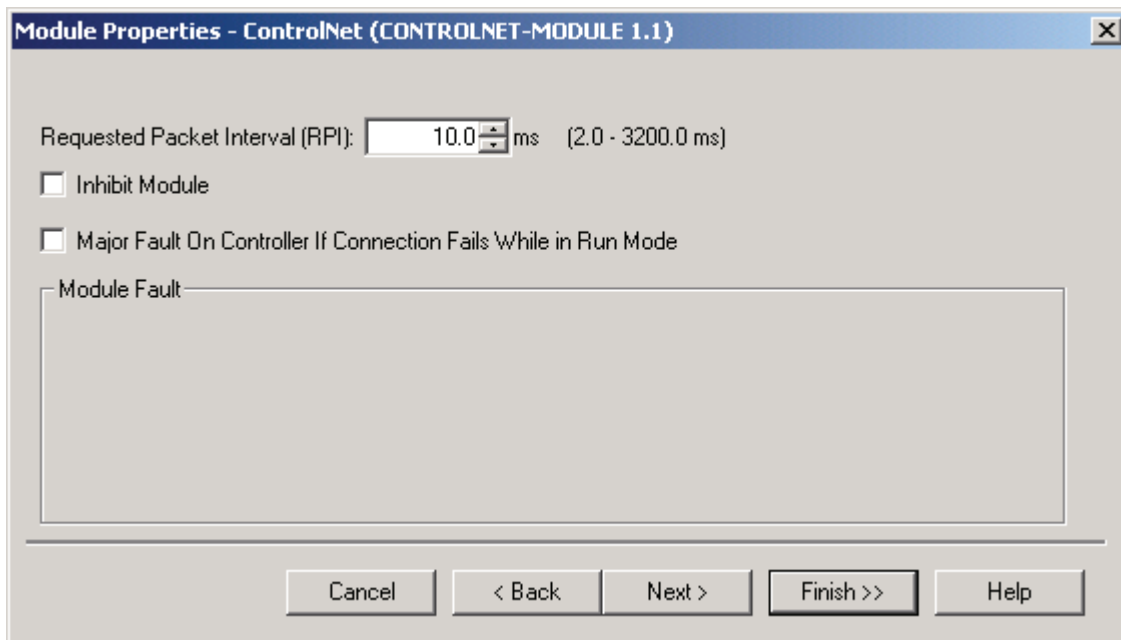

Figure 8   Configuring the Requested Packet Interval.

Now the Anybus-S Slave module has been added as a sub-device to the scanner in the I/O configuration. The main screen will now look like below.
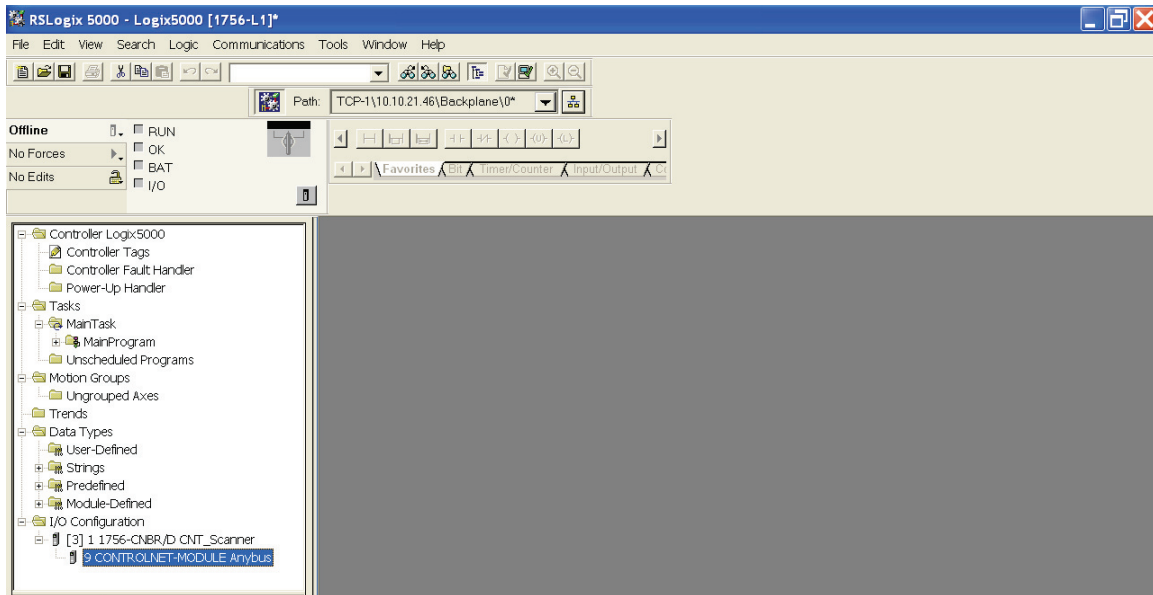

Figure 9   The main screen after adding the Anybus module.

Now we want to go online and download the configuration to the PLC. Begin with setting the communication path. Open the Communications menu and select Who Active.
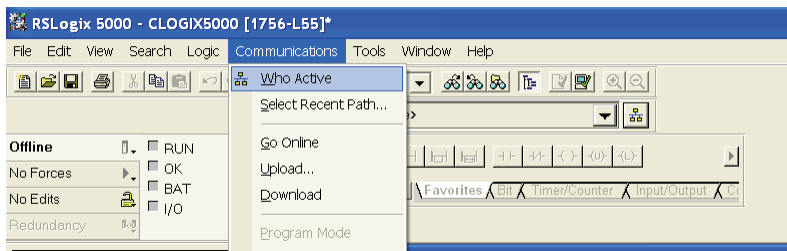

Figure 10 Opening the Communications menu.
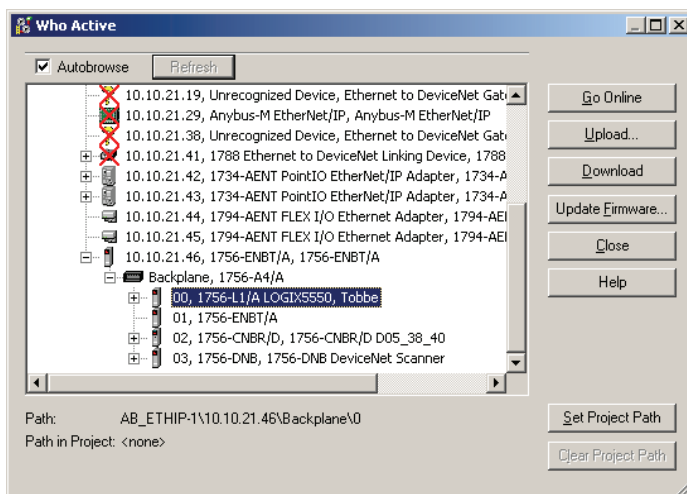
Select the desired communication path as shown below.

Figure 11 Selecting the desired communication path.

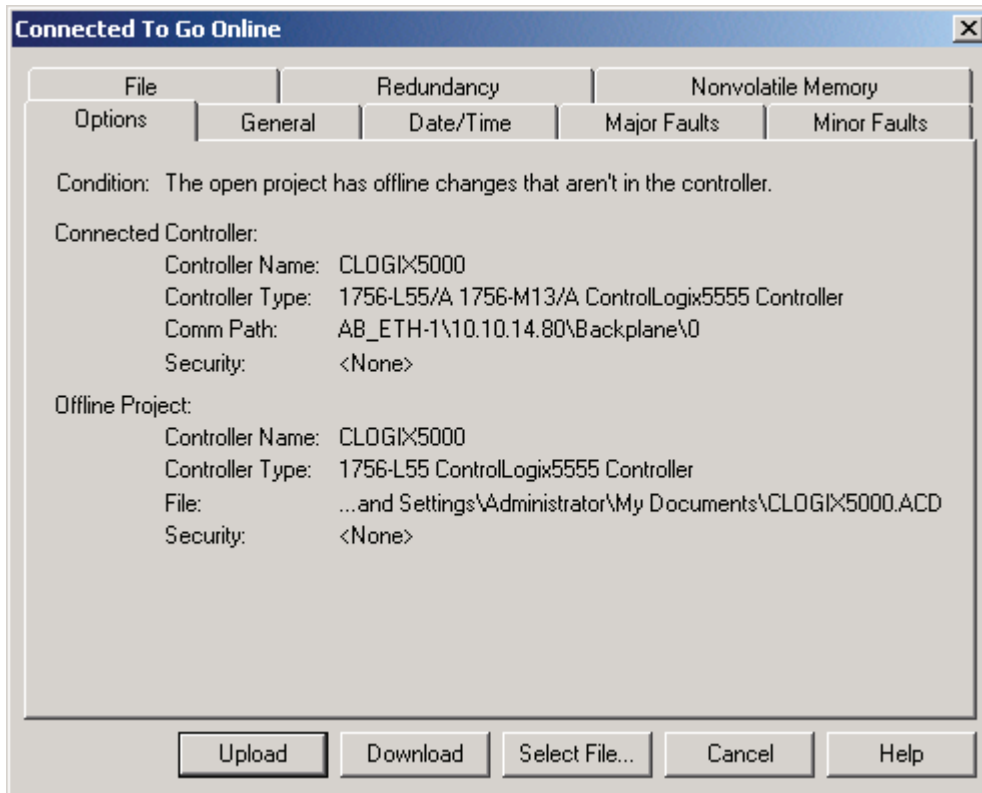Then Select Go Online in the Communications menu. A new window will now open, select download in this dialogue.

Figure 12 Online dialogue.

And in the next dialog, select download again. The configuration will now be downloaded to the PLC.
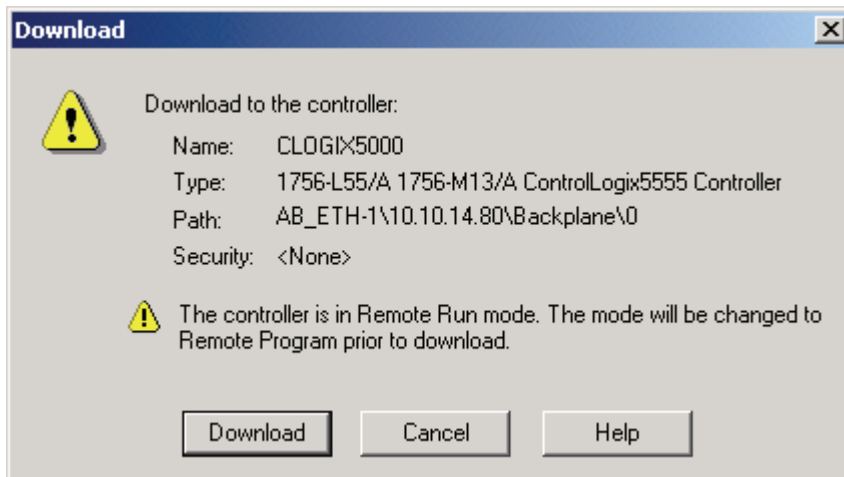

Figure 13 Downloading the configuration to the PLC.

When the configuration has been downloaded and we are online with the PLC, there shall be an error sign on the Anybus-S Slave module. This error sign is there since we have added the module to the PLC, but we have not configured the ControlNet scanner yet to communicate. The error could be seen by selecting the Anybus-S Slave module sub-node, and positioning the mouse pointer over the error code as shown below. Here the error is "Connection not scheduled", this is in order since we have not configured the scanner yet.
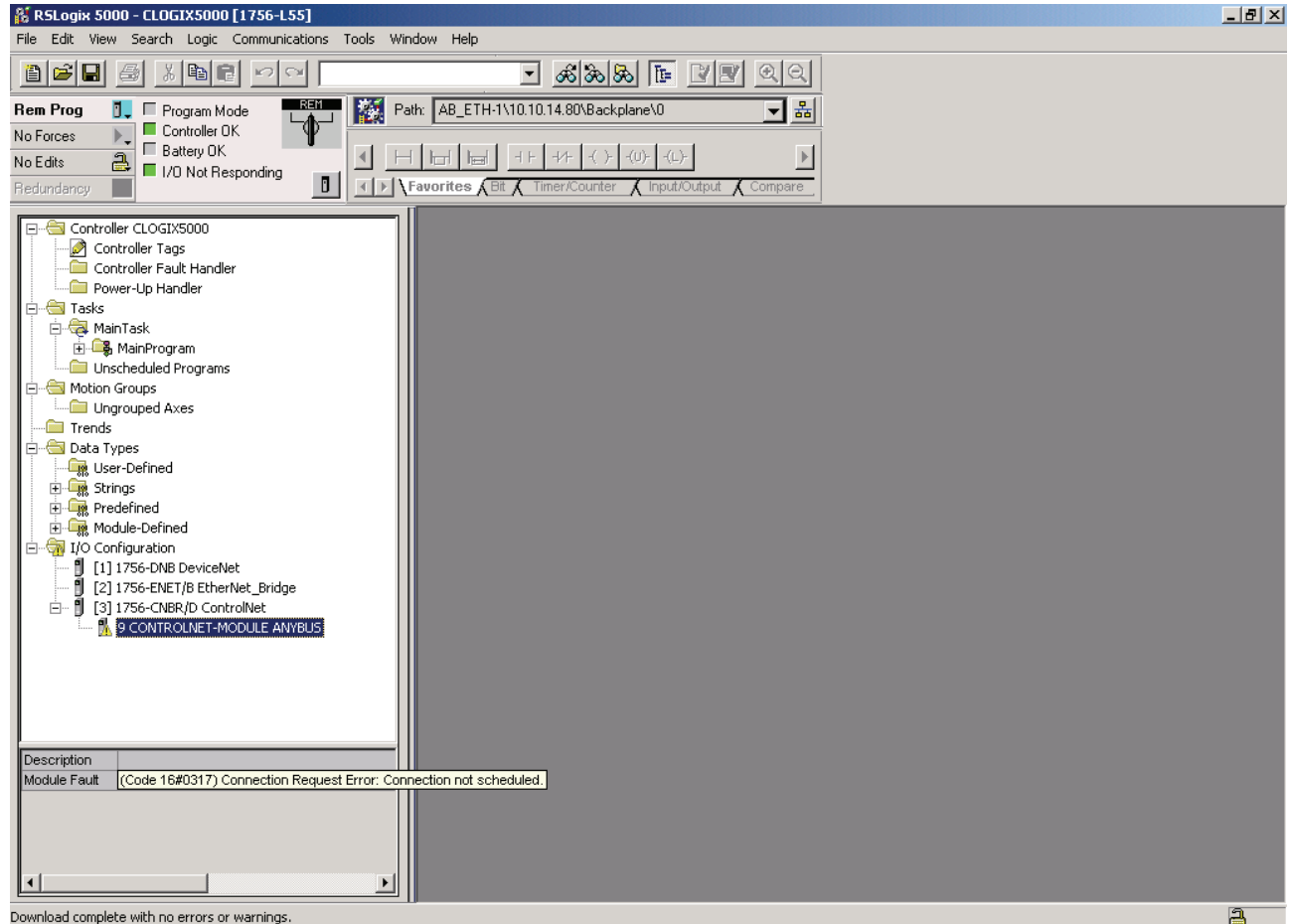

Figure 14 The main screen after adding the Anybus module.

4.2. Configuring the Scanner using RSNetWorx

RSNetWorx for ControlNet is the tool used to configure the ControlNet scanner. There are two ways to configure the network. It is possible to configure the network in offline or online mode. It is recommended to start with online mode and to manually complement with the modules not recognised by the RSNetWorx for ControlNet. Firstly the EDS file needs to be imported.

4.2.1. Importing the EDS file

Start the program RSNetWorx for ControlNet. Verify that the EDS file for the Anybus product has been installed. This can be done by browsing the library in the left window. If the Anybus EDS-file has not been installed click on the Tools menu and then on the EDS wizard to import the EDS file. The EDS file for the Anybus products can be downloaded at HMS website[1]. In the dialogue click on next and the following window will appear.
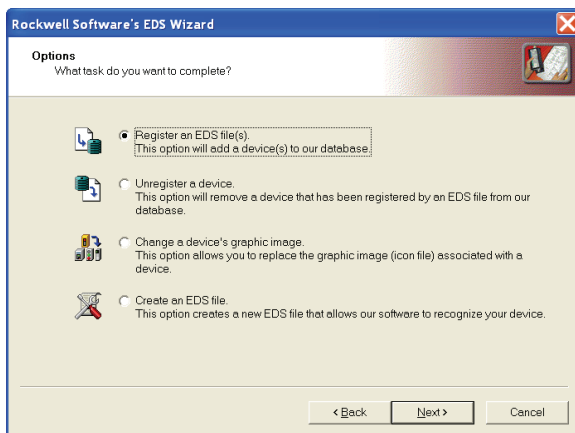

Figure 15 The EDS wizard.

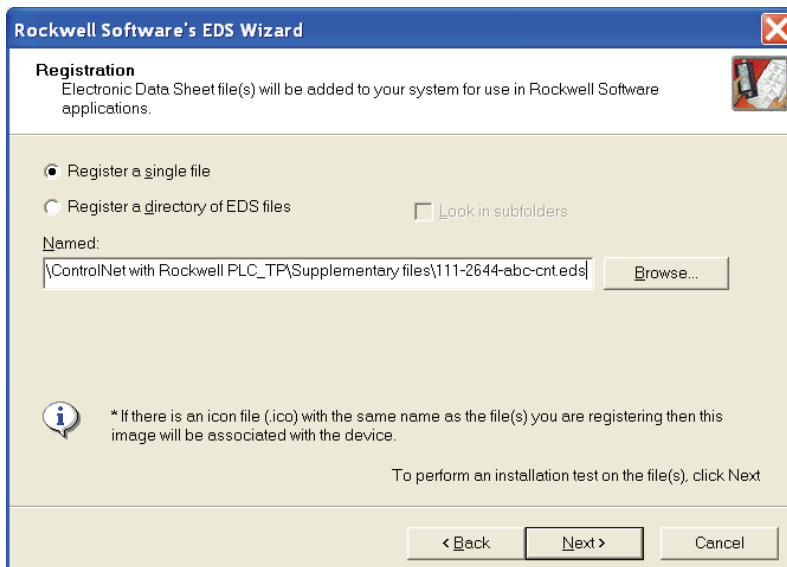Select register an EDS file and select next. Follow the dialogue as shown below.

Figure 16 Browsing the EDS file.

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[1] www.anybus.com

4.2.2. Online mode

To schedule the connection, start the RSNetWorx for ControlNet and select "Online" from the "Network" menu. This will open up a new window asking for the "path" to the ControlNet network.
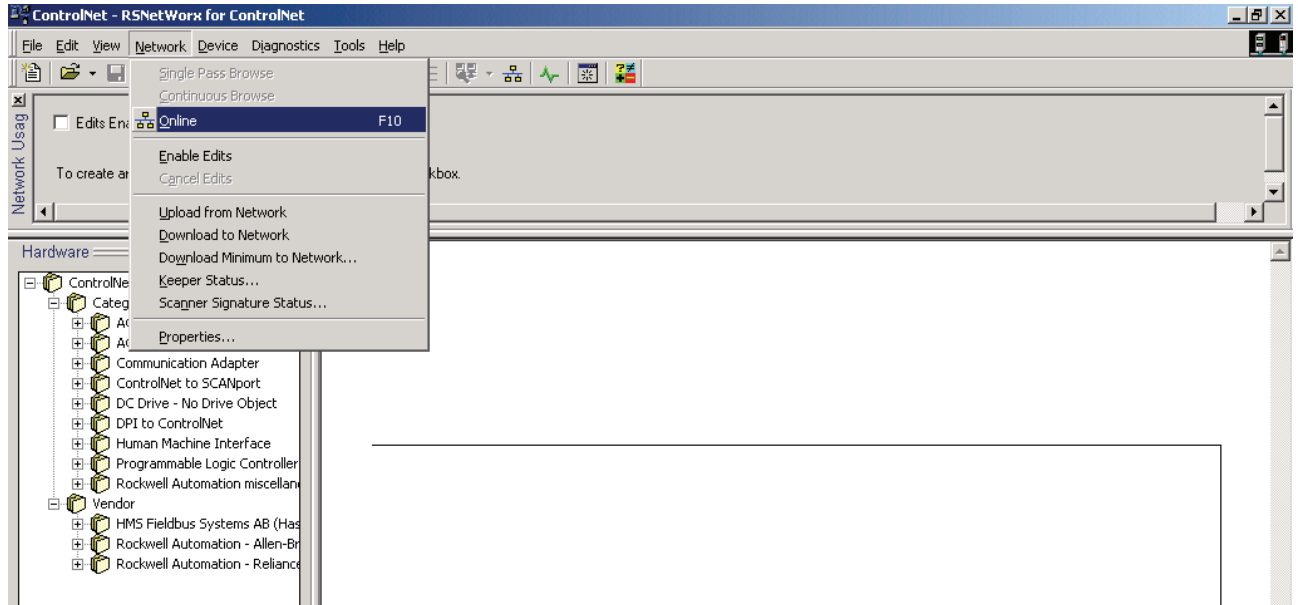

Figure 17 Going online in RSNetWorx.

Here the "path" has been selected using the AB_ETH-1 Ethernet driver. Select your path to your ControlNet network and click OK.
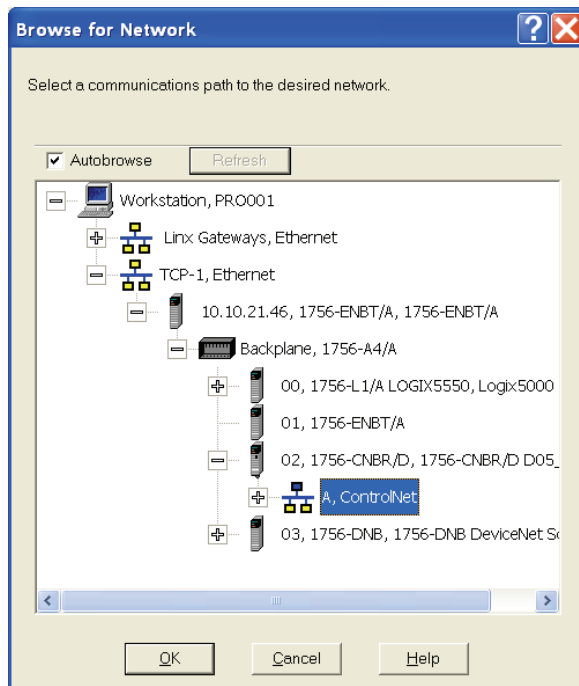

Figure 18 Selecting the path to the ControlNet module.

The network will now be "browsed" and all existing ControlNet modules will show up. Here we only have the Anybus-S Slave module and the PLC. All devices will show up with a black + sign on a green background. This means that the devices exist on the network configuration but not in the configuration file. This sign will disappear after the configuration is downloaded.
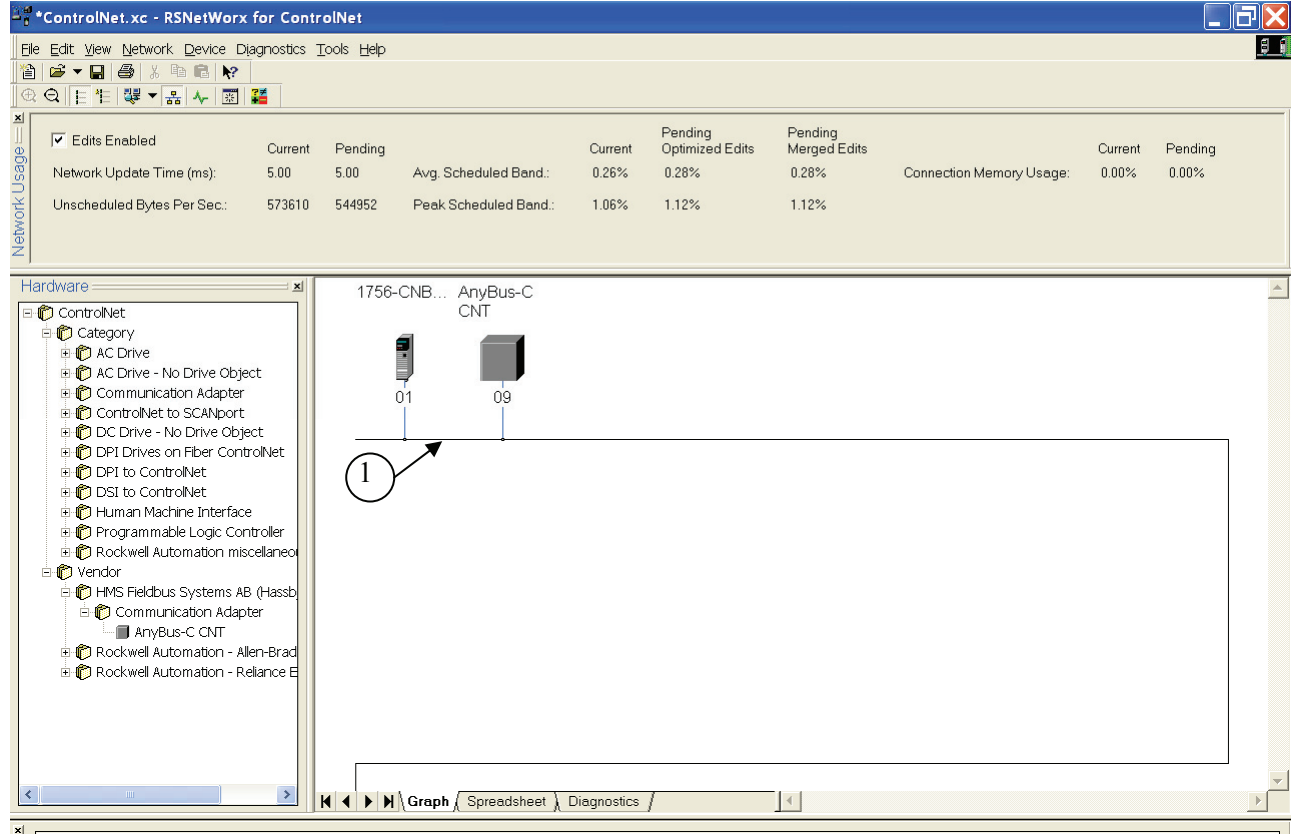

Figure 19 Browsing the network.

If necessary double click on the ControlNet network connection❶ to configure the settings of the network. As shown in the dialogue below it is possible to configure the network parameters, for example the update time, node addresses and channels.
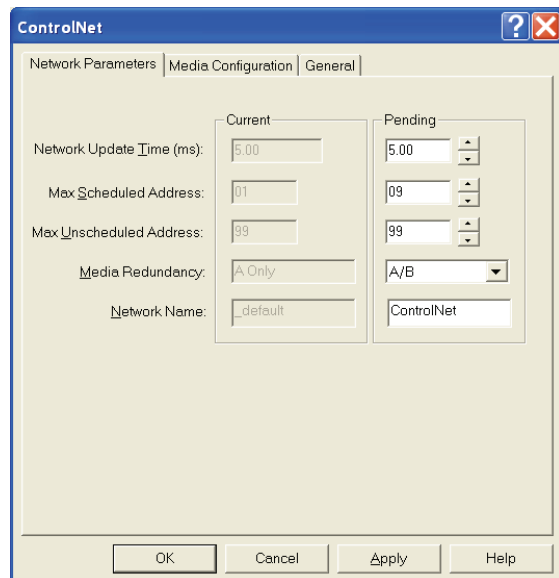

Figure 20 Configuring the network parameters.

4.2.3. Offline mode

The other way to configure the ControlNet network is in offline mode. For devices not included in the library of the RSNetWorx for ControlNet an EDS file has to be imported as described in the chapter 4.2.1 Importing the EDS file. If the module is not included in the library the unit will not be recognised by the program. Make sure the program is in offline mode. To build the network, as shown in Figure 19 showing the online network, use the navigation list to the left and use drag and drop.

4.2.4. Downloading the configuration

Now select "Edits Enabled"❶ as shown in Figure 22, this will show the window below. Click on OK, the offline configuration will now be downloaded to the keeper.
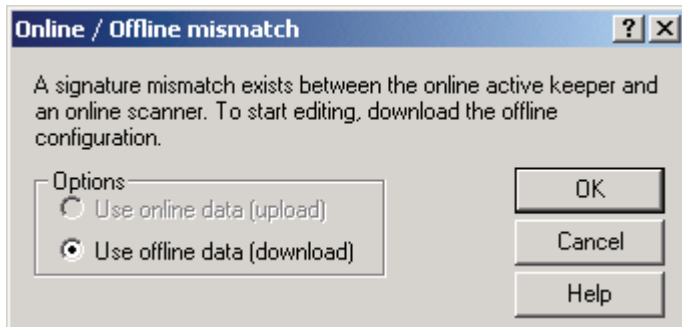

Figure 21 Downloading the offline configuration.
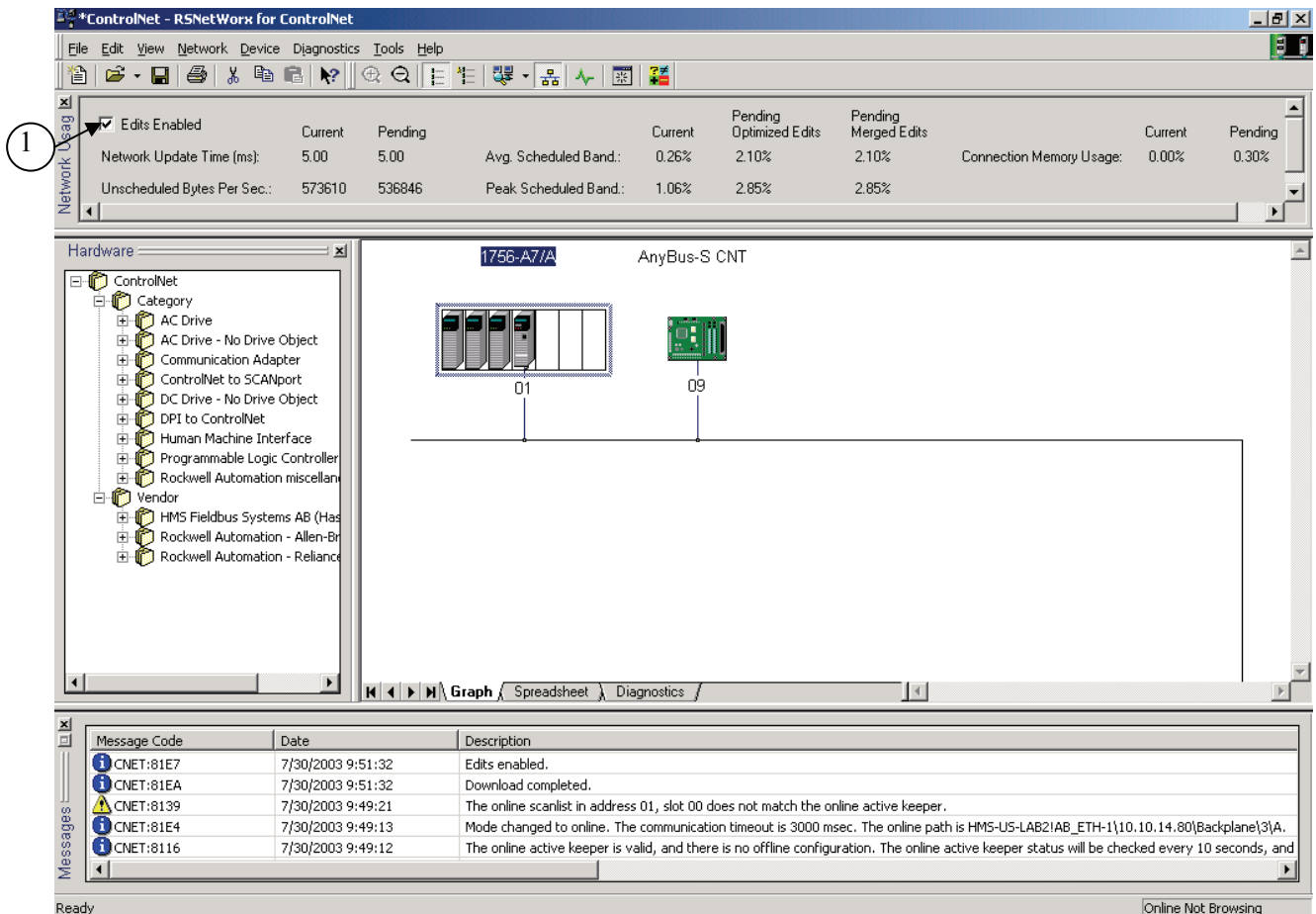
The black + signs will now disappear.

Figure 22 The network after complete configuration.

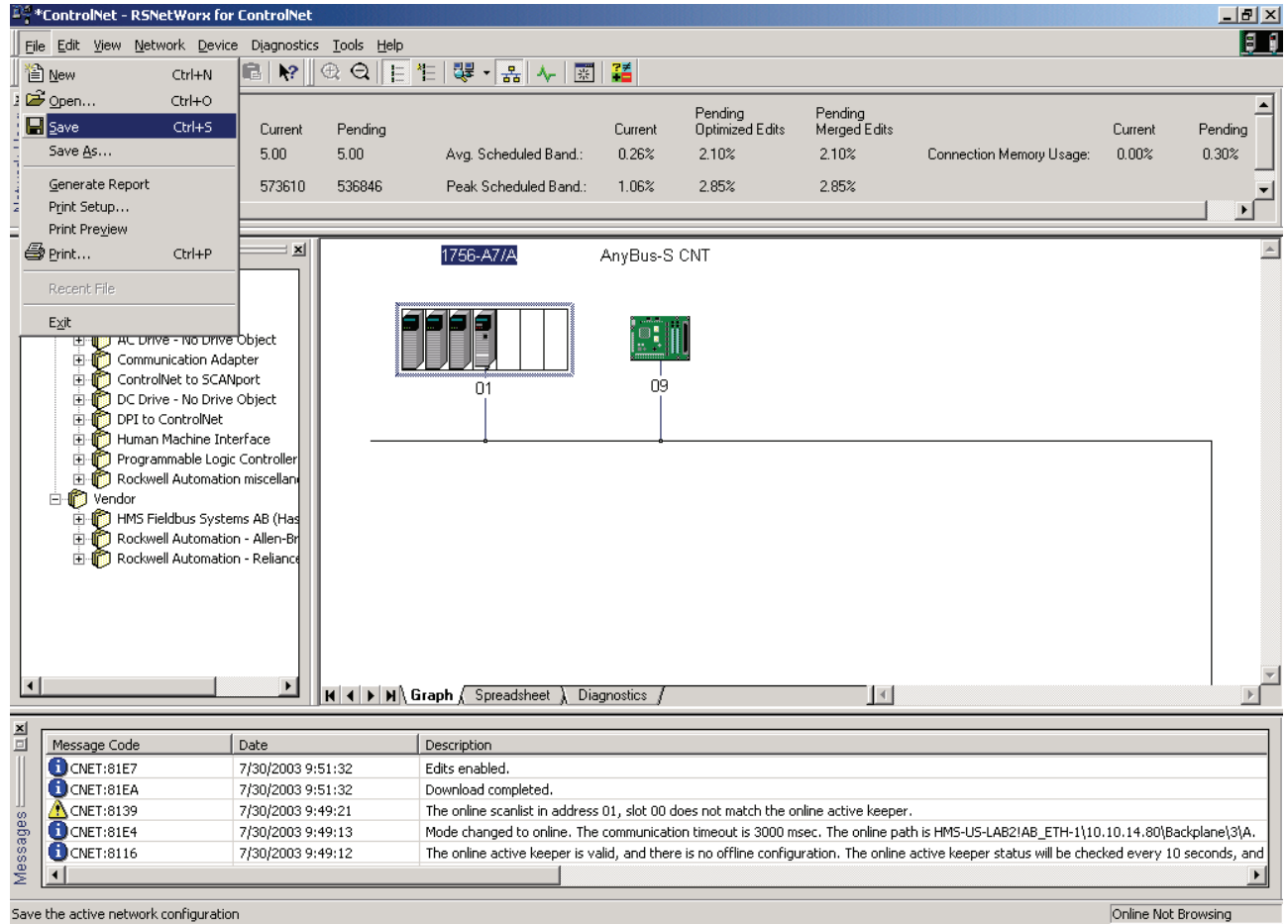Save the configuration, this will also download the configuration to the scanner.

Figure 23 Saving the configuration.

Give the configuration a name, here MyCfg.xc is used.
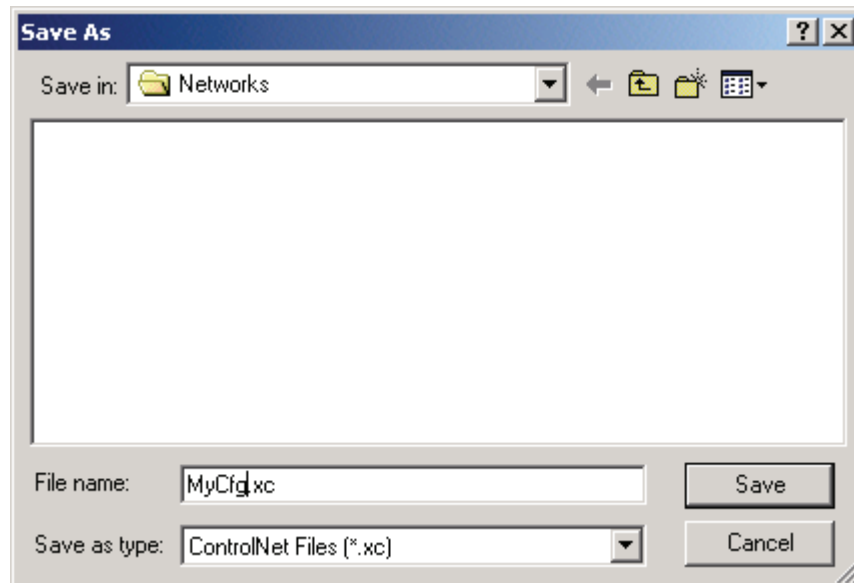

Figure 24 Naming the configuration.

When RSNetWorx saves the configuration, it will show this dialog. Select optimize, and press ok.
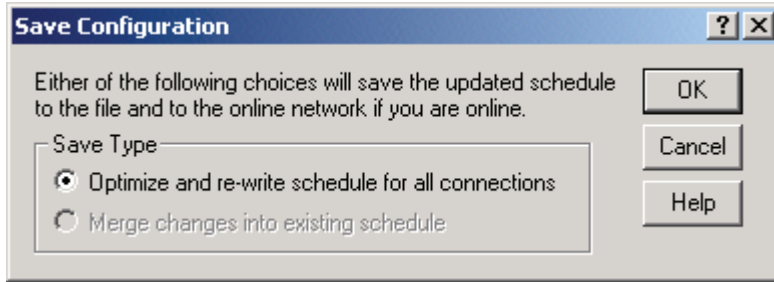

Figure 25 Optimizing and re-writing the schedule.

Now RSNetWorx will notice that this configuration is not the same as in the ControlNet scanner. Select to use offline data and download the configuration. Now the configuration is being downloaded to the scanner.
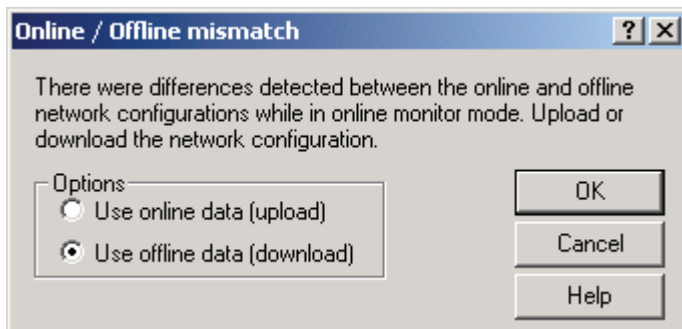

Figure 26 Downloading the offline configuration.

5. Anybus configuration

The Anybus product has to be configured for the same I/O sizes as set up in the ControlNet scanner configuration in RSLogix 5000.

Note: The I/O sizes are depending on the application, the configured I/O sizes in this chapter are just examples.

Anybus Slave Interface:

The Anybus Slave Interface is configured by mailbox commands. Refer to the Fieldbus Appendix for details.

Anybus Communicator and the Anybus X-gateway:

The configuration of the Anybus Communicator and the Anybus X-gateway is described in separate sections below.

5.1.   Communicator configuration

To configure the Communicator start the ABC Config Tool and start a new project. Select the fieldbus ControlNet and the desired I/O data size. In this case 32 bytes of I/O data is configured, the same as in the configuration of the ControlNet network.
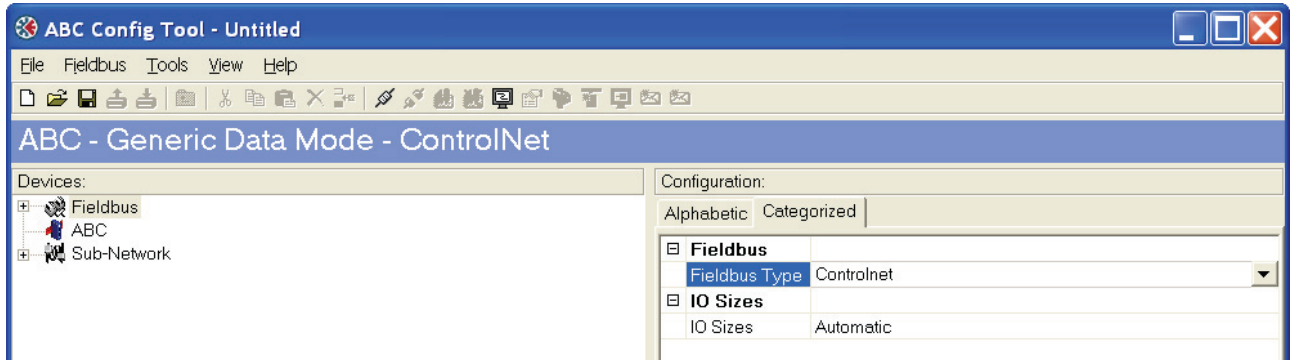
Figure 27 Configuring the Fieldbus.

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.

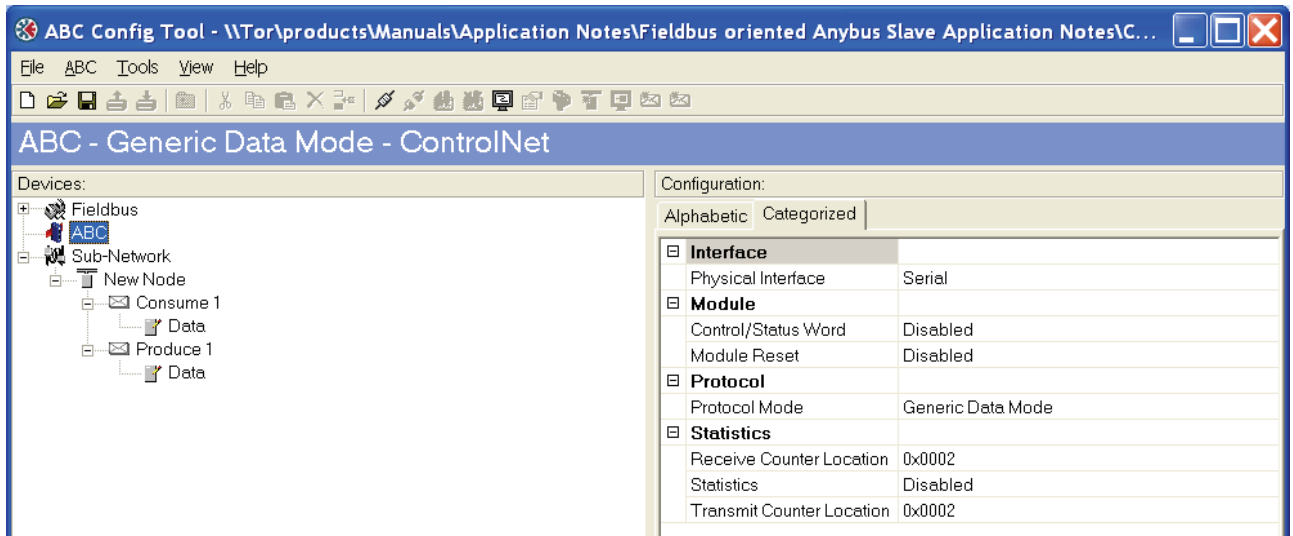*The ABC is configured for generic data mode; all other values are left at their defaults.*

Figure 28 Configuring the Communicator.

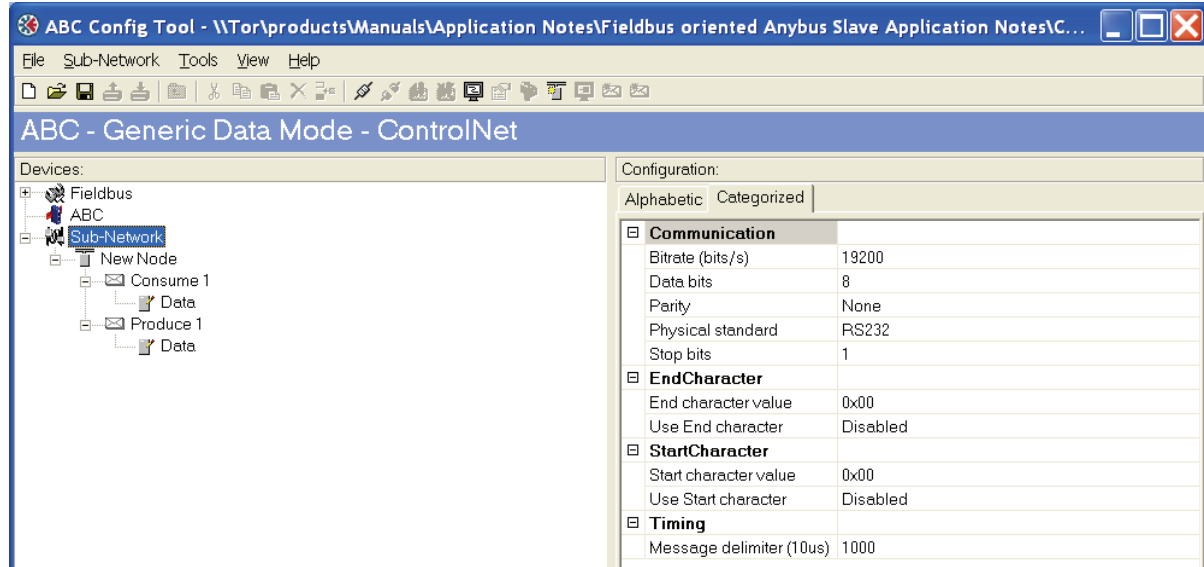*The next step is to configure the sub-network.*

Figure 29 Configuring the sub network.

Right click on New Node and add a consume and a produce transaction as shown above. Change the Offline timeout time for the consume transaction to 2000 ms and the update time for the produce transaction to 1000 ms. Right click on the produce and consume transaction respectively and select add data. In this case 32 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 1000 ms and the offline timeout time to 2000 ms.

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. Open the "File" menu and click on new, choose the desired COM port and click on OK. The following window will appear.
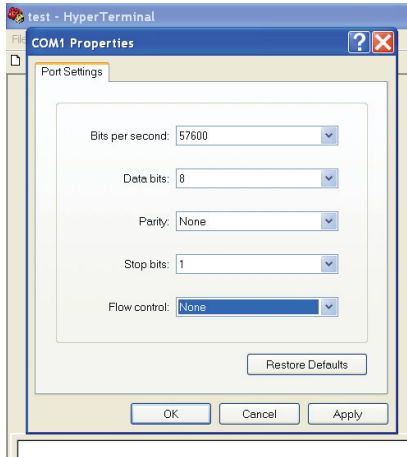

Figure 30 Configuring the connection in the HyperTerminal.

Make sure the settings are identical to those shown in the window above. An alternative method is to download the HyperTerminal session file from HMS website[2], double click on it and select COM port.

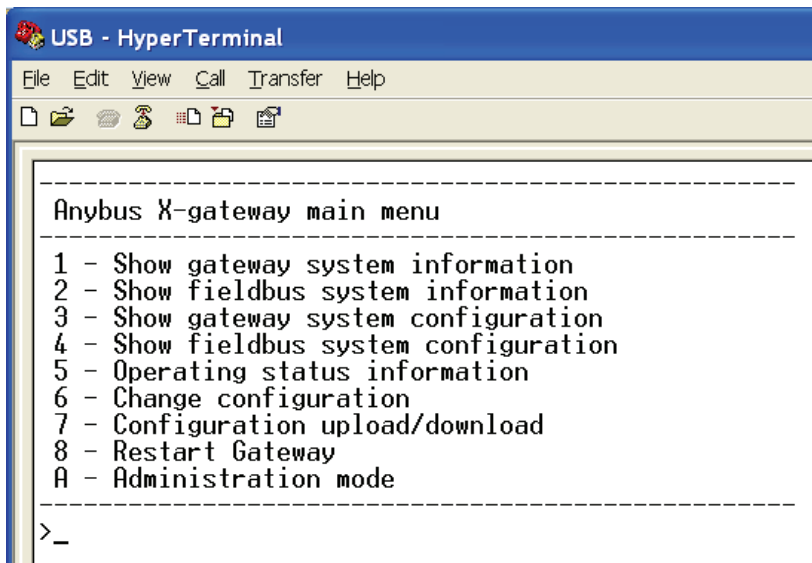*Connect and press ESC and the following menu will appear.*

Figure 31   Anybus X-gateway main menu.

Press 6 and enter the desired configuration.

The figure below shows an example; in this case a ControlNet/Ethernet X-gateway is used and 32 bytes of I/O data is configured.


```
-------------------------------------------------------
 Fieldbus system configuration
-------------------------------------------------------
 Controlnet Slave (Upper)

 Input I/O data size (bytes):          32
 Output I/O data size (bytes):         32
 Offline option:                    Clear
 Control word / Status word:     Disabled
-------------------------------------------------------
 Ethernet IP + MBTCP + WEB Slave (Lower)

 Input I/O data size (bytes):          32
 Output I/O data size (bytes):         32
 Offline option:                    Clear
 Control word / Status word:     Disabled
 Modbus Address Mode:             Enabled
-------------------------------------------------------
 Press ESC to continue
 _
```
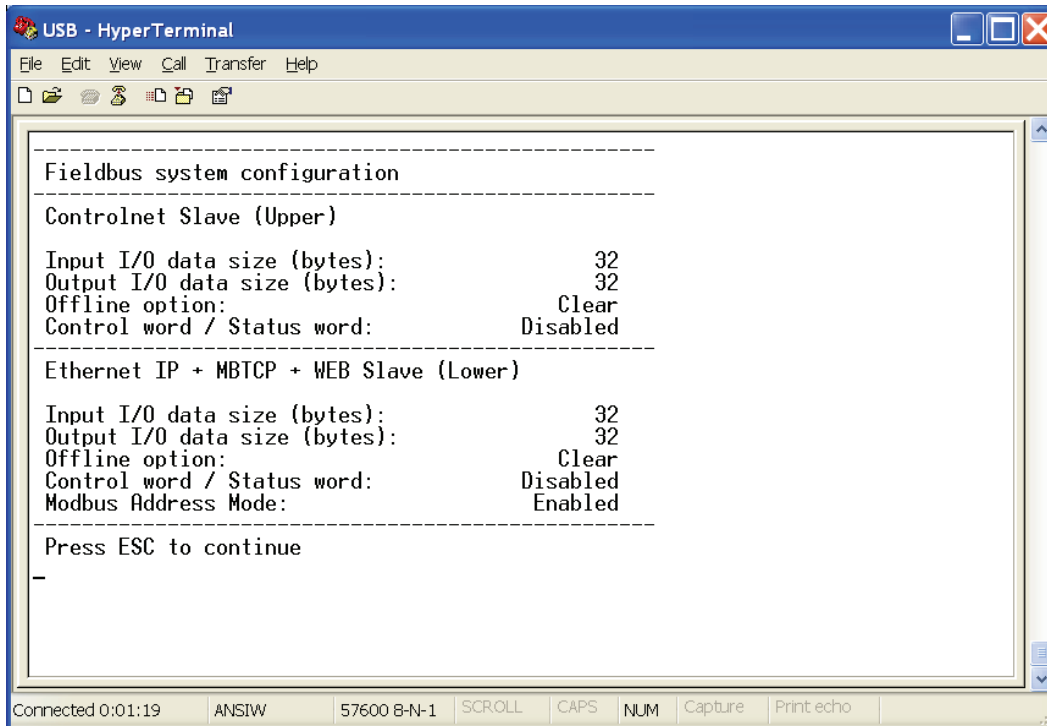
Figure 32   The X-gateway configuration.

6. Testing

If we go back to RSLogix 5000 now, the error sign will have disappeared from the Anybus-S Slave module. This means that the connection has been scheduled and the Anybus-S Slave module and the PLC are ready to exchange I/O data. In this case the Anybus Communicator with a loop back dongle at the serial port for test purpose is used.
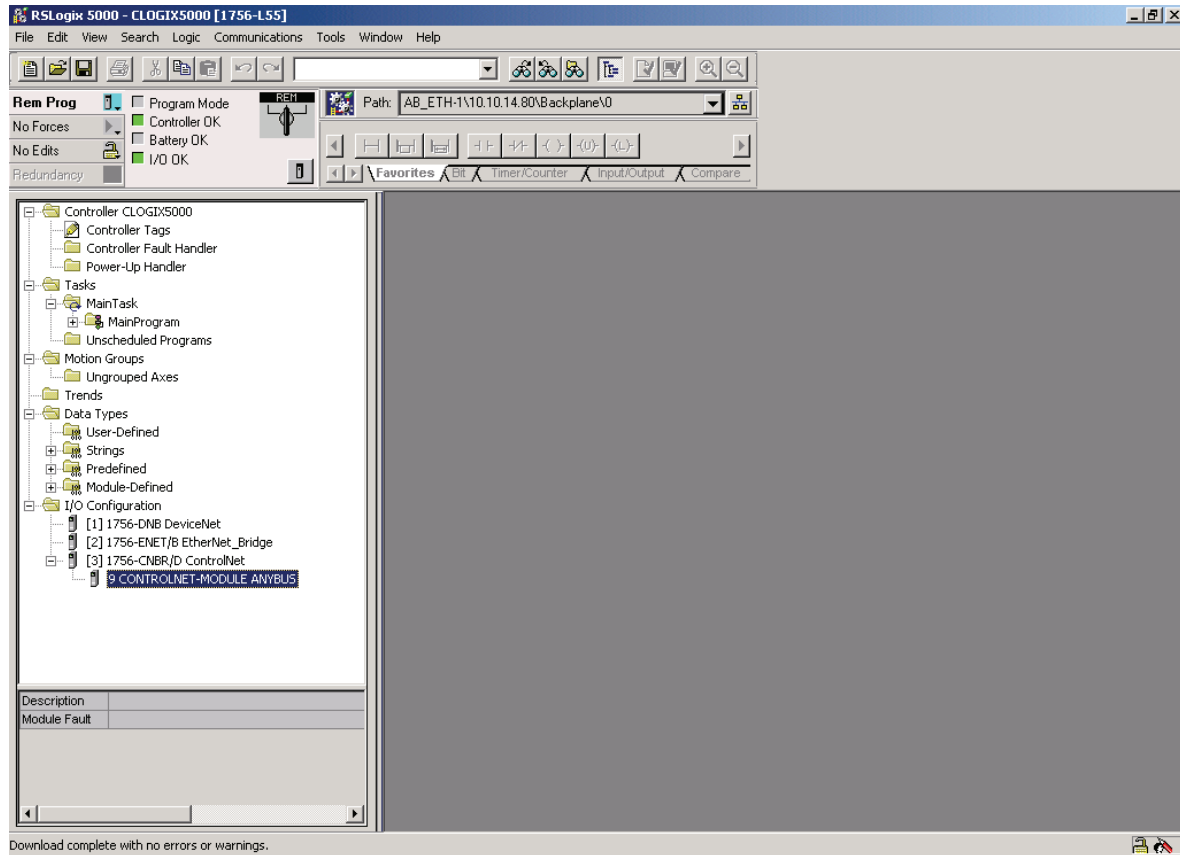

Figure 33 The main window in RSLogix 5000 after complete configuration.

The following chapter explain the monitoring of the tags. By writing and reading data to the tags the communication between the PLC and the Anybus-S Slave module is tested.

6.1. Monitoring the tag

Firstly go online and switch to "Remote Run" on the PLC. To monitor the tags open the "Controller Tags" window❶ as seen in Figure 34 below.
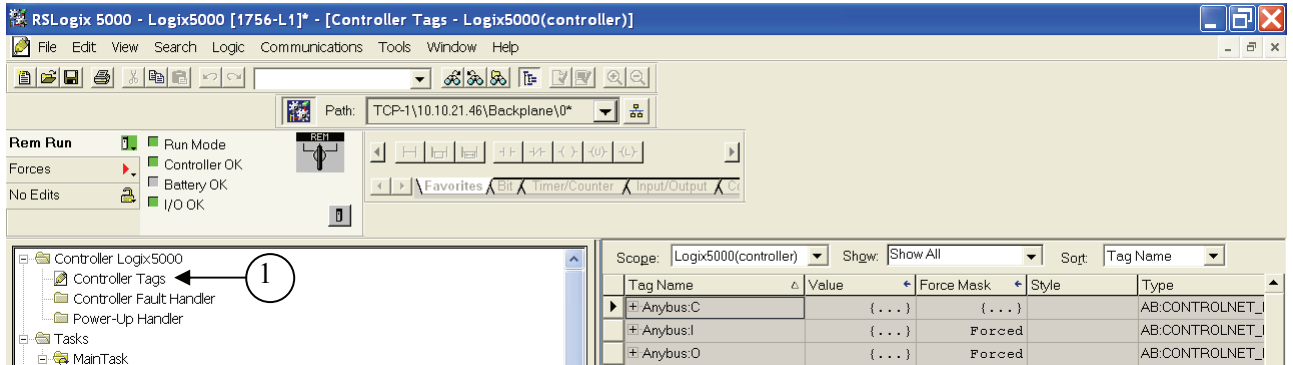
Figure 34 Monitoring the tags.

Three tags named "Anybus:C", "Anybus:I" and " Anybus:O" is to be visible, representing the three instances configuration, input and output. Each one corresponds to the instances that were configured earlier. The configuration instance is created even if we selected its size as zero. The AnyBus:I tag is data going from the Anybus-S Slave and AnyBus:O tag holds data going to the Anybus-S Slave.
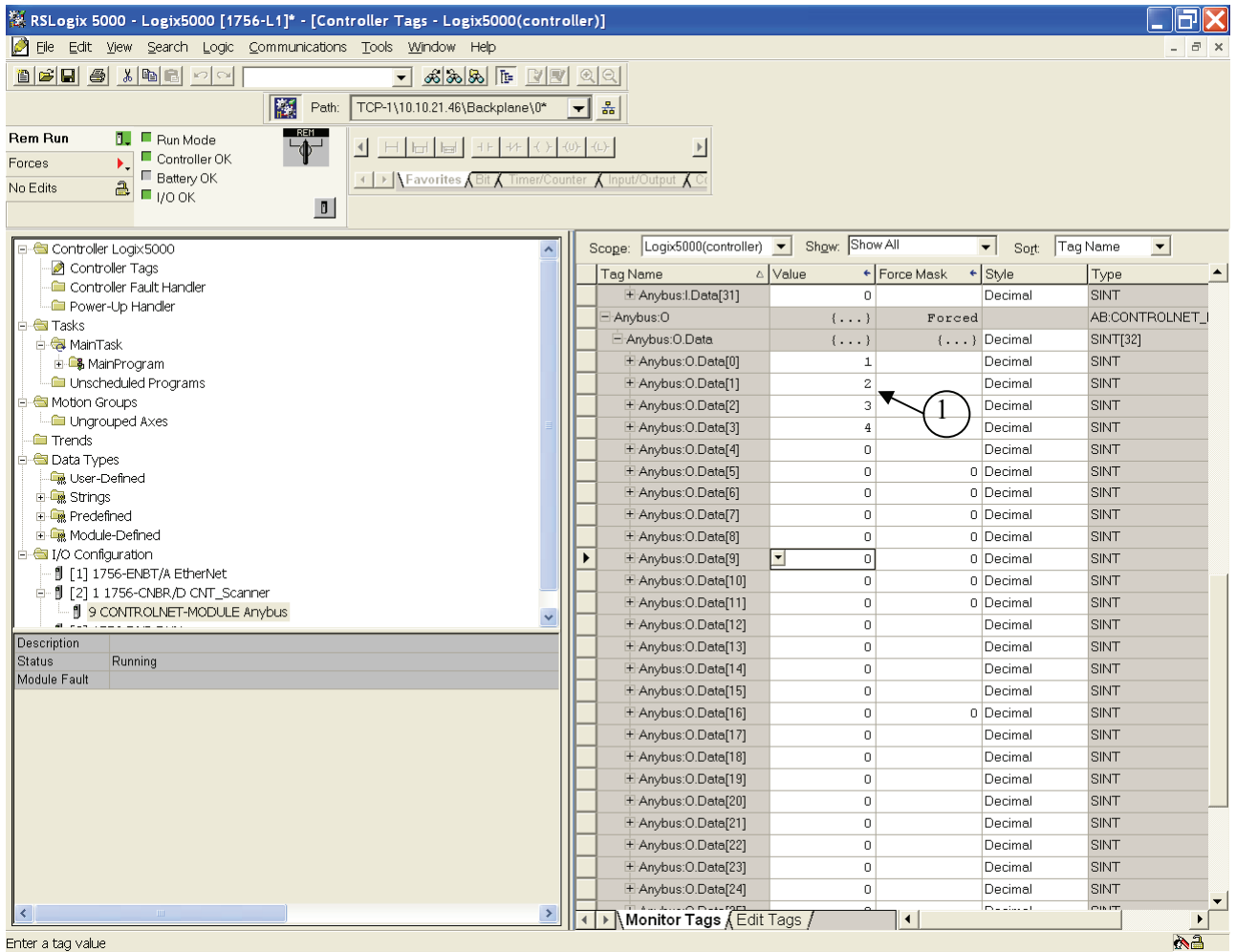
Figure 35 Editing the tags.

First enter 01 02 03 04 in the Output Tag, so there is some "data" to read. This can be done by just entering values for the Output tags❶. If the network is correctly configured the corresponding Input Tags will obtain the respective value. The values are depending on the application, in this case the values are just examples.

The Anybus-S Slave module uses a ControlNet 32-bit run/idle header, so the actual data from the module will always start with word 2 (the third word) of the data. The first 2 words, at 16 bits each, are the ControlNet run/idle header.
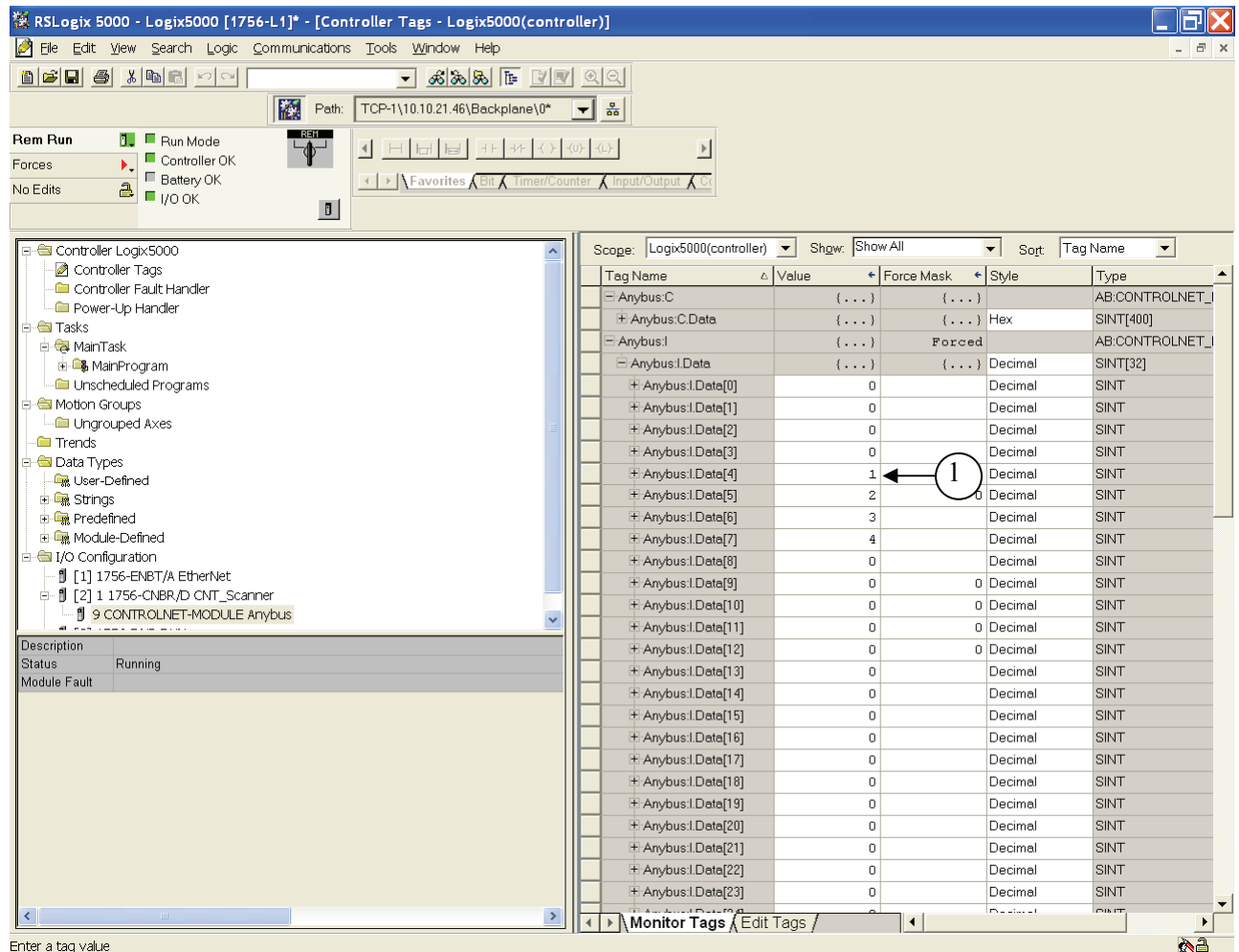

Figure 36 Viewing the Input tags.

The Input values ❶ can be seen in the figure above. Note the first four bytes are the run/idle header inserted by the Anybus module.