WAGO I/O SYSTEM 750

Using the WAGO 750-341 as Remote I/O with a ControlLogix Ethernet/IP Bridge Module

Application note

A203100, English
Version 1.1.0

WAGO®
INNOVATIVE CONNECTIONS

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded we would appreciate any information or ideas at any time.

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally trademark or patent protected.

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1 Important comments

To ensure fast installation and start-up of the units described in this manual, we strongly recommend that the following information and explanation is carefully read and adhered to.

1.1 Legal principles

1.1.1 Copyright

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1.1.2 Personnel qualification

The use of the product detailed in this manual is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH & Co. KG declines all liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Intended use

For each individual application, the components supplied are to work with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.

1.2 Range of validity

This application note is based on the stated hardware and software of the specific manufacturer as well as the correspondent documentation. This application note is therefore only valid for the described installation.

New hardware and software versions may need to be handled differently. Please note the detailed description in the specific manuals.

1.3 Symbols

Danger
Always observe this information to protect persons from injury.

Warning
Always observe this information to prevent damage to the device.

Attention
Marginal conditions must always be observed to ensure smooth operation.

ESD (Electrostatic Discharge)
Warning of damage to the components by electrostatic discharge. Observe the precautionary measure for handling components at risk.

Note
Routines or advice for efficient use of the device and software optimisation.

More information
References to additional literature, manuals, data sheets and INTERNET pages

2 Description

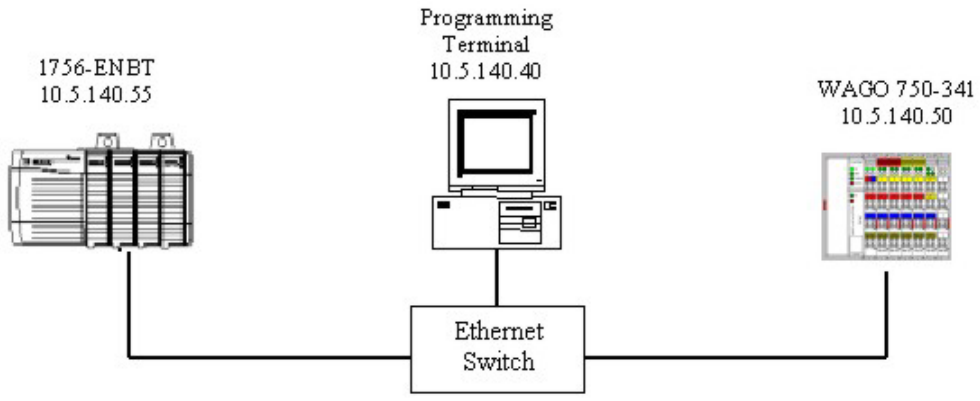
The purpose of this document is to provide a step-by-step example of interfacing the WAGO 750-341 Fieldbus Coupler with an Allen Bradley 1756-ENBT ControlLogix Ethernet Bridge using Ethernet/IP protocol. In this example, the 1756-ENBT module functions as an Ethernet/IP scanner and uses Control and Information Protocol (CIP) to manage the inputs and outputs (I/O) of the WAGO node (also known as “implicit messaging”).

3 Reference Material

This procedure has been tested with, but is not limited to, the following hardware and software:

- Allen Bradley’s 1756-A4 Chassis and 1756-PA72/B Power Supply
- Allen Bradley’s 1756-L55A Logix5555 Controller
- Allen Bradley’s 1756-ENBT ControlLogix Ethernet/IP Bridge
- Allen Bradley’s RSLogix5000 Programming Software, Version 16.03
- Allen Bradley’s RSLinx Lite Communications Software, Version 2.51
- Allen Bradley’s Bootp/DHCP Software, Version 2.3
- WAGO Ethernet Node

  750-341 Ethernet Fieldbus Coupler
  750-402 4-point 24VDC Digital Input Module
  750-504 4-point 24VDC Digital Output Module
  750-467 2-point 0-10VDC Analog Input Module
  750-550 2-point 0-10VDC Analog Output Module
  750-600 End Module

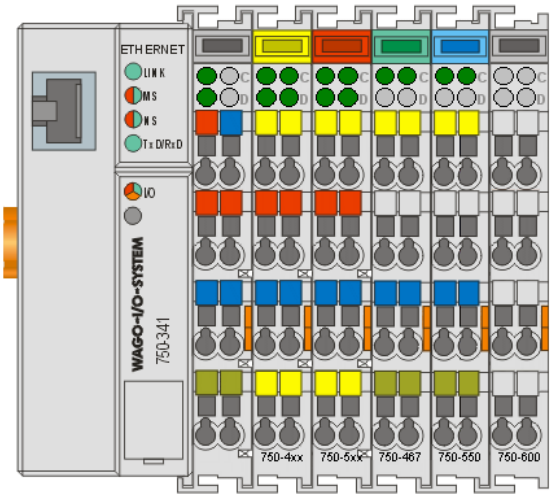


Note
This procedure assumes that the WAGO 750-341 contains a valid IP address and it is installed on a working network, along with the Allen Bradley 1756-ENBT and the RSLogix5000 programming terminal. If necessary, refer to WAGO's Application Note A202900 for assigning a static IP address to the WAGO 750-341.

4 Solution

The figure below illustrates the hardware of the WAGO node in this example. The process image table (I/O map) is displayed in byte format below the figure. In order to properly configure the 1756-ENBT Ethernet Bridge, the process image of the WAGO node must be determined.

When the coupler is powered up, it automatically addresses the I/O modules of the node. The data for complex modules (modules using 2 or more bytes) are mapped first in the process image. They are mapped in the order of their physical position after the coupler. As such, they start at byte address 0. Following this, the digital modules are grouped into bytes (8-bits per byte). The bits are arranged in the order of the module's location. When the number of digital points exceeds eight (8-bits), the coupler automatically starts the next byte.



Input Process Image

- Byte 0 - 750-467 Channel 1 Analog Input, Low Byte
- Byte 1 - 750-467 Channel 1 Analog Input, High Byte
- Byte 2 - 750-467 Channel 2 Analog Input, Low Byte
- Byte 3 - 750-467 Channel 2 Analog Input, High Byte
- Byte 4 - 750-402 4-Channel 24VDC Digital Input (bits 0 through 3)

Output Process Image

- Byte 0 - 750-550 Channel 1 Analog Output, Low Byte
- Byte 1 - 750-550 Channel 1 Analog Output, High Byte
- Byte 2 - 750-550 Channel 2 Analog Output, Low Byte
- Byte 3 - 750-550 Channel 2 Analog Output, High Byte
- Byte 4 - 750-504 4-Channel 24VDC Digital Output (bits 0 through 3)

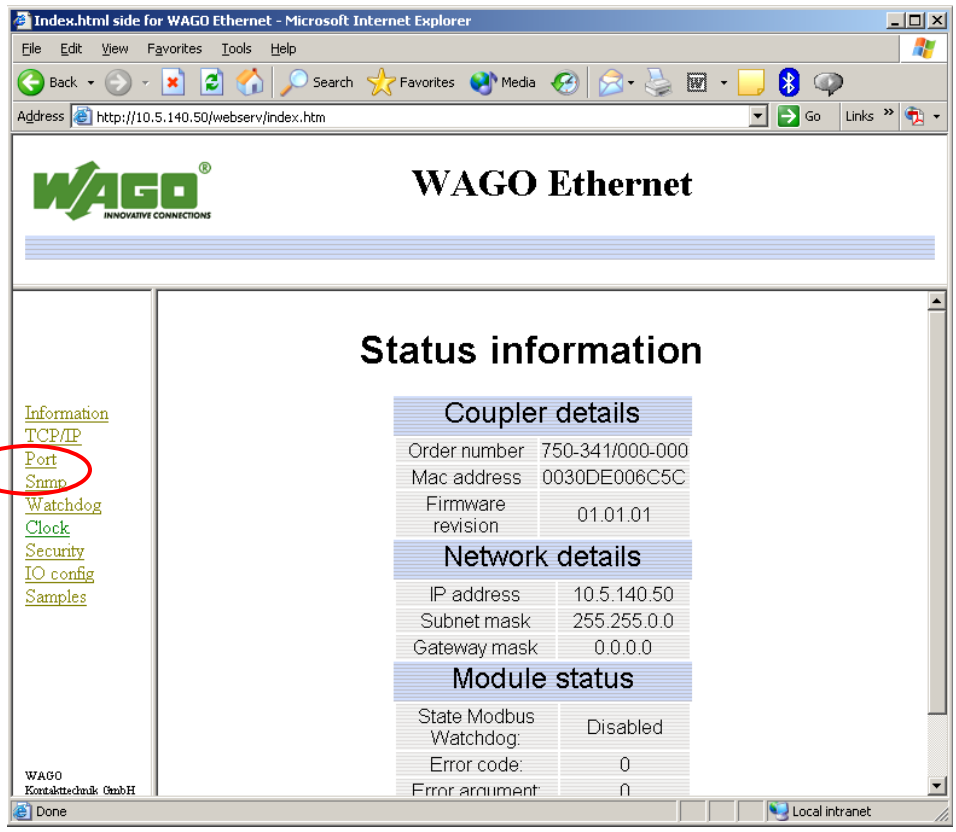
Note
This example has 5-bytes of data in both the Input and Output Process Image.

There are two main steps in setting up this system:

- 1.Configuring WAGO's 750-341 for Ethernet/IP
- 2.Configuring Allen Bradley's 1756-ENBT as an Ethernet/IP Scanner

4.1 Configuring WAGO's 750-341 for Ethernet/IP

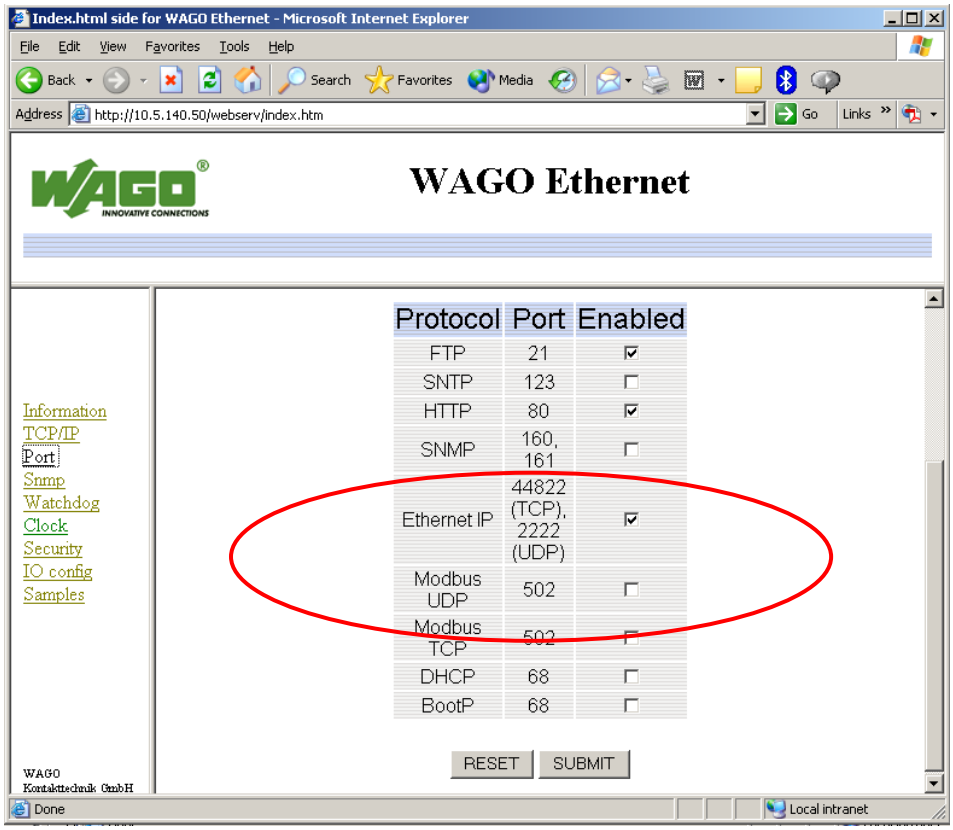
The EtherNet/IP settings for the WAGO 750-341 are configured through the built-in web pages. Using a web browser like Microsoft Internet Explorer, type in the IP address of the WAGO coupler in the Address field. The HTML page below appears. Click the "**Port"** hyperlink on the left navigation bar. A dialog window will prompt for a user name and password. Log on as the administrator with the user name "**admin"** and the password "**wago"**.



A list of supported protocols is displayed. Click on the EtherNet/IP check box to select it (checked). If Modbus UDP or Modbus TCP is enabled, click on it to unselect it (unchecked).

Note
Both the Modbus/TCP and Modbus/UDP protocols must be disabled in order to map the input and output process image to an EtherNet/IP fieldbus master. If either Modbus protocol is enabled, the inputs and outputs will be mapped for a Modbus/TCP (UDP) master.

Click the **SUBMIT** button to save the changes to EEPROM. Perform a hardware or software reset so the new settings take effect.

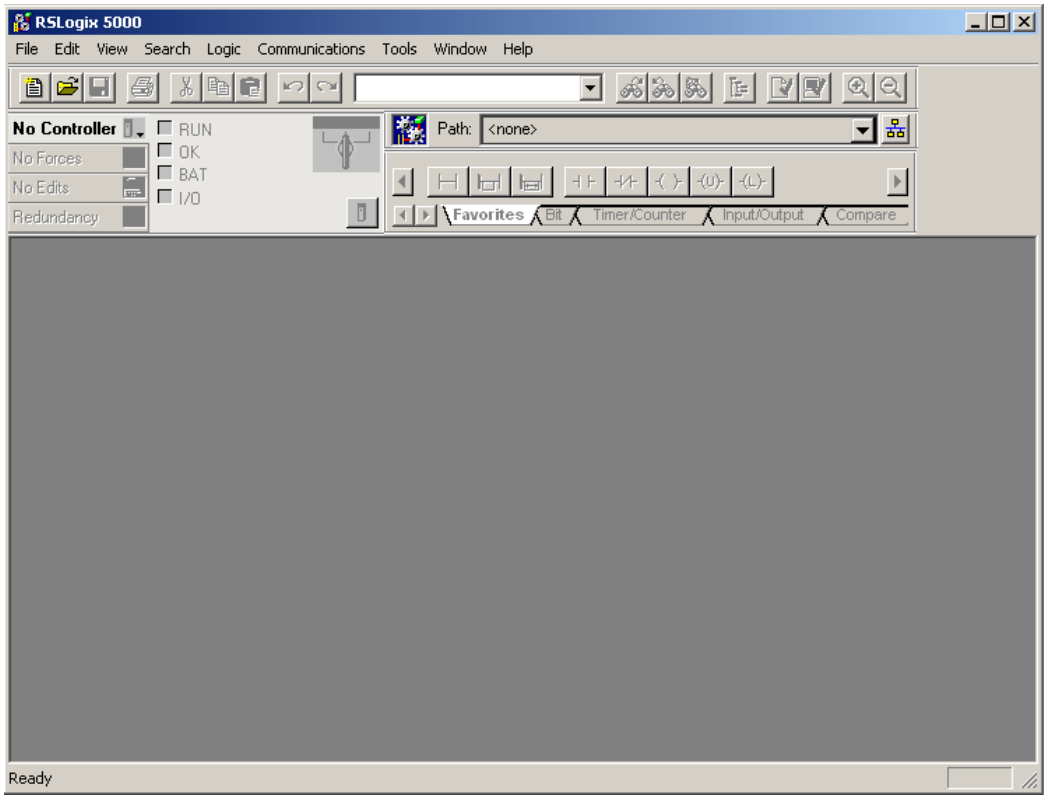


The WAGO 750-341 fieldbus coupler is now ready to use.

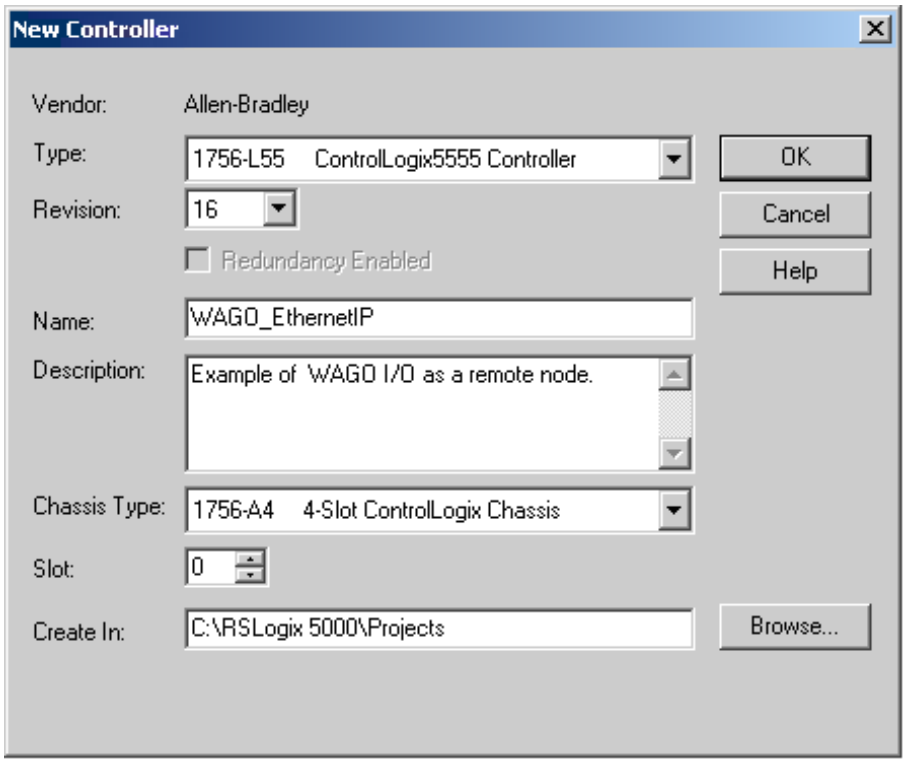
4.2 Configuring Allen Bradley's 1756-ENBT as an Ethernet/IP Scanner

This section assumes that you have an overall understanding of Allen Bradley's hardware and software. It focuses only on configuring the Logix5555 controller with RSLogix5000, so the WAGO coupler is accessible as a remote I/O node via Ethernet/IP.

1) Start **RSLogix5000**. The RSLogix5000 main window is displayed.



2) Create a new project with RSLogix5000. Select the **File…New** menu item. The *New Controller* dialog window is displayed.

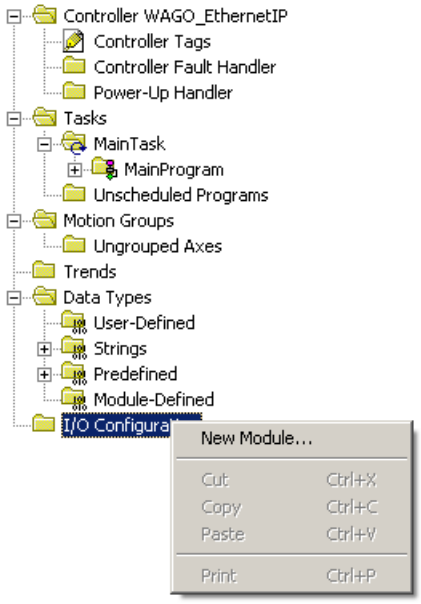


3) Enter the following parameters:

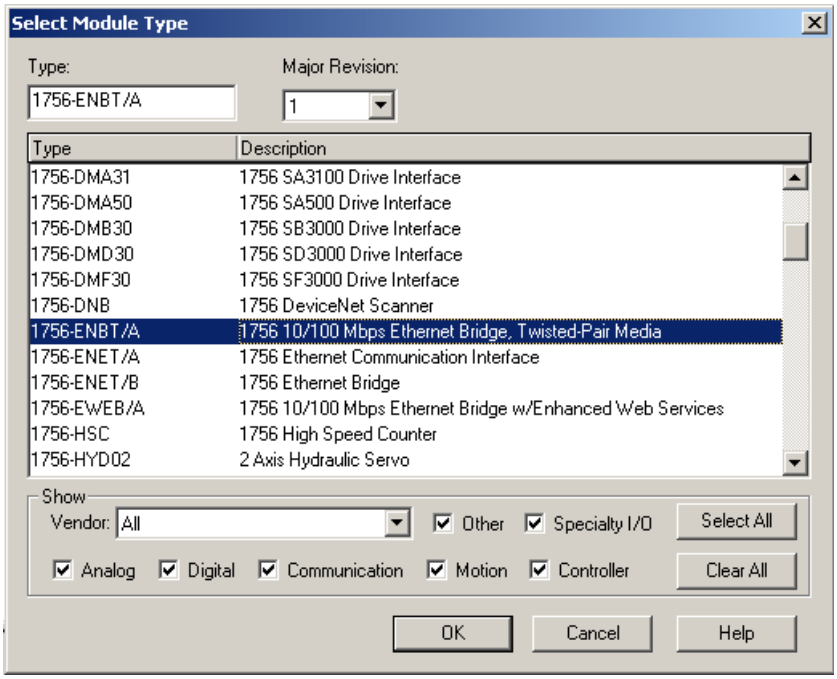
Type:	**1756-L55 ControlLogix5555 Controller**
Revision	**16**
Name	**WAGO_EthernetIP**
Description	Enter an appropriate description
Chassis Type	**1756-A4 4-Slot ControlLogix Chassis**
Slot	**0**
Created In:	Enter an appropriate folder

4) Click on **OK.**

5) Before adding the WAGO I/O to the Logix5555 I/O configuration, you must first add the local 1756-ENBT module. To do this, open the I/O Configuration folder in the project window. Right click on **I/O Configuration** and select the **New Module** menu item.

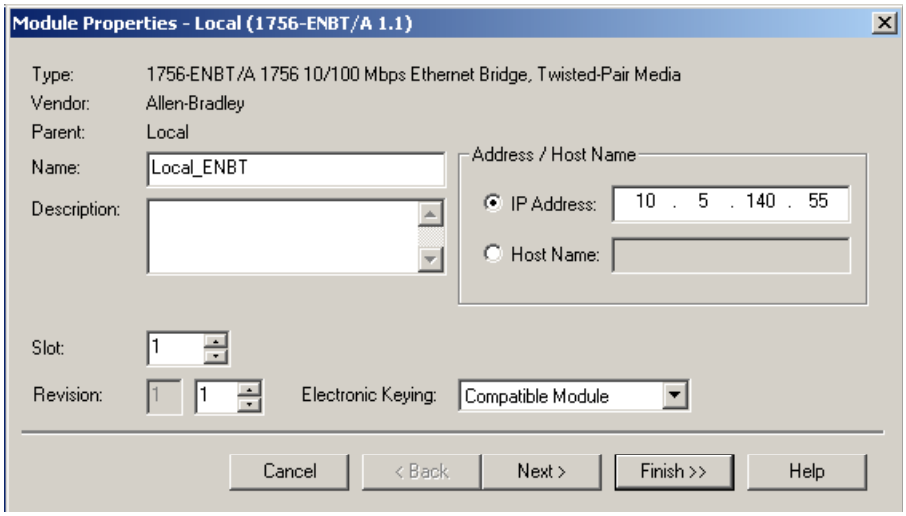


The *Select Module Type* dialog window is displayed.



6) Select **1756-ENBT/A …** from the list and click **OK**.

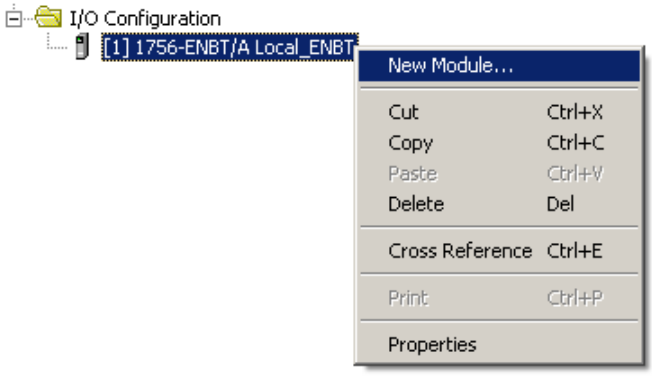
The *Module Properties...* dialog window is displayed.



7) Enter the following parameters:

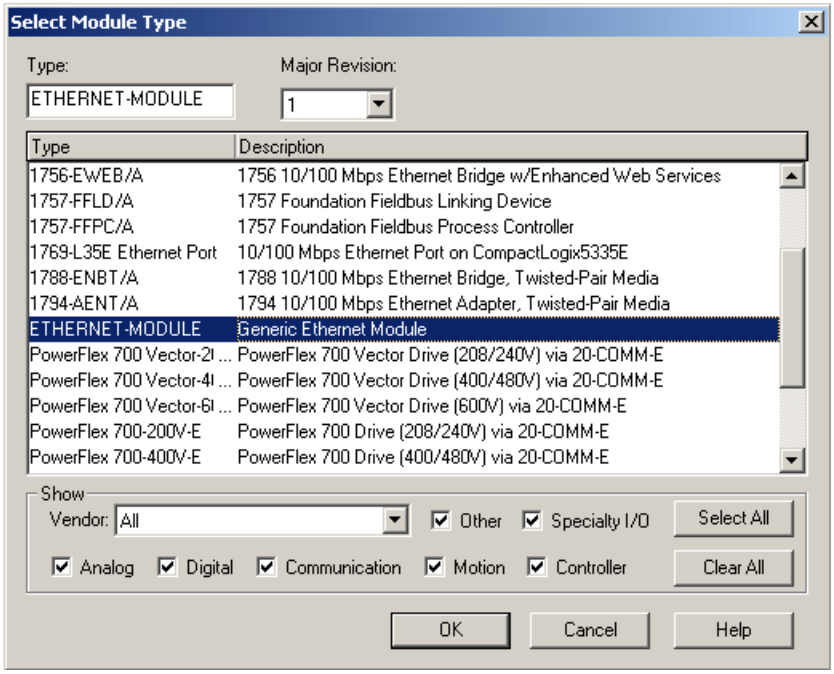
Name: **Local_ENBT**
IP Address: **10.5.140.55** (IP Address of the 1756-ENBT in this example)
Slot: **1** (slot of the scanner**)**
Electronic Keying**Compatible Module**

8) Click the **Finish** button. The module will appear in the I/O Configuration.



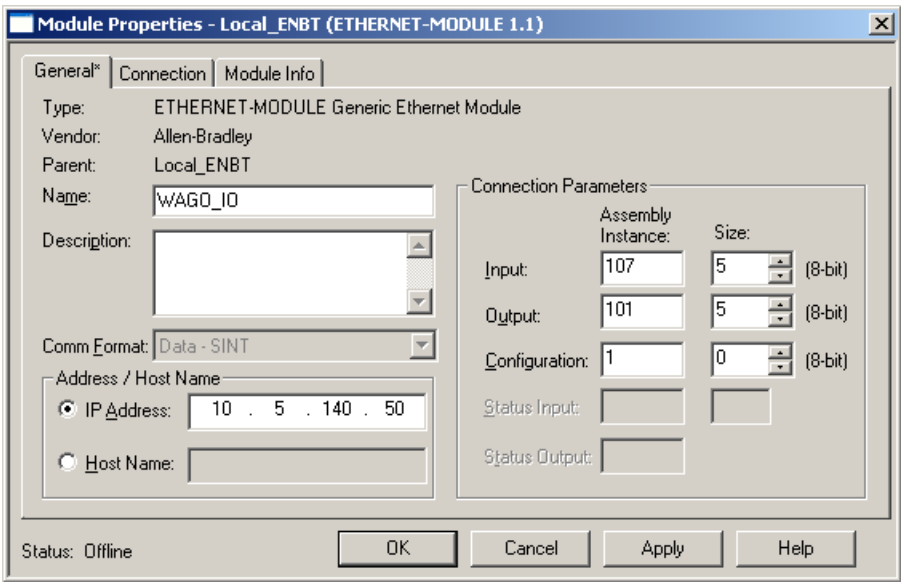
9) Right click on **1756-ENBT/A Local_ENBT** tree item, and select the **New Module…** menu item.

The *Select Module Type* dialog window is displayed.



10) Select **Generic Ethernet Module** from the list and click **OK**.

The *Module Properties*... dialog window is displayed.

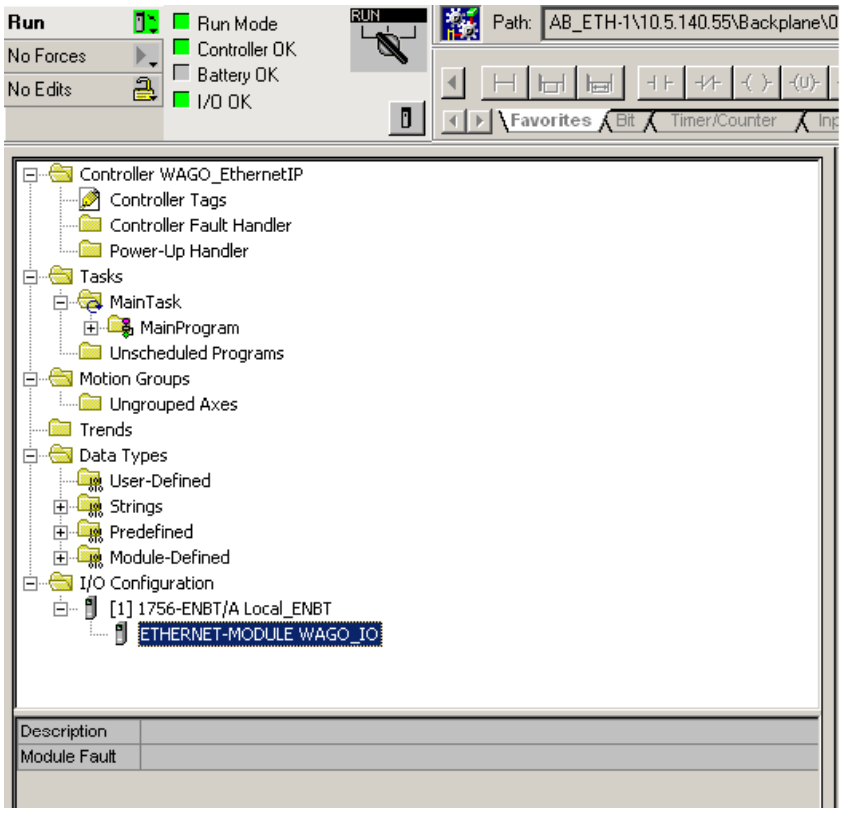


11) Enter the following parameters:

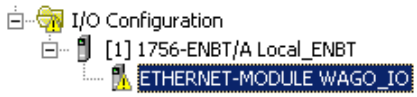
Name:	**WAGO_IO**	
Comm Format:	**Data – SINT**	(8-bit signed integer value; -128 to +127)
IP Address	**10.5.140.50**	(IP Address of WAGO 750-341 for example)
Input Assembly Instance	**107**	(CIP Assembly Instance)
Input Size	**5**	(5 bytes of Input Process Data)
Output Assembly Instance	**101**	(CIP Assembly Instance)
Output Size	**5**	(5 bytes of Input Process Data)
Configuration Assembly Instance	**1**	(Not used by system)
Configuration Size	**0**	(Not used by system)

12) The program/configuration can now be downloaded to the Logix5555 controller. Select the **Communications…Download** program menu item.

After downloading, if everything was setup correctly, the "I/O OK" indicator is green. Additionally, when the cursor is placed on the ETHERNET-MODULE WAGO_IO tree item, the Module Fault box at the bottom of the figure below should be blank, indicating no error.

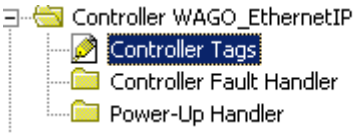


If an error does occur, the screen will look similar to the one below. This error is indicating an improper connection size was entered for either the input or output parameters.

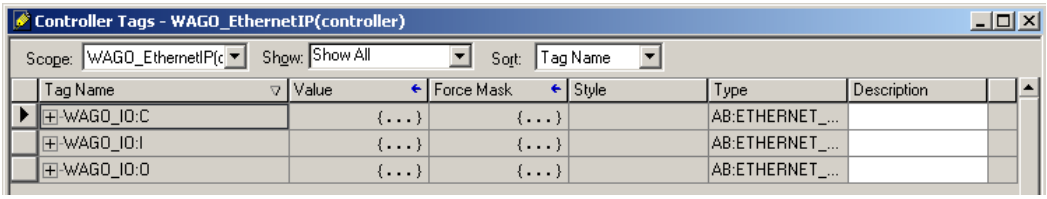


Description	
Module Fault	(Code 16#0109) Connection Request Error: Invalid connection size. -

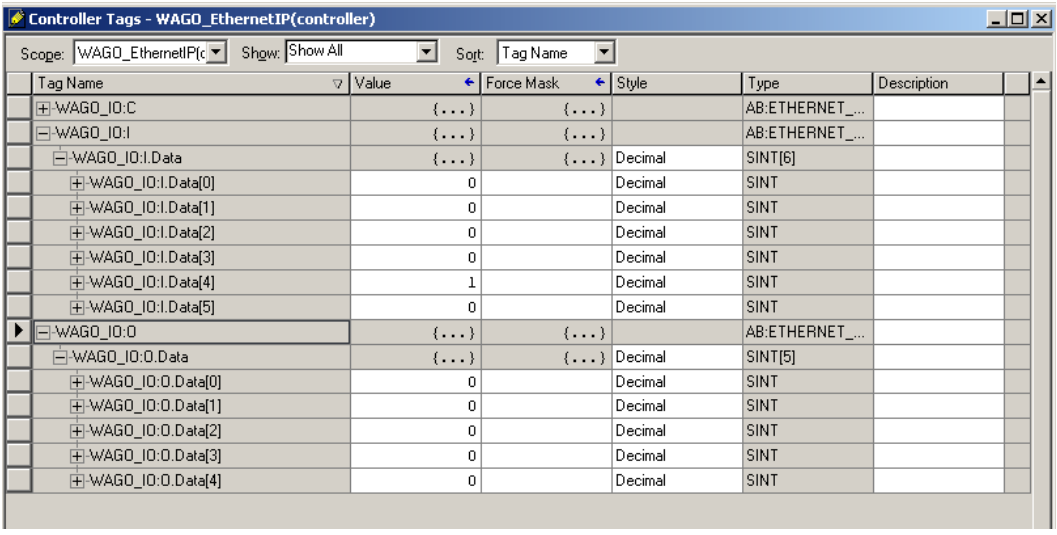
13) To view the process data from the WAGO 750-341, click on the **Controller Tags** tree item.



The Controller Tags dialog window opens. In this example, only data from the WAGO 750-341 is displayed. In a real world application, more data would be included in the project.



14) Click the + button to expand the Controller Tags view.



After completing these steps, the configuration of the WAGO 750-341 PFC and the 1756-ENBT Ethernet/IP Scanner are complete. The WAGO input and output data is now accessible to the Logix5555 controller as defined in the tables below:

Input Data

RSLogix Variable	WAGO Module/Parameter
WAGO_IO:I.Data[0]	750-467 Channel 1 Analog Input, Low Byte
WAGO_IO:I.Data[1]	750-467 Channel 1 Analog Input, High Byte
WAGO_IO:I.Data[2]	750-467 Channel 2 Analog Input, Low Byte
WAGO_IO:I.Data[3]	750-467 Channel 2 Analog Input, High Byte
WAGO_IO:I.Data[4].0	750-402 4-Channel 24VDC Digital Input 0
WAGO_IO:I.Data[4].1	750-402 4-Channel 24VDC Digital Input 1
WAGO_IO:I.Data[4].2	750-402 4-Channel 24VDC Digital Input 2
WAGO_IO:I.Data[4].3	750-402 4-Channel 24VDC Digital Input 3

Output Data

RSLogix Variable	WAGO Module/Parameter
WAGO_IO:O.Data[0]	750-550 Channel 1 Analog Output, Low Byte
WAGO_IO:O.Data[1]	750-550 Channel 1 Analog Output, High Byte
WAGO_IO:O.Data[2]	750-550 Channel 2 Analog Output, Low Byte
WAGO_IO:O.Data[3]	750-550 Channel 2 Analog Output, High Byte
WAGO_IO:O.Data[4].0	750-504 4-Channel 24VDC Digital Output 0
WAGO_IO:O.Data[4].1	750-504 4-Channel 24VDC Digital Output 1
WAGO_IO:O.Data[4].2	750-504 4-Channel 24VDC Digital Output 2
WAGO_IO:O.Data[4].3	750-504 4-Channel 24VDC Digital Output 3

Configuration Data

The configuration data (e.g., WAGO_IO:C.Data[0]) is automatically assigned by RSLogix when a Generic Ethernet/IP module is added as I/O. Since the WAGO 750-341 does not use this data, it should be ignored.

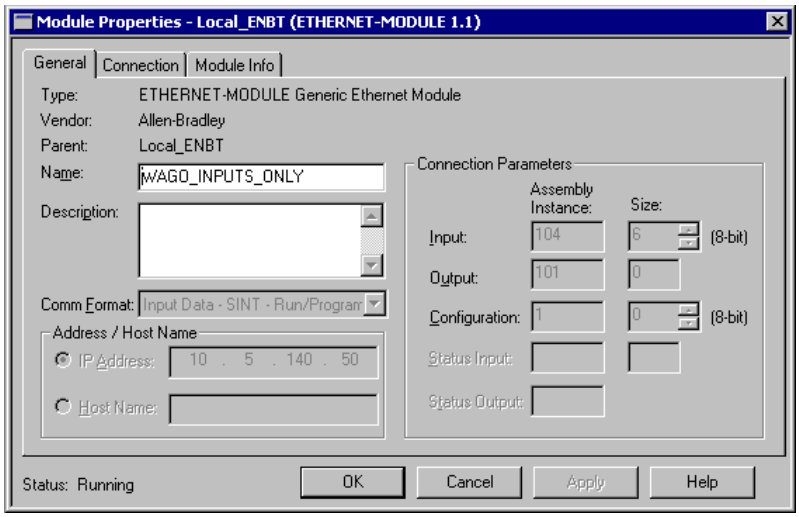
4.3 Addendum – Other Configuration Samples

4.3.1 Inputs Only

1) Set the *Comm Format* for **Input Data –SINT – Run/Program**.

2) Set the Input *Assembly Instance* to **104**. The input *Size* is the input process image size plus one byte for status.

3) Set the Output *Assembly Instance* to **101** with a *Size* of **0**.

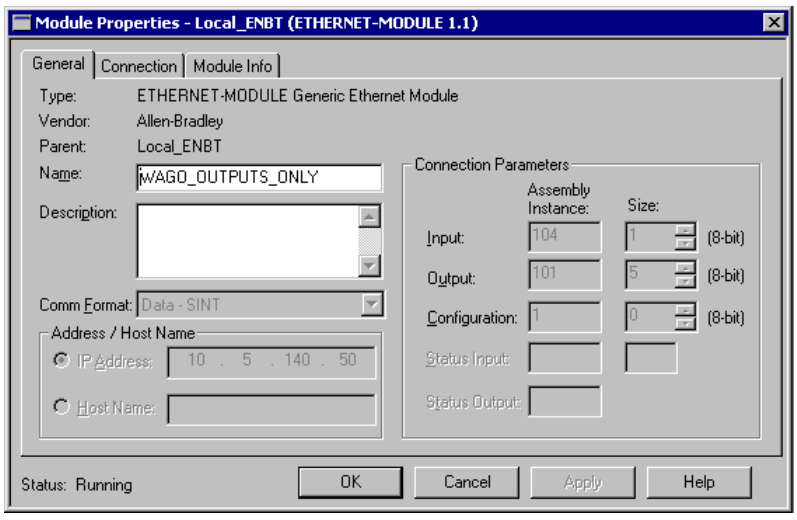


4.3.2 Outputs Only

1) Set the *Comm Format* for **Data –SINT.**

2) Set the Input *Assembly Instance* to **104** with a size of **1** for the status byte**.**

3) Set the Output *Assembly Instance* to **101** with the output process image size for your node.



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