Application Note

AUTOMATION

Using the WAGO 750-352 Ethernet Coupler as Remote IO with a CompactLogix™ PLC

A500470e, English

Version: 1.0.0

WAGO® INNOVATIVE CONNECTIONS

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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 protected by trademark or patent.

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1 Important Notes

To ensure quick installation and start-up of the units, we strongly recommend that the following information and explanations are carefully read and adhered to.

1.1 Legal Principles

1.1.1 Subject to Changes

WAGO Kontakttechnik GmbH & Co. KG reserves the right to provide for any alterations or modifications that serve to increase the efficiency of technical progress. WAGO Kontakttechnik GmbH & Co. KG owns all rights arising from the granting of patents or from the legal protection of utility patents. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

1.1.2 Copyright

1.1.3 Personnel Qualification

The use of the product detailed in this document 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 any liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this document.

1.1.4 Intended Use

For each individual application, the components are supplied from the factory with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in this document. 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 Scope of Validity

This application note is based on the stated hardware and software of the specific manufacturer as well as the associated 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 Number Notation

Table 1: Number Notation

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

1.4 Font Conventions

Table 2: Font Conventions

Font type	Indicates
italic	Names of paths and data files are marked in italic-type. e.g.: *C:\Programme\WAGO-I/O-CHECK*
Menu	Menu items are marked in bold letters. e.g.: **Save**
>	A greater-than sign between two names means the selection of a menu item from a menu. e.g.: **File** > **New**
Input	Designation of input or optional fields are marked in bold letters, e.g.: **Start of measurement range**
“Value”	Input or selective values are marked in inverted commas. e.g.: Enter the value “4 mA” under **Start of measurement range**.
[Button]	Pushbuttons in dialog boxes are marked with bold letters in square brackets. e.g.: **[Input]**
[Key]	Keys are marked with bold letters in square brackets. e.g.: **[F5]**

2 Description

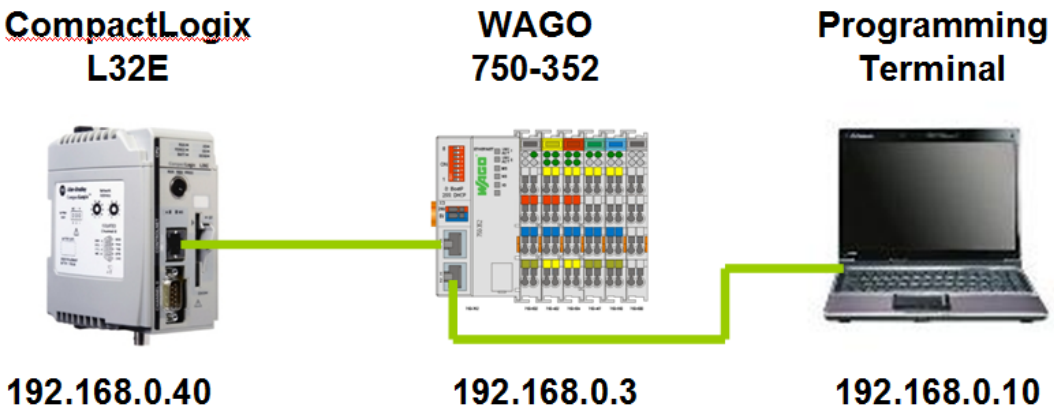
The purpose of this document is to provide a step-by-step example of interfacing the WAGO 750-352 Fieldbus Coupler with an Allen Bradley 1769-L32 CompactLogix™ Controller using EtherNet/IP protocol. In this example, the 1769-L32 controller functions as an EtherNet/IP scanner and uses Control and Information Protocol (CIP) to manage the inputs and outputs (I/O) of the WAGO node (also known as implicit messaging).

3 Components

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

Table 3: Components

Supplier	Pieces	Name	Item No.
WAGO	1	Ethernet Fieldbus Coupler	750-352
WAGO	1	24VDC Field Supply Module	750-602
WAGO	1	4-Channel Digital Input Module 24VDC	750-402
WAGO	1	4-Channel Digital Output Module 24VDC	750-502
WAGO	1	2-Channel Analog Input Module 0..10V	750-467
WAGO	1	2-Channel Analog Output Module 0..10V	750-550
WAGO	1	End Module	750-600
Allen Bradley	1	CompactLogix Controller	1769-L32E
Allen Bradley	1	Compact Power Supply	1769-PA2
Allen Bradley	1	Compact I/O End Cap	1769-ECR
Allen Bradley	1	Programming Software, Version 19.01	RSLogix5000
Allen Bradley	1	Communications Software, Version X.XX	RSLinx Lite



Note

This procedure assumes that the WAGO 750-352 contains a valid IP address and it is installed on a working network, along with the Allen Bradley CompactLogix Controller and the RSLogix5000 programming terminal. If necessary, refer to the 750-352 Product Manual for assigning a static IP address to the WAGO 750-352

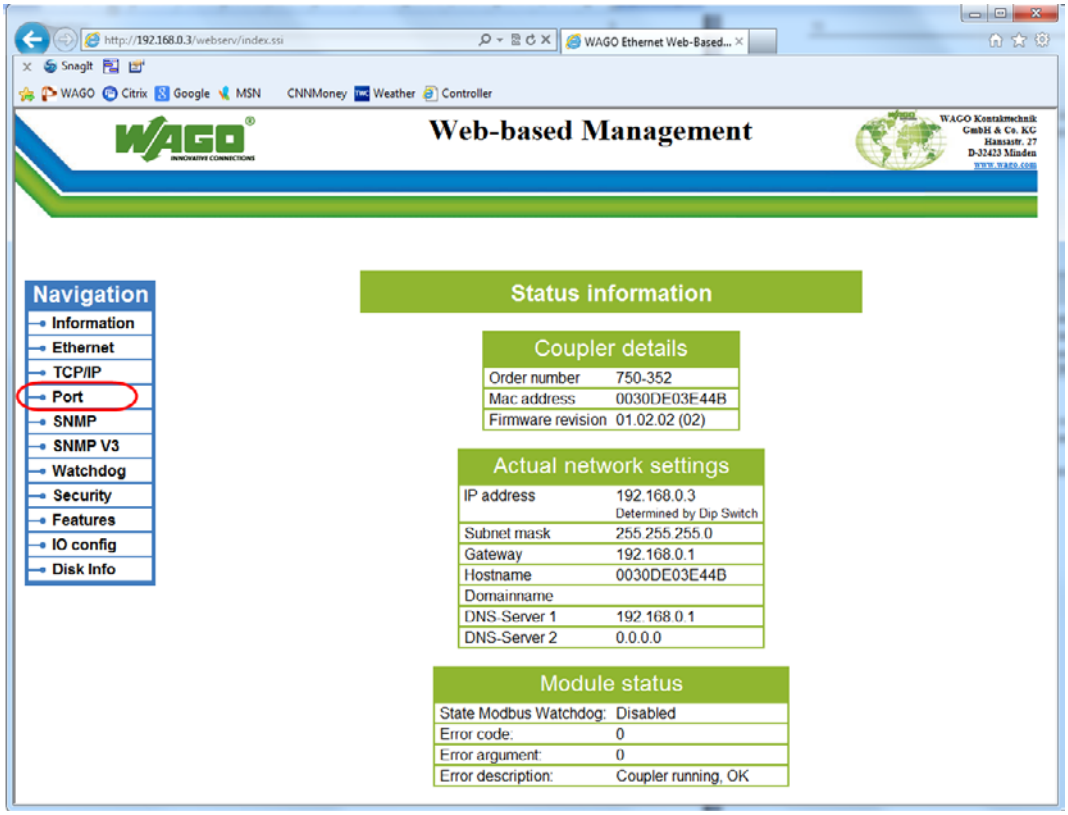
4 Solution

There are three general steps for setting up this system:

1) Enable EtherNet/IP in the WAGO 750-352 Coupler
2) Determine the Process Image of the WAGO 750-352 I/O Node
3) Add the WAGO 750-352 to the CompactLogix Integrated EtherNet/IP Scanner

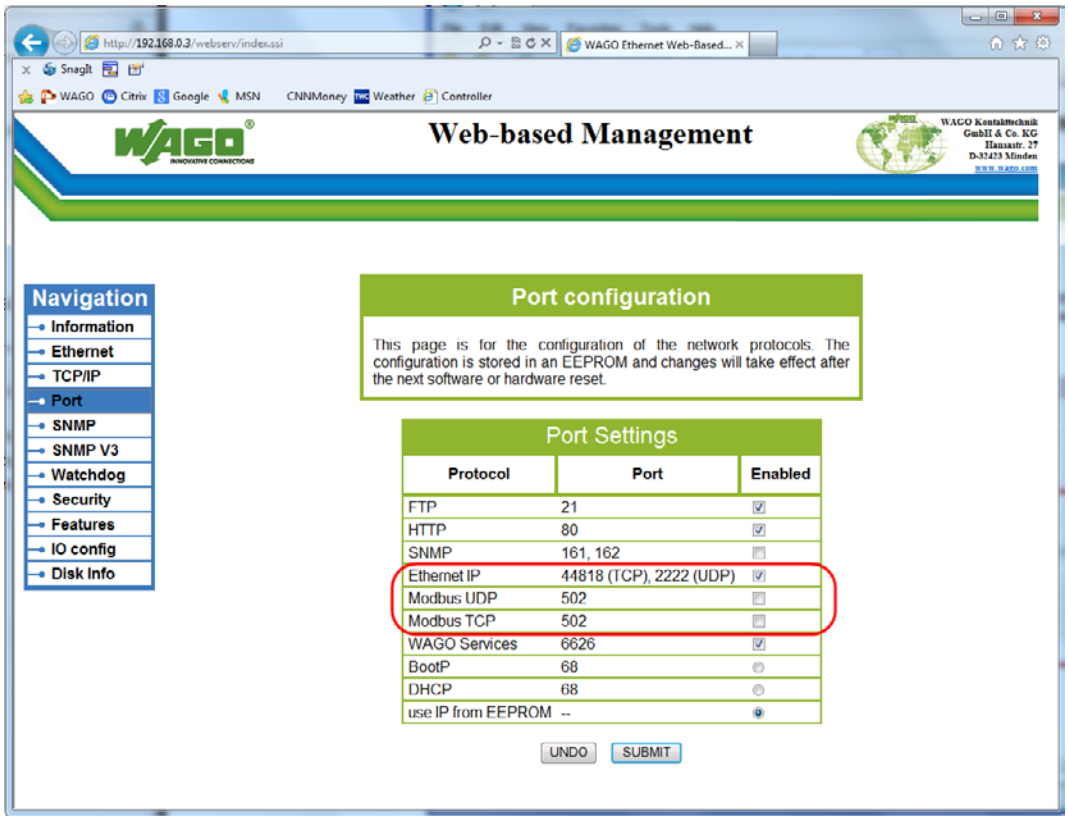
4.1 Enable EtherNet/IP in the WAGO 750-352 Coupler

The EtherNet/IP settings for the WAGO 750-352 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).

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



Note

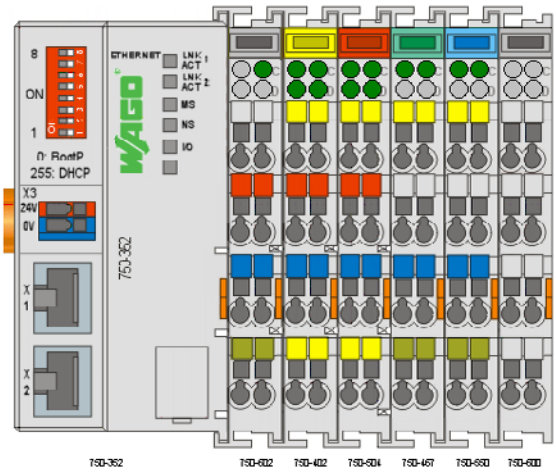
Both the Modbus/TCP and Modbus/UDP protocols must be disabled in order to map the input and output process image to an EtherNet/IP fieldbus master. If either Modbus protocol is enabled, the inputs and outputs will be mapped for a Modbus/TCP (UDP) master.

The WAGO 750-352 fieldbus coupler is now ready EtherNet/IP communications.

4.2 Determine the Process Image of the 750-352 I/O node

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 CompactLogix Controller, 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 analog and 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 modules location. When the number of digital points exceeds eight (8-bits), the coupler automatically starts the next byte.



Example Node Contents:

750-352 Ethernet Coupler

750-602 24VDC Power Feed

750-402 4ch 24VDC Digital Input

750-504 4ch 24VDC Digital Output

750-467 2ch 0..10V Analog Input

750-550 2ch 0..10V Analog Output

750-600 End Module

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)

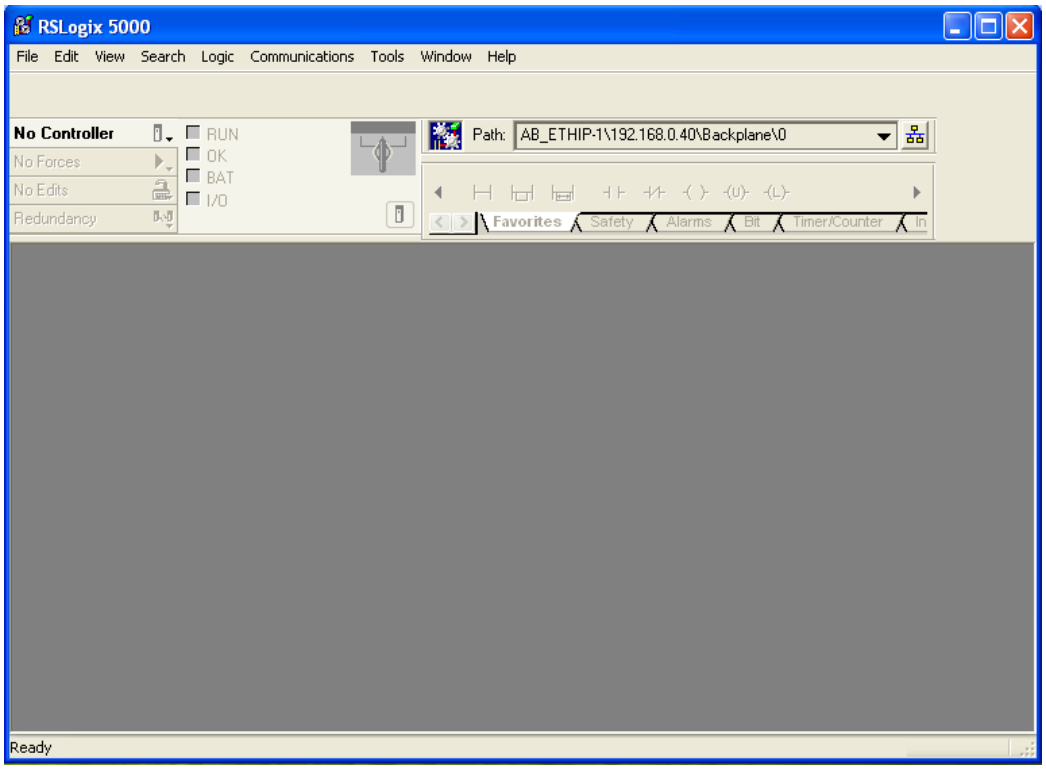
Output Process Image
Byte 0 – 750-550 Channel 1 Analog Output, Low Byte
Byte 1 - 750-550 Channel 1 Analog Output, High Byte
Byte 2 - 750-550 Channel 2 Analog Output, Low Byte
Byte 3 - 750-550 Channel 2 Analog Output, High Byte
Byte 4 - 750-504 4-Channel 24VDC Digital Output (bits 0 through 3)

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

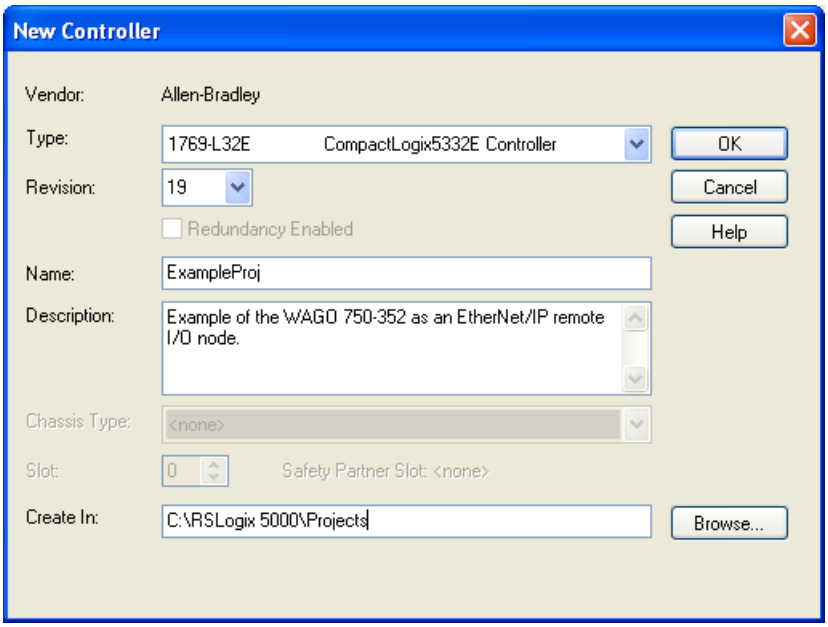
4.3 Add the WAGO 750-352 to the CompactLogix Integrated EtherNet/IP Scanner

This section assumes that you have an overall understanding of Allen Bradley's hardware and software. It focuses only on configuring the CompactLogix 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.

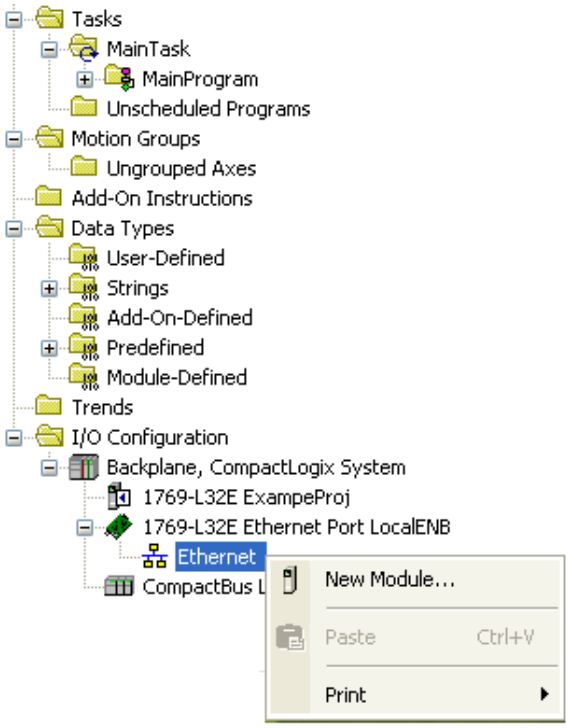


3) Enter the following parameters:

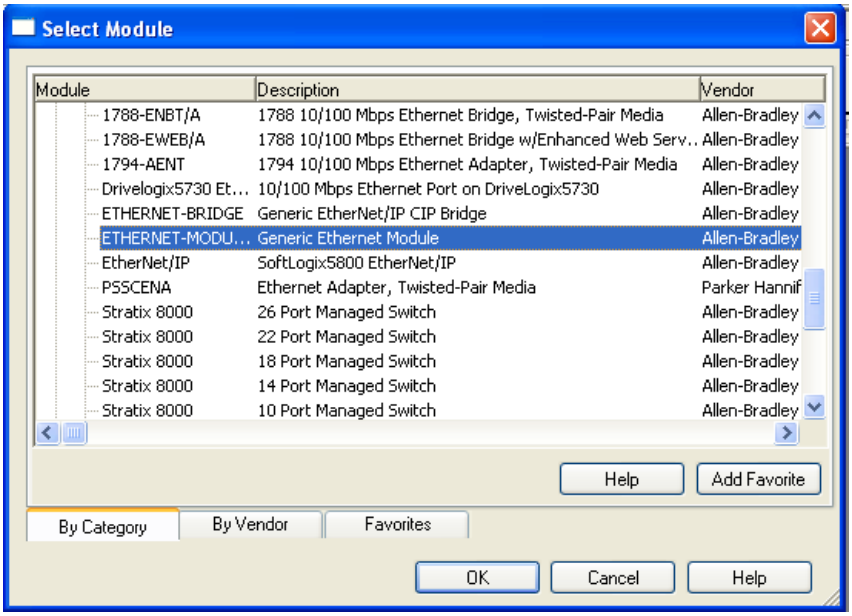
Type:	**1769-L32 CompactLogix5332E Controller**
Revision:	**19**
Name:	**ExampleProj**
Description	Enter an appropriate description
Created In:	Enter an appropriate folder

4) Click on **OK**.

5) The WAGO I/O node is configured as a Generic Ethernet Module in the CompactLogix I/O configuration. Right-click on I/O Configuration and select the **New Module…** menu item.

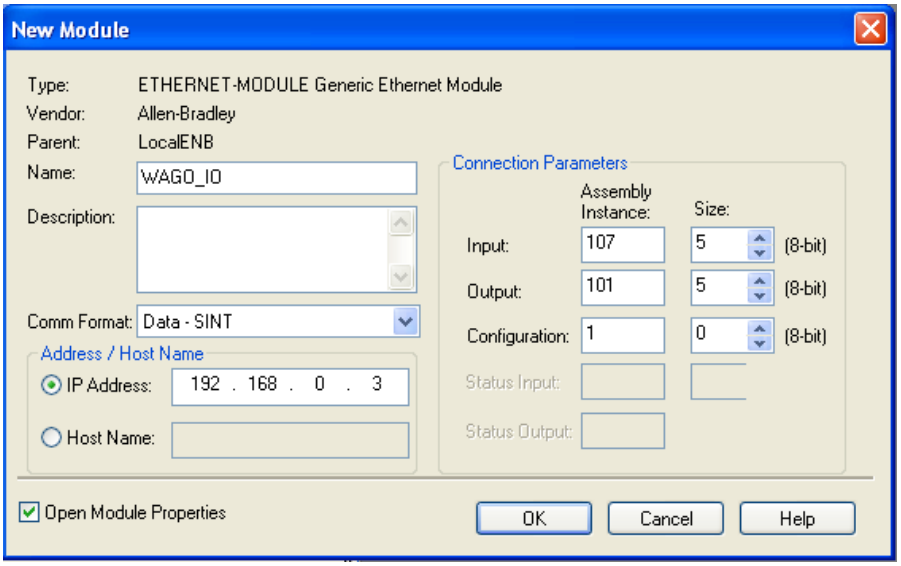


The *Select Module* dialog window is displayed.



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

The *New Module* dialog window is displayed for the Generic Ethernet Module.



7) Enter the following parameters:

Name:	**WAGO_IO**	
Comm Format: Data –	**Data- SINT**	(8-bit signed integer; -128..+127)
IP Address:	**192.168.0.3**	(IP Address of WAGO 750-352)
Input Assemby Instance:	**107**	(CIP Assembly Instance)
Input Size:	**5**	(5 bytes of Input Process Data)
Output Assemby Instance:	**101**	(CIP Assembly Instance)
Output Size:	**5**	(5 bytes of Output Process Data)
Config. Assemby Instance:	**1**	(Not used by system)
Configuration Size:	**0**	(Not used by system)

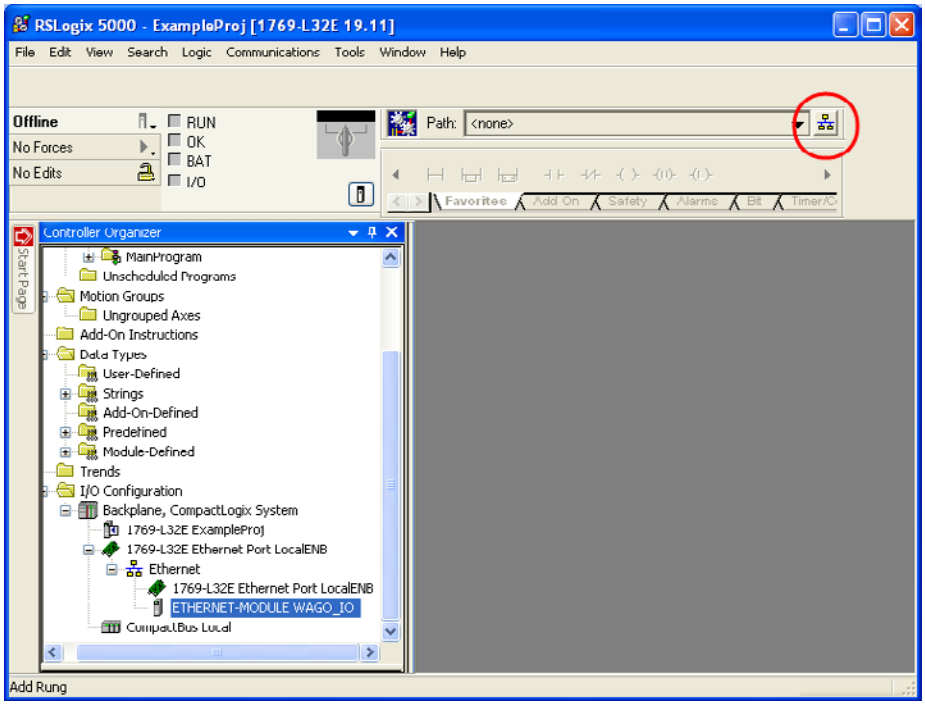
Note

Section 4.2 explains how to calculate the input and output process image sizes for the WAGO 750-352 node. The sizes are then used in the above *New Module* dialog for the Input and Output Assembly Sizes.

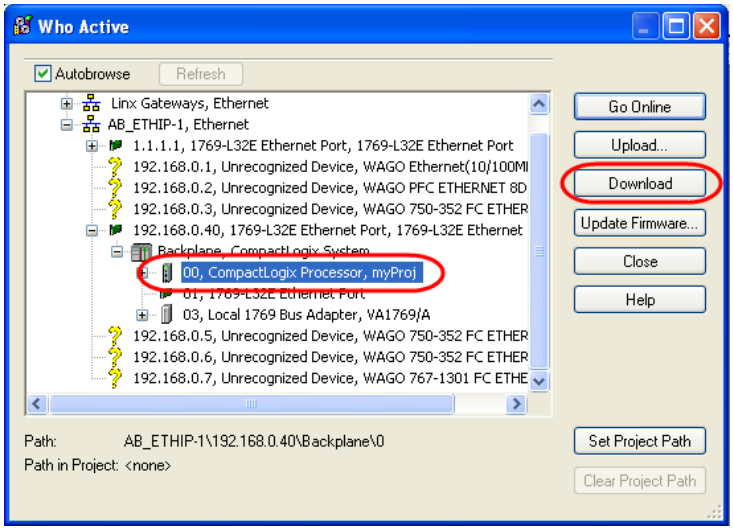
Note

A complete list of the Input and Output Assembly Instances can be found in Appendix B.

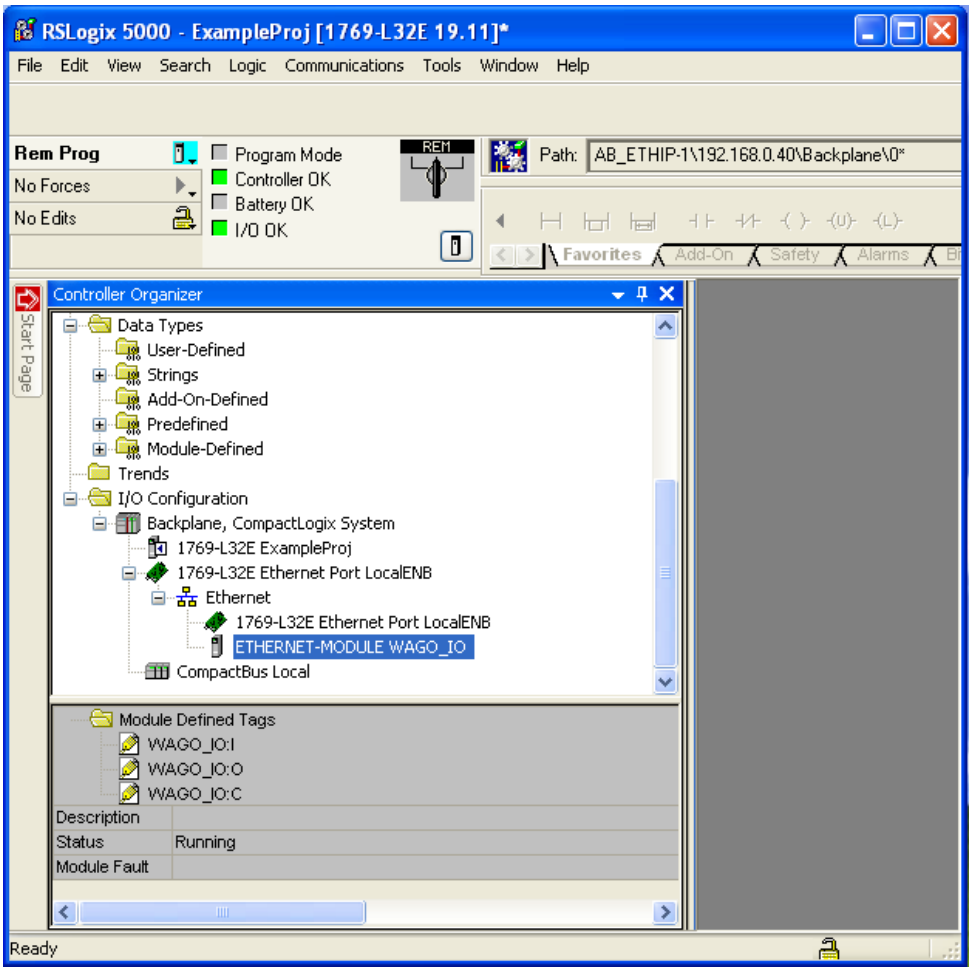
8) The Communications Path must be set before downloading. To set the path, click the "Who Active" button, i.e.,  , and choose the appropriate path.



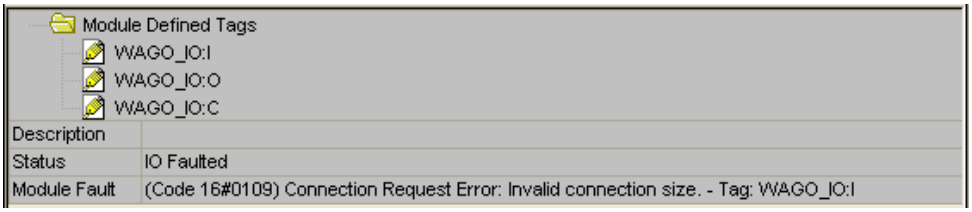
9) After selecting the appropriate path, the program and configuration can be downloaded to the CompactLogix controller by clicking **Download**.



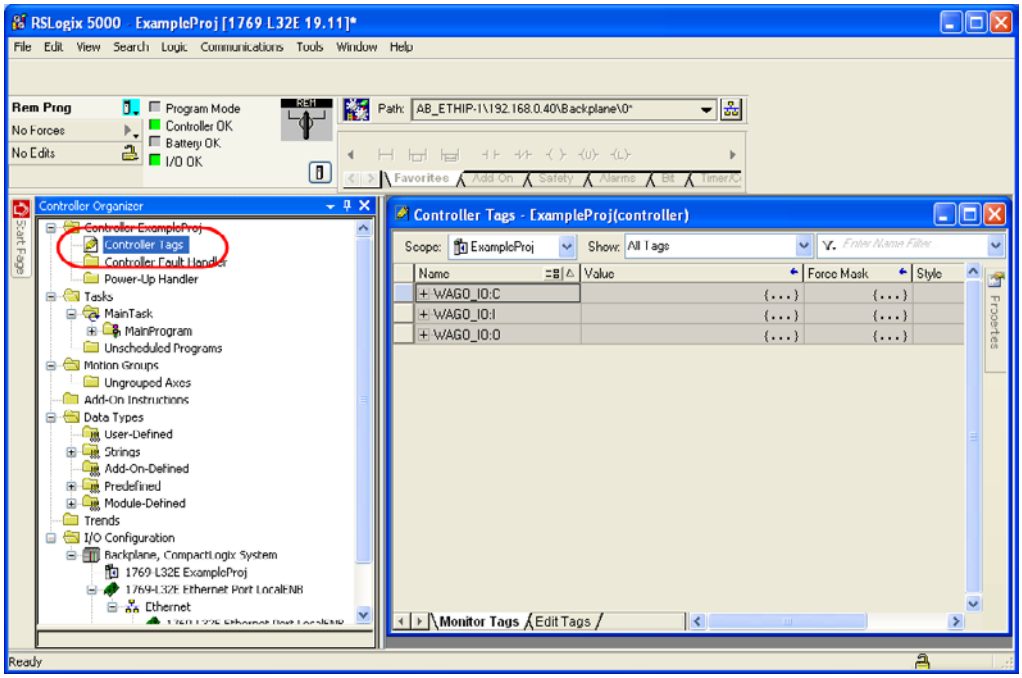
After downloading, if everything was setup correctly, the “I/O OK” indicator is green. Additionally, when the cursor is placed on the ETHERNET-MODULE WAGO_IO tree item, the Module Fault box at the bottom of the figure below should be blank, indicating no error.



If an error occurs, an error message will be displayed in the *Module Fault* box. The screen below indicates an improper connection size was entered for the input assembly.

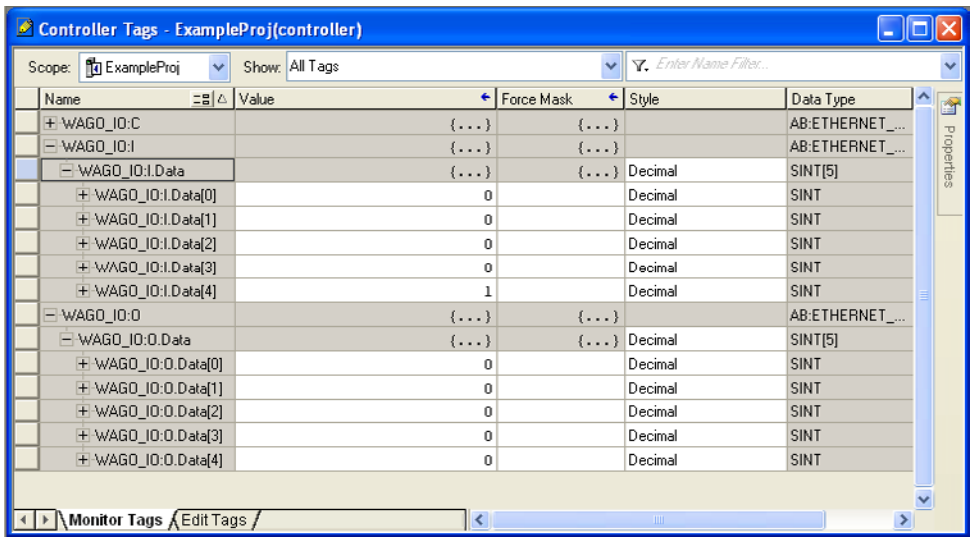


10) To view the process data from the WAGO 750-352, double-click on the **Controller Tags** tree item.



The *Controller Tags* dialog window opens. In this example, only data from the WAGO 750-352 is displayed. In a real world application, more data would be included in the project.

11) Click the ”+” button to expand the Controller Tags view.



After completing these steps, the configuration of the WAGO 750-352 coupler and the CompactLogix EtherNet/IP Scanner are complete. The WAGO input and output data is now accessible to the controller as defined in the following tables:

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 750-352 does not use this data, it should be ignored.

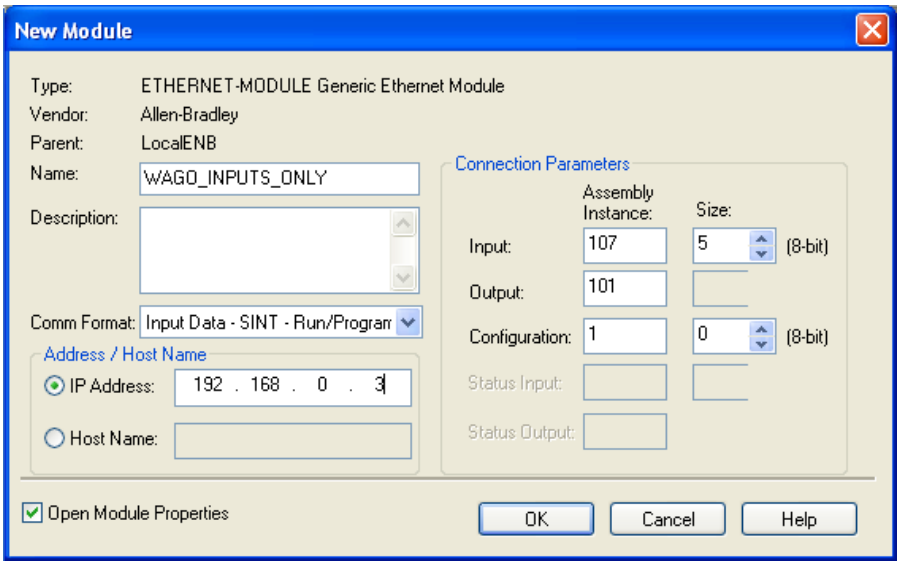
5 Appendix A – Other Configuration Samples

Input Modules Only

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

2) Set the Input *Assembly Instance* to **107**. The input *Size* is the input process image size.

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

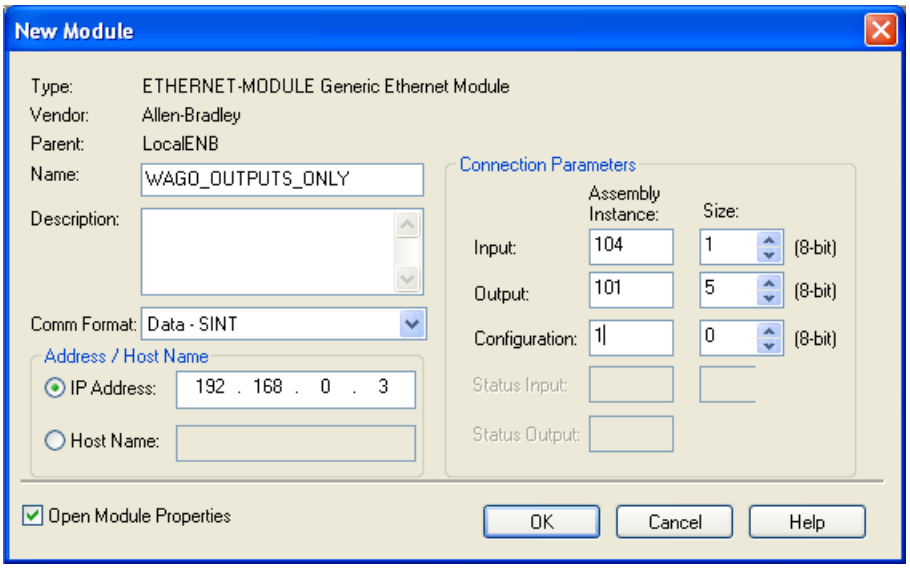


Outputs Modules Only

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

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

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



6 Appendix B – WAGO Assembly Instances

A process data exchange is initiated using assembly instances. From the existing static assembly instances (see Section 11.3.5.6 of 750-352 Product Manual), select one instance for each sending direction.

For transmission of process data from the higher-level controller (originator) to the fieldbus coupler (target), the following assembly instances are available:

Instance 101: for analog and digital output data

Instance 102: for digital output data

Instance 103: for analog output data

For transmission of process data from the fieldbus coupler to the higher-level controller, the following assembly instances are available:

Instance 104: for analog and digital input data, including status byte

Instance 105: for digital input data, including status byte

Instance 106: for analog input data, including status byte

Instance 107: for analog and digital input data

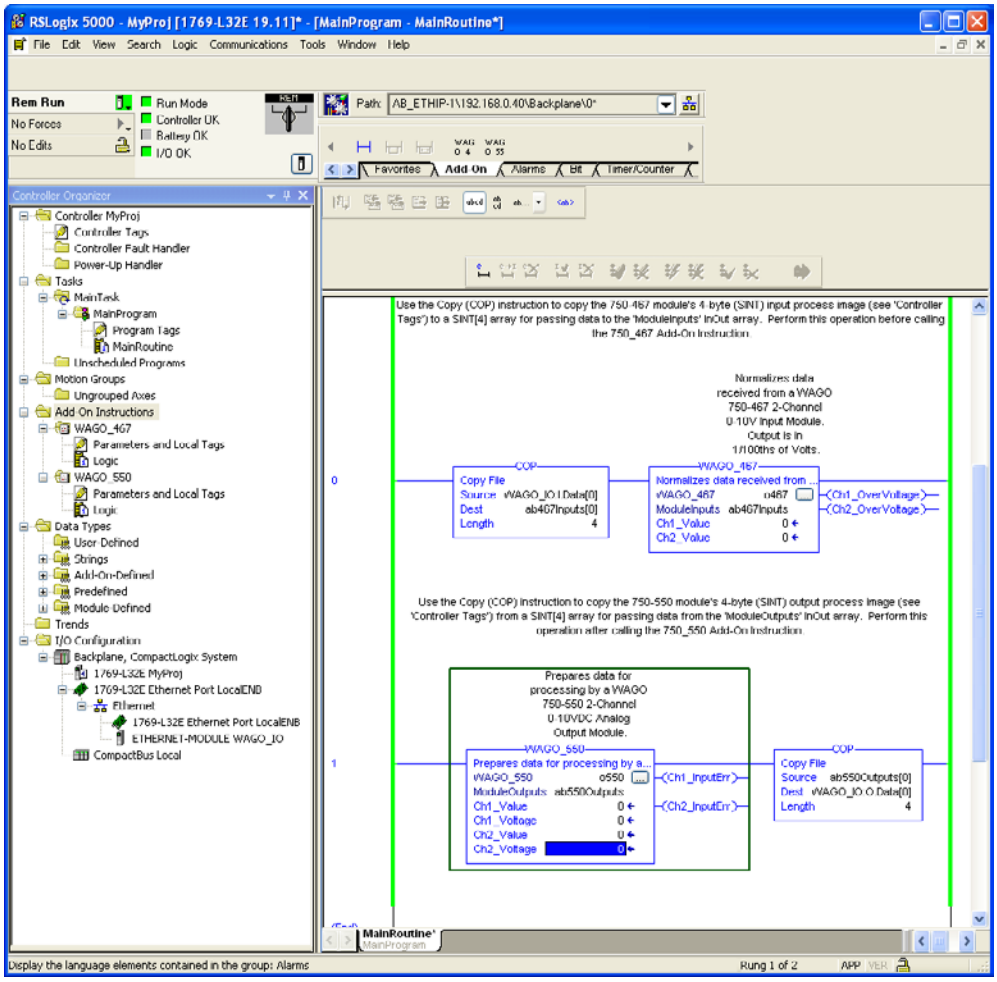
Instance 108: for digital input data

Instance 109: for analog input data

7 Appendix C – WAGO Add-On Instructions

WAGO offers optional RSLogix Add-On Instructions to simplify and accelerate the development of your RSLogix program with the WAGO-IO-SYSTEM. The instructions help decode, calculate, and scale process data from various WAGO IO modules.

To obtain a list of available instructions, or to request instructions for your application, visit http://www.wago.us/addon.htm or contact WAGO's Technical Support Team at support.us@wago.com.



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