



10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

[www.aimco-global.com](http://www.aimco-global.com)

# Using an AIMCO Gen 4 Controller on a Rockwell PLC with Modbus TCP

Authors: Kade Olson and Sam Stewart

Date: June 17, 2015

## Introduction

Many AIMCO torque controllers come standard with Modbus TCP. A common use is interfacing them to an Allen-Bradley PLC for error proofing and data collection. This document is intended to show the steps required to setup the PLC and AIMCO controller for Modbus TCP communication.

## Equipment/Software

- Modbus capable controller from AIMCO.
  - Generation 4 controller (iEC4EGVP).
- 1769-L32E CompactLogix5332E Controller Rev 16.20.
- MVI69-MNET Modbus TCP/IP Master Module.
- RSLogix 5000 Rev v16.3.
- 4 - Ethernet cables

## Hardware Setup

- Connect an Ethernet cable from the CompactLogix L32E to an Ethernet switch.
- Connect an Ethernet cable from the PC to an Ethernet switch.
- Connect an Ethernet cable from the Modbus module to an Ethernet switch.



- Connect an Ethernet cable from the AIMCO controller to an Ethernet switch.

10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

[www.aimco-global.com](http://www.aimco-global.com)



## Initial Setup

### Defining the CompactLogix L32E Module for the PLC

After the RSLogix5000 software is initialized, you will choose to create a new project. Make sure that the 'Type' and 'Revision' fields match the PLC controller being used. After a 'Name' and 'Description' are created, select a destination where you will save the project (see Figure 1). Click OK.

10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com

The screenshot shows a 'New Controller' dialog box with the following fields and values:

- Vendor: Allen-Bradley
- Type: 1769-L32E CompactLogix5332E Controller
- Revision: 16
- Redundancy Enabled:
- Name: Modbus\_Tutorial
- Description: This is a Modbus Tutorial
- Chassis Type: <none>
- Slot: 0
- Safety Partner Slot: (empty)
- Create In: C:\Documents and Settings\acrauser\Desktop

Buttons: OK, Cancel, Help, Browse...

Figure 1. Create a new Project with CompactLogix5332E Controller

## Defining the Modbus TCP Module for the PLC

In order to define a module on the PLC, you will need to be 'Offline' of the PLC controller. Navigate the tree view in the "Controller Organizer" window pane and right click on the 'CompactBus Local' item under the 'Backplane, CompactLogix System' tree view (see Figure 2). Select 'New Module' and search for 'Generic 1769 Module' under the 'Other' tree view. Click OK.

10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com

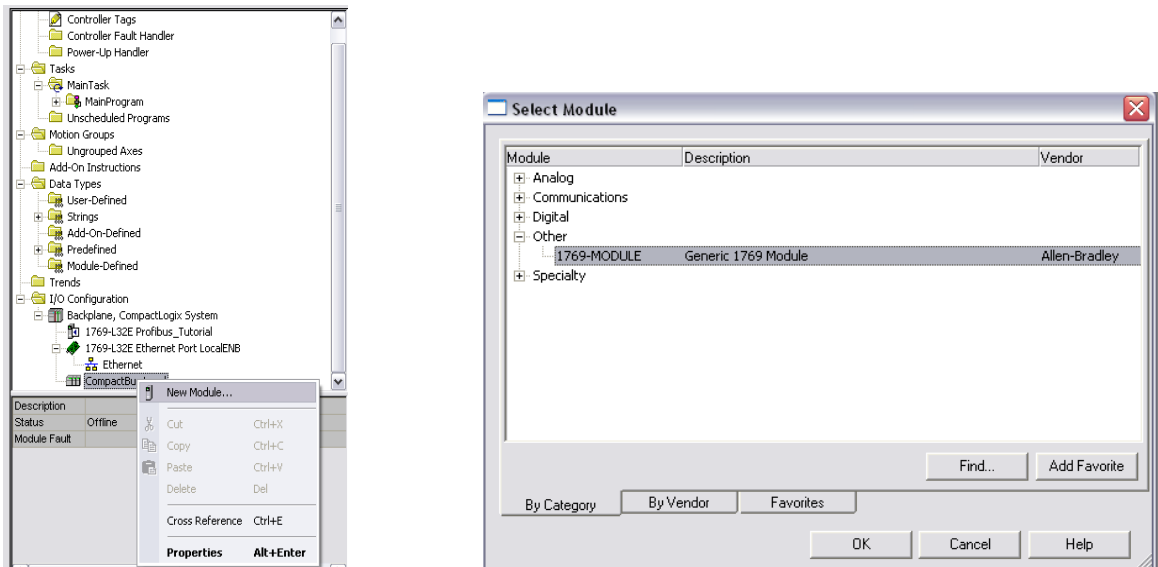


Figure 2. Define New Generic 1769 Module

## Setting up the Connection

The AIMCO controller has two connection assemblies, Input and Output. The AIMCO controller's produced output image (Assembly Instance 100) has a default size of 61 x (16 bit) INTS. The AIMCO controller's consumed input image (Assembly Instance 101) with a size of 62 x (16 bit) INTS. The size of the inputs and outputs associates with a block size of 60 (This value is needed in ProSoft Configuration Builder).

## Configuring the Connection

Configuring the connection will require you to define several pieces of information. See Figure 3

- Name of the Module – This will be used as an RSLogix references for Tags.
- Description of the Module.
- Comm Format – Change from default to “Data – INT”.
- Select the slot where the Modbus TCP module resides.
  - This example has the Modbus TCP module in the second slot on the PLC bus (it is the second closest to the CompactLogix controller).
- Connection Parameters
  - PLC Input Assembly 101 set to 62 x (16 bit) INTS.
  - PLC Output Assembly 100 set to 61 x (16 bit) INTS.
  - PLC Configuration set to 102 size of 0 bytes.

10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com

**New Module**

Type: 1769-MODULE Generic 1769 Module  
Parent: Local

Name: Modbus  
Description: Modbus Module  
Comm Format: Data - INT  
Slot: 2

Connection Parameters

	Assembly Instance:	Size:
Input:	101	62 (16-bit)
Output:	100	61 (16-bit)
Configuration:	102	0 (16-bit)

Open Module Properties

OK Cancel Help

Figure 3 Defining the Modbus TCP Module

Click 'OK' button when you have defined the module.



Verify that the next prompt has the 'Major Fault On Controller If Connection Fails While in Run Mode' box checked (see Figure 4). Click OK after this has been verified.

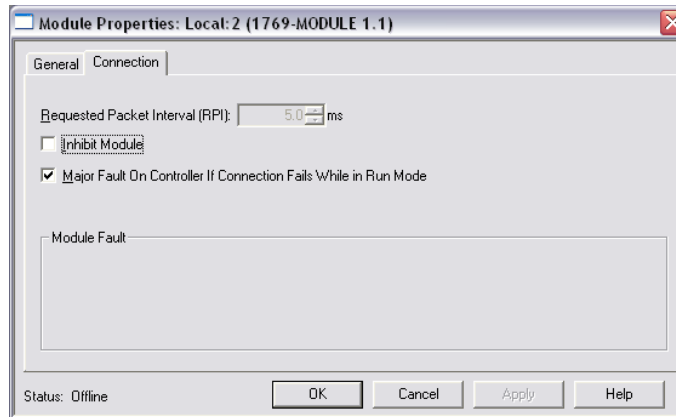
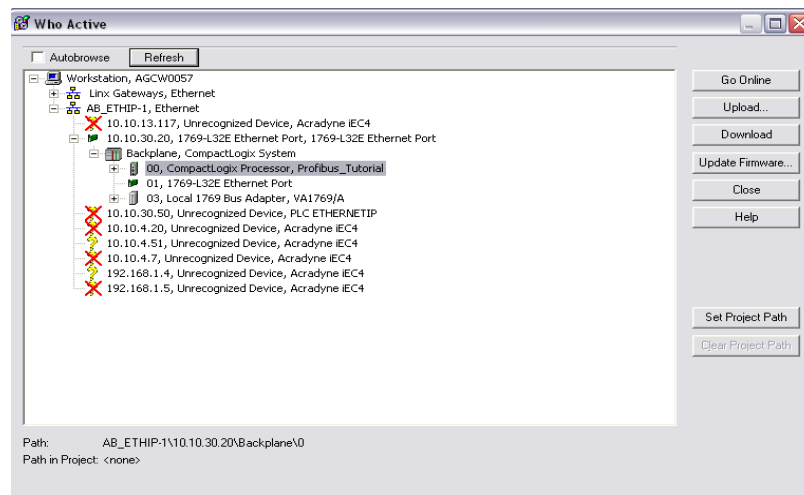


Figure 4 Defining the Modbus TCP Module

## Downloading the configuration

Under the Communications tab at the top of the RSLogix 5000 screen, select 'Who Active'. In this example a gateway has already been established therefore we can expand 'AB\_ETHIP-1, Ethernet' tab and click 'Refresh' (If this has not been configured, it must be done in RSLinx. Refer to document 'Configuring Communication between the PC and the Rockwell PLC' for further assistance with this). All the active addresses on the network created will remain without a red 'X' (see Figure 5). Expand the tree on the IP address that corresponds to the PLC controller you are using. Click on '00, CompactLogix Processor' under the 'Backplane, CompactLogix System' and select 'Download' to the right of the menu.



10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com



Figure 5 Defining the Modbus TCP Module

Follow the prompts. The program will ask if you would like to 'Change the controller mode back to remote run'. Click Yes.

### Configuring the AIMCO Controller

Go to any web browser and navigate to the IP address of the Gen 4 controller (AIMCO Controller default IP Address is 10.10.30.150). This step can also be done from the AIMCO controller itself. Click on the 'Controller' option and select 'Communication Interfaces' to bring up the Communication settings of the controller. Verify that the AIMCO controller IP address, subnet mast, and gateway match what is configured in the ProSoft Configuration Builder setup. This setup has the following values:

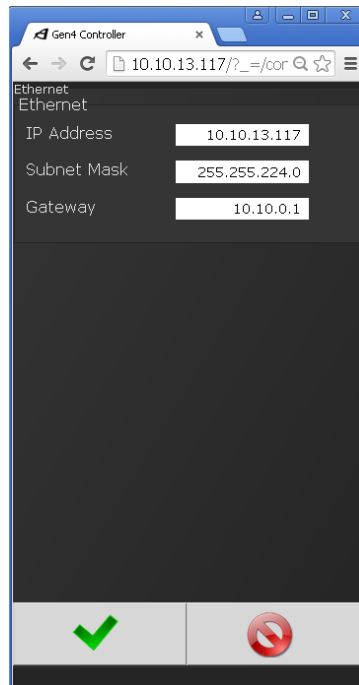


Figure 6 Gen 4 Controller Communication Settings

Return to the 'Controller' menu and select 'I/O' to bring up the Inputs and Outputs of various modes of communication. Since we are using Modbus TCP, we will need to create input and output variables since no defaults exist. To create a variable, click the 'plus' symbol on the left of the screen. Select which bit/bits you would like to enable and click the green check mark. For simplicity, choose only one bit for the input (stop bit) and output (tool enable). These steps are shown in Figure 7.

10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com

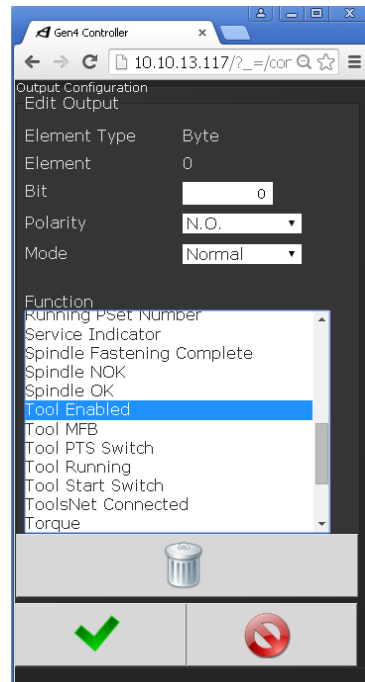
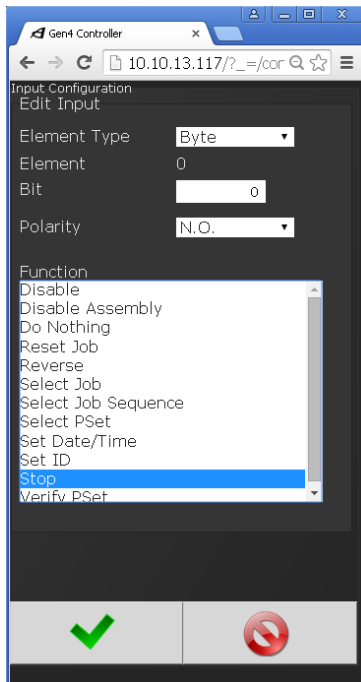
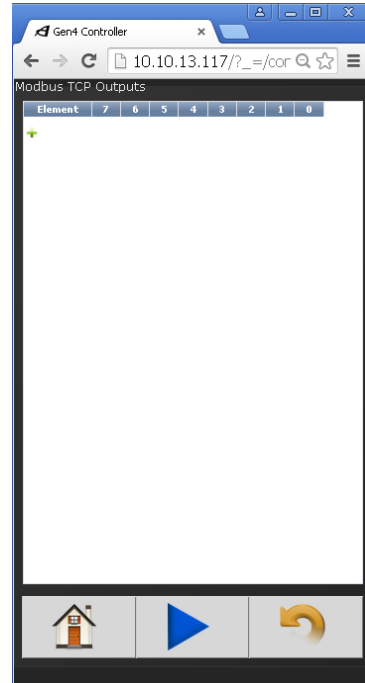
10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com





10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com

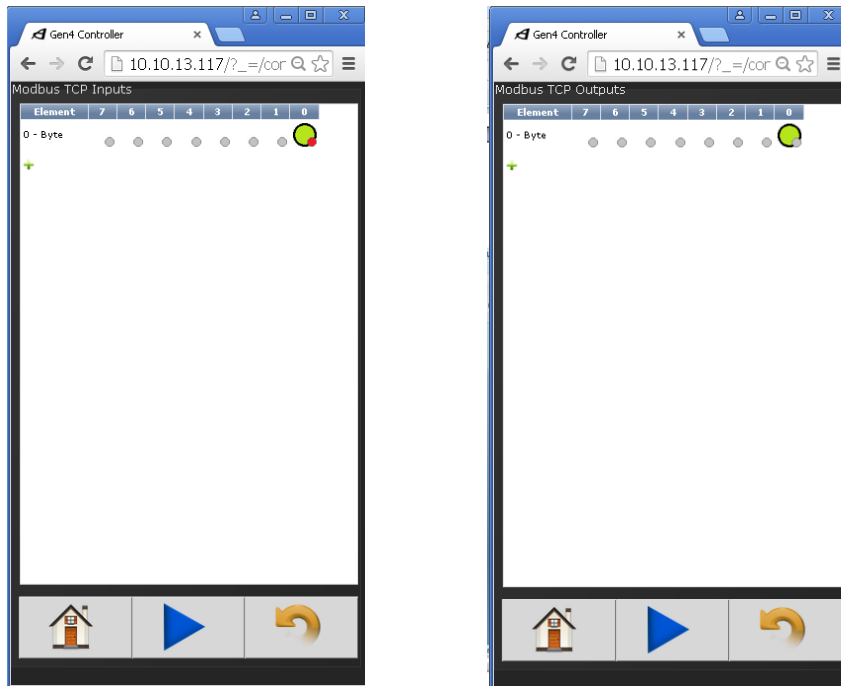


Figure 7 Controller Modbus TCP Settings

Pay no attention to any activated bits. These will be resolved once you import the Modbus TCP communication ladder rung. In the meantime, check that the controller and PLC are correctly configured by verifying that no red 'X' mark exists on the Modbus TCP module in the "Controller Organizer" tree view pane in RS Logix. The status will say 'Running' and can also be verified by navigating to the 'Properties' of the online module. If this is not the case, review the above procedures and settings.

## Adding the Logic

### Tags

RSLogix will automatically define 'Controller Tags' in the project file that reference module name as configured in Figure .

Name	Value	Force	Style	Data Type	Description
Local:2.C	{...}	{...}		AB:1769_MD...	
Local:2.I	{...}	{...}		AB:1769_MD...	
Local:2.I.Fault	0		Decimal	DINT	
Local:2.I.Data	{...}	{...}	Decimal	INT[62]	
Local:2.O	{...}	{...}		AB:1769_MD...	
Local:2.O.Data	{...}	{...}	Decimal	INT[61]	

Figure 8 Modbus TCP PLC Controller Tags

It is important to note that RSLogix defines its PLC Controller tags as 'INT' type. This means that every memory index will actually hold two bytes of data.

### Import Modbus TCP Rung

Find the 'Tasks' menu in the "Controller Organizer" tree view pane and expand 'MainTask' along with 'MainProgram'. There are two options in this field we will be using. To import the Modbus TCP communication rung, double click on 'MainRoutine'. Right click on the '0' rung and select 'Import Rung...' (Make sure you are offline from the PLC controller. This is done in under the 'Communications' tab at the top of the screen). See Figure 9.

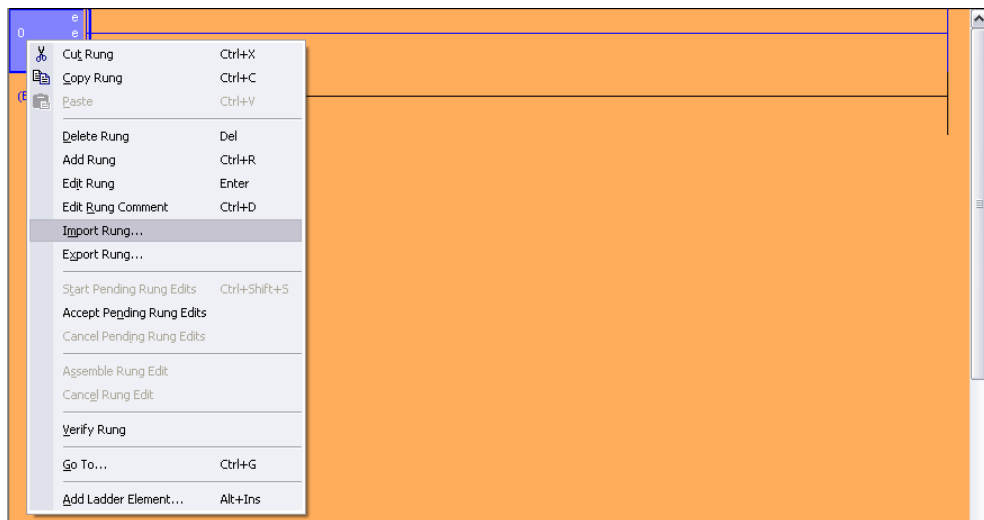


Figure 9 Modbus TCP PLC Communication Rung

10000 SE Pine Street  
Portland, OR 97216

TEL: 800.852.1368  
FAX: 503.262.3410

www.aimco-global.com

Locate the file 'MVI69MNET\_AddOn\_Rung\_v1\_4(1).L5X' and import (This can be found on ProSoft's website). Make sure that the Local values match up with the position of the Modbus TCP module (see Figure 10). For example, if the Modbus TCP module were in slot 3 on the PLC, then the Local variables would say 'Local:3:I' and 'Local:3:O'.

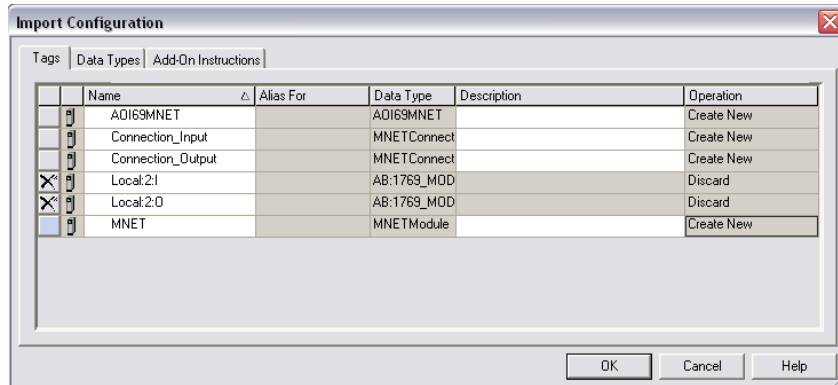


Figure 10 Modbus TCP PLC Controller I/Os

Click 'OK' when finished. Figure 11 shows the results.

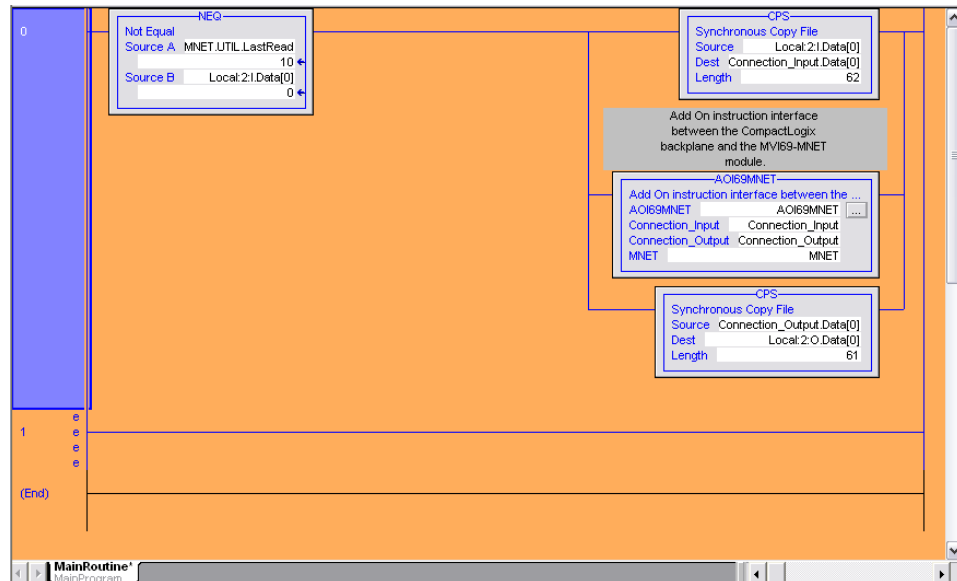


Figure 11 Modbus TCP PLC Result

### Read/Write to the AIMCO Controller

Now that our Modbus TCP communication rung is configured, we need to establish some logic variables to confirm proper functionality. Under the menu 'MainProgram', double click on

10000 SE Pine Street

Portland, OR 97216

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com



'Program Tags'. At the bottom of the screen, select 'Edit Tags' and click on the blank cell under the 'Name' column to create a variable. In this example, we will create two variables that will output to the AIMCO controller and tell the tool to stop (see Figure 12). Make sure that the 'Stop\_Button' variable has a 'BOOL' data type and that the second variable, 'Stop', is aliased to output over the Modbus TCP Ethernet port (The data type should automatically change to 'BOOL').

10000 SE Pine Street  
Portland, OR 97216

Name	Alias For	Base Tag	Data Type
Stop_Button			BOOL
Stop	MNET.DATA.WriteData[0].Q[C]	MNET.DATA.WriteData[0].Q[C]	BOOL

Figure 12 Modbus TCP PLC Program Tags

Before you download any of the configuration to the PLC, you need to create the ladder logic. Navigate back to 'MainRoutine' and create the setup shown in Figure 13.

TEL: 800.852.1368

FAX: 503.262.3410

www.aimco-global.com

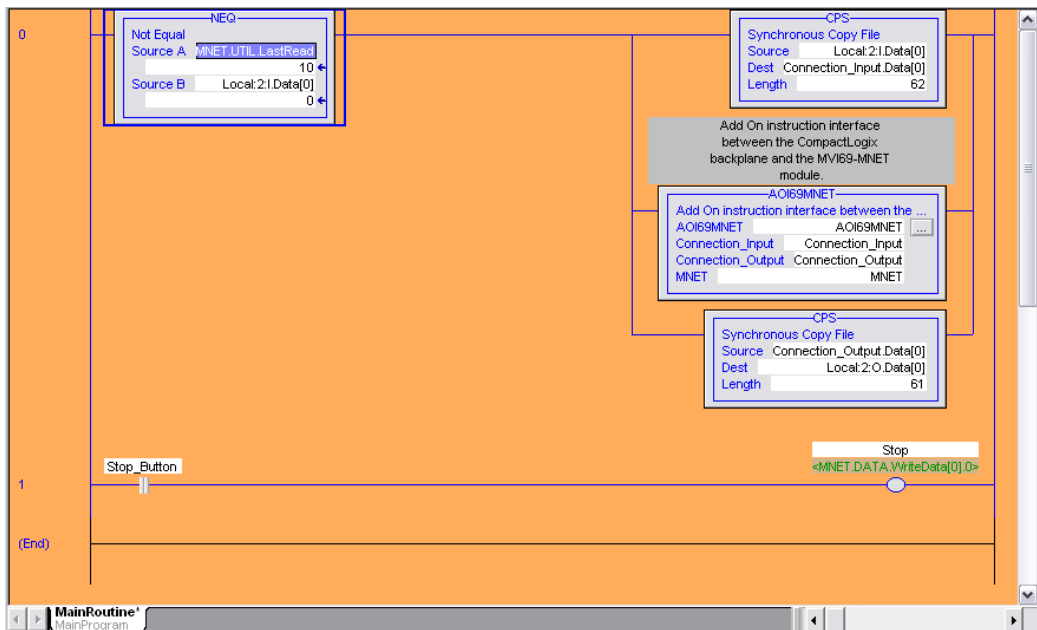


Figure 13 Modbus TCP PLC Ladder Logic

Download the new settings to the PLC controller. The 'Stop\_Button' variable can now be toggled by selecting the ladder element and pressing ctrl+T on the keyboard.