

# ***460ETCPS-N34***

## ***Protocol Gateway***

### **Product User Guide**

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*Firmware Version 5.2.14*

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## Revision History

Version	Date	Notes
<b>5.1.1</b>	6/7/16	<p>Features Added</p> <ol style="list-style-type: none"> <li>1. Reworked AutoMap functions to automap per device and made default for most productssupport@rtautomation.com</li> <li>2. Implemented Automatic reboot and redirect upon startup</li> <li>3. Modified Template usage so it can be applied easily on a protocol or product level</li> <li>4. All imported configurations will force Manual mode for Mapping and AutoServer functionalities</li> <li>5. Allow saving/replacing of configuration via SD Card</li> <li>6. Added DHCP for Network Settings (default)</li> </ol>
<b>5.2.1</b>	10/12/16	<p>Features Added</p> <ol style="list-style-type: none"> <li>1. Replaced Build Date with Revision Number</li> <li>2. DF1 Master (DFM) Released</li> <li>3. NNA4 Dual RS485 Hardware</li> </ol> <p>Bug Fixes</p> <ol style="list-style-type: none"> <li>1. BACnet/IP Server (BS) Relinquish Default</li> <li>2. BACnet MS/TP (BMS) Reninquish Default</li> <li>3. BACnet MS/TP Slave (BMS) CSV Object Parameter</li> <li>4. Modbus TCP/IP Client (MC) XML Import Bug when Write Only</li> <li>5. Modbus TCP/IP Client (MC) Write Directional changed Web Parameters</li> </ol>
<b>5.2.2</b>	1/12/17	<p>Features Added</p> <ol style="list-style-type: none"> <li>1. Added ability to add in prefixes to the filename (for BETA and DEMO)</li> <li>2. Updated Copyright Year to 2017</li> </ol>
<b>5.2.3</b>	1/19/17	<p>Bug Fixes</p> <ol style="list-style-type: none"> <li>1. BACnet/IP Server (BS) COV (Change of Value) Notifications with Binary Objects (both Input and Output)</li> </ol>
<b>5.2.4</b>	1/25/17	<p>Bug Fixes</p> <ol style="list-style-type: none"> <li>1. BACnet/IP Server (BS) COV (Change of Value) Notifications with Binary Output Objects</li> </ol>
<b>5.2.5</b>	2/16/17	<p>Bug Fixes</p> <ol style="list-style-type: none"> <li>1. BACnet/IP Server (BS) increased the number of COV's supported from 100 to 2800 across all objects</li> <li>2. BACnet MS/TP Slave (BMS) increased the number of COV's supported from 100 to 2800 across all objects</li> </ol>
<b>5.2.6</b>	2/21/17	<p>Bug Fixes</p> <ol style="list-style-type: none"> <li>1. BACnet/IP Server (BS) fixed the auto-server for Binary Objects for non-1 Bit Pack Option</li> <li>2. BACnet MS/TP Slave (BMS) fixed the auto-server for Binary Objects for non-1 Bit Pack Option</li> <li>3. BACnet MS/TP Slave (BMS) fixed the load template for Binary Output Objects for 1 Bit Pack Option</li> </ol>
<b>5.2.9</b>	3/15/17	<p>Bug Fixes</p> <ol style="list-style-type: none"> <li>1. Update for Translator Web Display for Mapping Configuration (buffer too small)</li> <li>2. Update for String Translator Web Display for Mapping Configuration (buffer too small)</li> </ol>
<b>5.2.14</b>	5/4/17	<p>Bug Fixes</p> <ol style="list-style-type: none"> <li>1. Completely removed unit id from MS protocol. MS will respond to all Unit IDs</li> <li>2. Removed "Unit ID" description from MS help page</li> </ol>

## Overview

The 460ETCPS-N34 gateway connects up to 5 Allen Bradley PLCs with a PROFINET IO Controller. By following this guide, you will be able to configure the 460ETCPS-N34 gateway.

For further customization and advanced use, please reference the appendices located on the CD or online at: <http://www.rtaautomation.com/product/460-gateway-support/>.

If at any time you need further assistance do not hesitate to call Real Time Automation support.

Support Hours are Monday-Friday 8am-5pm CST

Toll free: 1-800-249-1612

Email: [support@rtaautomation.com](mailto:support@rtaautomation.com)

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## Hardware Platforms

The 460 Product Line supports a number of different hardware platforms. There are differences in how they are powered, what serial settings are supported, and some diagnostic features supported (such as LEDs). For these sections, be sure to identify the hardware platform you are using.

To find which hardware platform you are using:

- 1) Look on the front or back label of the unit for the part number.
- 2) On the webpage inside the gateway, navigate to the dropdown menu under **Other** and select **Utilities**. Click the **Listing of Revisions** button. The full part number is displayed here.

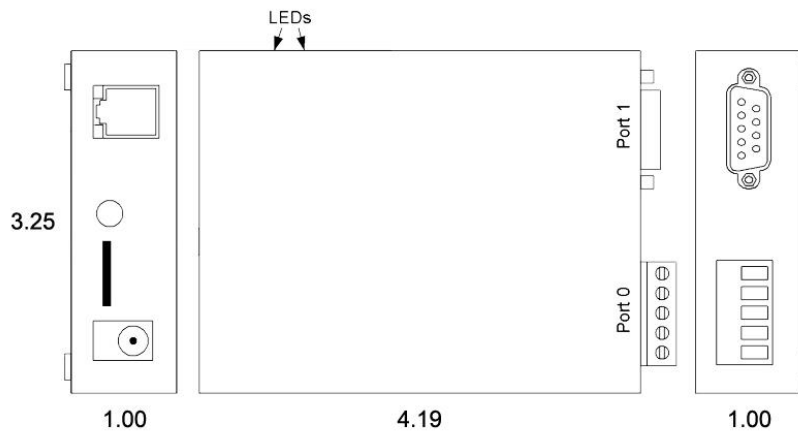
Once you have the full part number, the platform will be the number following the “-N”:

**460 P1P2 -NXXX**

↓                      ↓

**Product              Platform**

## Hardware – N34



Din Rail



Panel Mount

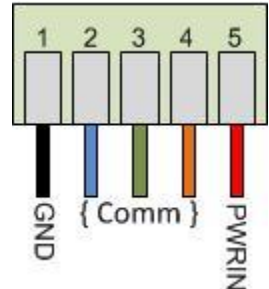


## Powering The Gateway

The following steps will allow you to properly and safely power the gateway.



**Warning** improper wiring will cause unit failure  
Use the Barrel Connector OR the Screw  
Terminals power connection, NOT both



- 1) Connect a 24VDC power source to the gateway.
  - a. The unit draws 125 mA at 24VDC
  - b. The gateway has a voltage operating range from 8-28VDC, 24VDC is recommended.

## Hazardous Environment Power & Installation Instructions



This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D, or non-hazardous locations only.

**WARNING – EXPLOSION HAZARD** - Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

**WARNING – EXPLOSION HAZARD** - Substitution of components may impair suitability for Class I, Division 2.

**THIS EQUIPMENT IS AN OPEN-TYPE DEVICE AND IS MEANT TO BE INSTALLED IN AN ENCLOSURE SUITABLE FOR THE ENVIRONMENT SUCH THAT THE EQUIPMENT IS ONLY ACCESSIBLE WITH THE USE OF A TOOL.**

**WARNING** – POWER JACK (Barrel Connector, J1) IS FOR MAINTENANCE USE ONLY AND MAY ONLY BE USED WHILE THE AREA IS KNOWN TO BE FREE OF IGNITIBLE CONCENTRATIONS OF FLAMMABLE GASES OR VAPORS. IT IS NOT TO BE CONNECTED UNDER NORMAL OPERATION.

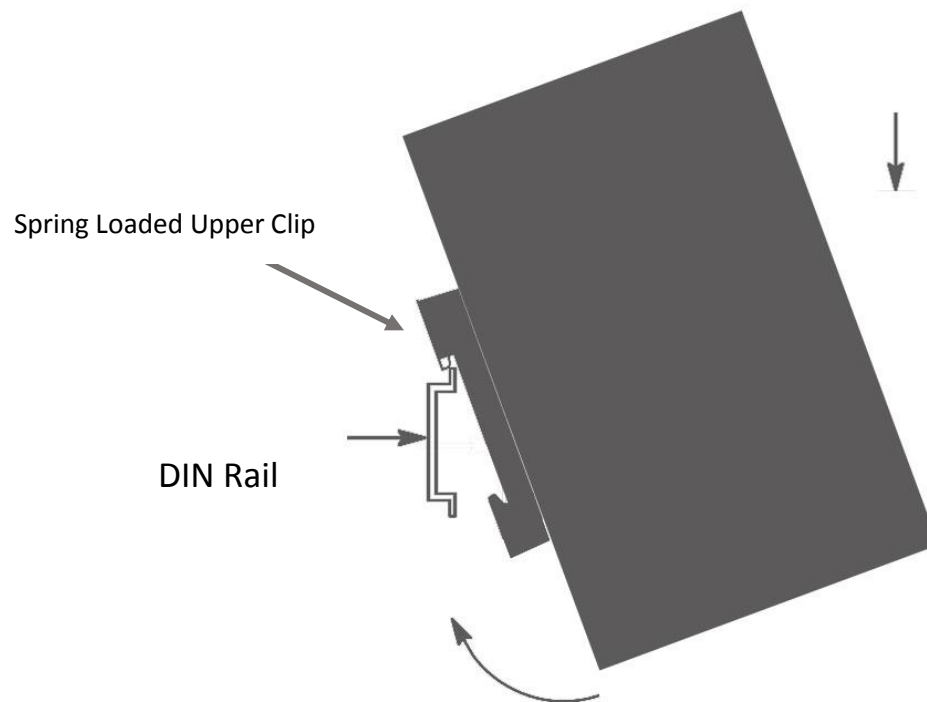
In Hazardous Environments the unit must be powered with between 12-24 VDC, 860 mA (6 W) max. Supervised. The unit is certified to be operated at -40°C to 50°C.

## Mounting with a DIN Rail

### Installing

Follow these steps to install your interface converter.

- 1) Mount your DIN Rail.
- 2) Hook the top mounting flange over the DIN Rail.
- 3) While pressing the 515RTAAIC against the rail, press down to engage the spring loaded upper clip and rotate the unit parallel to the DIN Rail.
- 4) Release downward pressure.



### Removing

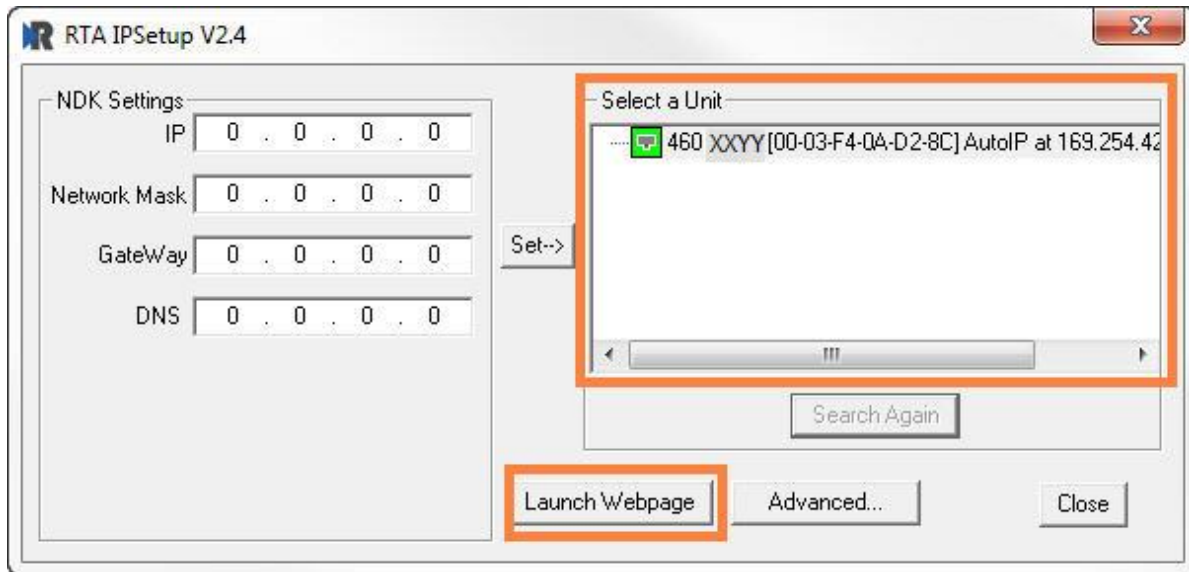
Follow these steps to remove your interface converter.

- 1) Press down on unit to engage the spring loaded upper clip.
- 2) Swing bottom of unit away from DIN Rail.

## Accessing the Main Page

The following steps will help you access the browser based configuration of the gateway. By default, DHCP is enabled. If the gateway fails to obtain an IP address over DHCP it will Auto IP with 169.254.X.Y.

- 1) Insert the provided CD-ROM into a computer also on the network.



- 2) Run the IPSetup.exe program from the CD-ROM.
- 3) Find unit under "Select a Unit".
  - a. Change Gateway's IP address to match that of your PC if DHCP has failed.
    - i. You will know DHCP has failed if the gateway's IP address is AutoIP at 169.254.X.Y.
    - ii. If successful, it will say DHCP'd at ex: 192.168.0.100 or however your DCHP Client is set up.
  - b. If you do not see the gateway in this tool, then your PC is most likely set up as a static IP.
    - i. Change your PC's network settings to be DHCP. If DHCP fails, then it will change to be on the 169.254.x.y network.
    - ii. Relaunch the IP Setup tool to see if gateway can be discovered now.
- 4) Click **Launch Webpage**. The Main page should appear.

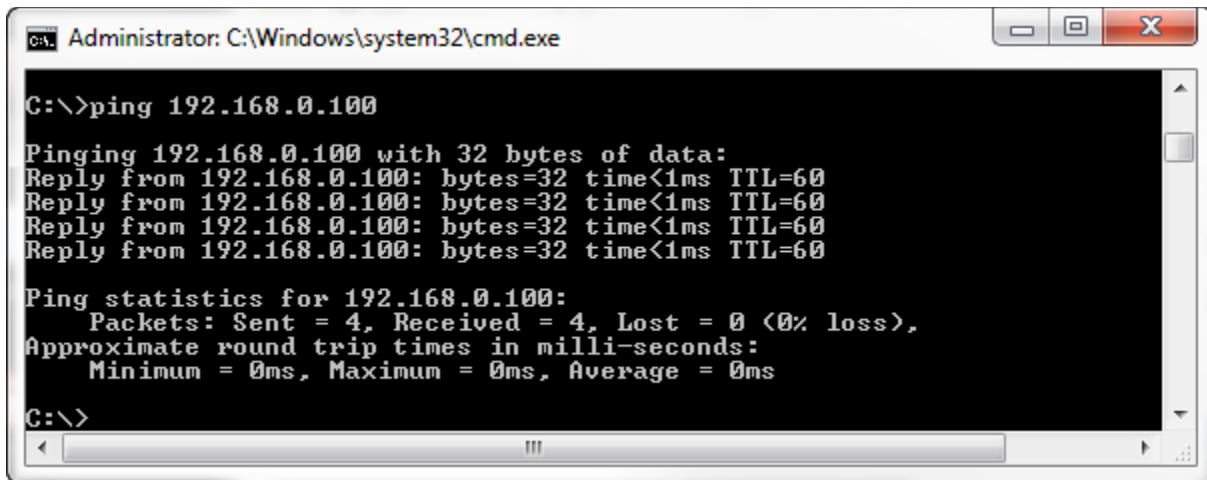
**Default setting is set to DHCP. If DHCP fails, default IP Address is 169.254.x.y**

## Error: Main Page Does Not Launch

If the Main Page does not launch, please verify the following:

- 1) Check that the PC is set for a valid IP Address
  - a. Open a MS-DOS Command Prompt
  - b. Type "ipconfig" and press enter
  - c. Note the PC's IP Address, Subnet, and Default Gateway
- 2) The gateway must be on the same Network/Subnet as the PC whether it's setup for DHCP or Static.

Once you have both devices on the same network, you should be able to ping the gateway using a MS-DOS Command Prompt.



```
Administrator: C:\Windows\system32\cmd.exe

C:\>ping 192.168.0.100

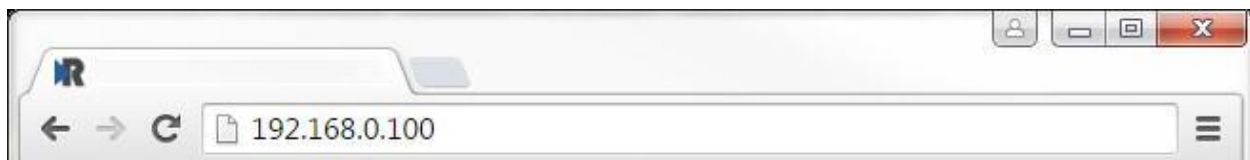
Pinging 192.168.0.100 with 32 bytes of data:
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60

Ping statistics for 192.168.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

The Screenshot above shows a gateway that is currently set to a static IP Address of 192.168.0.100.

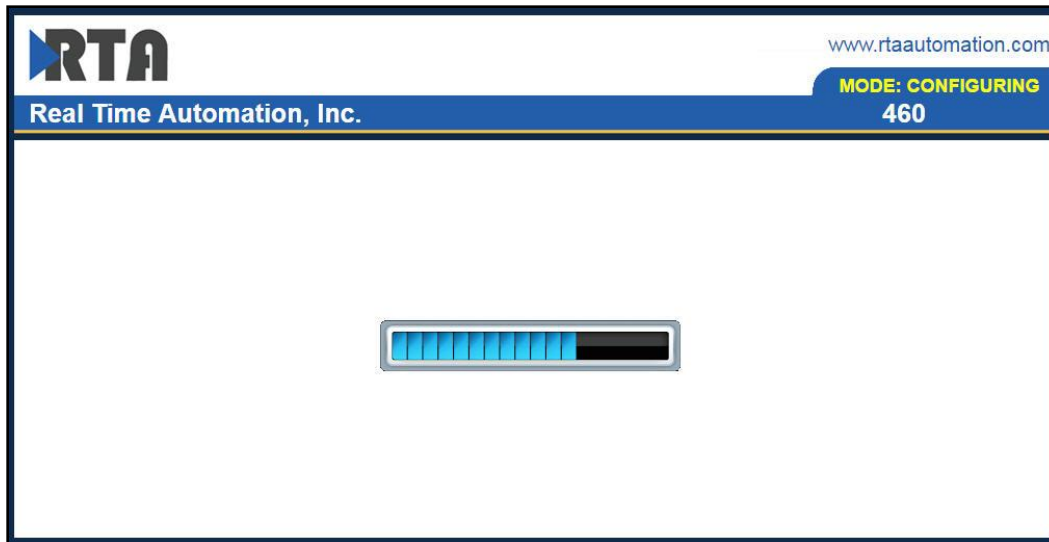
If you are able to successfully ping your gateway, open a browser and try to view the main page of the gateway by entering the IP Address of the gateway as the URL.





## Committing Changes to the Settings

- All changes made to the settings of the gateway in Configuration Mode will not take effect until the gateway is restarted via the webpage. Changes will not be stored if the gateway's power is removed prior to a reboot.
- **NOTE:** The gateway does not need to be restarted after every change. Multiple changes can be made before a restart, but they will not be committed until the gateway is restarted.
- When all desired changes have been made, press the **Restart Now** button.
- The webpage will redirect to our rebooting page shown below:



- The reboot can take up to 20 seconds. You will know the save was successful if the red box is no longer present.
  - If the IP address has not been modified, the gateway will automatically redirect to the main page.
  - If the IP address was modified, a message will appear at the top of the page to instruct the user to manually open a new webpage at that new IP.

## Main Page

The main page is where important information about your gateway and its connections are displayed.

Mode (orange box below):

Running Mode:

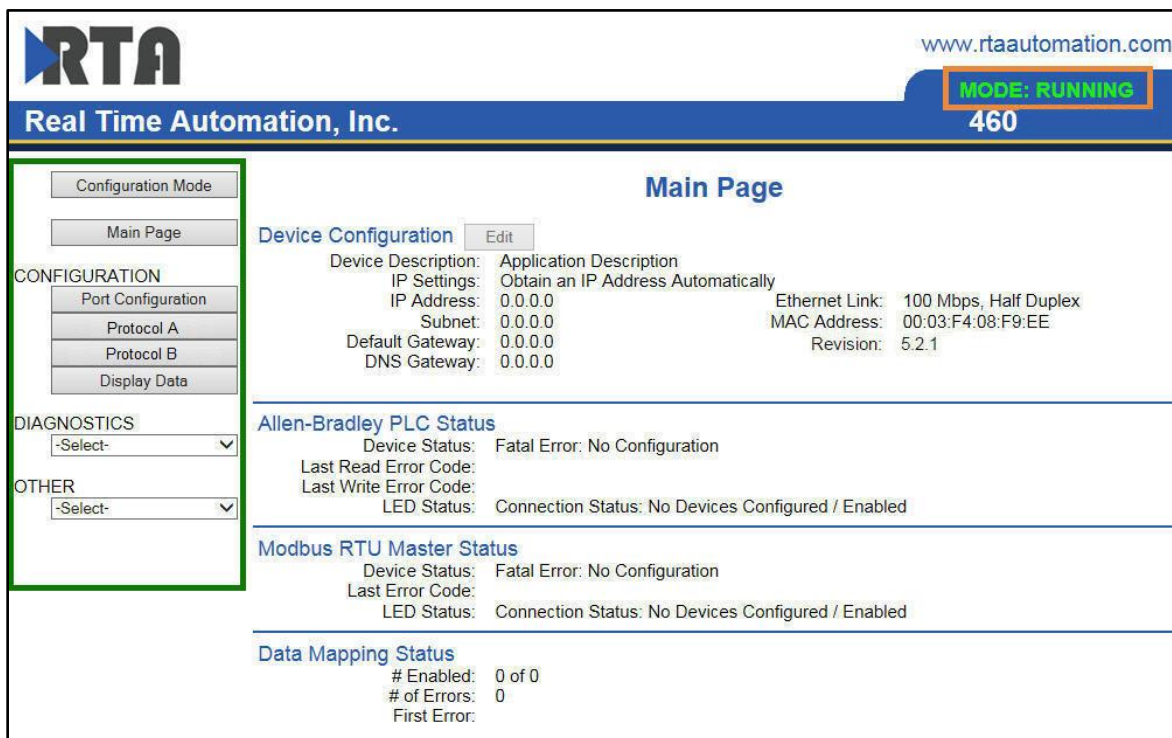
- Protocol communications are enabled
- Configuration cannot be changed during Running Mode. If changes are needed, click the **Configuration Mode** button shown in the green box below

Configuring Mode:

- Protocol communication is stopped and no data is transmitted
- Configuration is allowed

Navigation (green box below):

You can easily switch between modes and navigate between pages (Configuration, Diagnostics, and Other pages) using the buttons on the left hand side.



The screenshot shows the RTA Main Page interface. At the top, the RTA logo and website URL are visible. A status bar indicates the mode is 'MODE: RUNNING' and the device ID is '460'. On the left, a navigation menu is highlighted with a green box, containing buttons for 'Configuration Mode', 'Main Page', 'CONFIGURATION' (with sub-options: Port Configuration, Protocol A, Protocol B, Display Data), 'DIAGNOSTICS', and 'OTHER'. The main content area is titled 'Main Page' and displays several status sections: 'Device Configuration' (with an 'Edit' button), 'Allen-Bradley PLC Status', 'Modbus RTU Master Status', and 'Data Mapping Status'. Each status section shows details like Device Status, Last Read/Write Error Code, LED Status, and Connection Status.

## Device Configuration

The device configuration area is where you assign the device description, IP address, and other network parameters. Changes can only be made when the gateway is in Configuration Mode. Click the **Edit** button to make these changes.

### Main Page

**Device Configuration**

Device Description:	<input type="text" value="Application Description"/>		
IP Settings:	<input type="text" value="Obtain an IP Address Automatically"/>		
IP Address:	<input type="text" value="0.0.0.0"/>	Ethernet Link:	<input type="text" value="Auto-Negotiate"/>
Subnet:	<input type="text" value="0.0.0.0"/>	MAC Address:	<input type="text" value="00:03:F4:08:F9:EE"/>
Default Gateway:	<input type="text" value="0.0.0.0"/>	Revision:	<input type="text" value="5.2.1"/>
DNS Gateway:	<input type="text" value="0.0.0.0"/>		

Once you are done configuring the Description and the Network Settings, click the **Save Parameters** button.

If you are changing the IP Address of the gateway, the change will not take effect until the unit has been rebooted. After reboot, you must enter the new IP Address into the URL.

**It is recommended to leave the DNS Gateway set to 0.0.0.0 and the Ethernet Link as Auto-Negotiate. If configuring the gateway to use E-mail, the DNS Gateway must be set.**

## Allen-Bradley PLC Configuration

Click the **Allen-Bradley PLC** button to access the configuration page.

- 1) **Delay Between Messages:** Enter the length of time to delay between read and write scan line requests (ms).
- 2) **Response Timeout:** Enter the amount of time the gateway should wait before a timeout is issued for a read/write request (ms).
- 3) **Delay Between Connect Attempts:** Enter the amount of time the gateway should wait between attempts to connect to the PLC.
- 4) **Dependency Protocol:** If enabled, the Allen-Bradley PLC communication will stop if communication to the selected protocol is lost.

**Allen-Bradley PLC Configuration**Help

Delay Between Messages:  0-60000 ms

Response Timeout:  100-60000 ms

Delay Between Connect Attempts:  1000-60000 ms

Dependency Protocol:  ▼

Save Parameters

## External PLC Configuration

The bottom area of the Allen-Bradley PLC Configuration page lets you configure up to 5 PLCs.

There are three ways to configure this protocol:

- Auto-Configure Group by Device (Default)
- Auto-Configure Group by Data Type
- Manual Mode

**NOTE:** You may go back and forth between modes, but when reverting from Manual Mode to either of the two Auto-Configure Modes, all changes made in Manual Mode will be discarded.

**Allen-Bradley PLC Device List**

-Select-

Delete PLC

<< 1 >>

1-1

---

## External PLC Configuration: Auto-Configure

While in either of the two Auto-Configure Modes, the # of scan lines and the actual scan lines themselves cannot be edited. Auto-Configure Mode looks at the other protocol and then configures the Scan Lines within the PLC to match. The PLC Tag/File Names and Data Types will be defined after the other protocol is configured.

If the PLC is a CompactLogix, ControlLogix, or FlexLogix, the data will be configured according to the following rules:

- Any 8 Bit Signed/Unsigned data will be mapped as **Sint**.
- Any 16 Bit Signed/Unsigned data will be mapped as **Int**.
- Any 32 Bit Signed/Unsigned data will be mapped as **Dint**.
- Any 32 Bit Float and 64 Bit Float data will be mapped as **Real**.
- Any Coils or 1 Bit Binary Packs will be mapped as **Bool (1 Bit)**.
- Any Coils or 8/16/32 Bit Binary Packs will be mapped as **Bit Array (32 bit)**.
- Any String Data Types will be mapped as **String**.

If the PLC is a MicroLogix, SLC, or PLC5E, the data will be configured according to the following rules:

- Any 8 Bit Signed/Unsigned and 16 Bit Signed/Unsigned data will be mapped as **Int**.
- Any 32 Bit Signed/Unsigned, 32 Bit Float, and 64 Bit Float data will be mapped as **Real**.
- Any Coils or 1/8/16/32 Bit Binary Packs will be mapped as **Bit Array (16 bit)**.
- Any String Data Types will be mapped as **String**.

Regardless of PLC type, the following is also true:

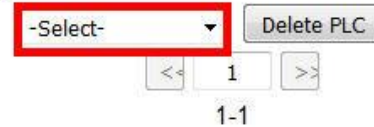
- The Read or Write direction depends on whether it is configured as a Read or Write on the other protocol.
- If the other protocol exceeds the number of Sint, Int, Dint, Real, Bool, Bit Array, or String Data Types the Allen-Bradley PLC supports (see limits on webpage), then nothing will be mapped. You will see the # of Scan Lines remain at 0 and the main page will display the following error:



- To fix this error, simply decrease the amount of data you configured on the other protocol so that the max number of Tag/File Name is not exceeded OR call customer support to increase the limits.

- 1) To add additional PLC's, click the -Select- dropdown under Allen-Bradley PLC Device List and select **Add Generic PLC** option.

### Allen-Bradley PLC Device List



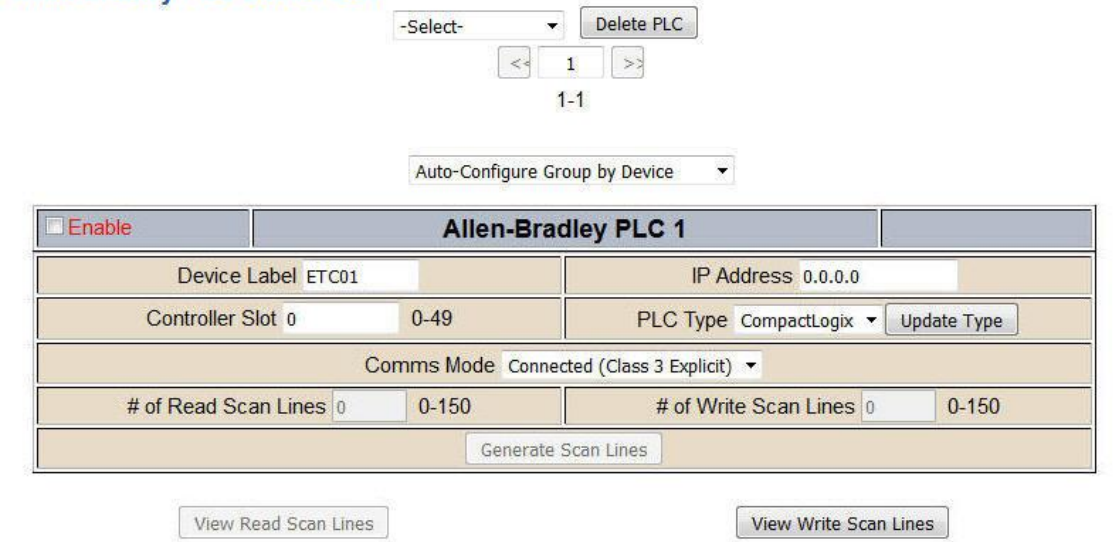
-To remove a device, navigate to the server to delete using the << and >> buttons and click the **Delete PLC** button.

-To create a new PLC with the same parameters already configured from another PLC, click the -Select- dropdown and select the **Add from PLC X** option (where X represents the PLC you wish to copy parameters from). Once created, you can make any additional changes needed to that new PLC.

**NOTE:** Auto-Configure Modes can ONLY be used in PLC 1.

- 2) The **Enable** check box should be selected for the device.
- 3) Enter a **Device Label** to identify the device within the gateway.
- 4) Enter the **IP Address** of the PLC, the **Controller Slot** (Integrated Ethernet, use Slot 0), and select the **PLC Type**. The Controller Slot is the slot where the Controller is located, not the Ethernet Card being used. These 3 parameters must match the PLC you are communicating to.
- 5) Select the **Comms Mode**. Unconnected (UCMM) messaging relies on shared resources to transfer data to/from the PLC. This could result in message timeouts if there are a lot of devices fighting for these shared buffers. Connected (Class 3 Explicit) messaging relies on reserved resources to transfer data to/from the PLC. RTA recommends using Connected.
- 6) To edit scan lines, you will need to go into Manual Configure Mode.

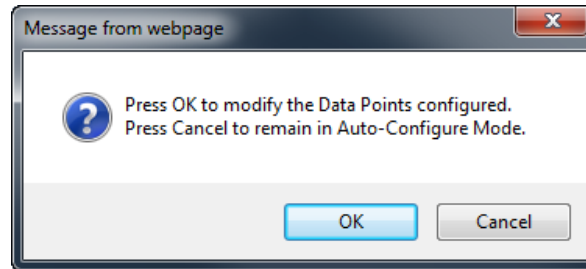
### Allen-Bradley PLC Device List



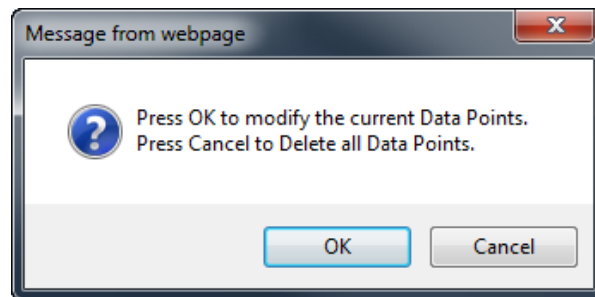
Allen-Bradley PLC 1			
Device Label ETC01		IP Address 0.0.0.0	
Controller Slot 0 0-49		PLC Type CompactLogix Update Type	
Comms Mode Connected (Class 3 Explicit)			
# of Read Scan Lines 0 0-150		# of Write Scan Lines 0 0-150	
Generate Scan Lines			
View Read Scan Lines		View Write Scan Lines	

## External PLC Configuration: Manual Configure Mode

- 1) To transition from either of the two Auto-Configure Modes to Manual Configure Mode, click the dropdown in the middle of the Allen-Bradley Configuration page and select Manual Configure.
  - a. When prompted, click **OK** to confirm mode change or **Cancel** to remain in Auto-Configure Mode.



- b. Once OK is clicked, there are 2 options on how to proceed.



- i. To keep the scan lines that are already configured, press **OK**.
      - You would want this option if you are adding additional scan lines or you want to modify the scan line(s) that already exist.
    - ii. To delete the scan lines that are already there and start over, press **Cancel**.
- 2) To add additional PLC's, click the -Select- dropdown under Allen-Bradley PLC Device List and select **Add Generic PLC** option.

### Allen-Bradley PLC Device List



-To remove a device, navigate to the server to delete using the << and >> buttons and click the **Delete PLC** button.

-To create a new PLC with the same parameters already configured from another PLC, click the -Select- dropdown and select the **Add from PLC X** option (where X represents the PLC you wish to copy parameters from). Once created, you can make any additional changes needed to that new PLC.



- 3) The **Enable** check box should be selected for the device.
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- 5) Enter the **IP Address** of the PLC, the **Controller Slot** (Integrated Ethernet, use Slot 0), and select the **PLC Type**. The Controller Slot is the slot where the Controller is located, not the Ethernet Card being used. These 3 parameters must match the PLC you are communicating to.
- 6) Select the **Comms Mode**. Unconnected (UCMM) messaging relies on shared resources to transfer data to/from the PLC. This could result in message timeouts if there are a lot of devices fighting for these shared buffers. Connected (Class 3 Explicit) messaging relies on reserved resources to transfer data to/from the PLC. Connected messaging is recommended.
- 7) Enter the number of Read Scan Lines and Write Scan Lines.
- 8) Click **Generate Scan Lines** to have the read and write scan lines auto-generated for you. If you need to manually configure the read and write scan lines you can do so after they have been generated.

## Configuring Read and Write Scan Lines

Follow these steps to manually configure Read and Write Scan Lines.

- 1) Click the **View Read Scan Lines** or **View Write Scan Lines** button.
- 2) Enter the **Tag/File Name** that is set up within the PLC. This Tag/FileName must exist at the Controller Scope - not the Program Scope.

-If you wish to start from a point other than the base, add [#] to the end of the Tag/File Name to specify which point is the starting point.

Example: A tag called "ReadTag" has dimension of 100 in the PLC. By default, we will start at point 0 of that array. Therefore, "ReadTag" and "ReadTag[0]" refer to the same point. To start from a different point, such as array index 27, enter in "ReadTag[27]" as the Tag/File Name in our gateways scan line. This means the gateway will go to "ReadTag" and start at array index 27.

-If you wish to access a specific bit from any Data Type, you must use the Mapping Page's Set Bit math function. *You may **not** use ReadTag/0.0 to access bits.*

- 3) Select the **Data Type** of the Tag/File.
- 4) Enter the **# of Points** you want to move from the PLC Tag/File to the gateway. See the *Scan Line Data Limit* section at the bottom of the page for the given max values.

-Example continued: Consider # of points is set to 10. If tag is set as "ReadTag" or "ReadTag[0]" this will read in array points 0 through 9. If tag is set as "ReadTag[27]" this will read in array points 27 through 36.

- 5) Click the **Save Parameters** button.
- 6) Repeat for the other direction if needed.

### Read Scan Lines

Read Scan Lines	Tag/File Name	Data Type	# of Points <small>*See Ranges Below</small>
1		Bit Array (32 Bit Int) ▼	0
<< 1-1 >>			

Save Parameters

## PROFINET IO Server Configuration

Click the **PROFINET IO Server** button to display the PROFINET configuration page.

- 1) **Device Label:** Enter a label to identify the PROFINET IO Server within the Controller. This name must match the Device Name field in the PROFINET IO Controller. It is not case-sensitive.

**NOTE:** The gateway will always save the Device Label in lower-case.

<b>Profinet IO Server Configuration</b>	Help
Device Label: <input type="text" value="ps01"/>	

**Note:** To properly set communication to the PROFINET Controller, you will need to install the GSD file provided on the CD that was shipped with the unit. For instructions on how to do this, please see the [Setting up the PLC- Example Using Simatic Step 7 software](#) and [Setting up the PLC- Example Using TIA Portal](#) sections.

### WARNING:

This gateway does not support the assignment of the IP address via the IO controller function. This function must be disabled for the system to function properly.

## PROFINET IO Server Slot Configuration

The bottom area of the PROFINET IO Server Configuration page lets you configure multiple Input and Output Slots.

- 1) Data Size is configurable. Options include: 8, 16, 32, 64, and 128 Bytes.
- 2) Data Format sets the formatting of the data. Automap will use this packing size to map data to/from the other protocol.

There are three ways to configure this protocol:

- Auto-Configure Group by Device (Default)
- Auto-Configure Group by Data Type
- Manual Mode

**NOTE:** You may go back and forth between modes, but when reverting from Manual Mode to either of the two Auto-Configure Modes, all changes made in Manual Mode will be discarded.

Auto-Configure Group by Device ▼

### Input Slots (460 to Profinet IO)

Slot	Data Size (Bytes)	Data Format
1	Disabled ▼	16 Bit Int ▼
2	Disabled ▼	16 Bit Int ▼
3	Disabled ▼	16 Bit Int ▼
4	Disabled ▼	16 Bit Int ▼
5	Disabled ▼	16 Bit Int ▼
6	Disabled ▼	16 Bit Int ▼
7	Disabled ▼	16 Bit Int ▼
8	Disabled ▼	16 Bit Int ▼
9	Disabled ▼	16 Bit Int ▼
10	Disabled ▼	16 Bit Int ▼

### Output Slots (Profinet IO to 460)

Slot	Data Size (Bytes)	Data Format
11	Disabled ▼	16 Bit Int ▼
12	Disabled ▼	16 Bit Int ▼
13	Disabled ▼	16 Bit Int ▼
14	Disabled ▼	16 Bit Int ▼
15	Disabled ▼	16 Bit Int ▼
16	Disabled ▼	16 Bit Int ▼
17	Disabled ▼	16 Bit Int ▼
18	Disabled ▼	16 Bit Int ▼
19	Disabled ▼	16 Bit Int ▼
20	Disabled ▼	16 Bit Int ▼

Save Parameters

---

## PROFINET IO Server Slot Configuration: Auto-Configure

While in either of the two Auto-Configure Modes, the Data Slots themselves cannot be edited. Auto-Configure Mode looks at the other protocol and then configures the Data Slots to match. The Data Formats will be defined after the other protocol is configured.

The data will be configured according to the following rules:

- Any 8 Bit Signed/Unsigned data will be mapped as **8 Bit Int or 8 Bit Uint**, matching signs whenever possible.
- Any 16 Bit Signed/Unsigned data will be mapped as **16 Bit Int or 16 Bit Uint**, matching signs whenever possible.
- Any 32 Bit Signed/Unsigned data will be mapped as **32 Bit Int or 32 Bit Uint**, matching signs whenever possible.
- Any 64 Bit Signed/Unsigned data will be mapped as **64 Bit Int or 64 Bit Uint**, matching signs whenever possible.
- Any 32 Bit Float will be mapped as **32 Bit Float**.
- Any 64 Bit Float will be mapped as **64 Bit Float**.
- Any Strings will be mapped as **Short String**.

**NOTE: When using a String Data Type, the 1<sup>st</sup> byte of each slot is reserved for the Length field. The remaining bytes will be used for the actual data.**

- Any Coils or 1/8/16/32 Bit Binary Packs will be mapped as **Binary 8 Bit Pack/Binary 16 Bit Pack/Binary 32 Bit Pack**, matching bit sizes whenever possible.
- The Input or Output direction depends on whether it is configured as an Input/Read or Output/Write on the other protocol.
- If the other protocol exceeds the number of data size supported, then nothing will be mapped. You will see all the Data Size values remain at Disabled and the main page will display the following error:

**ERROR XX 460 Re-initialization (Auto-Config Failed -9)**

- To fix this error, simply decrease the amount of data you configured on the other protocol so that the max data size is not exceeded OR call customer support to increase the limits.

To edit slot data sizes or formats you will need to go into Manual Configure Mode.

---

## Auto-Configure Group by Device vs. Auto-Configure Group by Data Type

There are two different methods for Auto-Configure: Group by Device or Group by Data Type.

There are a couple of rules to keep in mind when using Auto-Configure Mode:

- 1) If the other protocol inside the gateway is a Server, Slave, or Adapter protocol, then there are no differences between the Auto-Configure Modes.
- 2) Group by Data Type is how previous versions of the 460 gateway Auto-Configured. Versions with build dates prior to May 21 2016 had the default set to this grouping method.
- 3) Both modes use the rules outlined on the previous page for setting up data.

### Group by Device (Default Method)

Group by Device goes through the other protocol on the gateway and auto-configures the data slots on the Profinet IO Server for all the data points on the other protocol's first device. After it finishes with the first device, it will auto-configure all the points for the second device (if one is configured), and so on.

The data in this method is not optimized- there could potentially be a lot of wasted/unused data space, but it will be organized more logically from the Master/Client's point of view.

### Group by Data Type

Group by Data Type goes through the other protocol on the gateway and auto-configures the data slots on the Profinet IO Server for all the data points within the other protocol.

Another way to view this option is to say that the data points allocated are packed together so there is very little wasted data space. The data is packed or optimized.

**Example:**      *Protocol A is a Master/Client protocol that has 2 devices with the same setup:*

*Device\_1 has 1 integer scan line, 1 float scan line, 1 integer scan line- each for 1 point of data*

*Device\_2 has 1 integer scan line, 1 float scan line, 1 integer scan line- each for 1 point of data*

*Protocol B is a Server/Slave/Adapter protocol that can be mapped as follows:*

**Group by Device** - Protocol B will have 4 scan lines that will look like the following:

Scan Line 1 => Type Integer, length of 2

Scan Line 2 => Type Float, length of 1

Scan Line 3 => Type Integer, length of 2

Scan Line 4 => Type Float, length of 1

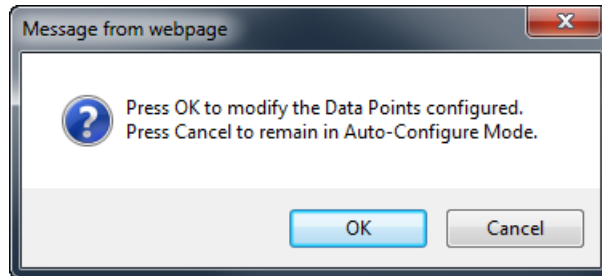
**Group by Data Type** - Protocol B will have 2 scan lines that will look like the following:

Scan Line 1 => Type Integer, length of 4

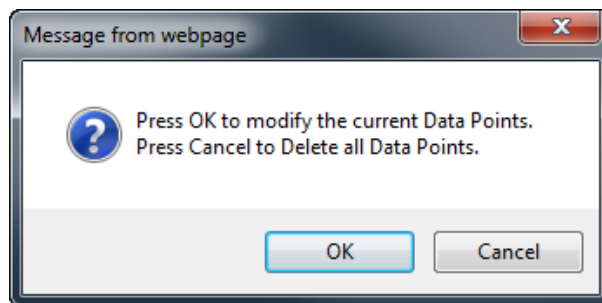
Scan Line 2 => Type Float, length of 2

## PROFINET IO Server Slot Configuration: Manual Mode

- 1) To transition from either of the two Auto-Configure Modes to Manual Configure Mode, click the dropdown at the top of the Profinet IO Server Configuration page and select Manual Configure.
  - a. When prompted, click **OK** to confirm mode change or **Cancel** to remain in Auto-Configure Mode.



- b. Once OK is clicked, there are 2 options on how to proceed.



- i. To keep the data slots that are already configured, press **OK**.
      - You would want this option if you are adding additional data slots or you want to modify the data slot(s) that already exist.
    - ii. To delete the data slots that are already there and start over, press **Cancel**.
- 2) Input Slots: Select the data size, in bytes, to move data from the gateway to the Controller. Then select the data format for that slot.
- 3) Output Slots: Select the data size, in bytes, to move data from the Controller to the gateway. Then select the data format for that slot.

## Example Setup

Siemens Simatic Step 7 Configuration Example:

Slot	Module	Order number	I address	Q address	Diagnostic address:	Comment
0	PS01	6ES7 195-0CA00			2042*	
1	Interface				2041*	
2	PS01	6ES7 195-0CA00			2040*	
3	8 bytes I		0...7			
4	128 bytes I		128...255			
5						
6						
7						
8						
9						
10						
11	32 bytes O			0...31		
12						
13						
14						

Siemens TIA Portal Configuration Example:

Topology view

Network view

Device view

Device overview

		Module	Rack	Slot	I address	Q addr...	Type	Article no.	Firmware	Comm...
		▼ ps01	0	0			Standard	6GK1 953-0CA00	Z1.0	
		▶ Interface	0	0 X1			ps01			
		8 bytes I_1	0	1	1...8		8 bytes I		1.0	
		128 bytes I_1	0	2	68...195		128 bytes I		1.0	
			0	3						
			0	4						
			0	5						
			0	6						
			0	7						
			0	8						
			0	9						
			0	10						
		32 bytes O_1	0	11		1...32	32 bytes O		1.0	
			0	12						
			0	13						
			0	14						

Gateway Configuration Example:

### Input Slots

Slot	Data Size (Bytes)	Data Format
1	8	16 Bit Uint
2	128	64 Bit Float
3	Disabled	16 Bit Int
4	Disabled	16 Bit Int
5	Disabled	16 Bit Int

### Output Slots

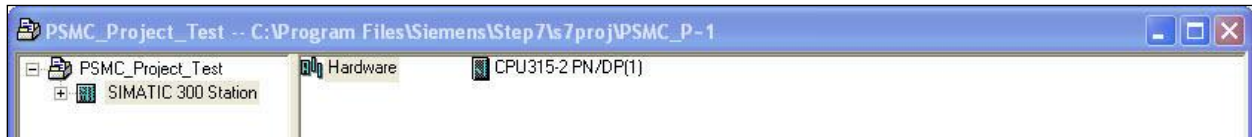
Slot	Data Size (Bytes)	Data Format
11	32	32 Bit Int
12	Disabled	16 Bit Int
13	Disabled	16 Bit Int
14	Disabled	16 Bit Int
15	Disabled	16 Bit Int



## Setting up the PLC- Example Using Simatic Step 7 software

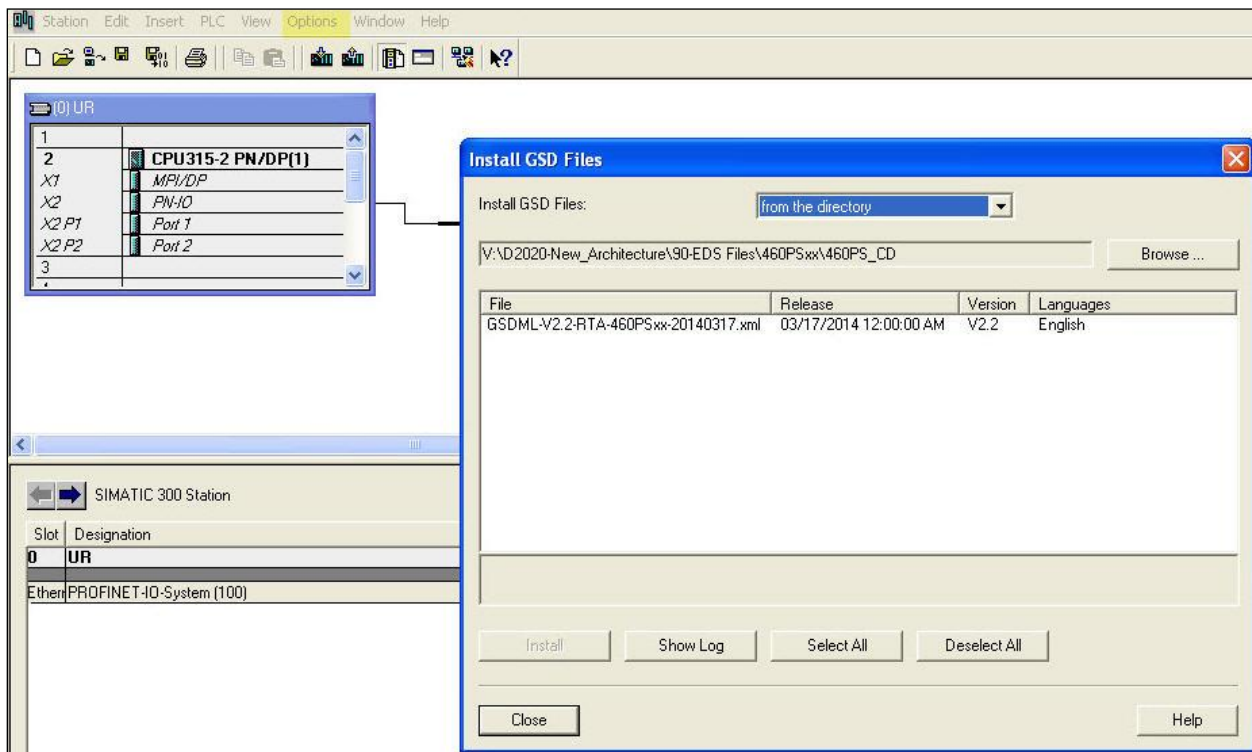
This is how you would set up the [Example Setup](#) on the previous page using Simatic Step 7:

- 1) In your project, click the CPU and you should see the Hardware option in the right pane. Double click on the Hardware icon.



- 2) IF YOU HAVE ALREADY INSTALLED THE GSD FILE, SKIP TO STEP 9.

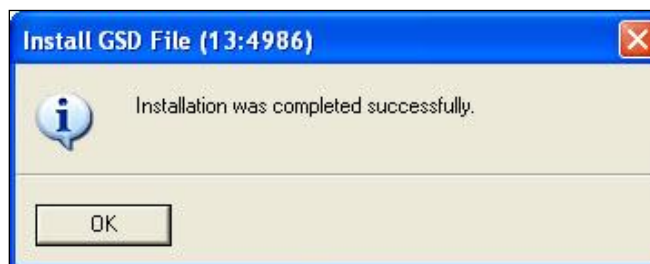
OTHERWISE - Under Options, select **Install GSD Files**.



- 3) Insert the CD that was shipped with the gateway and select Install GSD Files from the directory.
- 4) Browse to the CD and find the folder containing the GSD file.
- 5) Select the GSD file from the box and click **Install**.
- 6) When prompted to confirm installation because it cannot be undone, click **Yes**.



- 7) Click **OK** acknowledging that the install was successful.



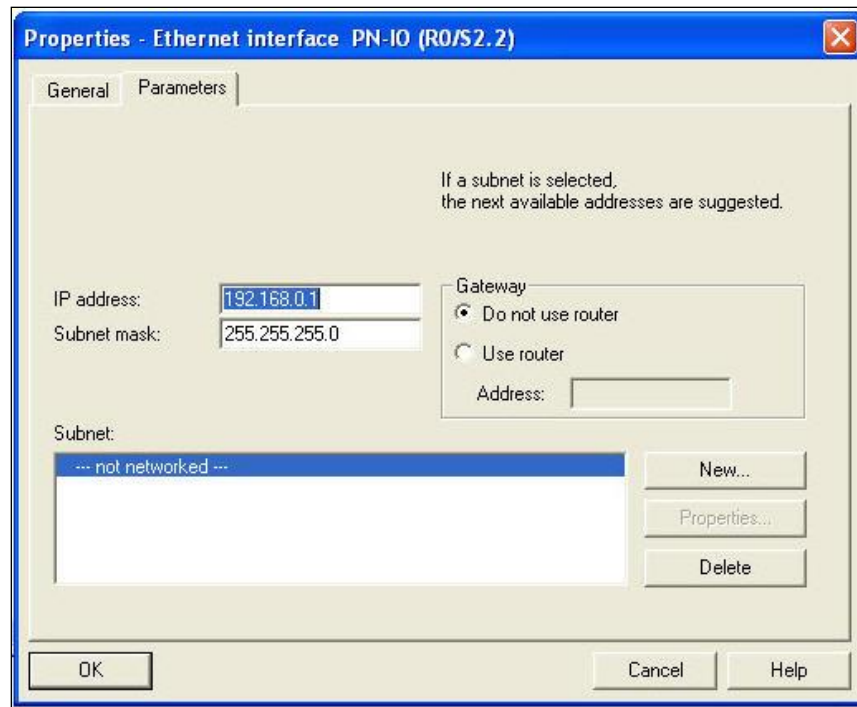
- 8) If you navigate to the right-hand side, you will see the RTA profile under:  
PROFINET IO->Additional Field Devices->I/O->460PSxx



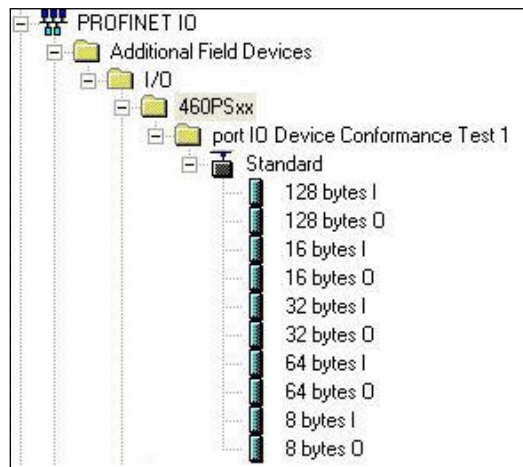
- 9) IF YOU HAVE ALREADY CONFIGURED THE PROFINET I/O CONTROLLER, SKIP TO STEP 11.

OTHERWISE - Right-click on the PN-IO block and select **Insert PROFINET IO System**.

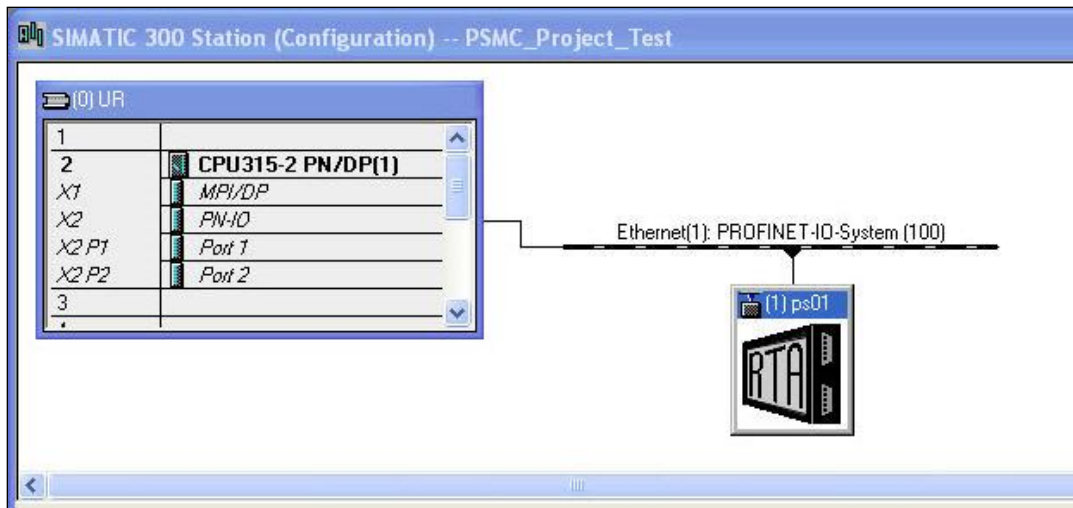
- 10) In the properties window, set the IP Address to match that of the PROFINET I/O Controller and press **New** and **OK**.



- 11) Find the RTA device in the I/O tree. It will be under PROFINET IO->Additional Field Devices->I/O->460PSxx->port IO Device Conformance Test 1->Standard.



- 12) Once found, drag the Standard icon into the network line you created in Step 9.



- 13) Double-click the gateway icon to open the properties window. Make sure the **Device Name** field matches exactly (case-sensitive) to the **Device Label** field in the PROFINET IO Server Configuration page. If not already done, uncheck the **Assign IP Address via IO controller** option (some versions already do this) and press **OK**.

The screenshot shows the "Properties - ps01" dialog box with the "Identification" tab selected. The fields are as follows:

- Short description: ps01
- 460PSxx IO Gateway
- Order No./ firmware: 6GK1 953-0CA00 / Z1.0
- Family: 460PSxx
- Device name: ps01
- GSD file: GSDML-V2.2-RTA-460PSxx-20140317.xml
- Change Release Number...
- Node in PROFINET IO System:
  - Device number: 1
  - PROFINET-IO-System (100)
  - IP address: Ethernet...
- ☐ Assign IP address via IO controller
- Comment:

Buttons at the bottom: OK, Cancel, Help.

- 14) Expand the Standard node on the right panel to show the available modules to insert (Refer to the picture in Step 11).

Input Slots			Output Slots		
Slot	Data Size (Bytes)	Data Format	Slot	Data Size (Bytes)	Data Format
1	8	16 Bit Uint	11	32	32 Bit Int
2	128	64 Bit Float	12	Disabled	16 Bit Int
3	Disabled	16 Bit Int	13	Disabled	16 Bit Int
4	Disabled	16 Bit Int	14	Disabled	16 Bit Int
5	Disabled	16 Bit Int	15	Disabled	16 Bit Int

To match the above configuration in the 460 gateway, add one 8-byte input module to slot 1, one 128-byte input module to slot 2, and one 32-byte output module to slot 11.

#### Siemens PLC Configuration:

Slot	Module	Order number	I address	Q address	Diagnostic address:	Comment
0	PS01	6ES7 300-1EA00-0AA0			2042*	
X1	Interface				2041*	
P1	FM45 10/10				2040*	
1	8 bytes I		0...7			
2	128 bytes I		128...255			
3						
4						
5						
6						
7						
8						
9						
10						
11	32 bytes Q			0...31		
12						
13						
14						

**Terminology Note and Example:** I addresses refer to Input, Q addresses refer to Output, %B refers to bytes and %W refers to words. So in this case, you would use %IB0-7, %IB128-255 and %QB0-31 to access the data to/from the gateway in the PLC.

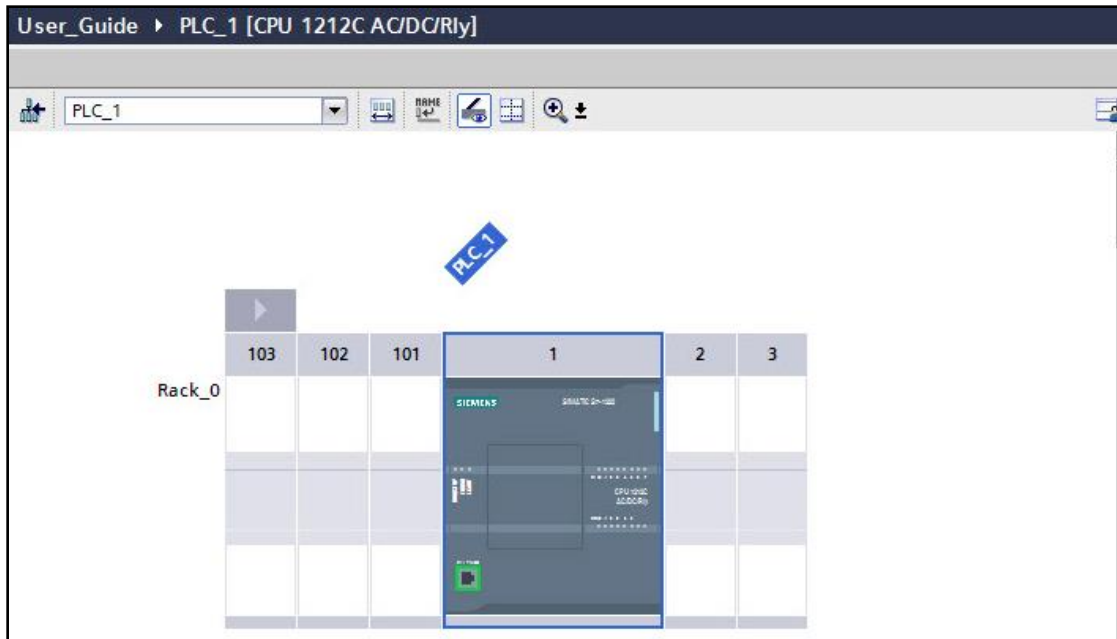
- 15) When finished, click the **Save and Compile** button and then the **Download to PLC** button.



## Setting up the PLC- Example Using TIA Portal

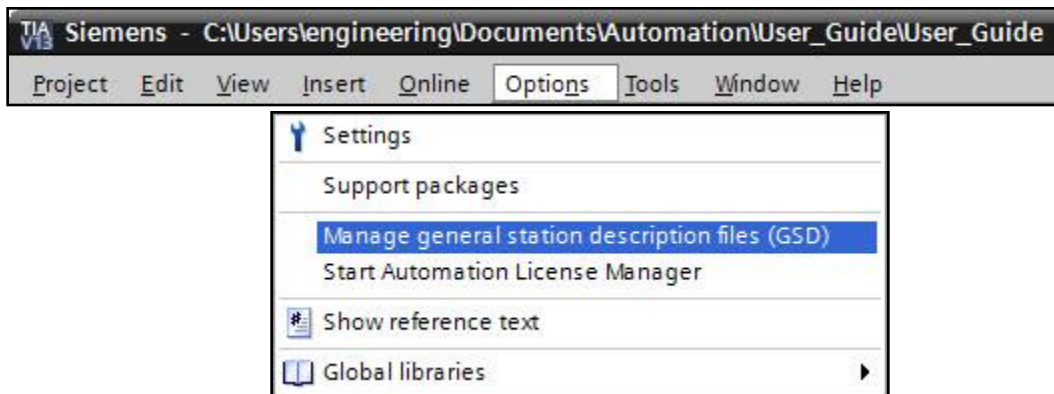
This is how you would set up the [Example Setup](#) using Siemens TIA Portal:

- 1) In your project, click the Device View tab and click your PLC.

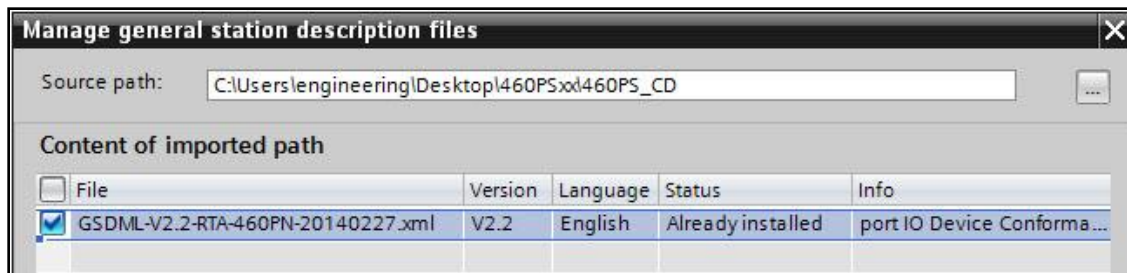


- 2) IF YOU HAVE ALREADY INSTALLED THE GSD FILE, SKIP TO STEP 9.

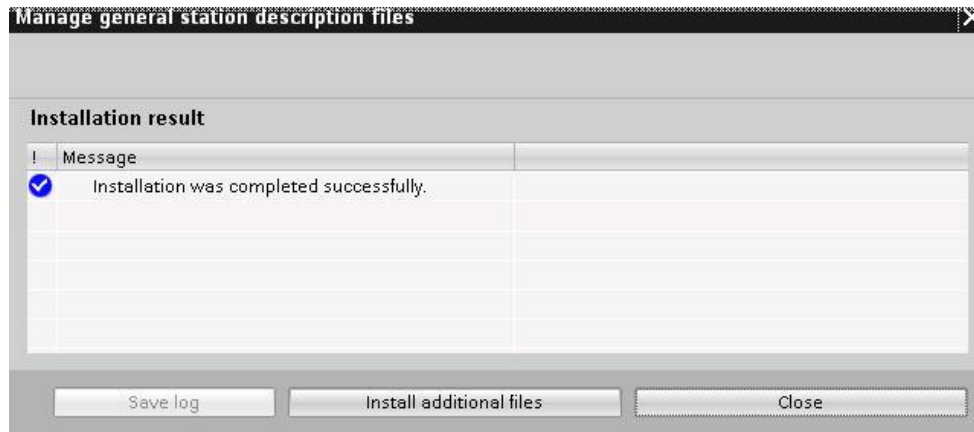
OTHERWISE - Under Options, select **Manage general station description file (GSD).**



- 3) Insert the CD that was shipped with the gateway and save off the GSD file on that CD to your desktop.
- 4) Click ... and browse to where you saved the GSD file.
- 5) Check the box to the left of the imported path and click **Install**.



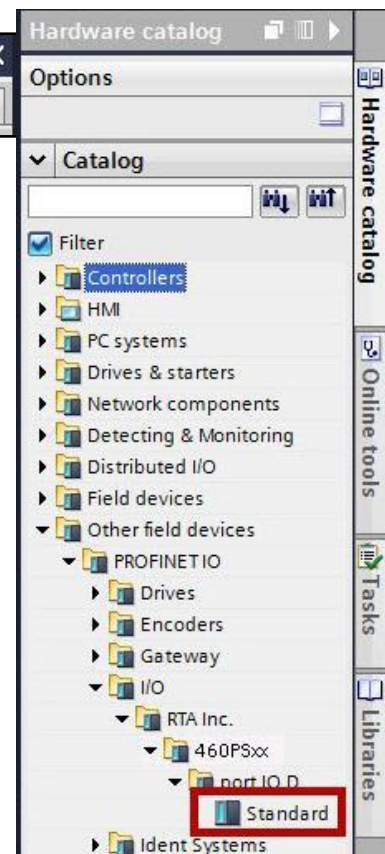
- 6) Click **Close** when it was installed successfully.



- 7) Click the Network View tab in your project.

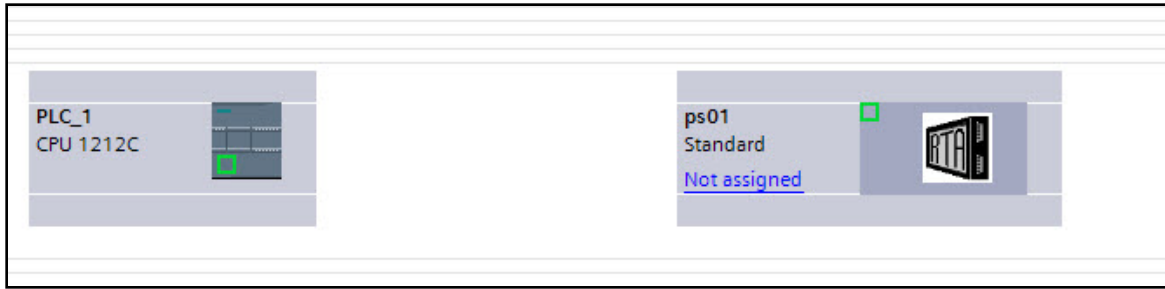


- 8) Navigate to the right-hand side of the screen under the Hardware catalog and you will see the RTA profile under: Other field devices->PROFINET IO-> I/O->RTA Inc. -> 460PSxx->port IO Device Conformance Test 1 ->Standard



- 9) Drag the Port IO standard into the Network next to the PLC.





10) Once the RTA device is in the network click the Device view tab.



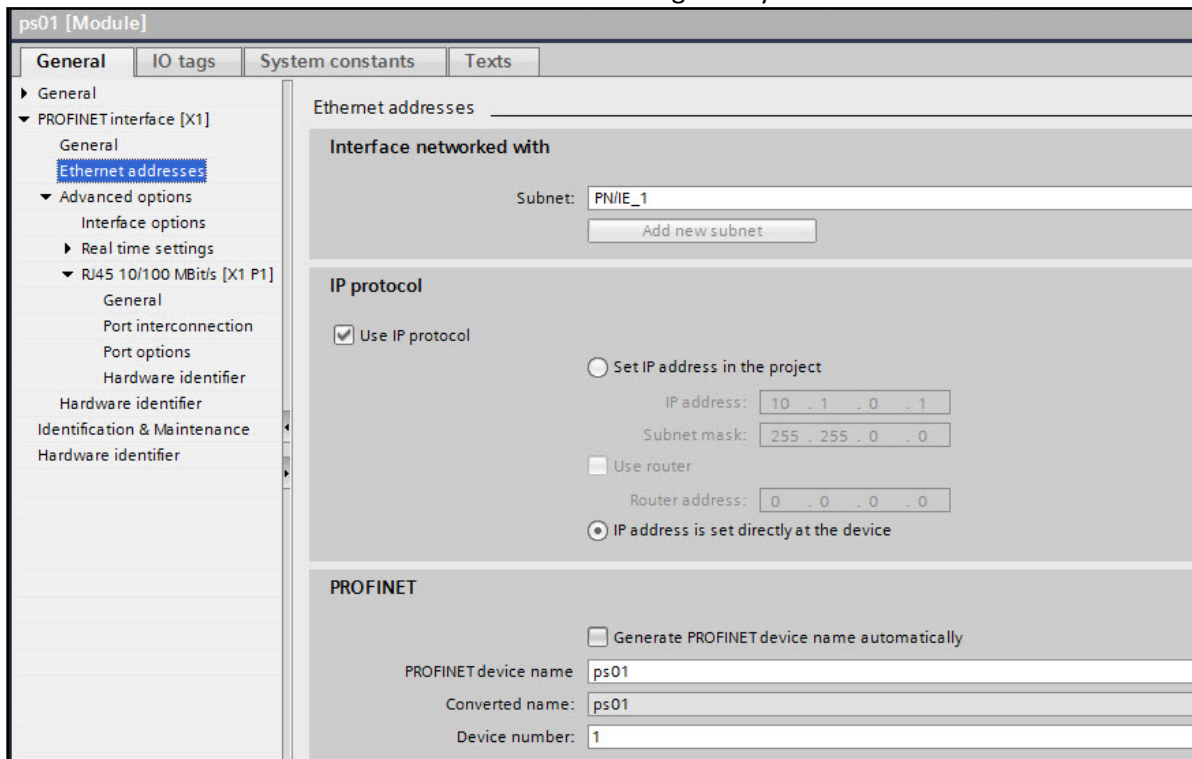
11) From the dropdown menu select ps01. Right click on the RTA device to select Properties.



12) Go down to the Ethernet addresses.

13) Be sure that the "IP address is set directly at the device" option is selected and uncheck the "Generate PROFINET device name automatically."

- a. \*Make sure the **PROFINET Device Name** field matches exactly (case-sensitive) to the **Device Label** field in the PROFINET IO Server Configuration page.
- b. \*Make sure the PROFINET device and the gateway are on the same network.



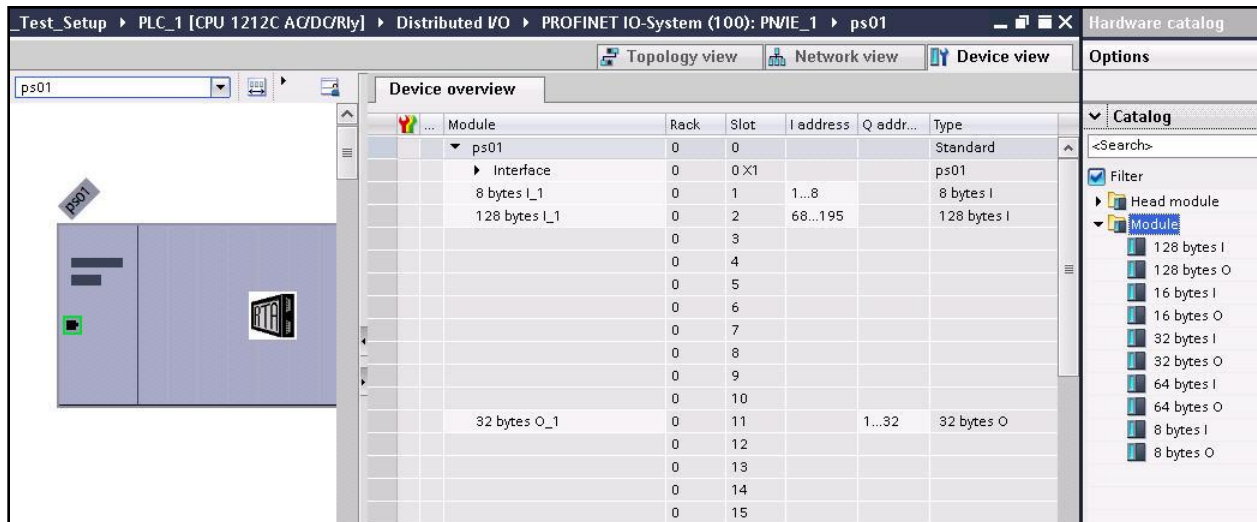


- 14) Expand the Module list under the catalog on the right panel to show the available modules to insert into the device overview slots.

Input Slots			Output Slots		
Slot	Data Size (Bytes)	Data Format	Slot	Data Size (Bytes)	Data Format
1	8	16 Bit Uint	11	32	32 Bit Int
2	128	64 Bit Float	12	Disabled	16 Bit Int
3	Disabled	16 Bit Int	13	Disabled	16 Bit Int
4	Disabled	16 Bit Int	14	Disabled	16 Bit Int
5	Disabled	16 Bit Int	15	Disabled	16 Bit Int

To match the above configuration in the 460 gateway, add one 8-byte input module to slot 1, one 128-byte input module to slot 2, and one 32-byte output module to slot 11.

TIA Portal Configuration:



The screenshot shows the TIA Portal interface with the 'Device overview' table and the 'Hardware catalog' on the right.

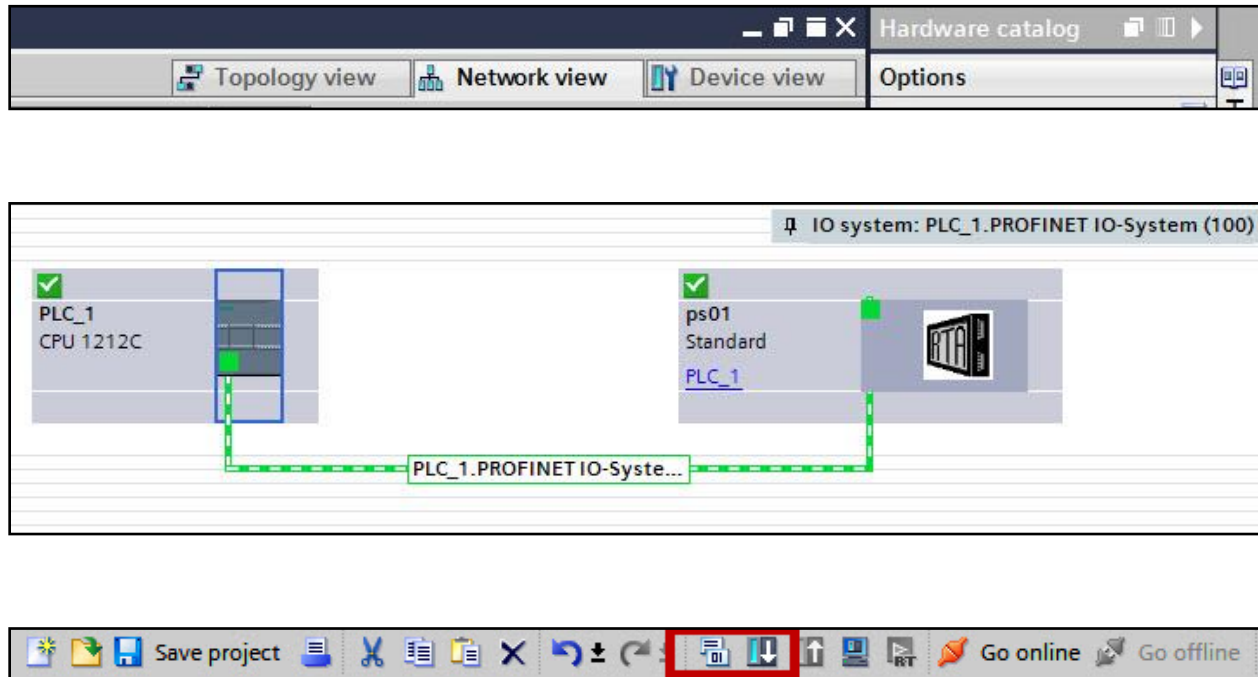
Module	Rack	Slot	I address	Q addr...	Type
ps01	0	0			Standard
Interface	0	0 X1			ps01
8 bytes I_1	0	1	1...8		8 bytes I
128 bytes I_1	0	2	68...195		128 bytes I
	0	3			
	0	4			
	0	5			
	0	6			
	0	7			
	0	8			
	0	9			
	0	10			
32 bytes O_1	0	11		1...32	32 bytes O
	0	12			
	0	13			
	0	14			
	0	15			

The Hardware catalog on the right shows the 'Module' list expanded, displaying various input and output modules with their respective data sizes and formats.

To insert a module, just double click to add it to the next available slot.

**Terminology Note and Example:** I addresses refer to Input, Q addresses refer to Output, %B refers to bytes and %W refers to words. So in this case, you would use %IB1-8, %IB68-195 and %QB1-32 to access the data to/from the gateway in the PLC.

- 15) In the Network view tab, click the port of the RTA ps01 and drag the line into the port of the PLC. Once the link has been established click the Compile button and Download to Device button (in red).



- 16) Once everything is downloaded to the PLC there will be a green check box on both devices, then click **Go Online** (see red box).



## Mapping - Transferring Data Between Devices

There are 5 ways to move data from one protocol to the other. You can combine any of the following options to customize your gateway as needed.

**Option 1 – Data Auto-Configure Mappings:** The gateway will automatically take the data type (excluding strings) from one protocol and look for the same data type defined in the other protocol. If there isn't a matching data type, the gateway will map the data to the largest available data type. See Data Auto-Configure section for more details.

**Option 2 – String Auto-Configure:** The gateway will automatically take the string data type from one protocol and map it into the other. See String Auto-Configure section for more details.

**Option 3 – Manual Configure Mappings:** If you don't want to use the Auto-Configure Mappings function, you must use the manual mapping feature to configure translations.

**Option 4 – Manipulation/Scaling:** You can customize your data by using math operations, scaling, or bit manipulation. See Data Mapping-Explanation section for more details.

**Option 5 – Move Diagnostic Information:** You can manually move diagnostic information from the gateway to either protocol. Diagnostic information is not mapped in Auto-Configure Mappings Mode. See Diagnostic Info section for more details.

## Display Mapping and Values

The Display Data and Display String pages are where you can view the actual data for each mapping that is set up.

### Display Data

Click the **Display Data** button to view how the data is mapped and what the values of each mapping are. Here you will see how each data point (excluding strings) is mapped. To view, select the device from the dropdown menu and click **View** to generate the information regarding that device. Then select either the **Protocol 1 to Protocol 2** or **Protocol 2 to Protocol 1** button, correlating to the direction you wish to see the data.



The screenshot shows the 'Display Data' interface. At the top left is the title 'Display Data'. On the top right are two buttons: 'Edit Mapping' and 'View as Text'. Below the title is a section labeled 'Select a Device' with a dropdown menu showing 'Modbus TCP Server IP Address: 0.0.0.0' and a 'View' button. At the bottom are two buttons: 'Protocol 1 to Protocol 2' and 'Protocol 2 to Protocol 1'.

This page is very useful when verifying that all data is mapped somehow from one protocol to another. If a data point is not mapped, it will display on this page in a yellow highlighted box.

BACnet/IP			Modbus RTU		
BACnet/IP to Modbus RTU			Modbus RTU to BACnet/IP		
			460MMBS ↔		
Name	Value (Hex)		Manipulation	Name	Value (Hex)
AI1	0	0	↔	Slave1 400001	0 0
AI2	0.000000	0x00000000	↔	N/A	Point Not Mapped
AI3	0	0	↔	Slave1 400030	0 0

In the above example, we see the following:

- Modbus 400001 from Slave 1 is being mapped to AI1 on BACnet
- Nothing is being moved from Modbus to AI2 on BACnet
- Modbus 400030 from Slave 1 is being mapped to AI3 on BACnet

**NOTE:** If a data point is mapped twice, only the first instance of it will show here. EX: If Modbus 400001 & 400040 from Slave 1 are both mapped to AI1, only 400001 will show as being mapped to AI1.

If there are values of “-” on this page, it indicates that the source has not yet been validated and no data is being sent to the destination.

The example below reflects the Modbus to PLC flow of data. The Modbus (right side) is the source and the PLC (left side) is the destination.

- The 460 gateway has received valid responses from Modbus registers 400001-400005 and therefore can pass the data on to the PLC tag called MC2PLC\_INT.
- The 460 gateway has NOT received valid responses from Modbus register 400011 & 400012. As a result, the data cannot be passed to the PLC tag ETC01\_GN0\_INT2 and indicates so by using “-” in the value column of the table.

**Display Data**

Edit Mapping
View as Text

Select a Device
Allen-Bradley PLC IP Address: 10.1.100.15
View

PLC to Modbus TCP/IP
Modbus TCP/IP to PLC

PLC
460ETCMC
Modbus TCP/IP

Name	Value (Hex)		Manipulation	Name	Value (Hex)	
MC2PLC_INT[0]	15	0x000F	←←	MC01 400001	15	0x000F
MC2PLC_INT[1]	1495	0x05D7	←←	MC01 400002	1495	0x05D7
MC2PLC_INT[2]	1	0x0001	←←	MC01 400003	1	0x0001
MC2PLC_INT[3]	0	0x0000	←←	MC01 400004	23	0x0017
MC2PLC_INT[4]	3	0x0003	←←	MC01 400005	3	0x0003
ETC01_G2N0_INT2[0]	--	--	←←	MC01 400011	--	--
ETC01_G2N0_INT2[1]	--	--	←←	MC01 400012	--	--

To view the actual data mappings, click the **Edit Mapping** button. For more details, see the Data Mapping-Explanation section.

To view the data mappings purely as text, click the **View as Text** button. For more details, see the View Data Mapping as Text section.

## Display String

Click the **Display String** button to view how the string data types are mapped and what the values of each string are. Here you will see how each string from each protocol is mapped to the other. To view, select the source or destination group and the String from the dropdown menu to generate the information regarding that device. The string data will be displayed in both hex and ASCII.



The screenshot shows the "Display String" window. It has a title bar with "Display String" and two buttons: "Edit Mapping" and "View as Text". Below the title bar, there is a section labeled "Select a Group" with a dropdown menu showing "Src: MC02 400001". To the right of this is the text "and a String" followed by another dropdown menu showing "400001". To the right of the second dropdown is the text "(0 bytes)".

If there are values of "Data Not Valid" on this page, it indicates that the source has not been validated yet and no data is being sent to the destination.

In the example below, this page reflects the Modbus to PLC flow of data. Since the Destination "Dst: ETC01 ETC01\_G2N0\_STRING" displays "Data Not Valid", it can be assumed that the source field has not yet been validated.



The screenshot shows the "Display String" window. It has a title bar with "Display String" and two buttons: "Edit Mapping" and "View as Text". Below the title bar, there is a section labeled "Select a Group" with a dropdown menu showing "Dst: ETC01 ETC01\_G2N0\_STRING". To the right of this is the text "and a String" followed by another dropdown menu showing "ETC01\_G2N0\_STRING". To the right of the second dropdown is the text "(0 bytes)". Below this section is a large rectangular area containing the text "Data Not Valid!".

To view the string mappings, click the **Edit Mapping** button. For more details see the String Mapping-Explanation section.

To view the string mappings purely as text, click the **View as Text** button. For more details see the View String Mapping as Text section.

## Data and String Mapping – Auto-Configure

The Auto-Configure function looks at both of the protocols and will map the data between the two protocols as best as it can so that all data is mapped. Inputs of like data types will map to outputs of the other protocols like data types first. If a matching data type cannot be found, then the largest available data type will be used. Only when there is no other option is data truncated and mapped into a smaller data type.

If the Auto-Configure function does not map the data as you want or you want to add/modify the mappings, you may do so by going into Manual Configure mode.

The following are examples of the Auto-Configure function.

- 1) This example shows a common valid setup.

Source		Destination
8-bit Sint	—————	8-bit Sint
16-bit Int	—————	16-bit Int

- a. Both Source values were able to be mapped to a corresponding Destination value.

- 2) This example shows how Auto-Configure will make its best guess.

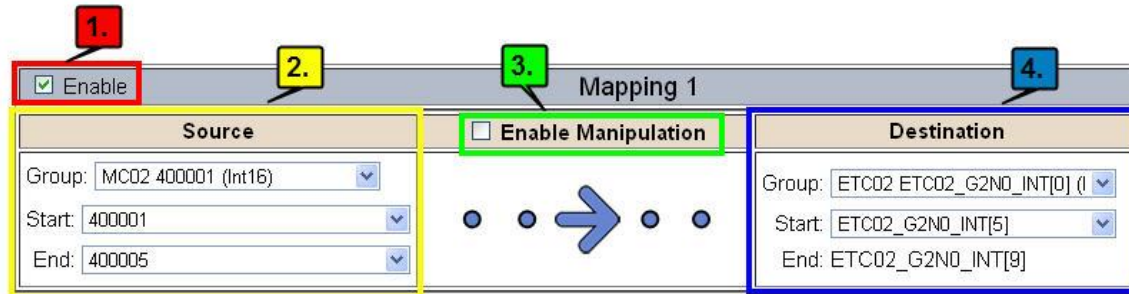
Source		Destination
8-bit Sint	—————	8-bit Sint
16-bit Int	—————	16-bit Int
32-bit Uint	—————	32-bit Uint
32-bit Float	—————	32-bit Uint

- a. The 32-bit Float from the Source location could not find a matching Destination data-type. After all other like data types were mapped, the only data type available was the 2<sup>nd</sup> 32-bit Uint data type. Auto-Configure was completed even though the data in the Float will be truncated.

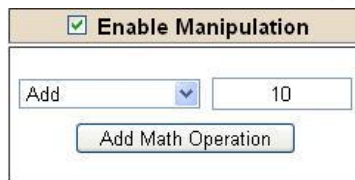


## Data Mapping – Explanation

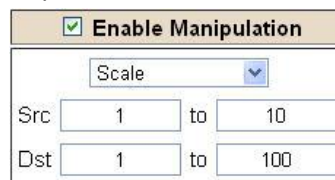
Below are the different parts that can be modified to make up a data mapping.



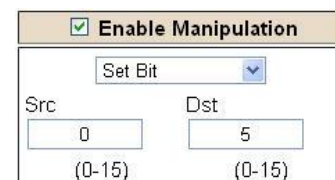
- 1) Enable (red box above): Check to enable mapping. If not checked, this mapping is skipped.
- 2) Source Field (yellow box above) :
  - a. Group - Select the data group you set up in the protocol config to use for this mapping.
  - b. Start - This is the starting point for this mapping.
  - c. End - This is the final point to be included for this mapping.
- 3) Manipulation Area (green box above) :
  - a. Enable the Data Manipulation. This can be enabled for any mapping.
  - b. Click **Add Math Operation** for each operation needed. Up to 3 are allowed unless you are using the Scale, Set Bit, or Invert Bit functions. If using Scale, Set Bit, or Invert Bit, then only 1 operation is allowed.
  - c. Select the Operation(s) to perform.
    - i. Math Operations are performed in the order they are selected.
    - ii. If more than one point is selected on the source, the Math Operations will be performed on every point.
  - d. Enter the value(s) for the operation.



*Example of Add (similar for Subtract, Multiple, Divide, and MOD). This will add a value of 10 to the source field before it is written to the destination field.*



*Example of Scale. This will scale the source values from 1-10 into 1-100 for the destination.*



*Example of Set Bit (similar to Invert Bit). This will take the value of the 0<sup>th</sup> source bit and copy it into the value of the 5<sup>th</sup> destination bit.*

- 4) Destination Field (blue box above) :
  - a. Group - Select the data group you set up in the protocol config to use for this mapping.
  - b. Start - This is the starting point for where the data is being stored.
  - c. End - The End point is derived from the length of the source and cannot be modified.



## Data Mapping – Adding Diagnostic Information

Data Mapping offers 5 different types of information in addition to any scan lines specified for each protocol.

**IMPORTANT NOTE:** Only add Diagnostic Information **AFTER** both sides of the gateway have been configured. If changes to either protocol are made after diagnostic information has been added to the mapping table, it is necessary to verify all mappings. Remapping may be necessary.

- 1) Temporary Ram (Int 64)
  - a. This offers five levels of 64bit Integer space to assist in multiple stages of math operations. For example, you may wish to scale and then add 5. You can set up a single translation to scale with the destination as the temporary ram. Then another translation to add 5 with the source as the temporary ram.
  - b. The gateway will automatically convert the Source to fit the Destination, so there is no need for Int 8, 16, 32 since the 64 may be used for any case.

Mapping 1		
Source	Enable Manipulation	Destination
Group: Temporary Ram0 (Int64) Start: Ram0 End: Ram0	<input checked="" type="checkbox"/> Enable Manipulation Scale Src: 1 to 10 Dst: 1 to 100	Group: Temporary Ram0 (Int64) Start: Ram1 End: Ram1
Mapping 2		
Source	Enable Manipulation	Destination
Group: Temporary Ram0 (Int64) Start: Ram1 End: Ram1	<input checked="" type="checkbox"/> Enable Manipulation Add 5 Add Math Operation	Group: Temporary Ram0 (Int64) Start: Ram2 End: Ram2

*In this example, Ram0 is scaled into Ram1. Ram1 is then increased by 5 and stored into Ram2. Ram0 and Ram2 could be considered a source or destination group.*

- 2) Temporary Ram (Double)
  - a. This is similar to the Temporary Ram (Int 64), except manipulations will be conducted against the 64bit floating point to allow for large data.
- 3) Ticks Per Second
  - a. The gateway operates at 200 ticks per second. This equates to one tick every 5ms. Thus, mapping this to a destination will give easy confirmation of data flow without involving one of the two protocols.
- 4) XY\_NetBmpStat
  - a. If a protocol is a Client/Master, there is a Network Bitmap Status that is provided. Since a Client/Master may be trying to communicate with multiple devices on the network, it may be beneficial to know if a Server/Slave device is down. By using this Network Bitmap Status you can expose the connection statuses of individual devices.
  - b. 0x00000002 shows that only device 2 is connected
  - c. 0x00000003 shows that only devices 1 and 2 are connected
  - d. 0x00000004 shows that only device 3 is connected

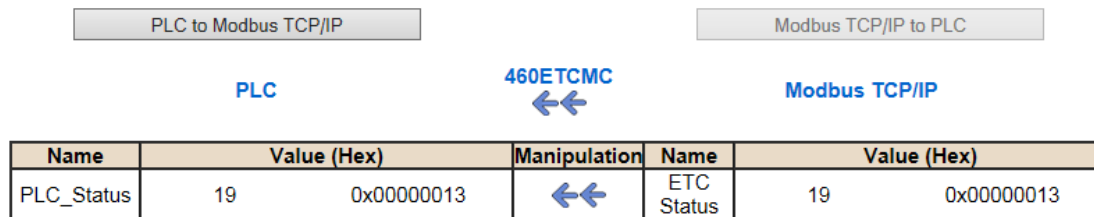
## 5) Status\_XY

- a. There are two Statuses provided, one for each protocol. This gives access to the overall status of that Protocol. Each Bit has its own meaning as follows:

**Common Status:** **0x000000FF (bit 0-7) 1<sup>st</sup> byte**

Hex:	Bit Position:	Decimal:	Explanation:
0x00	0	0	if we are a Slave/Server
0x01	0	1	if we are a Master/Client
0x02	1	2	connected (0 not connected)
0x04	2	4	first time scan
0x08	3	8	idle (usually added to connected)
0x10	4	16	running (usually added to connected)
0x20	5	32	bit not used
0x40	6	64	recoverable fault
0x80	7	128	nonrecoverable fault

For this example the ETC Status is mapped to a PLC tag called PLC\_Status



**Example:** ETC Status is 0x00000013 (19 decimal), here is the break down

Hex	Bit	Decimal	Explanation
0x01	0(on)	1	if we are a Master/Client
0x02	1(on)	2	connected (0 not connected)
0x10	4(on)	16	running (usually added to connected)
Total:	0x13	19	

**External Faults:** **0x0000FF00 (bit 8-15) 2<sup>nd</sup> byte**

Hex:	Bit Position:	Decimal:	Explanation:
0x00	8	0	local control
0x01	8	256	remotely idle
0x02	9	512	remotely faulted
0x04	10	1,024	idle due to dependency
0x08	11	2,048	faulted due to dependency

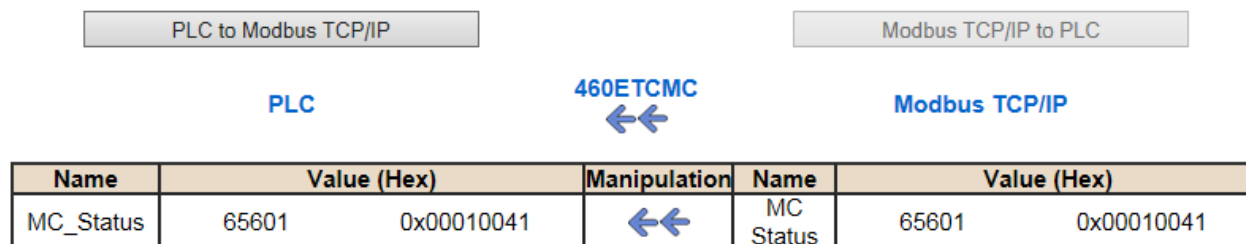
**Recoverable Faults:** **0x00FF0000 (bit 16-23) 3<sup>rd</sup> byte**

Hex:	Bit Position:	Decimal:	Explanation:
0x01	16	65,536	recoverable fault - timed out
0x02	17	131,072	recoverable fault - Slave err

### Non-Recoverable Faults 0xFF000000 (bit 24-31) 4<sup>th</sup> byte

Hex:	Bit Position:	Decimal:	Explanation:
0x01	24	16,777,216	nonrecoverable fault - task fatal err
0x02	25	33,554,432	nonrecoverable fault - config missing
0x04	26	67,108,864	nonrecoverable fault - bad hardware port
0x08	27	134,217,728	nonrecoverable fault - config err
0x10	28	268,435,456	Configuration Mode
0x20	29	536,870,912	No Ethernet Cable Plugged In

For this example the MC Status is mapped to a PLC tag called MC\_Status



**Example:** MC Status is 0x00010041 (65601 decimal), here is the break down, we know that bytes 1 and 3 are being used, so here is the break down,

#### Common Status:

Hex:	Bit:	Decimal:	Explanation:
0x01	0(on)	1	if we are a Master/Client
0x40	6(on)	64	recoverable fault

#### Recoverable Faults:

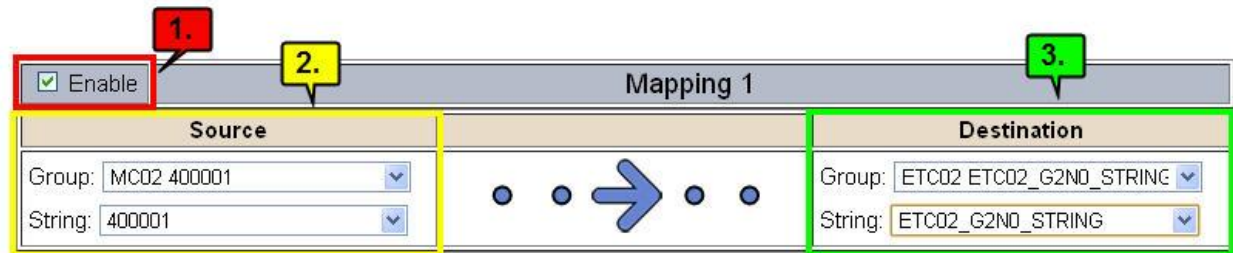
Hex:	Bit:	Decimal:	Explanation:
0x01	16	65,536	recoverable fault - timed

Total:            0x010041            65,601

## String Mapping – Explanation

Below are the different parts that can be modified to make up a string mapping.

String data types can only be mapped to other string data types. There is no manipulation that can be done on the string.



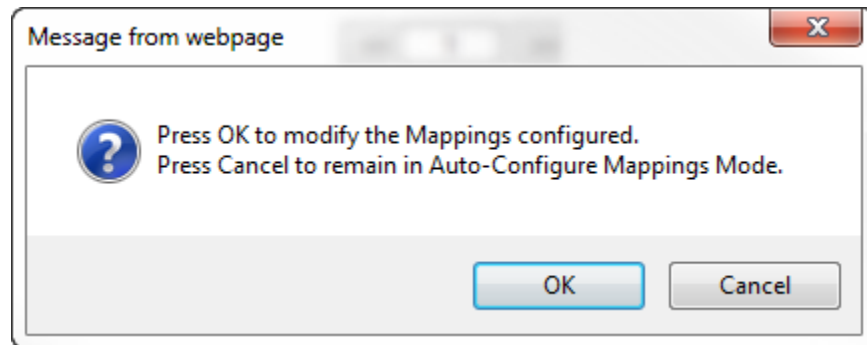
Mapping 1	
<b>Source</b>	<b>Destination</b>
Group: MC02 400001	Group: ETC02 ETC02_G2NO_STRING
String: 400001	String: ETC02_G2NO_STRING

- 1) Enable (red box above): Check to enable mapping. If not checked, this mapping is skipped.
- 2) Source Field (yellow box above):
  - a. Group - Select the string data group you set up in the protocol config to use for this mapping.
  - b. String - This is the string used for this mapping.
- 3) Destination Field (green box above):
  - a. Group - Select the string data group you set up in the protocol config to use for this mapping.
  - b. String - This is the string where the data is being stored.

## Mapping – Auto-Configure Mode to Manual Configure Mode

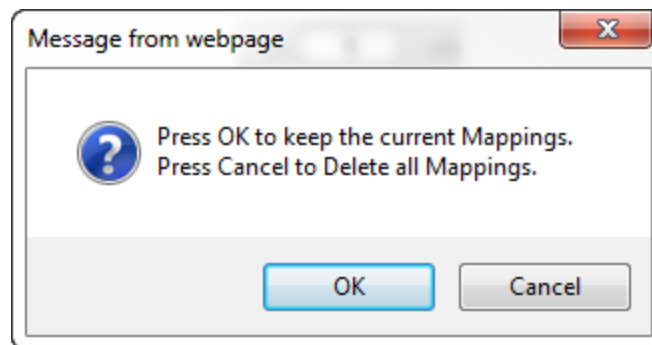
To transition from Auto-Configure Mapping Mode to Manual Configure Mode, click the dropdown at the top of the Mapping Configuration page and select Manual Configure.

After you click this button, you will be prompted to confirm if this is really what you want to do.



Click **OK** to proceed to Manual Configure Mode or click **Cancel** to remain in Auto-Configure Mappings Mode.

Once OK is clicked, there are 2 options on how to proceed from here.

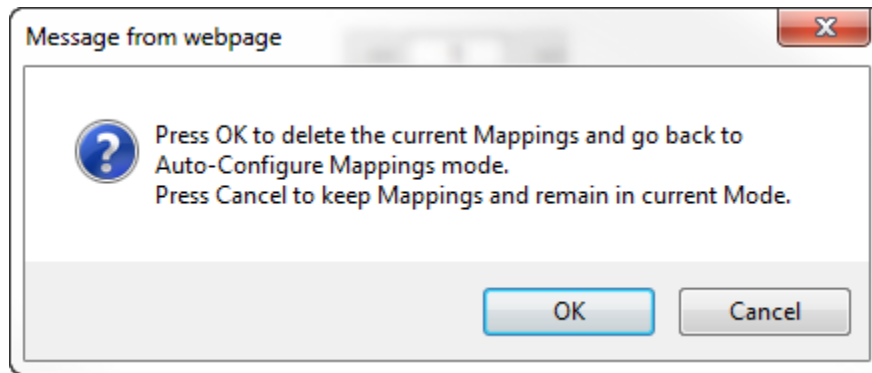


- 1) To keep the mappings that are already configured press **OK**.
  - a. You would want this option if you are adding additional mappings or you want to modify the mapping(s) that already exist.
- 2) To delete the mappings that are already there and start over press **Cancel**.

To modify the number of mappings, enter a number next to **# of Mappings to Configure** and click the **Set Max # of Mappings** button. You can always add more mappings if needed.

## Mapping – Manual Configure Mode to Auto-Configure Mode

To transition from Manual Configure Mode to Auto-Configure Mapping Mode, click the dropdown menu at the top of the Mapping Configuration page and select Auto-Configure Mappings.



Click **OK** to proceed to delete all current mappings and go back to Auto-Configure Mappings Mode. Click **Cancel** to keep all mappings and remain in Manual Configure Mode.

**NOTE:** Once you revert back to Auto-Configure Mapping Mode there is no way to recover the mappings you lost. Any mappings you previously have added will be deleted as well.

## View as Text

### Data Mapping

The View as Text page displays the point to point mapping(s) you set up in the Data Mapping section. This will also display any manipulation(s) that are configured.

Each line on this page will read as follows:

**Mapping number:** *source point* **Len:** *Number of points mapped -> manipulation (if blank then no manipulation) -> destination point*

If you are looking for a specific point to see if it is mapped, you can do a find in this text box for your point in question. Example: you defined 20 Registers starting at register 1 and want to see if 400011 is mapped. If it is not in this text box then it is not mapped and no data will be transferred.

This is the text display for the example shown under the *Data Mapping- Adding Diagnostic Information* section.

Data Mapping				
Mapping 1:	Temporary Ram0	Len: 1	-> 1:10 Scale to 1:100 ->	Temporary Ram1
Mapping 2:	Temporary Ram1	Len: 1	-> Add 5 ->	Temporary Ram2

### String Mapping

The View as Text page displays the string mapping(s) you set up in the String Mapping section.

Each line on this page will read as follows:

**Mapping number:** *source point* -> **Copy** -> *destination point*

If you are looking for a specific point to see if it is mapped, you can do a find in this text box for your point in question. Example: you defined 20 String Tags in the PLC and want to see if "Test\_String" in the Logix PLC is mapped. If it is not in this text box, then it is not mapped, and no data will be transferred.

String Mapping			
Mapping 1:	Logix Test_String	-> Copy ->	MC02 400001

## Security Configuration

To setup security on the 460 gateway, navigate to **Other->Security Configuration**. You can configure Security for 3 administrators, 5 users, and 1 guest.

### THIS IS **NOT** A TOTAL SECURITY FEATURE

The security feature offers a way to password protect access to diagnostics and configuration on the network. The security feature does not protect against “Air Gap” threats. If the gateway can be physically accessed, security can be reset. All security can be disabled if physical contact can be made. From the login page, click the Reset Password button twice. You will be forced to do a hard reboot (power down) on the gateway within 15 minutes of clicking the button. This process should be used in the event a password is forgotten.

**Note:** Only Admins have configuration access to all web pages.

- 1) Log Out Timer: The system will automatically log inactive users off after this period of time.  
**NOTE:** A time of 0 means that the user will not be automatically logged off. Instead, they must manually click the **Logout** button.
- 2) Username: Enter a username, max of 32 characters.
- 3) Password: Enter a password for the username, max of 32 characters, case sensitive.
  - a. Re-enter the Password
- 4) E-mail: In case the password was forgotten, a user can have their password e-mailed to them if e-mail was configured.
- 5) Hint: A helpful reminder of what the password is.

**Security Configuration**

Log Out Timer:  0-15 min

**Admin Configuration**

Admin	Username	Password	Re-enter Password	Email	Hint
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>

**Admin Contact Information**

**User Configuration**

User	Username	Password	Re-enter Password	Email	Hint
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	Not Configured	<input type="text"/>



## Security Configuration-Security Levels

Each webpage in the gateway can have a separate security level associated with it for each user.

Security Levels:

- 1) **Full Access:** Capability to view and configure a web page.
- 2) **View Access:** Capability to view a web page, but cannot configure parameters.
- 3) **No Access:** No capability of viewing the web page and page will be removed from Navigation.

User 1: View

User 1:
User 2:
User 3:
User 4:
User 5:
Guest

Web Page	Security
All Web Pages	No Access <span>Set</span>
Web Page	Security
Main Page	Full Access <span></span>
Device Configuration	Full Access <span></span>
Port Configuration	Full Access <span></span>
BACnet/IP Server	Full Access <span></span>
Modbus RTU Master	Full Access <span></span>
View Mapping	Full Access <span></span>
Mapping	Full Access <span></span>
Setup LED's	Full Access <span></span>
Diagnostic Info	Full Access <span></span>
Logging	Full Access <span></span>
Display Data	Full Access <span></span>
Export Configuration	Full Access <span></span>
Import Configuration	Full Access <span></span>
Save As Template	Full Access <span></span>
Load From Template	Full Access <span></span>
Utilities	Full Access <span></span>
Email Configuration	Full Access <span></span>
Alarm Configuration	Full Access <span></span>
String Mapping	Full Access <span></span>
View String Mapping	Full Access <span></span>
Display String	Full Access <span></span>

Save Parameters

## Security - Log In

**Username:** Name of the user to login.

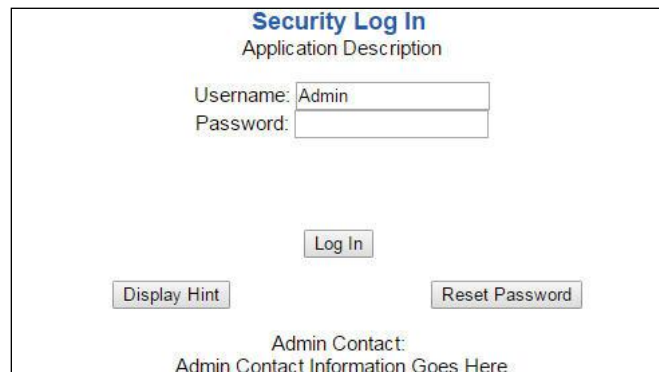
**Password:** Password of the user to login.

**Log In:** If login is successful, the user will be redirected to the Main Page.

**Send Password to Email:** Sends the specified User's Password to the email configured for that user.

**Display Hint:** Displays the hint specified for the User if one was set up.

**Reset Password:** This is used to reset security settings. Confirm reset password must be selected to confirm this action. Once confirmed, there is a 15 minute window to do a hard reset of the gateway by physically removing and restoring power from the gateway. Once power is restored, you may navigate to the IP address of the gateway as normal.



The image shows a web form titled "Security Log In" with the subtitle "Application Description". It contains two input fields: "Username:" with the value "Admin" and "Password:". Below these fields are three buttons: "Log In", "Display Hint", and "Reset Password". At the bottom of the form, it says "Admin Contact:" followed by "Admin Contact Information Goes Here".

## Security - Log Out

Once a user is done with a session they may click **logout** at the top of any page. The user may also be logged out for inactivity based off of the Log Out Timer specified during the configuration.



The banner contains the RTA logo on the left, the text "Welcome Admin [logout](#)" in the center, and the website URL "www.rtaautomation.com" on the right. Below this, a blue bar displays "Real Time Automation, Inc." on the left and "MODE: RUNNING 460" on the right.

Closing the browser is not sufficient to log out.

## Email Configuration

To setup e-mails on the 460 gateway, navigate to **Other->Email Configuration**.

You can configure up to 10 email addresses.

- 1) SMTP Mail Username: The email address that the SMTP server has set up to use.
- 2) SMTP Mail Password: If authentication is required, enter the SMTP Server's password (Optional).
- 3) SMTP Server: Enter the Name of the SMTP Server or the IP Address of the Server.
- 4) From E-mail: Enter the e-mail that will show up as the sender.
- 5) To E-mail: Enter the e-mail that is to receive the e-mail.
- 6) E-mail Group: Choose a group for the user. This is used in other web pages.

Click the **Save Parameters** button to commit the changes and reboot the gateway.

**Email Configuration**

Number of Emails to Configure:  0-10

User	SMTP Mail Username	SMTP Mail Password	SMTP Server	From Email	To Email	Email Group
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Group A ▼

## Alarm Configuration

To setup alarms on the 460 gateway, navigate to **Other->Alarm Configuration**.

- 1) Alarm Delay upon Powerup: At Powerup, the gateway will have values of '0' stored for all data. This may cause alarms to trigger before these values are updated by the mating protocols. Set this field to provide needed time to update fields before considering values for alarms.

Alarm Configuration

Help

Alarm Delay upon Powerup:  0-3600 s

# of Alarms to Configure:  0-100

<<  >>

☒ Enable

Alarm 1				
Data Point	Set Error	Clear Error	Alarm Name	Email
<div>Ticks Since Powerup (Uint32)</div> <div>Ticks Since Powerup</div>	<div>&gt;=</div> <div>1000</div>	<div>None</div> <div>0</div>	<div>Gateway_test</div>	<div>Group A</div>

<< >>

- 2) Enter the number of alarms to configure and click **Set Max # Alarms** to generate those lines.
- 3) In the Data Point Section:
  - a. Top dropdown: select the Data Group. This dropdown menu will contain all groups that go from the gateway to the network.
  - b. Lower dropdown: select the Data Point's Specific Point. This is used to select which point in the group will be monitored for alarms.
- 4) In the Set Error Section:
  - a. Select the Set Error Operation in the top dropdown menu. Available options are <, >, <=, >=, !=, ==, and Change of State (COS). This is the operation that will be used to compare the Data Point value against the Error Value to determine if the alarm needs to be set.
  - b. Select the Set Error Value. This value is used as: 'Data Point's Value' 'Operation' 'Value.' Ex: Ticks Since Powerup >= 1000. This will set the alarm after 1000 ticks have elapsed since the unit powered up.

- 5) In the Clear Error Section:
  - a. Select the Clear Error Operation. Available options are <, >, <=, >=, !=, ==, and Change of State (COS). This is the operation that will be used to compare the Data Point value against the Error Value to determine if the alarm needs to be cleared.
  - b. Select the Clear Error Value.  
-Ex: Ticks Since Powerup >= 5000. This will clear the alarm after 5000 ticks have elapsed since the unit powered up.
- 6) Enter an Alarm Name. This will make the alarm unique and will be available in the Alarm Status page as well as in the email generated by the alarm.
- 7) Select an email to associate this alarm with. When an alarm is set, it sends an email. When an alarm is cleared, it will also send an email.

Click the **Save Parameters** button to commit the changes to memory and reboot the gateway.

## Diagnostics – Alarm Status

Alarm Status will only display under the Diagnostic menu tab if at least 1 Alarm is enabled.

- 1) # Alarms Enabled: This is a count of enabled alarms.
- 2) # Alarms Active: This is how many alarms are presently active (set).
- 3) Last Active Alarm: This is the last alarm that the gateway detected.
- 4) **Clear # of Times Active:** This will reset all alarms ' # of Times Active ' to 0.
- 5) Alarm #: The reference number to the given alarm on the alarm setup page.
- 6) Name: The name of the alarm.
- 7) Status: The current status of the alarm, either OK or ALARM.
- 8) # of Times Active: This count represents the number of times this alarm has become active. If an alarm is triggered, this count will increment.

**Alarm Status**

# Alarms Enabled: 1  
# Alarms Active: 0  
Last Active Alarm:

Clear # of Times Active

Alarm#	Name	Status	# of Times Active
1	Alarm Example	OK	0

## Alarms – Active

While one or more alarms are active, every page will display 'Alarms Active' at the top of the page. This will no longer be displayed if all active alarms have been cleared.



www.rtaautomation.com

Alarms Active

MODE: RUNNING  
460

Real Time Automation, Inc.

When an alarm is activated, the following will occur:

- 1) A one-time notification will be sent out to the email associated with the alarm.
- 2) For duplicate emails to occur, the alarm must be cleared and then become active again.
- 3) # Alarms Active and # of Times Active will be incremented.
- 4) Status of the Individual Alarm will be set to *Alarm*.
- 5) *Last Active Alarm* field will be populated with details on what triggered the alarm.

#### Alarm Status

# Alarms Enabled: 1  
# Alarms Active: 1  
Last Active Alarm: Alarm 1 is Set: Actual: 0 < Limit: 20

Clear # of Times Active

Alarm#	Name	Status	# of Times Active
1	Alarm Example	Alarm	1

## Alarms – Clear

When an alarm is cleared, the following will occur:

- 1) A one-time notification will be sent to the email associated with the alarm.
  - a. For duplicate emails to occur, the alarm must become active and then be cleared again.
- 2) Total # *Alarms Active* will decrement. *Last Active Alarm* will not be changed.
- 3) Status of the Individual Alarm will be reset to *OK*.

## Change of State (COS) Configuration

To access the configuration files in the 460 gateway, navigate to dropdown **Other->COS Configuration**. The gateway, by default only writes when data has changed. The gateway also waits to write any data to the destination until the source protocol is successfully connected.

**Default values should fit most applications. Change these values with caution as they affect performance.**

- 1) **Stale Data Timer:** If the data has not changed within the time allocated in this Stale Data Timer, the data will be marked as stale within the gateway and will force a write request to occur. This timer is to be used to force cyclic updates in the gateway, since data will only be written if it has changed by default. There is a separate timer per data mapping.

**Gateway behavior:**

- If time = 0s => (DEFAULT) The gateway will write out new values on a Change of State basis.
  - If time > 0s => The gateway will write out new values whenever the timer expires to force cyclic updates (write every x seconds).
- 2) **Production Inhibit Timer:** Amount of time after a Change of State write request has occurred before allowing a new Change of State to be written. This is to be used to prevent jitter. Default value is 0ms. This timer takes priority over the Stale Data Timer. There is a separate timer per data mapping. This timer is active only after the first write goes out and the first COS event occurs.
  - 3) **Writes Before Reads:** If multiple writes are queued, execute # of Writes Before Reads before the next read occurs. Default is 10 and should fit most applications.  
**Warning:** A value of 0 here may starve reads if a lot of writes are queued. This may be useful in applications where a burst of writes may occur and you want to guarantee they all go out before the next set of reads begin.
  - 4) **Reads Before Writes:** If multiple writes are queued, the # of Writes Before Reads will occur before starting the # of Reads Before Writes. Once the # of Reads Before Writes has occurred, the counter for both reads and write will be reset. Default is 1 and should fit most applications.
  - 5) **Enable Data Integrity:** If enabled, do not execute any write requests to the destination until the source data point is connected and communicating. This prevents writes of 0 upon power up.

### Change of State Configuration

Help

Stale Data Timer: 0 0-3600 s

Production Inhibit Timer: 0 0-60000 ms

Writes Before Reads: 10 0-255

Reads Before Writes: 1 1-255

Enable Data Integrity: ☒

Save Parameters

Click the **Save Parameters** button to commit the changes to memory and reboot the gateway.



## Diagnostics Info

The Diagnostic page is where you can view the gateway's translations and protocol specific status information.

For protocol specific diagnostic information, refer to the next three pages.

## Diagnostics – Data and String Mapping

The Diagnostics->Diagnostic Info->System section displays the number of translations that are enabled, for both Data and String data types, the number of mappings that have an error, and the first mapping that has an error.

**# Enabled:** Number of mappings that are enabled.

**# Error:** The number of mappings that are enabled that have an error.

**First Error:** This is a detailed description of the first mapping that has an error.

Common Errors:

- 1) Destination or Source Point does not exist  
-Solution: Re-map the mapping
- 2) Source or Destination Pointer too small  
- There is not enough space on either the Source, or the Destination for the data you want to copy. This is typically seen when the Destination is smaller than the amount of data being transferred to it.
- 3) Range Discard, Min or Max Value  
- The actual data value is outside of the defined range
- 4) Math Error  
- Operation value cannot be 0
- 5) Scaling Error  
- Source Min must be smaller than Source Max  
- Destination Min must be smaller than Destination Max

## Diagnostics – Allen-Bradley PLC

Select the **Allen-Bradley PLC** in the dropdown menu on the Diagnostic page to view a breakdown of the diagnostics and common strings that are displayed on the page. You may also view individual counters by selecting the device in the **All PLC's** dropdown menu and clicking **View**. Additional diagnostic information can be found by clicking the **Help** button.

**NOTE:** This page will auto-refresh every 5 seconds with the latest data.

**Device Status** - This will only display when viewing *All PLC's*.

- 1) Connected – The gateway is connected to all of the PLC's that are configured and enabled.
- 2) Nodes Missing (timed out) – one or more enabled PLC's are missing.
- 3) Empty Scan List – No PLC's are configured.
- 4) Dependency Protocol Faulted – The dependent protocol is missing causing the communication to go to inactive.

**Diagnostics** (MAC: 00:03:F4:06:15:E6)

Allen-Bradley PLC

View

All PLC's

View

Clear All Values

Device Status

Connected and Running

Help

LED Status

Connection Status: Connected

Variables

Network Bitmap Status: 0x00000001

Read Requests: 2210

Read Responses: 2210

Read Timeouts: 0

Read Errors: 0

Write Requests: 0

Write Responses: 0

Write Timeouts: 0

Write Errors: 0

Status Strings

Last Read Error Code:

Last Write Error Code:

---

**LED Status** - This is the Status for *All PLC's* or the specific PLC selected.

- 1) Connected (Solid Green) – All of the enabled PLC devices are connected and running.
- 2) Not Connected (Flashing Green) – No PLC's are enabled.
  - a. Verify Allen-Bradley PLC settings and ensure that the *Enable* checkbox is checked for the appropriate device(s).
- 3) Connection Timeout (Flashing Red) – The gateway cannot open a connection to 1 or more of the enabled PLC's.
  - a. Verify the IP, Slot and Controller type is accurate for the missing connection. Missing connection can be determined from the Network Bitmap Status value.
- 4) Communication not attempted yet (Flashing Red) – (Specific Server Only) No reads are configured and data needed for writes isn't valid yet.
- 5) Dependency Error (Flashing Red) – The dependent protocol is missing causing the communication to go to inactive.
  - a. The other Protocol must be connected.

**Variables** - These are the values for *All PLC's* or the specific PLC selected.

- 1) Network Bitmap Status (hex) – each bit corresponds to a PLC. If the bit is set, then the PLC is connected, otherwise the bit is 0. Bit 0 (right most) is PLC 1 and Bit 4 is PLC 5.
- 2) Read Requests – Number of read requests sent from the gateway to the PLC (N2G).
- 3) Read Responses – Number of valid responses sent from PLC to the gateway (G2N).
- 4) Read / Write Timeouts – Since we are TCP based, the gateway will timeout on the read or write and close the TCP connection. This counter will not continually increment. The Bitmap will reflect the missing PLC.
- 5) Read Errors – Number of read error responses sent from the PLC to the gateway.
- 6) Write Requests – Number of write requests sent from the gateway to the PLC (G2N).
- 7) Write Responses – Number of valid write responses sent from the PLC to the gateway.
- 8) Write Errors – Number of write error responses sent from the PLC to the gateway.

**Common Error Strings** - These are the values for *All PLC's* or the specific PLC selected.

- 1) IP: xxx.xxx.xxx.xxx "tagname" (04) Path Segment Error – The tag name is wrong or the tag is not defined as a controller scope tag.
- 2) IP: xxx.xxx.xxx.xxx "tagname" (08) Service Not Supported – The IP Address or the Slot Number does not match with the PLC the gateway is setup to communicate with.
- 3) IP: xxx.xxx.xxx.xxx "tagname" (1E) Embedded Server Error – The tag name that is setup within the gateway doesn't match a tag setup in the PLC.
- 4) IP: xxx.xxx.xxx.xxx "tagname" (ff,2105) Access beyond end of array – Tried to read/write too much data.
- 5) IP: xxx.xxx.xxx.xxx "tagname" (ff, 2107) Abbreviated type mismatch – The data type of the tag, on a write, in the gateway doesn't match the tag in the PLC.

## Diagnostics – PROFINET IO Server

Select the **PROFINET IO Server** in the dropdown menu on the Diagnostic page to view a breakdown of the diagnostics and common strings that are displayed on the page. Additional diagnostic information can be found by clicking the **Help** button.

**NOTE:** This page will auto-refresh every 5 seconds with the latest data.

**Clear All Values** - *This will only affect Displayed Values.*

- 1) This will return all values displayed to 0.
- 2) If viewing PROFINET IO Server, this will only clear the values for the PROFINET IO Server section of the gateway.

### Device Status:

- 1) Connected - A PROFINET IO Controller has a connection for the gateway.
- 2) Not Connected:
  - a. The PROFINET IO Controller has not opened up communication to the gateway.
  - b. The PROFINET IO Server has an invalid configuration or no parameters configured.

### Diagnostics (MAC: 00:03:F4:06:5E:4C)

Profinet IO Server

View

Clear All Values

View

Help

#### Device Status

Not Connected

#### LED Status

Connection Status: Not Connected

#### Variables

Parameters Read:	3
Parameters Written:	0
PN Ethernet Pkts Rcvd:	0
PN Ethernet Pkts Sent:	1
UDP Pkts Rcvd:	0
UDP Pkts Sent:	0
OutData Pkts Rcvd:	0
Connection Timeouts:	0

**LED Status:**

- 1) Good Communication (Solid Green) – Connected to a PROFINET IO Controller and Online.
- 2) Not Connected (Flashing Green) – Configured but no PROFINET IO Connection was established.
- 3) Fatal Error (Solid Red) –
  - a. Invalid Configuration due to no input/output slots configured within the gateway
- 4) Connection Timeout (Flashing Red) –
  - a. PROFINET IO Controller's slot configuration doesn't match the gateway's slot configuration
  - b. PROFINET IO Controller was communicating to the gateway and is no longer communicating
- 5) No Ethernet cable plugged in (Off)

**Variables:**

- 1) Parameters Read: Rollover counter for the number of parameters read by the IO Controller.
- 2) Parameters Written: Rollover counter for the number of parameters written by the IO Controller.
- 3) PN Ethernet Pkts Rcvd: Rollover counter for the number of PROFINET Ethernet packets received.
- 4) PN Ethernet Pkts Sent: Rollover counter for the number of PROFINET Ethernet packets sent.
- 5) UDP Pkts Rcvd: Rollover counter for the number of PROFINET UDP packets received.
- 6) UDP Pkts Sent: Rollover counter for the number of PROFINET UDP packets sent.
- 7) OutData Pkts Rcvd: Rollover counter for the number of PROFINET IO cyclic data packets transmitted and/or received.
- 8) Connection Timeouts: Rollover counter for the number of connection timeouts between the gateway and the IO Controller. If this counter is incrementing, check the Ethernet connection and verify the gateway is in the IO Controller.

## LED Configuration

To modify the behavior of the LEDs on the 460 gateway, navigate to **Other->Setup LEDs**.

The LED Configuration page lets you configure the LEDs on the gateway.

Each LED may be set to Disabled, Protocol 1, or Protocol 2. If either Protocol is a Master/Client, you may set the LED to represent either all Slaves/Servers configured in the gateway or a particular Slave/Server device.

To select a particular Slave/Server device:

- 1) Select the protocol in the left dropdown menu.
- 2) Click **Save Parameters** to generate the second dropdown menu.
- 3) Select the individual Slave/Server in the right dropdown menu.

Click the **Save Parameters** button to commit the changes and reboot the gateway.

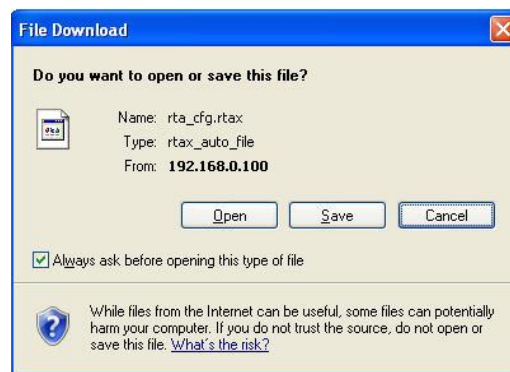
## Configuration Files

To access the configuration files in the 460 gateway, navigate to dropdown **Other->Export/Import Config**.

## Export Configuration

The export tool allows you to save your gateway configuration for backup or to be exported into another gateway. This file is named *rta\_cfg.rtax* by default. Network settings will not be saved in this configuration since they must be unique for each gateway.

Upon clicking the **Save Configuration to File** button, you will be prompted to select a location to save the file.



## Import Configuration

You can import a previously exported configuration file or a configuration file from another device into the 460 gateway whenever it is in Configuration Mode.

Upon clicking the **Choose File** button, you will be prompted to select a location from which to load the saved file. Once the location is selected, click the **Load Configuration** button.

If it has successfully loaded, the gateway will indicate that it was successful and a message will appear under the Load Configuration button indicating you should reboot the gateway.

If it encountered an error while trying to load the saved configuration, the gateway will indicate the first error it found and a brief description about it under the Load Configuration button. The configuration file is xml and can be modified with any text editor. Once that error is fixed, try loading again until it is successful.

## Save and Replace Configuration Using SD Card

### Saving Configuration Using SD Card

This function saves the gateway's configuration automatically to an SD Card each time the gateway is rebooted via the **Restart Now** button on the webpage. If this unit should fail in the future, the last configuration the gateway used is stored on the SD card and can be used for a new gateway to get the application back up and running quickly.

This SD Card replaces every configurable field in the gateway, **EXCEPT** for IP Address, Subnet Mask, and Default Gateway.

### Replacing Configuration Using SD Card

To replace a configuration in a gateway using the SD Card, a specific sequence of events must be followed for the replacement to happen correctly:

- 1) Extract SD Card from gateway you wish to copy the configuration from.
- 2) Power up the gateway you wish to copy the configuration to. DO NOT INSERT SD CARD YET.
- 3) Navigate to the webpage inside the unit.
- 4) Navigate to the dropdown **Other->Utilities**.
- 5) If you are not currently in *Mode: Configuring*, go into Configuration Mode by clicking on the **Configuration Mode** button at the top left-hand side of the screen.
- 6) Press the **Revert to Manufacturing Defaults** button on the Utilities Page. The Configuration will ONLY be replaced by the SD Card if the gateway does not have a configuration already in it.
- 7) When the unit comes back in *Mode: Running*, now insert the SD Card.
- 8) Do a hard Power Cycle to the unit by unplugging power. DO NOT RESET POWER VIA WEBPAGES.
  - a. It will take an additional 30 seconds for the unit to power up while it is transferring the configuration. During this time, the gateway cannot be accessed via the webpage.
- 9) When the unit comes back up, the configuration should be exactly what was on the SD Card.



## Utilities

To access the Utilities page in the 460 gateway, navigate to **Other->Utilities**. The Utilities screen displays information about the gateway including Operation Time, File System Usage, Memory Usage, and Memory Block Usage.

Here you can also:

- View the full revision of the software.
- View all the files stored in the Flash File System within the gateway.
- Identify your device by clicking the **Start Flashing LED's** button. By clicking this button, the two diagnostic LED's will flash red and green. Once you have identified which device you are working with, click the button again to put the LED's back into running mode.
- Configure the size of the Log through the Log Configuration.
- Bring the device back to its last power up settings.
- Bring the device back to its original manufacturing defaults.
- Remove the Configuration File and Flash Files within the gateway.

### Utilities Page

Operation Time Since Last Reboot	0 days, 1 hours, 16 mins, 42 secs
File System Usage	Bytes Used: 344064 (43.75%) Bytes Free: 442368 (56.25%) Bytes Bad: 0 ( 0.00%)
Memory Usage	Bytes Used: 341004 (32.52%) Bytes Free: 707572 (67.48%)
Used Memory Blocks	Memory Blocks Used: 13 out of 2000
Revisions	<button>Listing of Revisions</button>
File List	<button>File List</button>
Identify Device	<button>Start Flashing LED's</button>
Set Up Log	<button>Log Configuration</button>
Revert To Last Powerup	<button>Revert to Last Powerup</button>
Revert All	<button>Revert to Manufacturing Defaults</button>
Reformat Flash	<button>Reformat Flash</button>