460PSA-NNA1
Protocol Gateway
Product User Guide

Firmware Version 8.4.6

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Revision History

Version	Date	Notes
6.3.4	11/13/18	Features Added 1. Released BC Protocol on the N2E Hardware 2. Released PS Protocol on NNA1 Hardware with updated GSDML file 3. Released Base Triggering with ETC Protocol Optimization Bug Fixes 1. WI Protocol handling of STRING data types Allow Origins in GET requests, and CR / LF on HTTP 200 responses 2. WI Protocol now has the Allow Origins as part of the HTTP Header 3. WI Protocol receives a second CR / LF at the end of the HTTP 200 response
6.4.7	03/05/19	Features Added 1. New Header Image 2. Released ASCII Protocol on N2E Hardware 3. Released ES Protocol on N2E Hardware 4. Updated Profinet Code and new GSDML V2.3 on NNA1 Hardware Bug Fixes 1. Cleaned up ASCII parser and concatenation functionality
8.3.9	10/21/2019	Features Added 1. Released BACnet MS/TP Slave Protocol on N2E Hardware 2. Released Profinet on N2E Hardware 3.Updated GSMDL file with new icons 4. Released S7 protocol 5. Released Wi-Fi Hardware Bug Fixes 1.Improved functionality of the Network conifguration page when going from Independent to Switch Mode. 2. Import/Export issues
8.4.5	11/18/2019	Features Added 1. Released OPC UA Server (US) Protocol 2. Ability to now Import/Export Template Files with out an FTP session. Bug Fixes 1. Updated Profinet Server (PS) on N34 hardware Platform 2. Updated Wi-Fi software

Overview

The 460PSA-NNA1 gateway connects a PROFINET IO Controller with a single ASCII device. By following this guide, you will be able to configure the 460PSA-NNA1 gateway.

Number of ASCII devices is dependent on the Hardware and Product number of the 460 gateway.

For further customization and advanced use, please reference the appendices located on the CD or online at: http://www.rtautomation.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@rtautomation.com

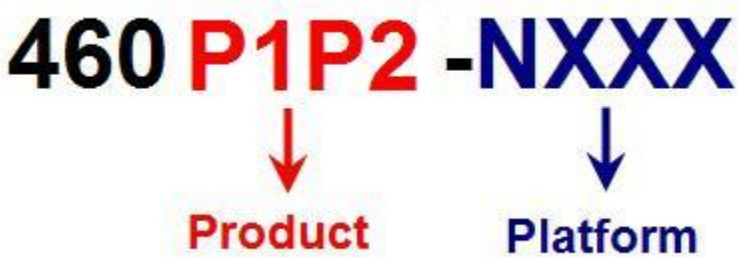
Hardware Platforms

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.

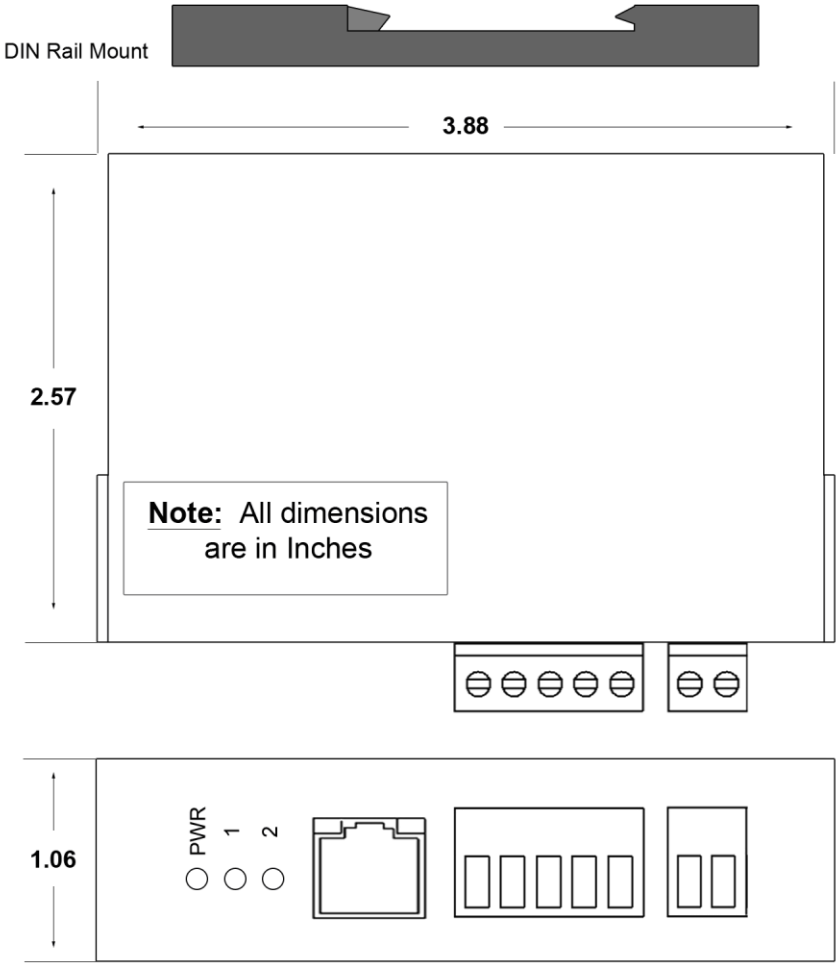
To find which hardware platform you are using:

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":

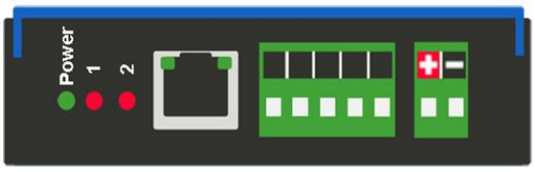


Hardware – NNA1



Powering the Gateway

- An 8-24 VDC power source to the gateway, Red Wire = (+) Black Wire = (-).
    a. The unit draws 175mA @ 12V.



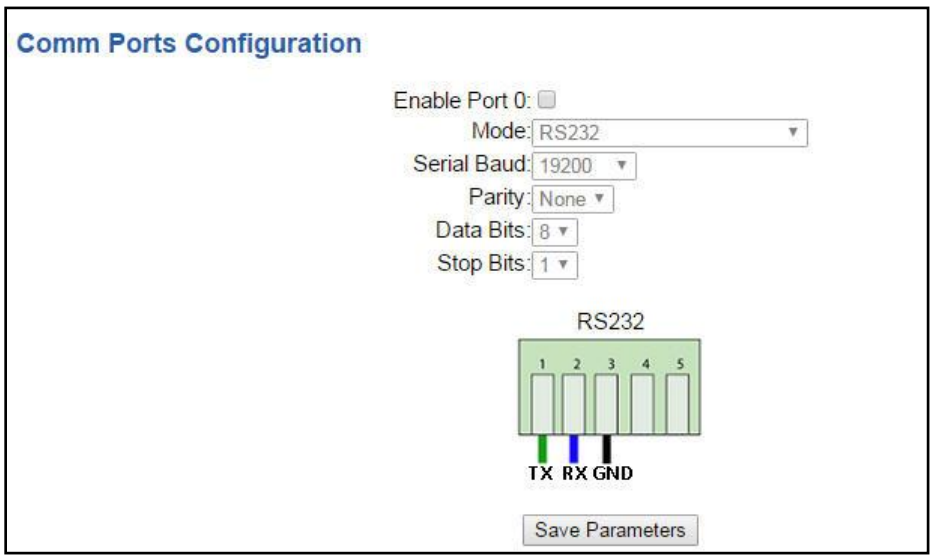
Port Configuration

The Port Configuration page is where you set port specific parameters. These settings must match the settings of the device(s) that you are connecting to.

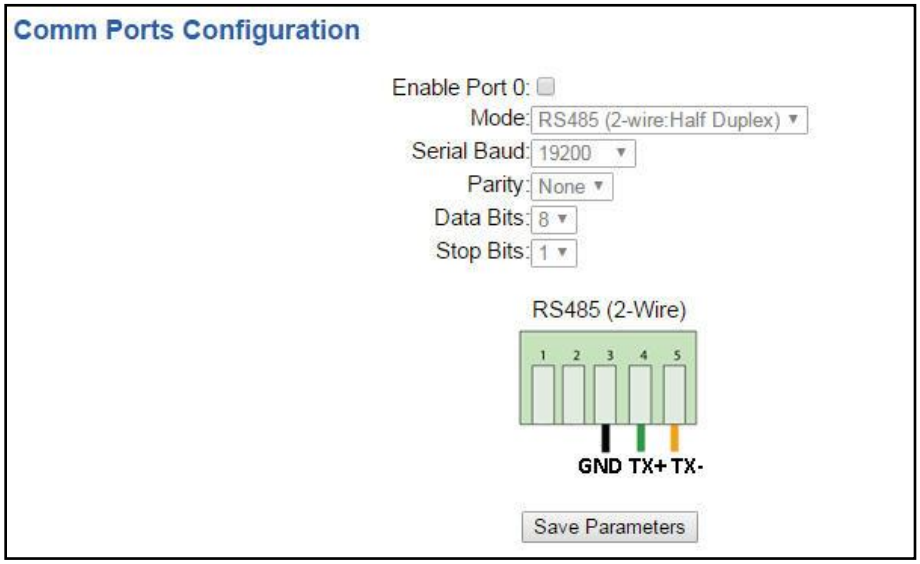
Only 1 mode can be configured for this hardware. Below are the wiring pinouts for each mode.

When you have completed your port configuration, click the **Save Parameters** button.

RS232 pinouts:



RS485 pinouts:

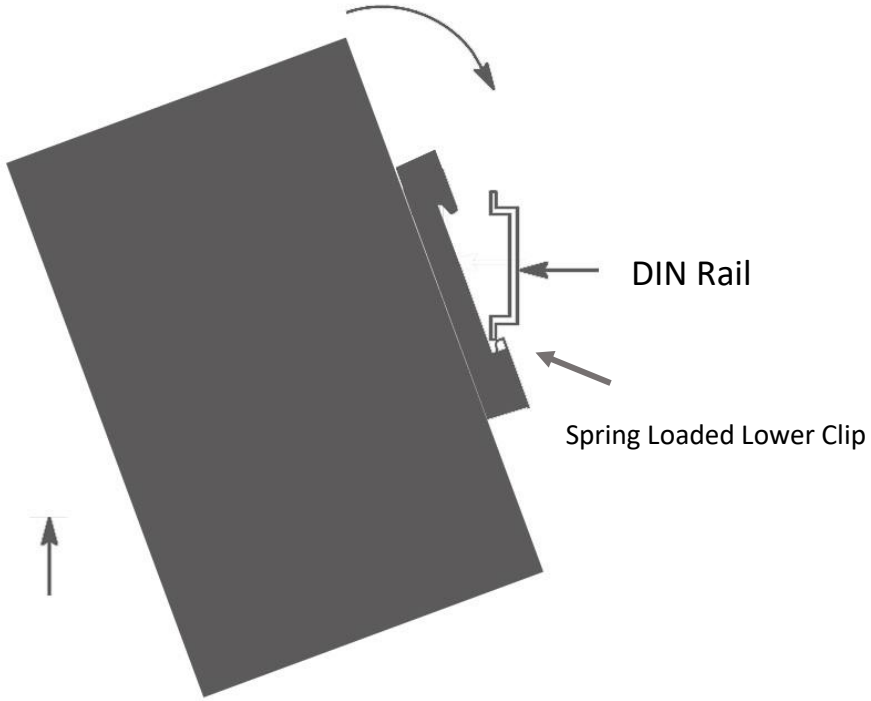


Mounting with a DIN Rail

Installing

Follow these steps to install your interface converter.

1) Mount your DIN Rail.
2) Hook the bottom mounting flange under the DIN Rail.
3) While pressing the 460PSA-NNA1 against the rail, press up to engage the spring loaded lower clip and rotate the unit parallel to the DIN Rail.
4) Release upward pressure.



Removing

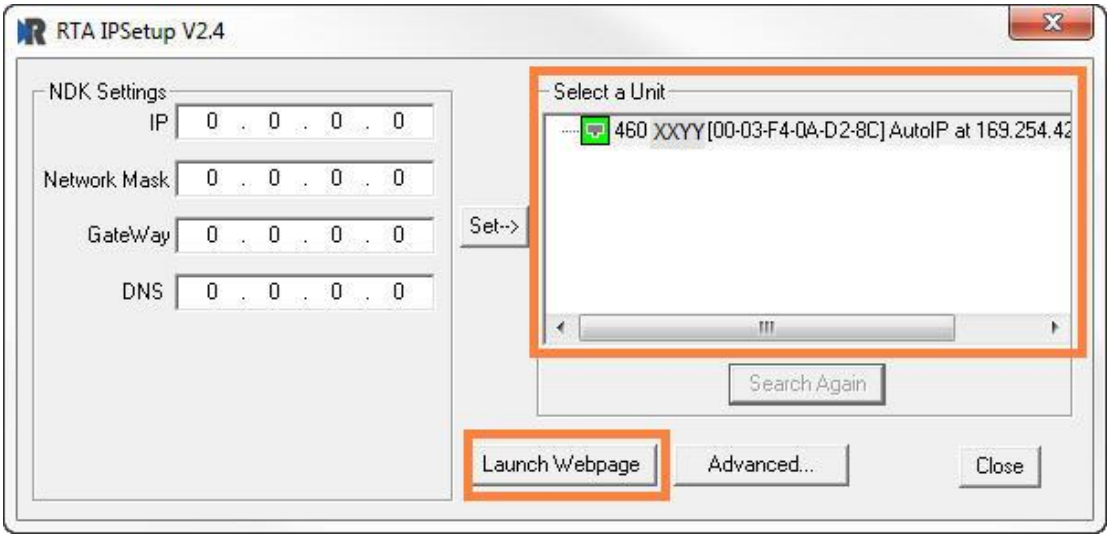
Follow these steps to remove your interface converter.

1) Press up on unit to engage the spring loaded lower clip.
2) Swing top of the 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. For more information on your Operating system network setting refer to the Access Browser Configuration Doc on the CD or download from our support web site.

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 on a 192.168.1.X network where X is not 11.

      ii. Relaunch the IP Setup tool to see if gateway can be discovered now.

4) Click **Launch Webpage**. The Main page should appear.

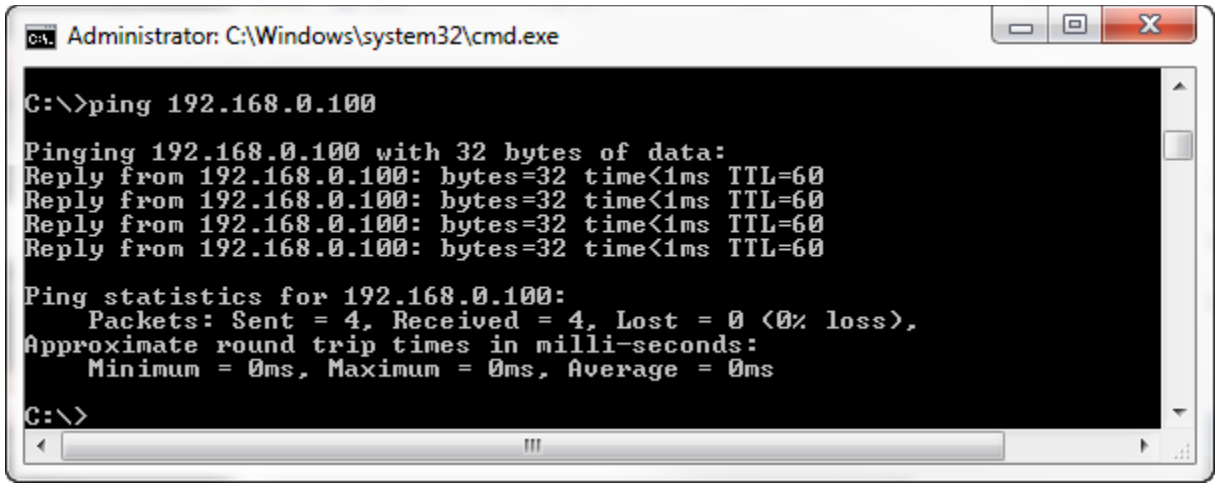
Default setting is set to 192.168.1.11, Subnet Mask 255.255.255.0, Default Gateway 192.168.1.1.

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.

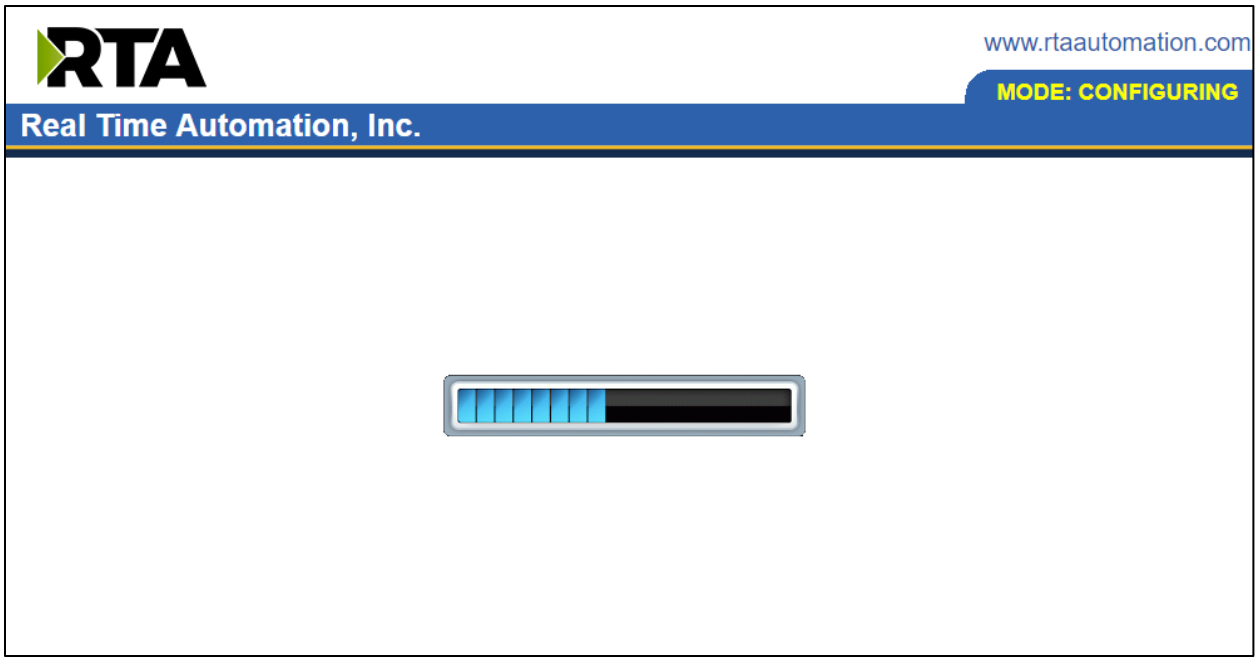


The Screenshot above shows a gateway that is currently set to a static IP Address of 192.168.0.100.

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.
    - 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:

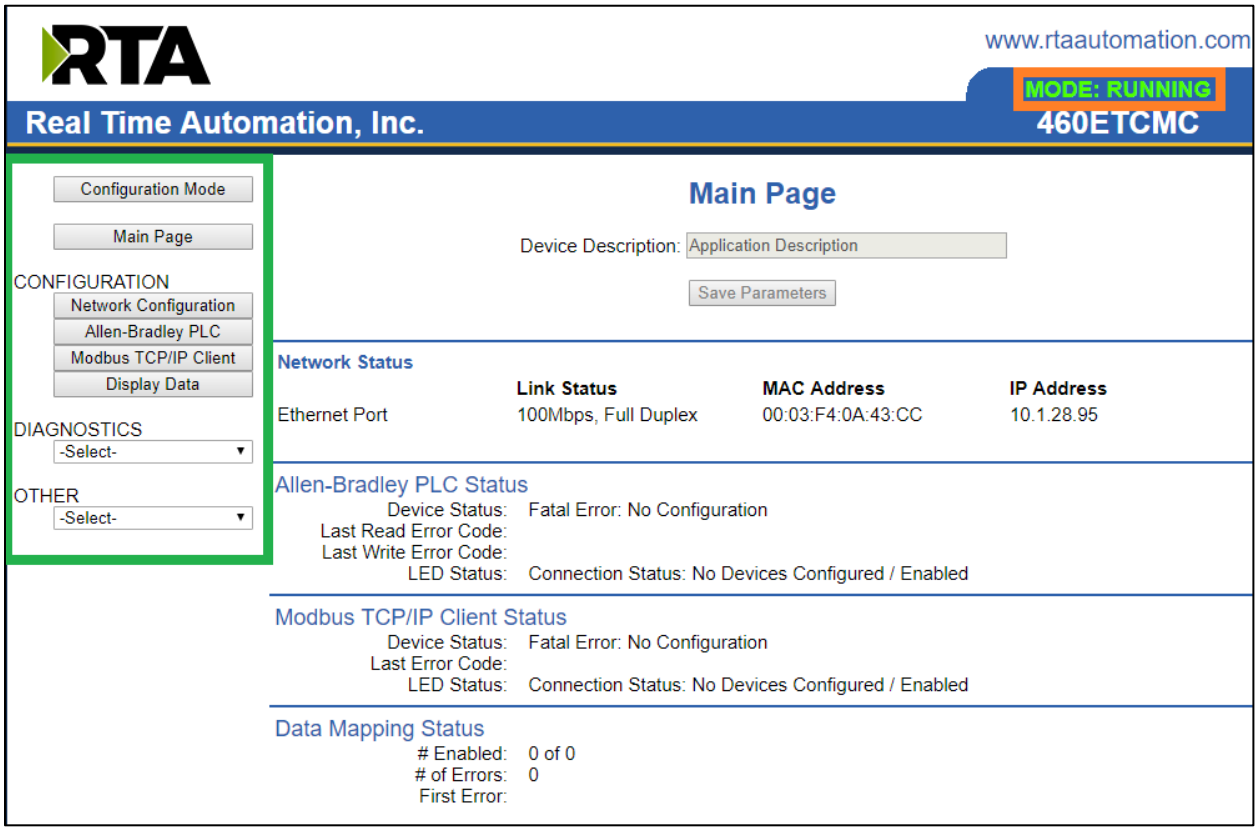
- Protocol communications are enabled
- Configuration cannot be changed during Running Mode. If changes are needed, click the **Configuration Mode** button shown in the green box below

Configuring Mode:

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

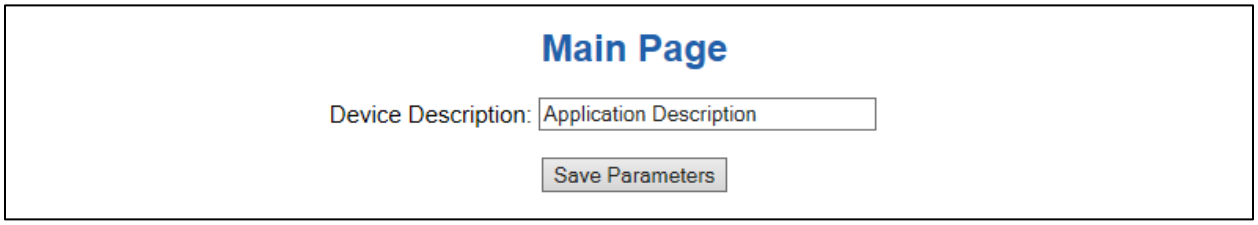
Navigation (green box below):

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



Device Configuration

The device configuration area is where you assign the device description paramter. Changes can only be made when the gateway is in Configuration Mode.



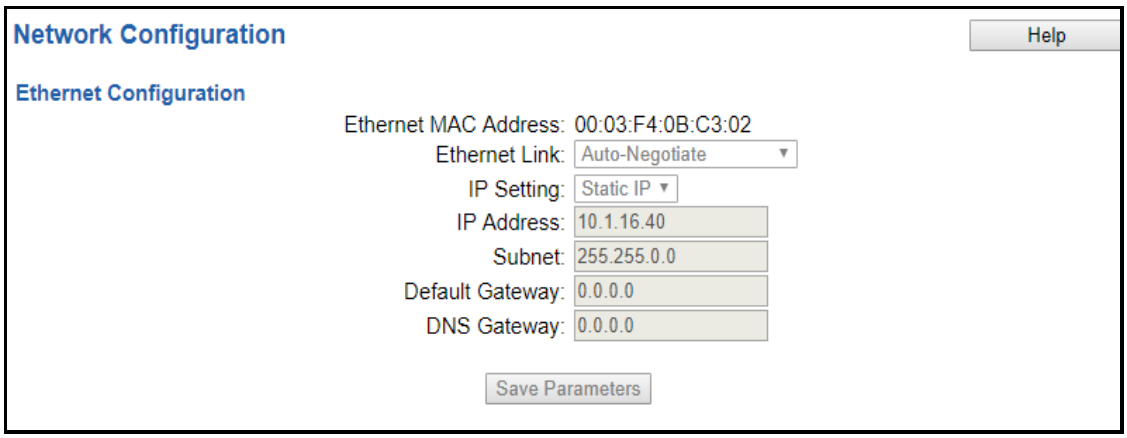
Once you are done configuring the Description, click the **Save Parameters** button.

Network Configuration

The network configuration area is where you assign the IP address and other network parameters. Changes can only be made when the gateway is in Configuration Mode.

Once you are done configuring 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.

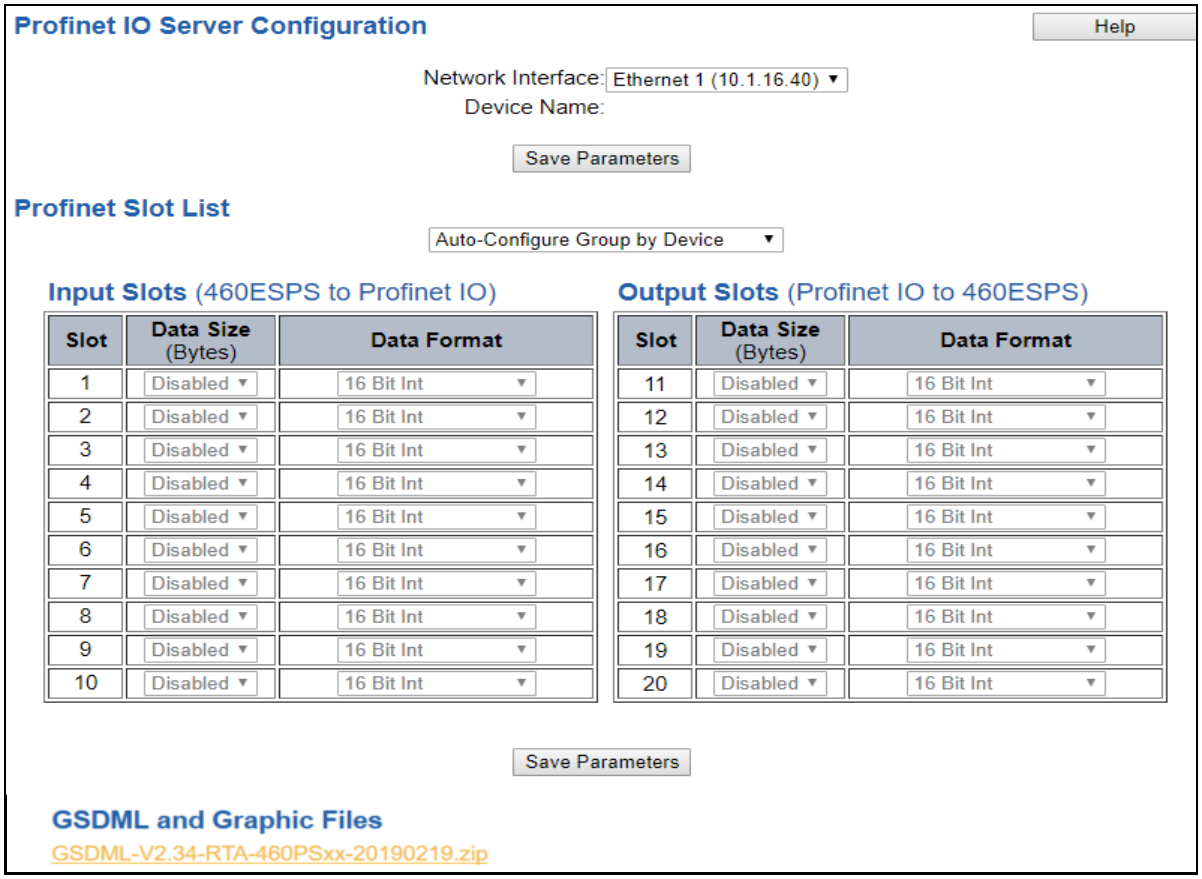


It is recommended to leave the DNS Gateway set to 0.0.0.0 and the Ethernet Link as Auto-Negotiate. If configuring the gateway to use E-mail, the DNS Gateway must be set.

PROFINET IO Server Configuration

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

1) Select which **Network Interface** to use for this PROFINET IO connection.
2) **Device Label**: This is the PROFINET name that is assigned by TIA Portal or STEP 7.



Note: To properly set communication to the PROFINET Controller, you will need to install the GSD file that is downloadable on the configuration web page or 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.

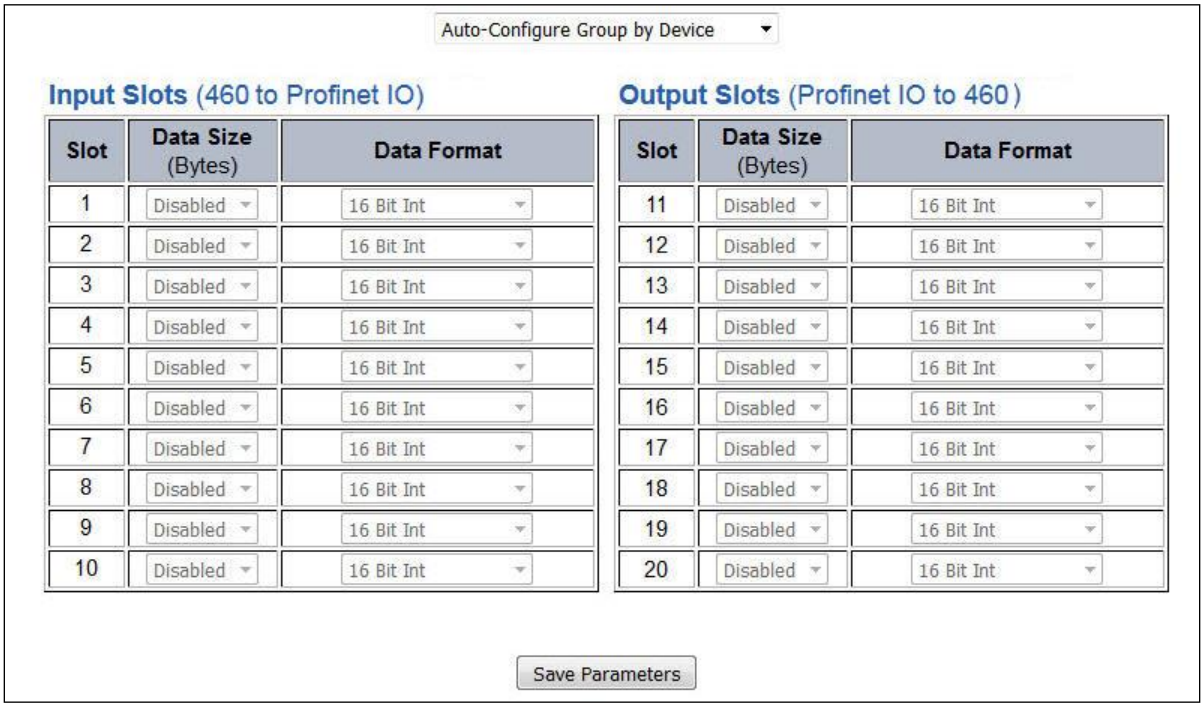
1) Data Size is configurable. Options include: 8, 16, 32, 64, and 128 Bytes.

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.



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 1st 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:

  - 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:

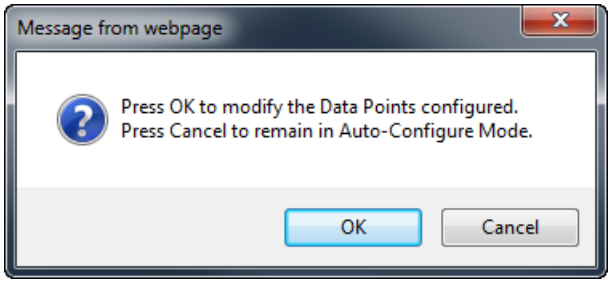
Scan Line 1 => Type Integer, length of 2
Scan Line 2 => Type Float, length of 1
Scan Line 3 => Type Integer, length of 2
Scan Line 4 => Type Float, length of 1

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

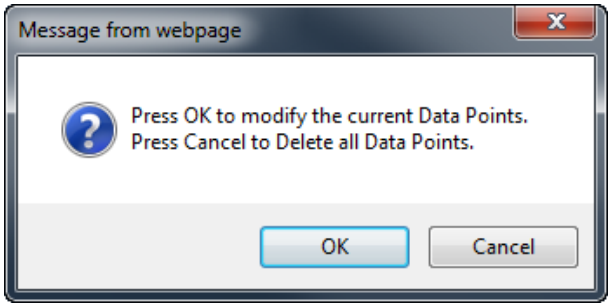
Scan Line 1 => Type Integer, length of 4
Scan Line 2 => Type Float, length of 2

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 two 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:

(1) ps01

Slot	Module	Order number	I address	Q address	Diagnostic address:	Comment
0	ps01	6GK1 953-0CA			2042*	
X1	Interface				2041*	
P1	RJ45 10/100				2040*	
1	128 bytes I		0...127			
2						
3						
4						
5						
6						
7						
8						
9						
10						
11	128 bytes O			0...127		
12						
13						

Siemens TIA Portal Configuration Example:

Topology view | Network view | Device view

Device overview

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

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

Gateway Configuration Example:

Input Slots (460 to Profinet IO)

Slot	Data Size (Bytes)	Data Format
1	128	Short String
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	128	Short String
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

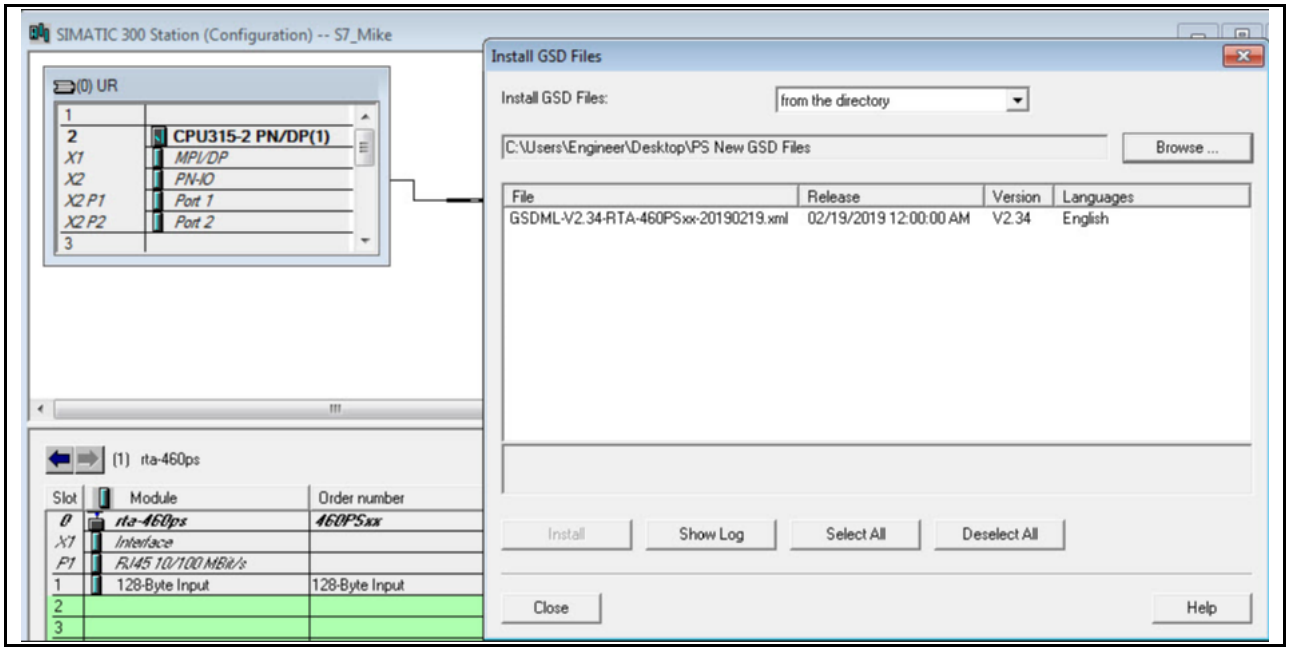
Setting up the PLC- Example Using Simatic Step 7 Software

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.

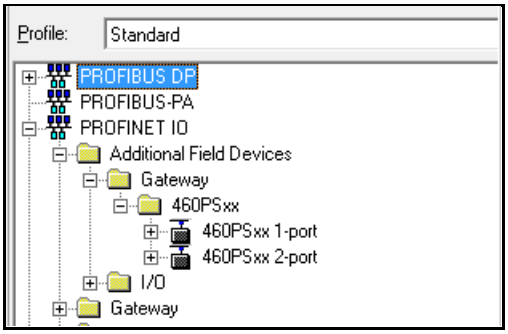
4) Browse to the CD and find the folder containing the GSD file.

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.

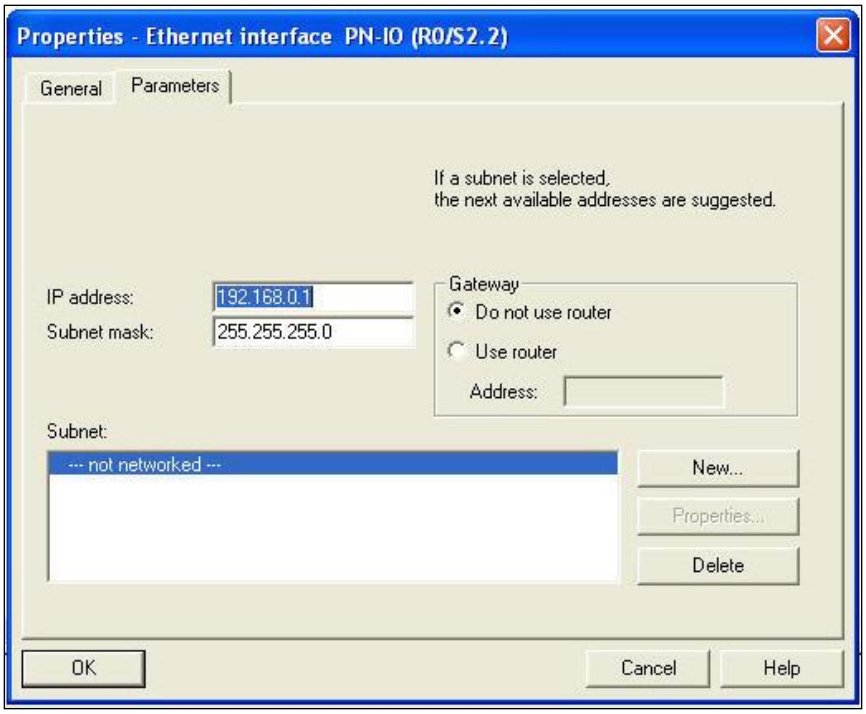
8) If you navigate to the right-hand side, you will see the RTA profile under: PROFINET IO->Additional Field Devices->Gateway->460PSxx



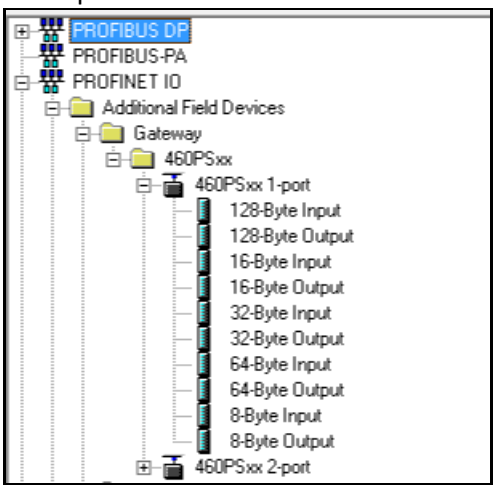
9) IF YOU HAVE ALREADY CONFIGURED THE PROFINET I/O CONTROLLER, SKIP TO STEP 11.

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

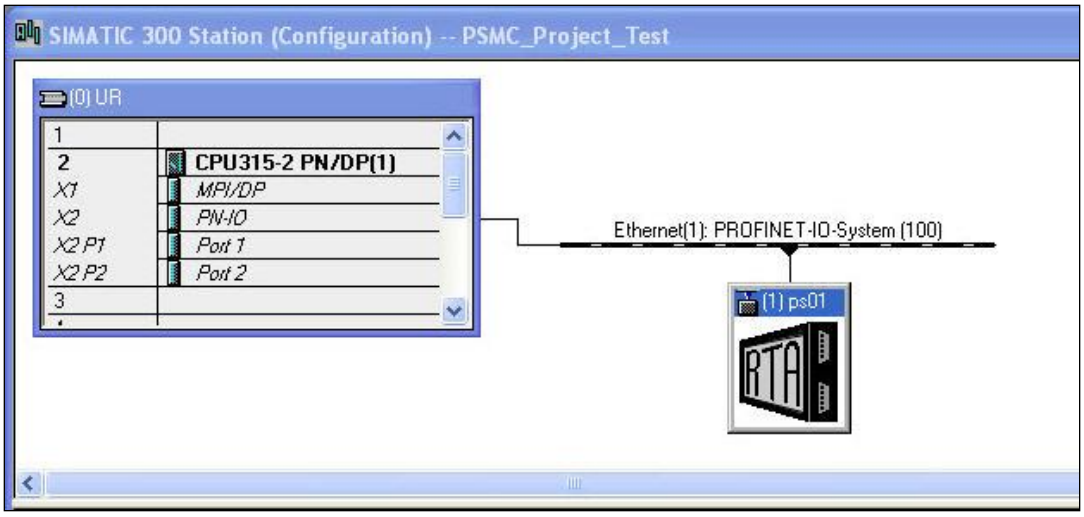
10) In the properties window, set the IP Address to match that of the PROFINET I/O Controller and press **New** and **OK**.



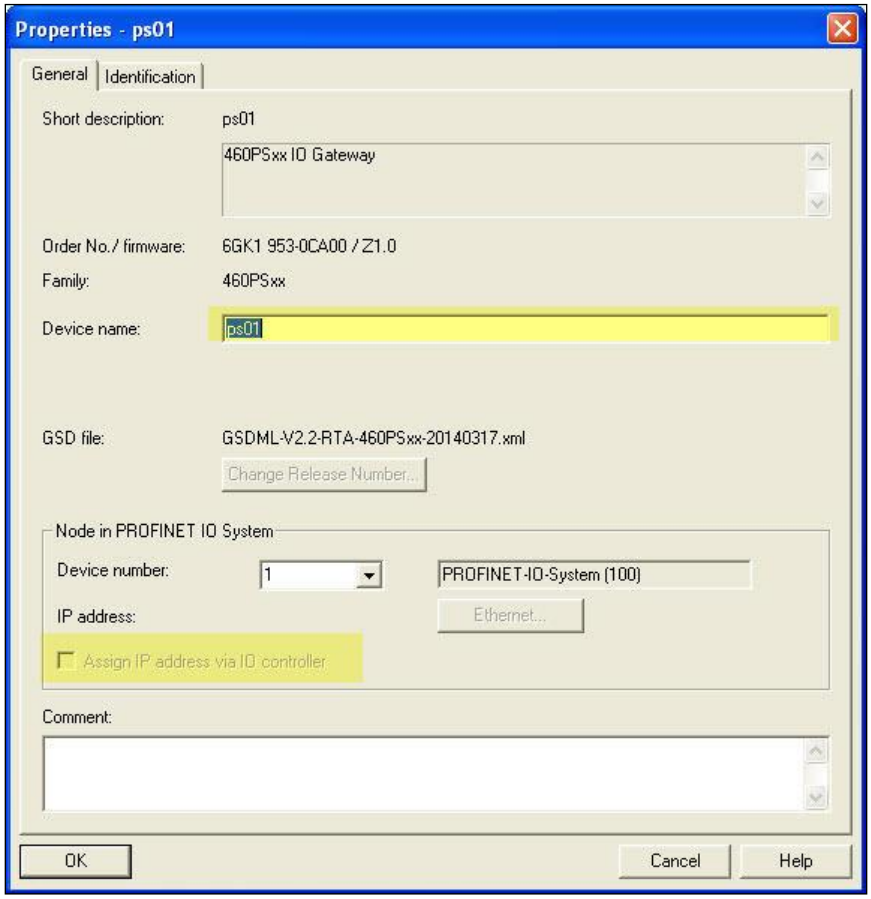
11) Find the RTA device in the I/O tree. It will be under PROFINET IO->Additional Field Devices-> Gateway->460PSxx->460PSxx 1-port.



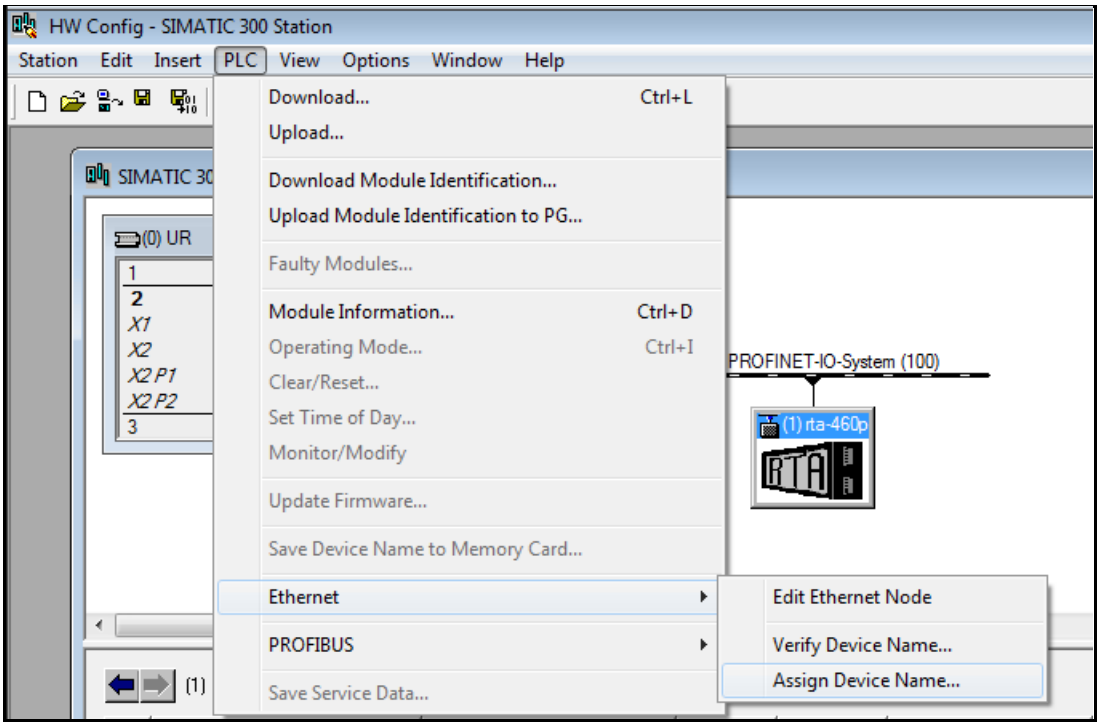
12) Once found, drag the Standard icon into the network line you created in Step 9.



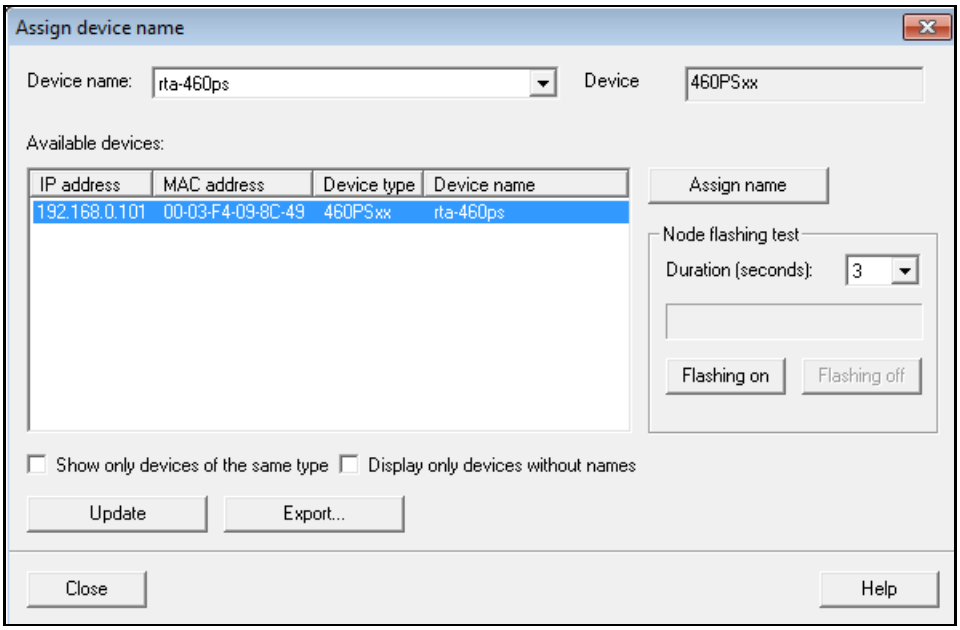
1) Double-click the gateway icon to open the properties window. If not already done, uncheck the **Assign IP Address via IO controller option** (some versions already do this) and press **OK**.



2) To Assign the RTA a Device Name click on the RTA device, click on the PLC tab, Ethernet, Assign Device name.



3) Click on the Assign name button to give the RTA a name. This name will appear on the RTA Profinet configuration page. If you would like to assign your own name simple right click on the RTA device and select the objects properties.



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

Input Slots (460 to Profinet IO)

Slot	Data Size (Bytes)	Data Format
1	128	Short String
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	128	Short String
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

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

Siemens PLC Configuration:

(1) ps01

Slot	Module	Order number	I address	Q address	Diagnostic address:	Comment
0	ps01	6GK1 953-0CA			2042*	
X1	Interface				2041*	
P1	RJ45 10/100				2040*	
1	128 bytes I		0...127			
2						
3						
4						
5						
6						
7						
8						
9						
10						
11	128 bytes Q			0...127		
12						
13						

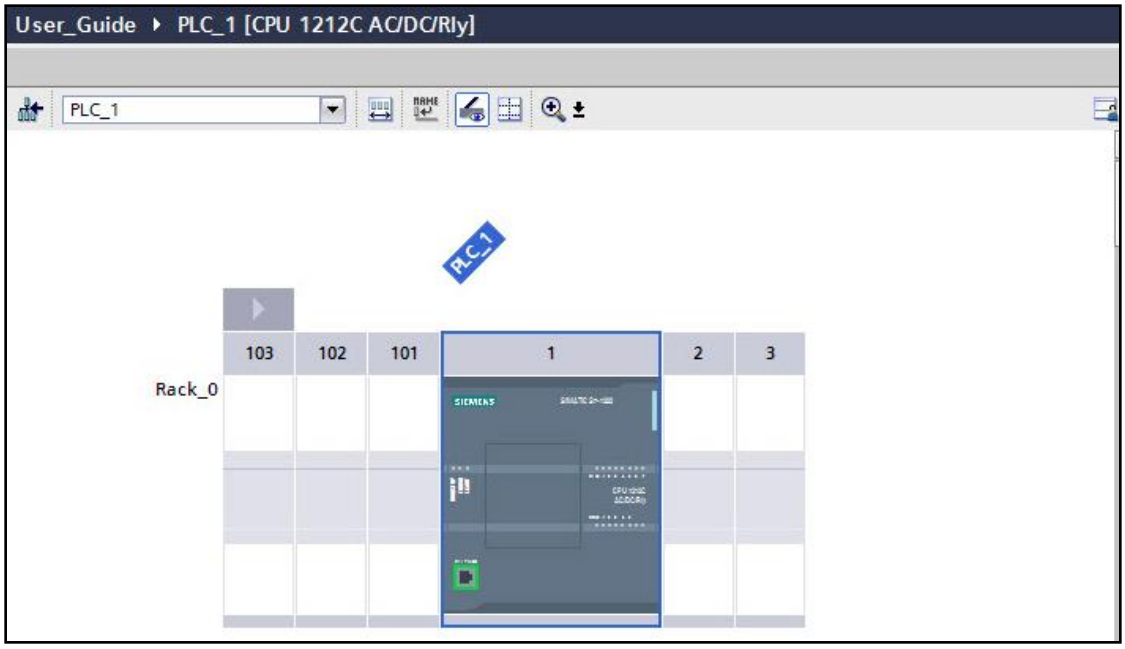
Terminology Note and Example: *I addresses refer to Input, Q addresses refer to Output, %B refers to bytes and %W refers to words. So in this case, %IB0 would be used to represent how many bytes to read starting from %IB1 up to %IB127. Likewise, %QB0 would be used to represent how many bytes of information to write starting from %QB1 up to %QB127.*

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

Setting up the PLC- Example Using TIA Portal

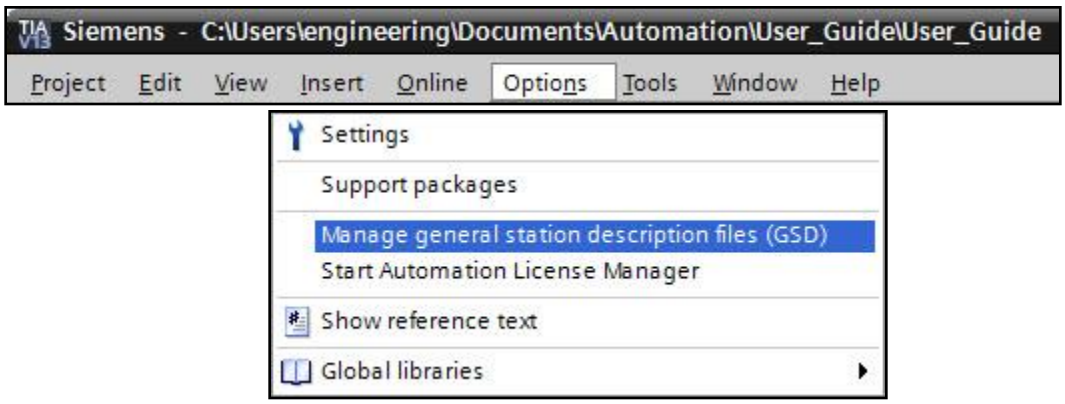
This is how you would set up the Example Setup using Siemens TIA Portal:

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



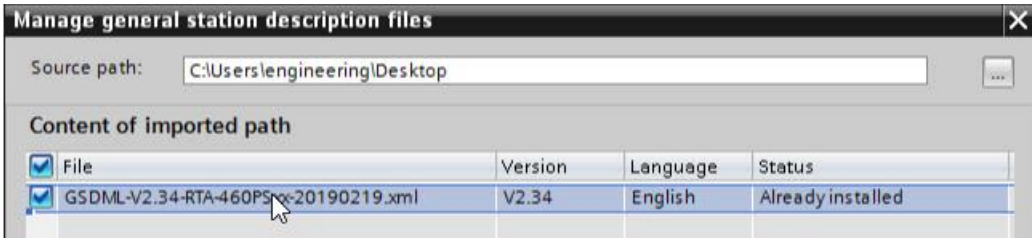
2) IF YOU HAVE ALREADY INSTALLED THE GSD FILE, SKIP TO STEP 9.

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

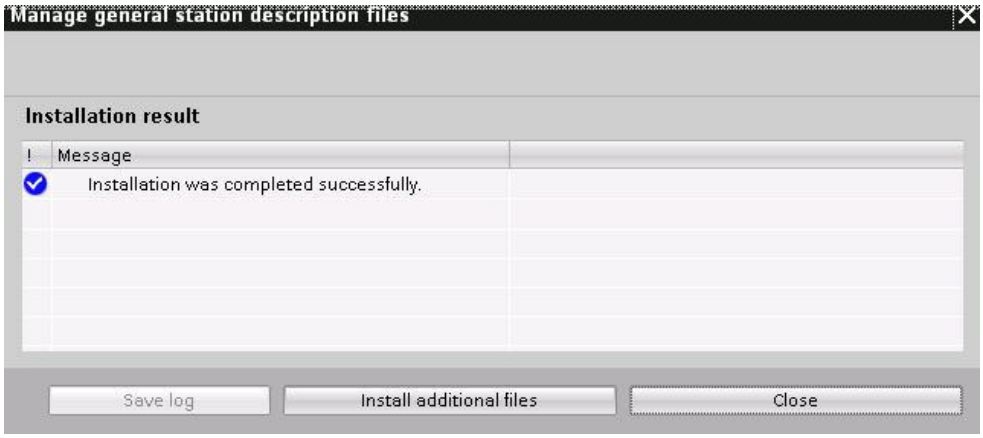


3) Insert the CD that was shipped with the gateway and save off the GSD file on that CD to your desktop.
4) Click **…** and browse to where you saved the GSD file.

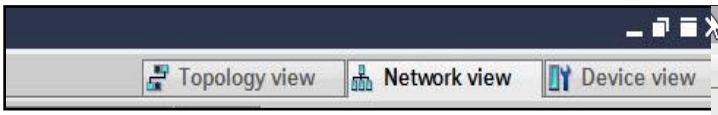
1) Check the box to the left of the imported path and click **Install**.



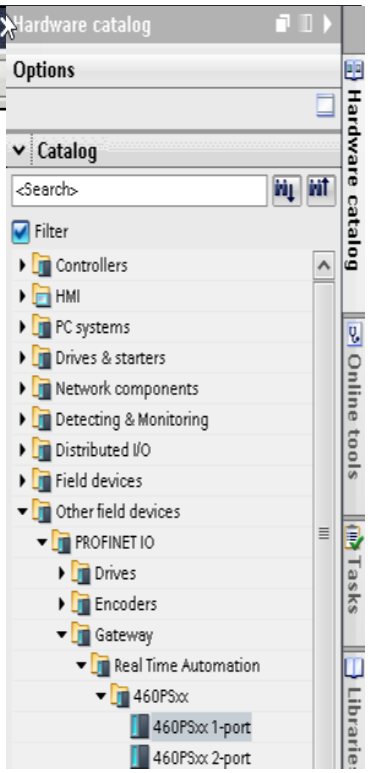
2) Click **Close** when it was installed successfully.



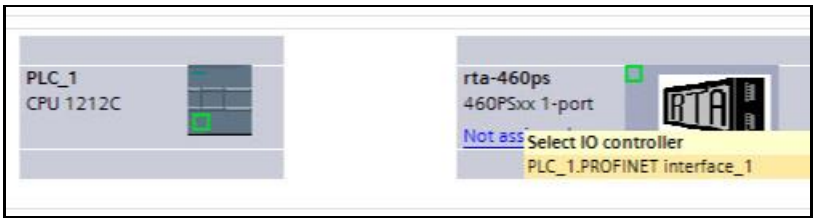
3) Click the Network View tab in your project.



4) 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-> Gateway-> Real Time Automation-> 460PSxx-> 460PSxx 1-port

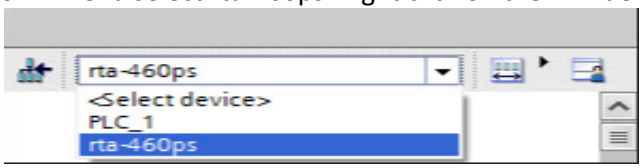


5) Drag the 460PSxx 1-port next to the PLC, click on the **Not Assigned** and select the PLC to connect to.



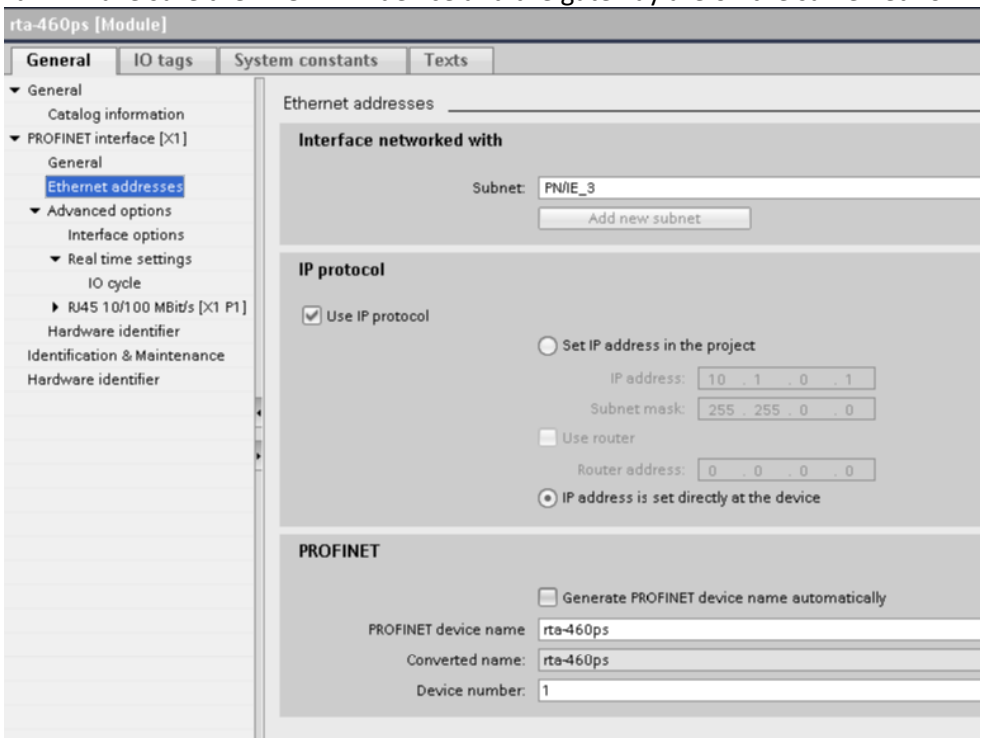
6) Once the RTA device is in the network click the Device view tab.

7) From the dropdown menu select rta-460ps. Right click on the RTA device to select Properties.

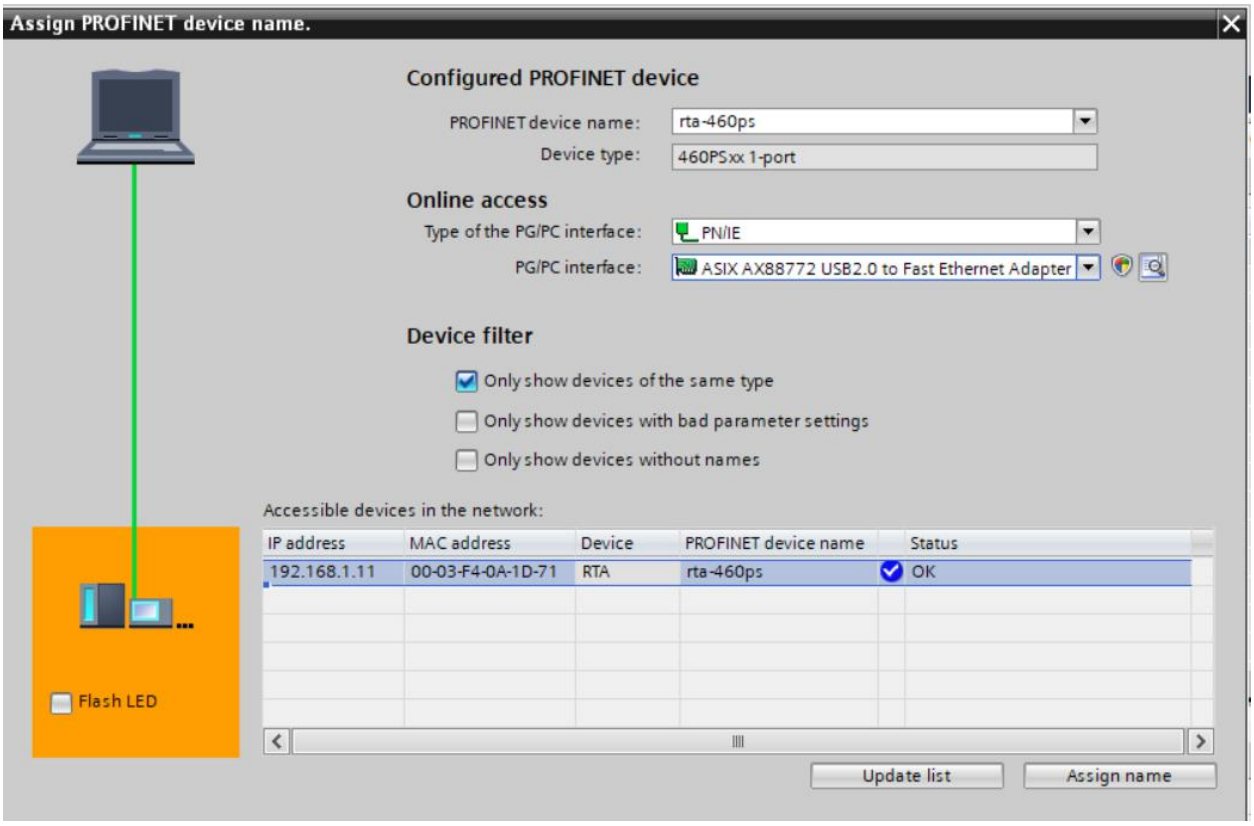


8) Go down to the Ethernet addresses.

9) Be sure that the "*IP address is set directly at the device*" option is selected and **uncheck** the "Generate PROFINET device name automatically."
   a. *The **PROFINET Device Name** field is the name to assign to the RTA gateway
   b. *Make sure the PROFINET device and the gateway are on the same network.



10) You can also assign the device name by right clicking on the rta unit in the device view and selecting ‘Assign Device Name”. From here you can scan for the rta unit and click ‘Assign Name”.



5) 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 (460 to Profinet IO)

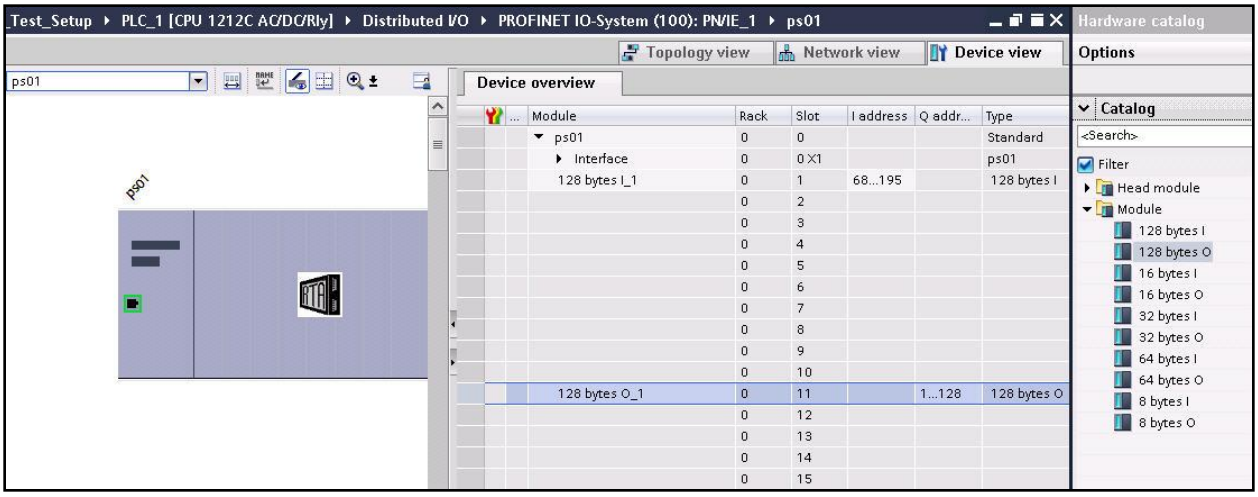
Slot	Data Size (Bytes)	Data Format
1	128	Short String
2	Disabled	16 Bit Int
3	Disabled	16 Bit Int
4	Disabled	16 Bit Int
5	Disabled	16 Bit Int
6	Disabled	16 Bit Int
7	Disabled	16 Bit Int
8	Disabled	16 Bit Int
9	Disabled	16 Bit Int
10	Disabled	16 Bit Int

Output Slots (Profinet IO to 460)

Slot	Data Size (Bytes)	Data Format
11	128	Short String
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

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

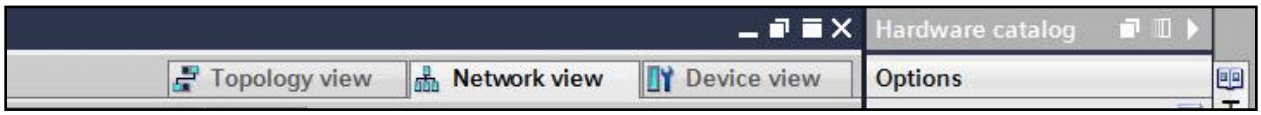
TIA Portal Configuration:

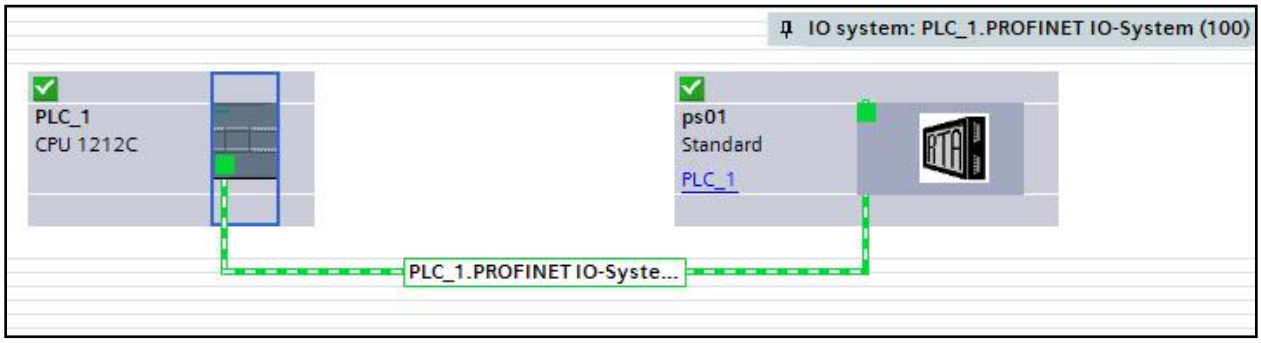


To insert a module, double click to add it to the next available slot.

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, %IB68 would be used to represent how many bytes to read starting from %IB69 up to %IB195. Likewise, %QB1 would be used to represent how many bytes of information to write starting from %QB2 up to %QB128.*

6) In the Network view tab, click the port of PLC ,click the Compile button and Download to Device button (in red).

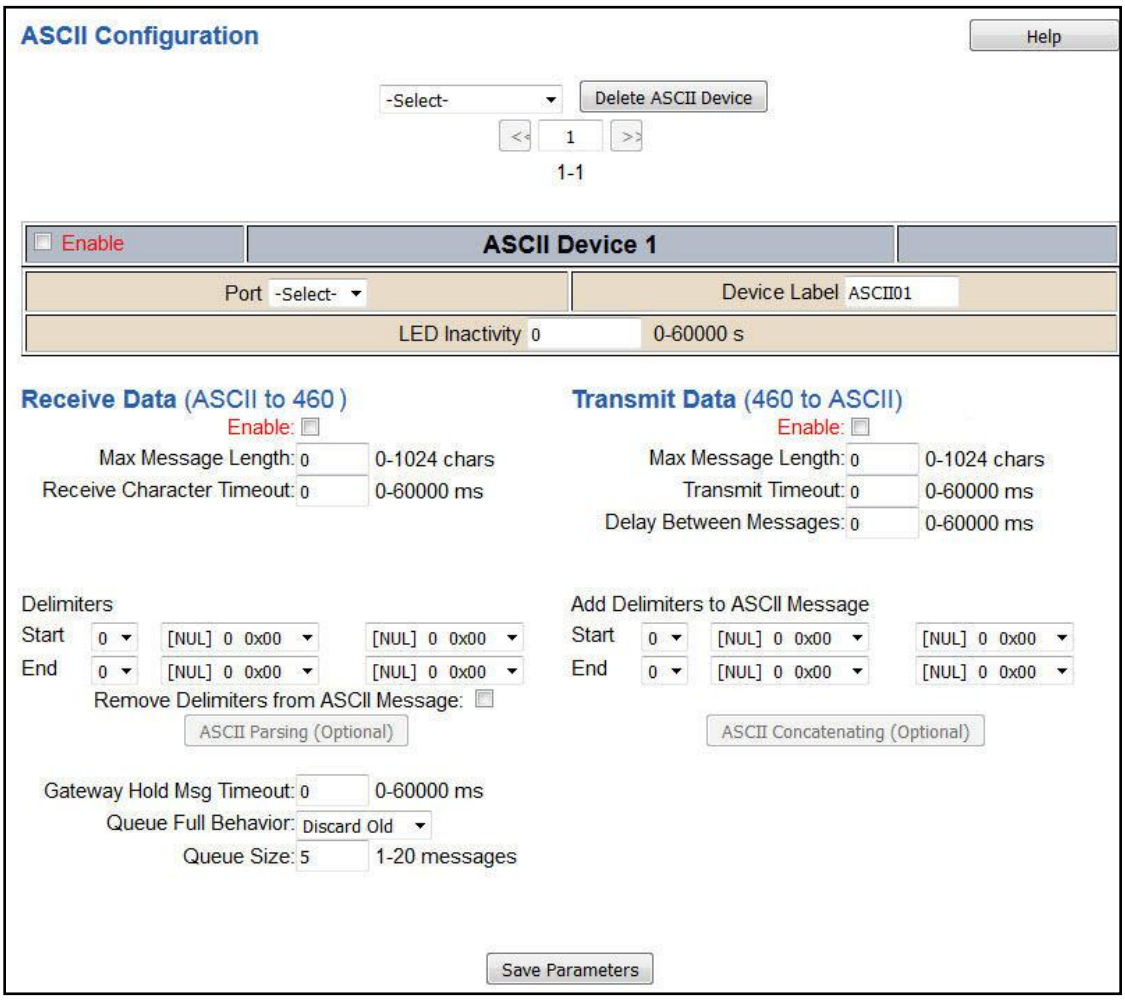




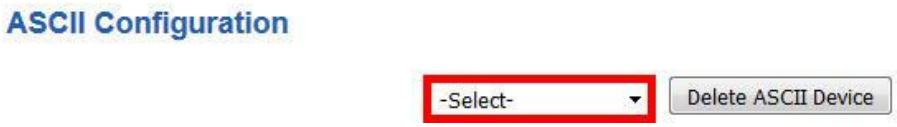
7) Once everything is downloaded to the PLC there will be a green check box on both devices, then click **Go Online** (see red box).

ASCII Configuration

After the Port Configuration has been completed, click the **ASCII** button to continue configuration.



1) To add an additional ASCII connection, click the -Select- dropdown menu under ASCII Configuration and select **Add Generic ASCII** option.



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

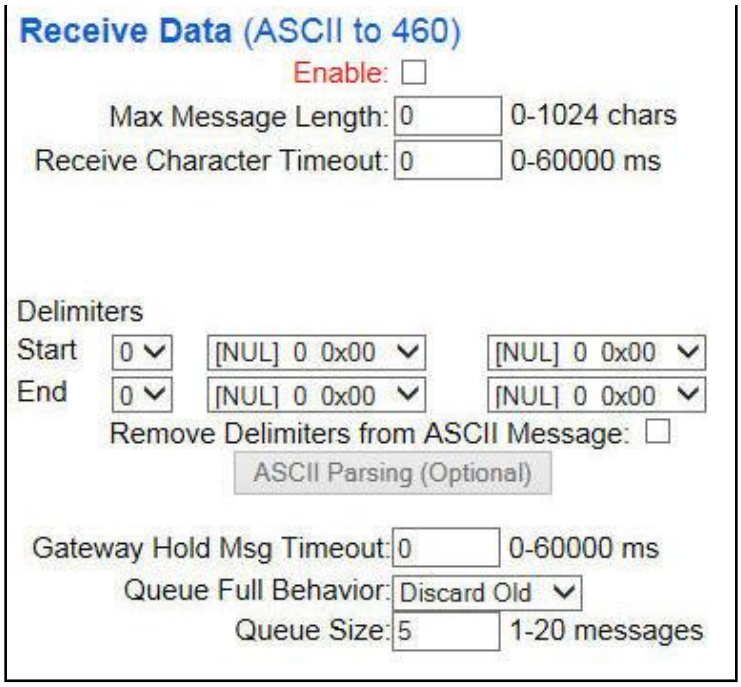
-To create a new ASCII device with the same parameters already configured from another ASCII device, click the -Select- dropdown and select the **Add from ASCII X** option (where X represents the ASCII device you wish to copy parameters from). Once created, you can make any additional changes needed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

2) The **Enable** check box should be selected for the device.

3) **Port**: Select which Comm port is being used for communication. This Comm port must be configured on the Port Configuration page. If it has not yet been configured, it will not display in this dropdown.
4) Enter a **Device Label** to identify the device within the gateway.
5) **LED Inactivity Timeout**: Enter the amount of time, in seconds, to wait before flashing the LED red indicating that no messages have been received or transmitted during this time.

Receive Data

This side is configured to receive data from the ASCII device into the gateway.



Use the following fields to determine when a message has been received.

1) **Enable**: Check this box to move data from the ASCII device to the Gateway.
2) **Max Message Length**: Enter the max number of characters that can be received by the gateway.

   Example: Max Message Length is set to 5 and the message of "helloworld" was sent by the ASCII device. This will be sent to the other protocol as "hello" followed by "world" as two messages.
3) **Receive Character Timeout:** Enter the max amount of time (in ms) between characters that the gateway will wait before issuing a timeout and calling the message complete.
4) **Number of Start Delimiters:** Select the number of delimiters that the gateway should look for before the gateway processes the data.
5) **Select Start Delimiters:** Select the Start Delimiters that the gateway should look for.
6) **Number of End Delimiters:** Select the number of delimiters that the gateway should look for to call a message complete.
7) **Select End Delimiters:** Select the End Delimiters that the gateway should look for.

8) **Remove Delimiters from ASCII Message:** If checked, the gateway will remove all delimiters that have been configured before sending it to the other protocol.

9) **ASCII Parsing (Optional):** Additional parsing can be performed on the string before being passed to the other protocol. See the ASCII Parsing section for more information.

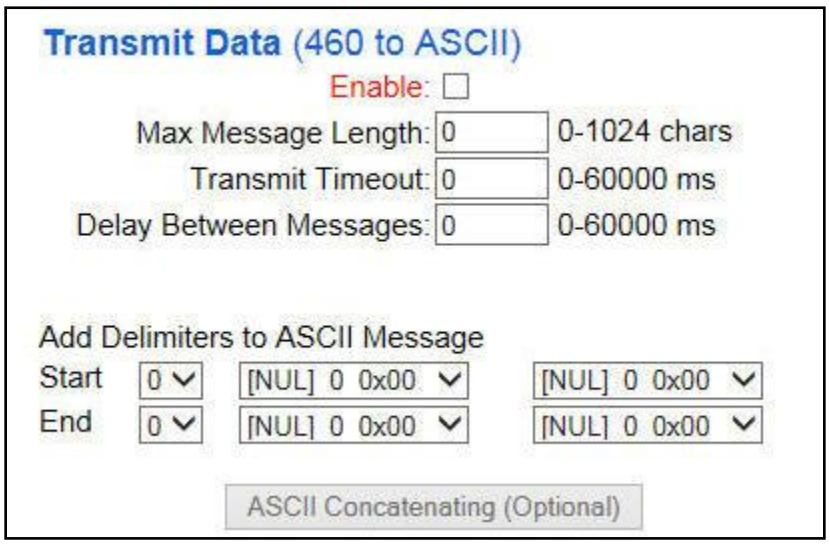
10) **Gateway Hold Msg Timeout:** Enter the amount of time (in ms) to wait before sending a new message to the other protocol.

11) **Queue Full Behavior**: Select which message to discard when the Queue is full. Once the Queue is full, the gateway will discard either the oldest or newest message. (Only used if Gateway Hold Msg Timeout is non-zero.)

12) **Queue Size**: Select how many complete messages the gateway will hold before starting to discard (Only used if Gateway Hold Msg Timeout is non-zero).

Transmit Data

This side is configured to transmit data from the gateway into the ASCII device.



Use the following setup fields to help the 460 transmit an ASCII message.

1) **Enable**: Check this box for moving data from the Gateway to the ASCII device.

2) **Max Message Length**: Enter the max number of characters that can be transmitted by the gateway.

3) **Transmit Timeout:** Enter the amount of time (in ms) that the gateway waits before sending an ASCII message (0 Sends Immediately). If the data has changed before the time expires, the gateway immediately sends the message to the ASCII device.

4) **Delay Between Messages:** Enter the amount of time (in ms) that the gateway waits before verifying a Change of State of the ASCII message OR will start the Transmit Timeout.

5) **Number of Start Delimiters:** Select the number of delimiters that will be added onto the beginning of the ASCII string.

6) **Select Start Delimiters:** Select the Start Delimiters that should be added to the ASCII string.

7) **Number of End Delimiters:** Select the number of delimiters that will be added onto the end of the ASCII string.

8) **Select End Delimiters:** Select the End Delimiters that should be added to the ASCII string.

9) **ASCII Concatenating (Optional):** Additional concatenating can be performed on the string before being written to the ASCII device. See the ASCII Configuration – ASCII Concatenating section for more information.

Transmit Data – Triggering Methods

There are 3 methods that determine when the message is ready to be transmitted:

1) **Change-Of-State** – This means that when any of the data changes, the 460 will transmit a new ASCII message with the new data.

2) **Cyclic** – This means that every *x* ms a new ASCII message will be transmitted, regardless of whether or not the data has changed.

3) **Trigger** – This means that a trigger event determines when a new ASCII message will be transmitted.

   Some methods can co-exist with others. Here are the rules:

   - Change-Of-State is default and can only exist by itself. This method is chosen if the Transmit Timeout field is left at 0 and the Trigger Variables (as described in ASCII Configuration – ASCII Message Triggering Method section of this manual) are not mapped.
   - Cyclic and Trigger can co-exist. For this to happen, the Transmit Timeout field needs be to nonzero and the Trigger Variables (as described in ASCII Configuration – ASCII Message Triggering Method section of this manual) are also mapped.

ASCII Configuration – ASCII Message Triggering Method

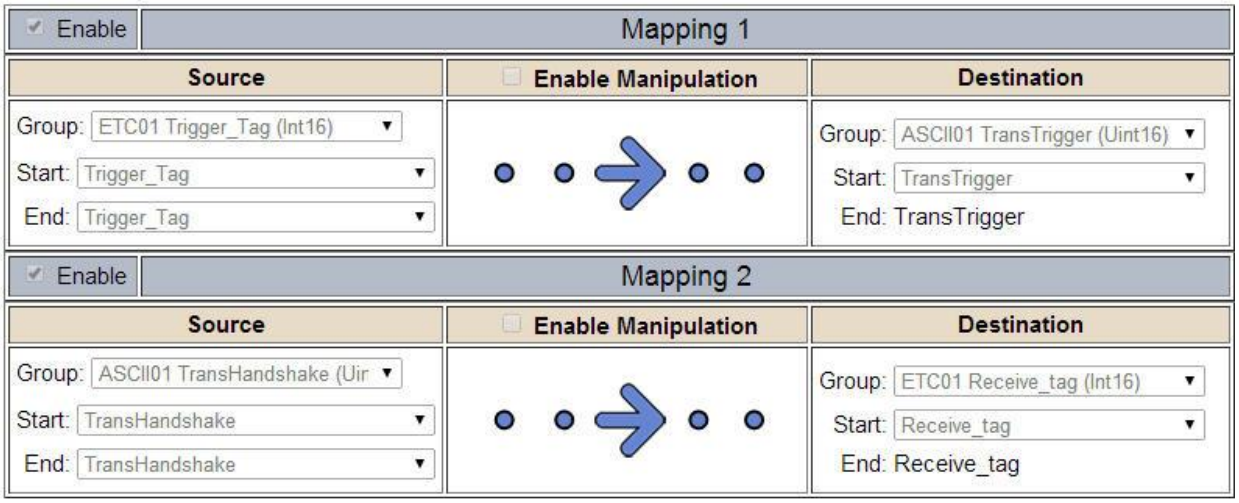
This method allows the other protocol to signal when to send the next message using data handshakes. These "signals" are controlled using data variables in the memory manager.

NOTE: These two data variables will need to be added manually to the Data Mapping webpage since it will not be mapped using Auto-Map. They are mapped just like the Status_XY variable described in the Data Mapping- Adding Diagnostic Information section of this userguide.

While these two data variables are mapped, the Change-of-State method is disabled but messages can still be sent via the Cyclic method, if configured. For more information on the ASCII Triggering Methods, please see the Transmit Data – Triggering Methods section of this userguide.

How the triggering method works:

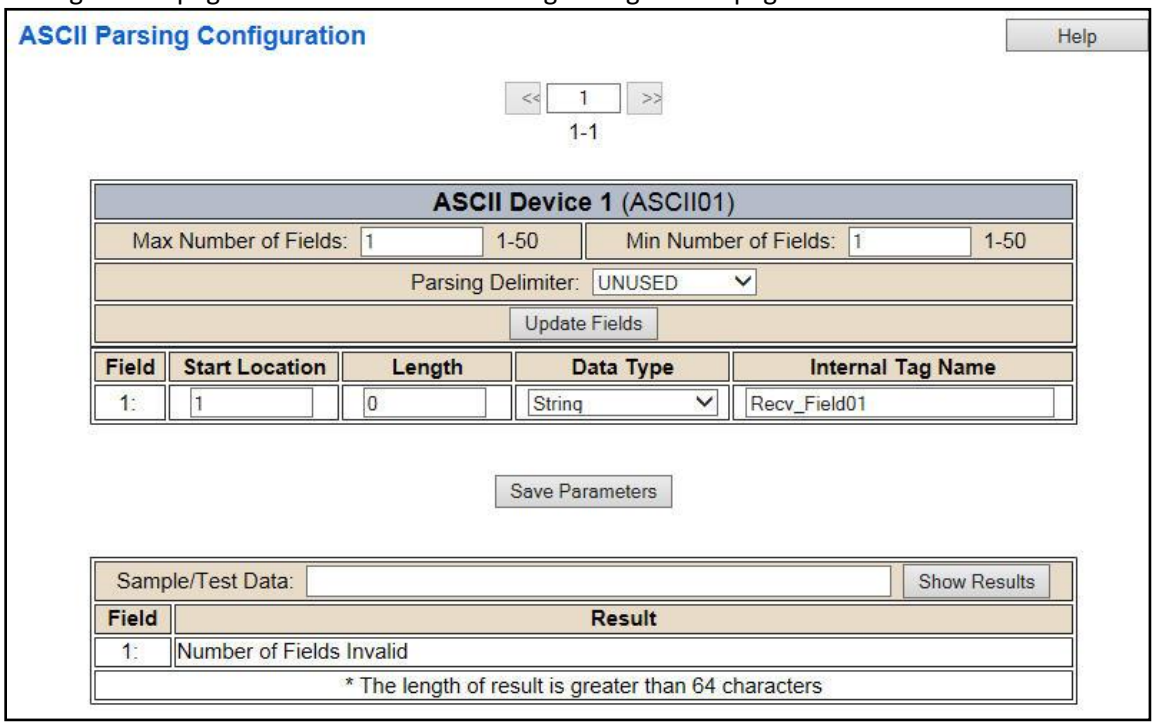
- The mating protocol sends a numbered value to the ASCII TransTrigger diagnostic variable. This value must be different from the previous value for a new message to be triggered.
- Depending on the TransTigger value, one of 4 things will occur:
  1) If TransTrigger = 65535, then the triggering method is disabled.
  2) If TransTrigger = 0, then the triggering method is enabled, but no message will transmit.
  3) If TransTrigger is between 1-65534 **AND** the value **IS** equal to the TransHandshake diagnostic variable, then no new message will transmit.
  4) If TransTrigger is between 1-65534 **AND** the value **IS NOT** equal to the TransHandshake diagnostic variable, then a new message will transmitted. The value in TransTrigger will then be moved to TransHandshake.
- The value of TransHandshake could be mapped back to the mating protocol for monitoring purposes.



Example: For the above example the other protocol in the gateway is the Allen-Bradley PLC. As you can see from the picture above, the TransTrigger for ASCII Device 1 is mapped to the PLC tag called Trigger_Tag. If the value in Trigger_Tag is between 1-65534 AND is a different value that is currently stored in TransHandshake, then a new message will be transmitted to the ASCII device, the value of TransTrigger will be copied to TransHandshake, and the value of TransHandshake will be written to the PLC tag, Receive_tag.

ASCII Configuration – ASCII Parsing

The ASCII Parsing feature allows you to break apart an incoming ASCII string by delimiter or character offset into multiple data fields. You can then apply a data type to the fields and deliver them to user defined locations in the mating protocol. Click the **ASCII Parsing (Optional)** button at the bottom of the ACII Configuration page to access the ASCII Parsing Configuration page for this device.

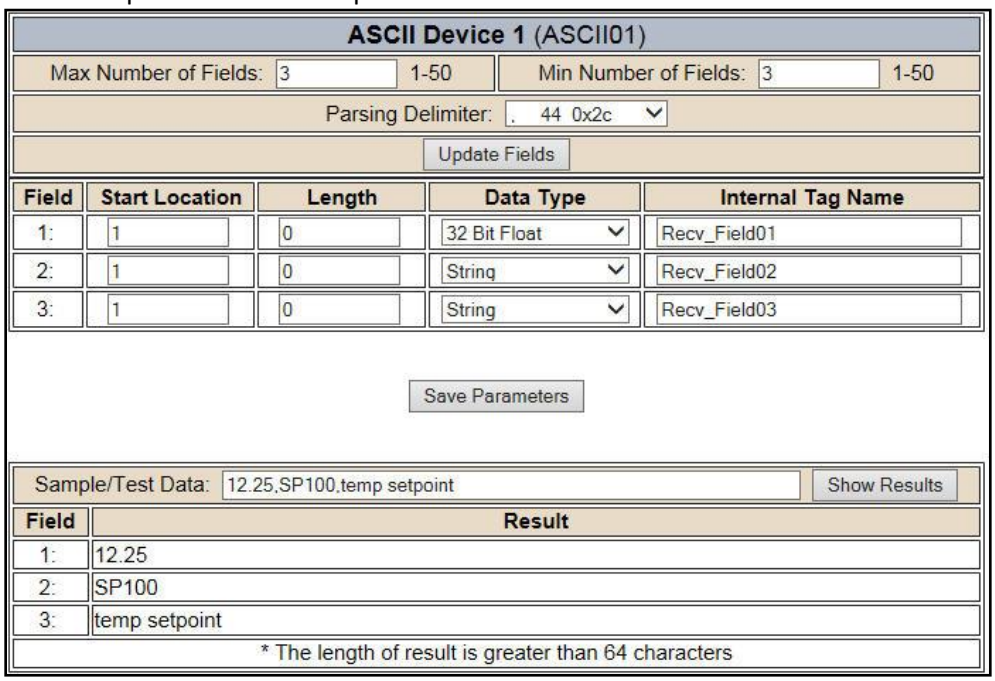


1) **Max Number of Fields:** This indicates the max number of fields the ASCII data will be parsed into (up to 50 values per message).
2) **Min Number of Fields:** This indicates the min number of fields that must be present in an ASCII string for the message to be considered valid. An error will be flagged if the actual number of fields is less than this value.
3) **Parsing Delimiter:** This defines the delimiter that will be used to parse an ASCII message. If delimiters are not present, select UNUSED and use the character length fields to parse the message.
4) **Start Location & Length:**
    a. If a Parsing Delimiter is used, the **Start Location** will be the first character of the data field. The **Length** will be the number of characters from the Start Location. If the **Length** is 0, the gateway will read the entire field.
    b. If the Parsing Delimiter is unused, then the **Start Location** will be the first character of the string. The **Length** will be the number of characters from the Start Location. If the **Length** is 0, the gateway will read the entire message from the **Start Location** to the end of the ASCII string.
5) **Data Type:** Select the data type of the parsed value.
6) **Internal Tag Name:** Enter a name to reference this tag within the gateway's display and mapping pages.

ASCII Configuration – ASCII Parsing Examples

Example #1 - Parsing a message using the Parsing Delimiter option:

In this example, we are separating the string "12.25,SP100,temp setpoint" by a comma delimiter. The first value is being parsed into a float data type, the second and third values are being parsed into a string data type. Since the Min Number of Fields is 3, all 3 fields must be present for the message to be considered valid and processed. The output is seen below:



ASCII Device 1 (ASCII01)

Max Number of Fields: 3 1-50 | Min Number of Fields: 3 1-50

Parsing Delimiter: , 44 0x2c

Update Fields

Field	Start Location	Length	Data Type	Internal Tag Name
1:	1	0	32 Bit Float	Recv_Field01
2:	1	0	String	Recv_Field02
3:	1	0	String	Recv_Field03

Save Parameters

Sample/Test Data: 12.25,SP100,temp setpoint Show Results

Field	Result
1:	12.25
2:	SP100
3:	temp setpoint

* The length of result is greater than 64 characters

Example #2 - Parsing a message without the Parsing Delimiter option:

In this example, we are separating the fields in the string "12.25,SP100,temp setpoint" using the start and length parameters. The first value is being parsed from the 1st character for a length of 5 and stored into a float data type. The second value is being parsed from the 7th character for a length of 5 characters and stored into a string data type. The third value is being parsed starting from the 13th character for the rest of the remaining characters and stored into a string. The fourth value contains the entire ASCII message and is stored into a string. Only the first field needs to be present for the data to be considered valid and will be processed. If less than field 1 is present, the message will not be parsed and will be flagged an error. The output is seen below:

ASCII Device 1 (ASCII01)

Max Number of Fields: 4 1-50 | Min Number of Fields: 1 1-50

Parsing Delimiter: UNUSED

Update Fields

Field	Start Location	Length	Data Type	Internal Tag Name
1:	1	5	32 Bit Float	Recv_Field01
2:	7	5	String	Recv_Field02
3:	13	0	String	Recv_Field03
4:	1	0	String	Recv_Field04

Save Parameters

Sample/Test Data: 12.25,SP100,temp setpoint Show Results

Field	Result
1:	12.25
2:	SP100
3:	temp setpoint
4:	12.25,SP100,temp setpoint

Example #3 - Parsing a message using the Parsing Delimiter option and Start Location and Length:
In this example, we are separating the fields in the string "12.25,SP100,temp setpoint" using the comma delimiter, the start, and length fields. The first value is being parsed from the 1st character for a length of 2 and stored into an integer data type. The second value is being parsed from the 3rd character of the second comma-parsed field for the remainder of that field and stored into an integer data type. The third value is being parsed starting from the 1st character of the third comma-parsed field for that entire field and stored into a string. All 3 fields need to be present for the message to be valid. The output is seen below:

ASCII Device 1 (ASCII01)

Max Number of Fields: 3 1-50 | Min Number of Fields: 3 1-50

Parsing Delimiter: , 44 0x2c

Update Fields

Field	Start Location	Length	Data Type	Internal Tag Name
1:	1	2	16 Bit Int	Recv_Field01
2:	3	0	16 Bit Int	Recv_Field02
3:	1	0	String	Recv_Field03

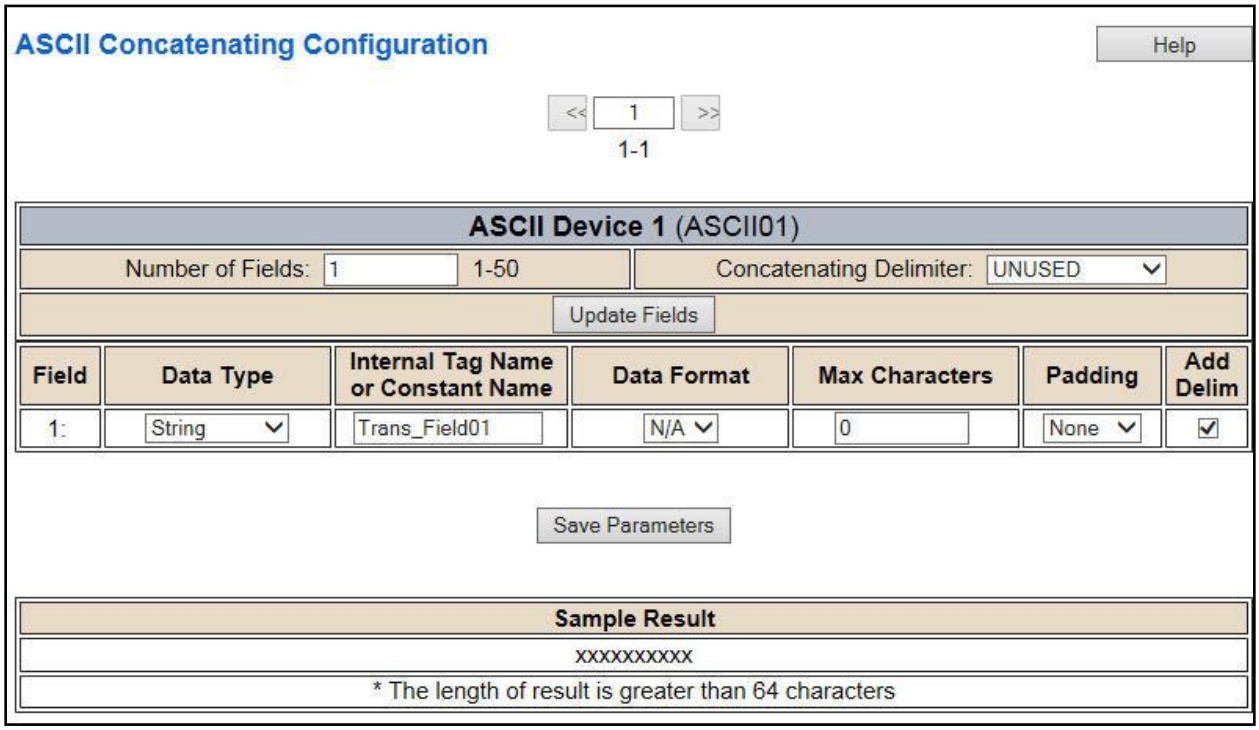
Save Parameters

Sample/Test Data: 12.25,SP100,temp setpoint Show Results

Field	Result
1:	12
2:	100
3:	temp setpoint
* The length of result is greater than 64 characters	

ASCII Configuration – ASCII Concatenating

The ASCII Concatenating features allows you to combine multiple data points and locations, in the mating protocol, into a single ASCII string. Click the **ASCII Concatenating (Optional)** button at the bottom of the ACII Configuration page to access the ASCII Concatenating Configuration page for this device.



1) **Number of Fields:** This indicates how many values will be concatenated together to form a single ASCII message (up to 50 values per message).
2) **Concatenating Delimiter:** This adds a delimiter between data fields in the ASCII string. If a delimiter should not appear between each of the fields, select UNUSED.
3) **Data Type:** Select the data type of the parsed value.
    a. Signed and Unsigned 8/16/32/64 Bit Integers
    b. 32/64 Bit Floating Points
    c. String – in order to use, a String data type must be selected in the other protocol. Cannot concatenate an Integer to a String.
    d. Constant String
4) **Internal Tag Name/Constant Name:**
    a. If Data Type other than Constant String is selected, then this will be the name to reference this tag within the gateway. This value is used on the display page and the mapping page.
    b. If Data Type Constant String is selected, then this is the string value that will send.
5) **Data Format:**
    a. %d – used for Signed Integers
    b. %u – used for Unsigned Integers
    c. %lf – used for Floating Points with no set decimal precision

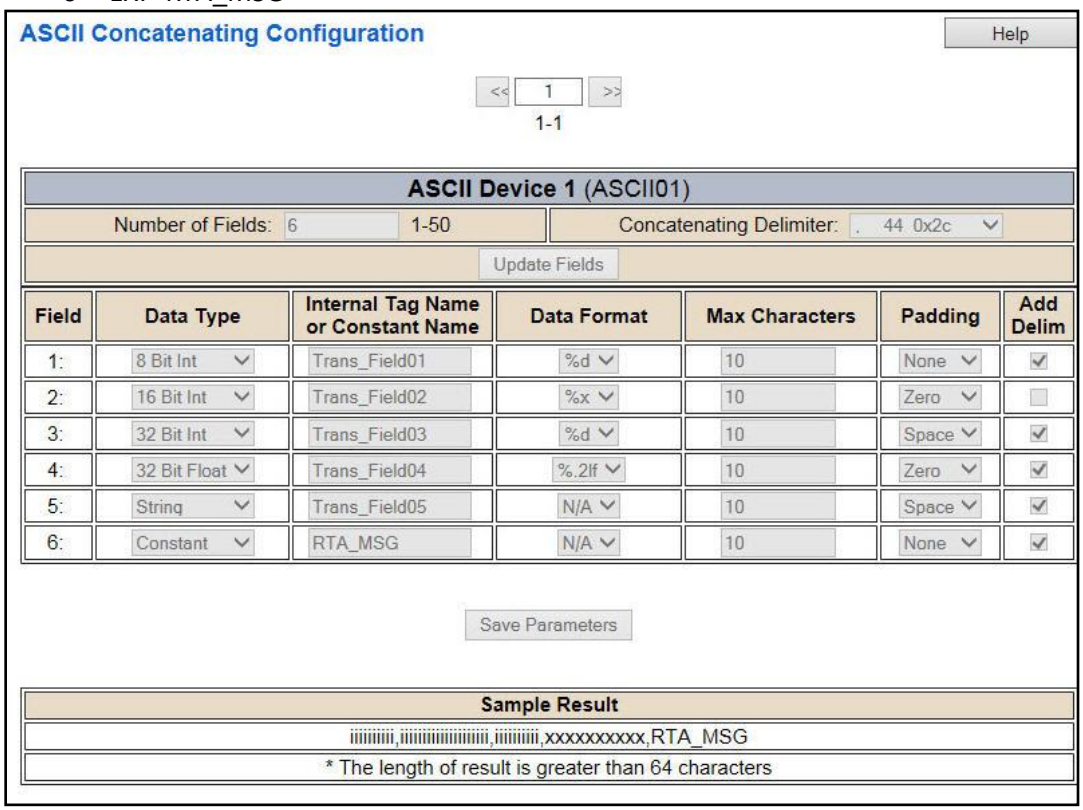
   d. %.1lf…%.6lf – used for Floating Points to show the offset of the decimal point value
      i. EX: 123.456789 set as %.3lf will display as 123.456
   e. %e – used for Exponential Notation
   f. %x – used to represent Hexadecimal values for Signed/Unsigned Integers or Floating points
   g. String and Constant String Data Types do not use this field
6) **Max Characters:** This is the Max Number of Characters that can be transmitted for a single field.
   Special Cases
   a. If set to 0, the entire field is transmitted.
   b. If the length of the value is less than the Max Characters, then the Padding Character will be used (if set).
   c. If the length of the value is greater than the Max Characters, then the value will be truncated.
7) **Padding:** If the length of the value is less than the Max Characters padding Zeroes, Spaces, or Nothing to the remaining character placeholders. The padding will occur to the left of the value.
8) **Add Delim:** Used when a Concatenating Delimiter is selected. Check to add the Concatenating Delimiter to the end of that field.
9) **Sample Result:** This will display an example of how the data will output. This will not display live data. It provides an example of the string structure.
   NOTE: Sample Result field will only show the first 64 characters of the message.
   a. String data and Constant data types will display as *x*'s.
   b. Any other data type will display as *i*'s.
      NOTE: For display purposes, if Max Characters is set to 0, only 10 characters will display for that field in the Sample Result section. The true value, if larger, will we processed correctly.
         EX: Field 1 is set for a String data type and Max Characters is set to 0, only 10 *x*'s will display in the sample result even though the max character length is set to 50.

ASCII Configuration – ASCII Concatenating Examples

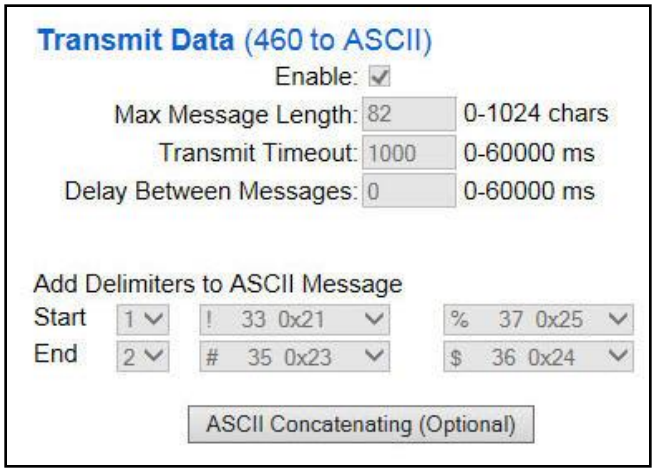
Example #1 - Concatenating a message using the Concatenating Delimiter option:

In this example, the comma is selected as the Concatenating Delimiter. Let's look at each field closer:

- Field 1 –8 bit int represented as Trans_Field01 in the gateway. It will output as an integer with a max of 10 characters. No padding is used and a comma will be added to the end of the value.
  - EX: "34,"
- Field 2 –16 bit int represented as Trans_Field02. It will output in Hexadecimal with a max of 10 characters, padded with zeros and no comma will be added to the end of the value.
  - EX: "00000000A0"
- Field 3 –32 bit int represented as Trans_Field03. It will output as an integer with a max of 10 characters, padded with spaces and a comma will be added to the end of the value.
  - EX: "____123456," (shown with _'s to see spaces)
- Field 4 –32 bit float represented as Trans_Field04. It will output as a float with 2 decimal places with a max of 10 characters, padded with zeros and a comma will be added to the end of the value.
  - EX: "00001234.56,"
- Field 5 –String represented as Trans_Field05 in the gateway. It will output as string with a max of 10 characters, padded with spaces and a comma will be added to the end of the value.
  - EX: "___testing," (shown with _'s to see spaces)
- Field 6 – Constant String will output as "RTA_MSG" with a max of 10 characters. No padding is used and no comma will be added to the end (though checked) since it is the last field.
  - EX: "RTA_MSG"



If our Transmit Data is set up with the following Delimiters, then a sample result is pictured below:



Sample Result:

```
!22,00000004D2    123456,0000123.45, ETCA Test,RTA_MSG#$
```

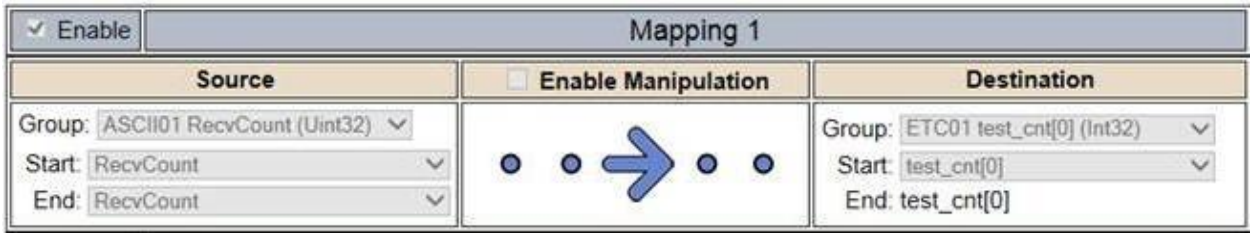
ASCII Configuration – ASCII Message Counter

There is an additional ASCII variable that is very useful to access within the gateway's mating protocol. This data variable will need to be added manually since it will not be mapped using Auto-Map.

RecvCount- indicates how many ASCII messages have been successfully read by the gateway for that device. A successful incoming message means that at least one of the three end cases (Max Length, Timeout or Delimiters) have been met. This will match the Diagnostic Variable Successful Receive Count for each ASCII device.

This variable can be mapped to the mating protocol using the Data Mapping webpage. It is mapped just like the Status_XY variable described in the Data Mapping- Adding Diagnostic Information section of this userguide.

Example: For this example the other protocol in the gateway is the Allen-Bradley PLC. As you can see from the picture below, the RecvCount for ASCII Device 1 is mapped to the first index of a PLC tag array called test_cnt. The data type of this tag is an Int32 to match the data type of RecvCount. The tag test_cnt[0] will now hold the number of successfully read messages from ASCII Device 1.



Application Use: This is particularly useful for application connecting devices like barcode scanners and weigh scales. The gateway will cyclically update the mating protocol with the last ASCII message sent, a change in the RecvCount is the only way to identify a new message if the messages are identical.

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.

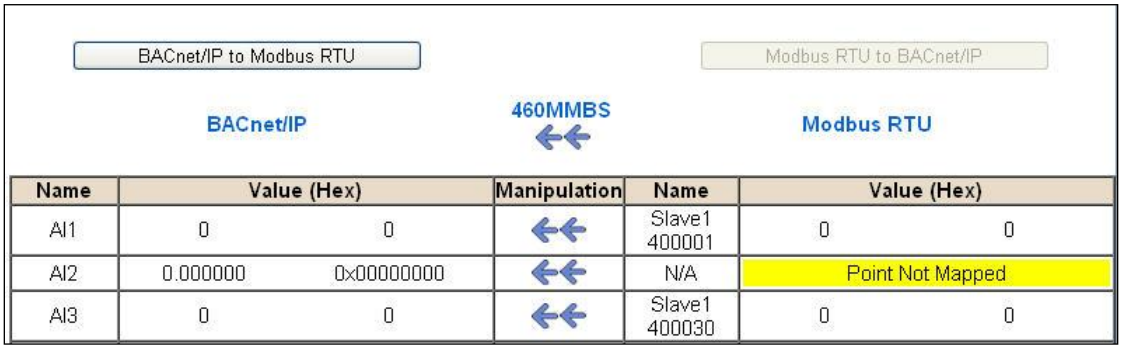
Display Mapping and Values

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.

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.



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:

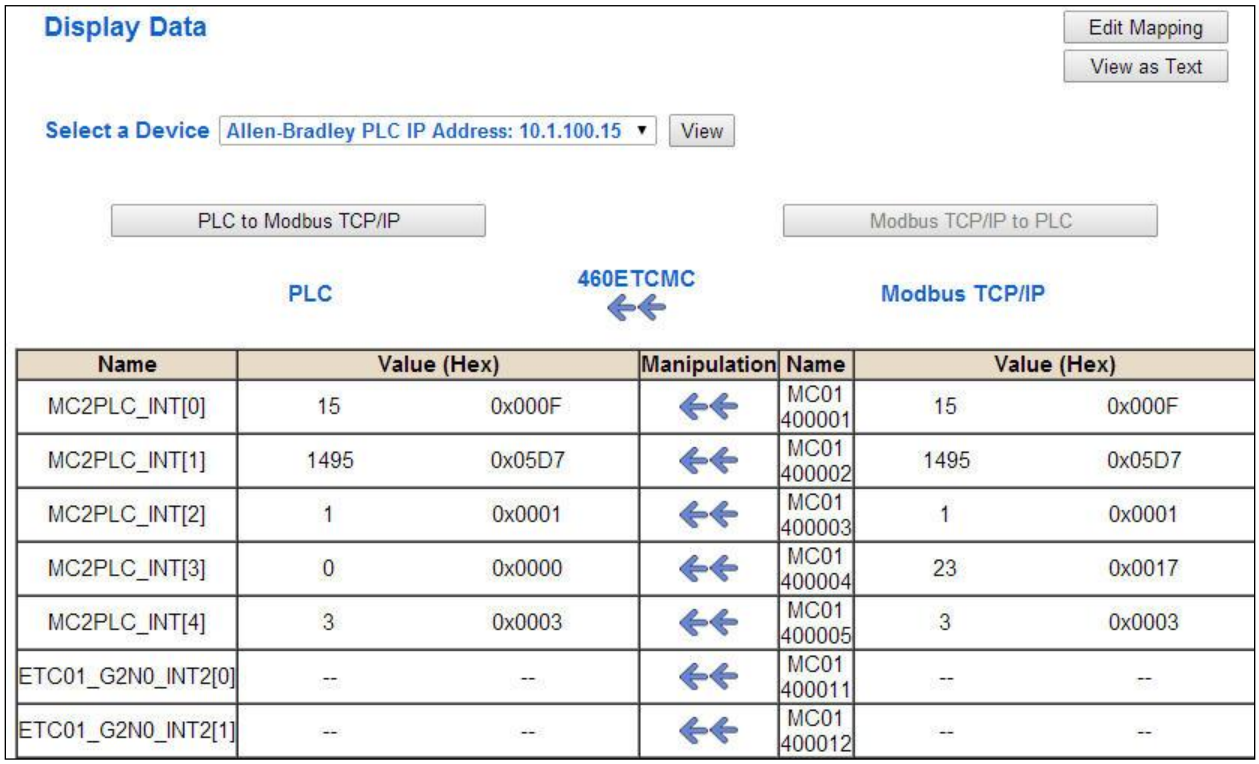
- Modbus 400001 from Slave 1 is being mapped to AI1 on BACnet
- Nothing is being moved from Modbus to AI2 on BACnet
- Modbus 400030 from Slave 1 is being mapped to AI3 on BACnet

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.



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.

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.

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.

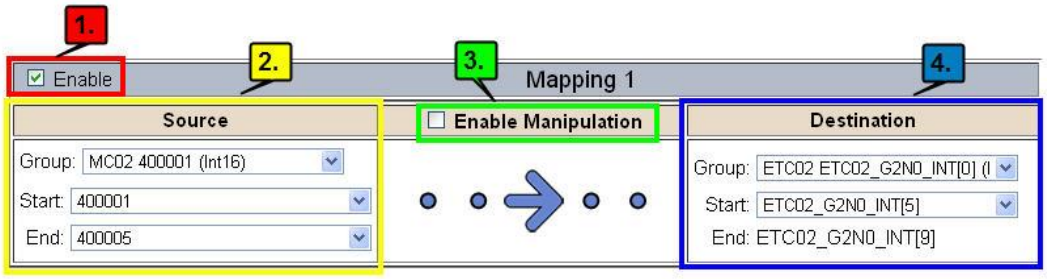
   a. Both Source values were able to be mapped to a corresponding Destination value.

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

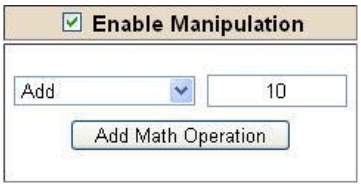
   a. The 32-bit Float from the Source location could not find a matching Destination data-type. After all other like data types were mapped, the only data type available was the 2nd 32-bit Uint data type. Auto-Configure was completed even though the data in the Float will be truncated.

Data Mapping – Explanation

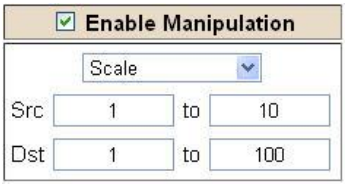
Below are the different parts that can be modified to make up a data mapping.



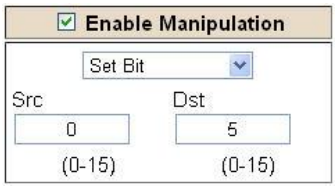
1) Enable (red box above): Check to enable mapping. If not checked, this mapping is skipped.
2) Source Field (yellow box above) :
    a. Group - Select the data group you set up in the protocol config to use for this mapping.
    b. Start - This is the starting point for this mapping.
    c. End - This 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 0th source bit and copy it into the value of the 5th destination bit.

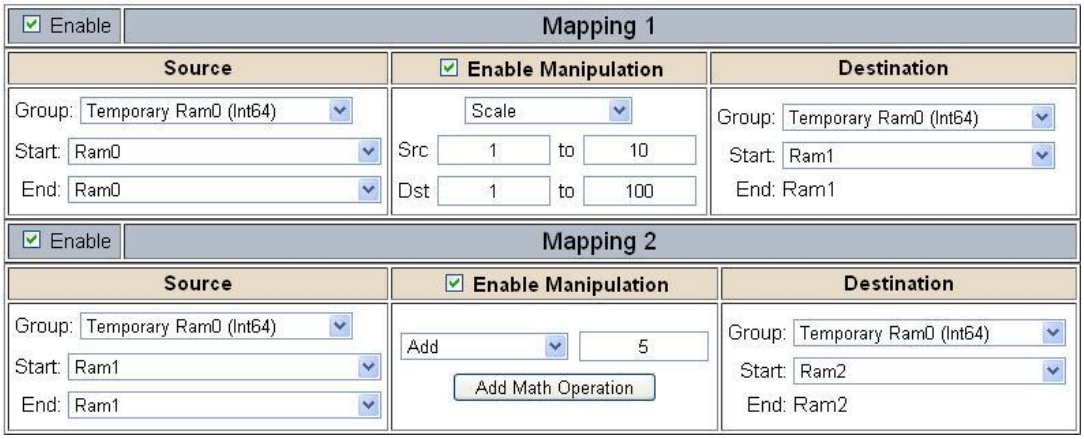
4) Destination Field (blue box above) :
    a. Group - Select the data group you set up in the protocol config to use for this mapping.
    b. Start - This is the starting point for where the data is being stored.
    c. End - The End point is derived from the length of the source and cannot be modified.

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 (Int64)
    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.



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

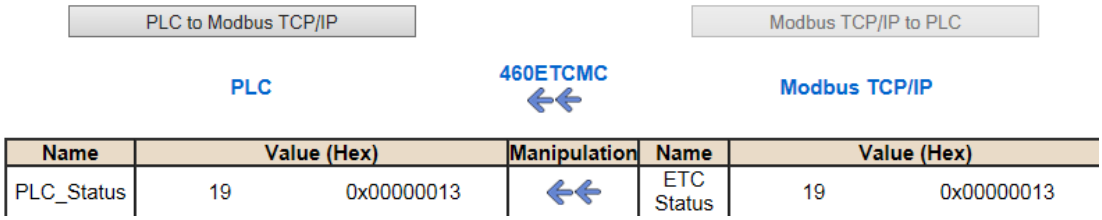
5) Status_XY

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)1st 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



Name	Value (Hex)		Manipulation	Name	Value (Hex)	
PLC_Status	19	0x00000013		ETC Status	19	0x00000013

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)2nd 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)3rd 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) 4th 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

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

PLC — 460ETCMC — Modbus TCP/IP

Name	Value (Hex)		Manipulation	Name	Value (Hex)	
MC_Status	65601	0x00010041	←	MC Status	65601	0x00010041

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:

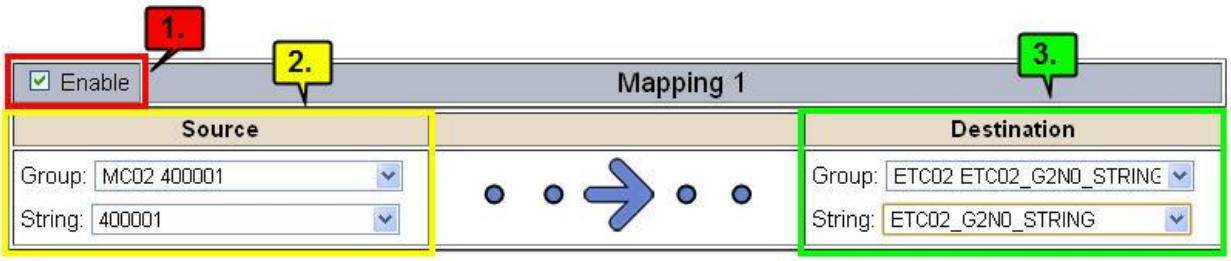
Hex:	Bit:	Decimal:	Explanation:
0x01	16	65,536	recoverable fault – timed

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.

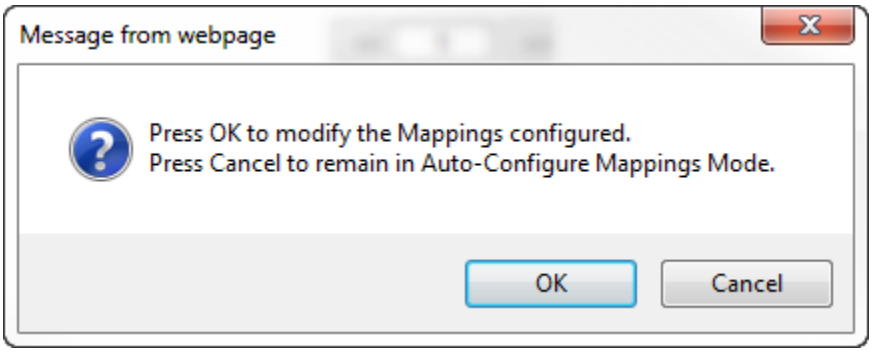


1) Enable (red box above): Check to enable mapping. If not checked, this mapping is skipped.
2) Source Field (yellow box above) :
    a. Group - Select the string data group you set up in the protocol config to use for this mapping.
    b. String - This is the string used for this mapping.
3) Destination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

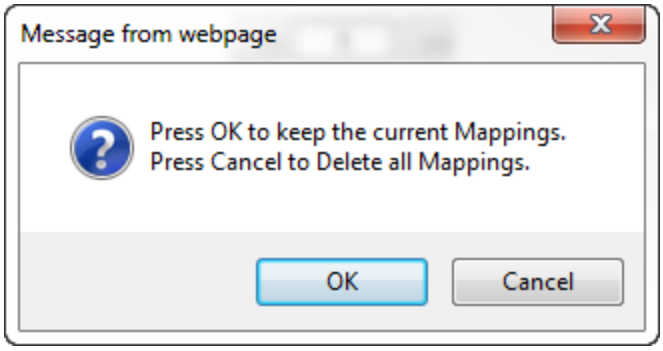
To transition from Auto-Configure Mapping Mode to Manual Configure Mode, click the dropdown at the top of the Mapping Configuration page and select Manual Configure.

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.

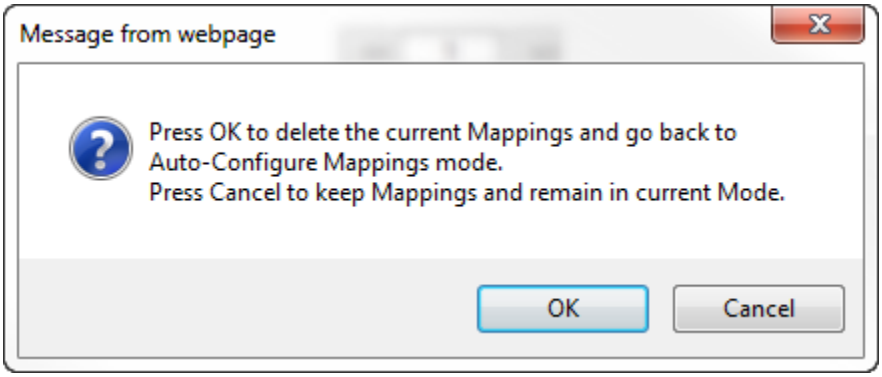


1) To keep the mappings that are already configured press **OK**.
    a. You would want this option if you are adding additional mappings or you want to modify the mapping(s) that already exist.
2) To delete the mappings that are already there and start over press **Cancel**.

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

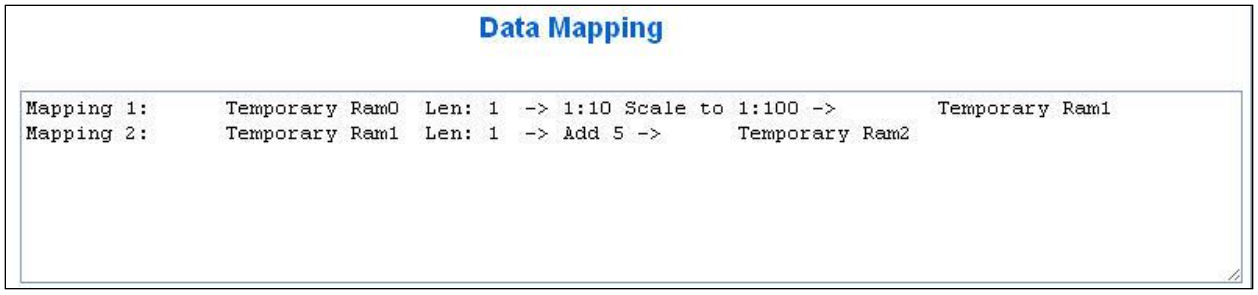
The View as Text page displays the point to point mapping(s) you set up in the Data Mapping section. This will also display any manipulation(s) that are configured.

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.



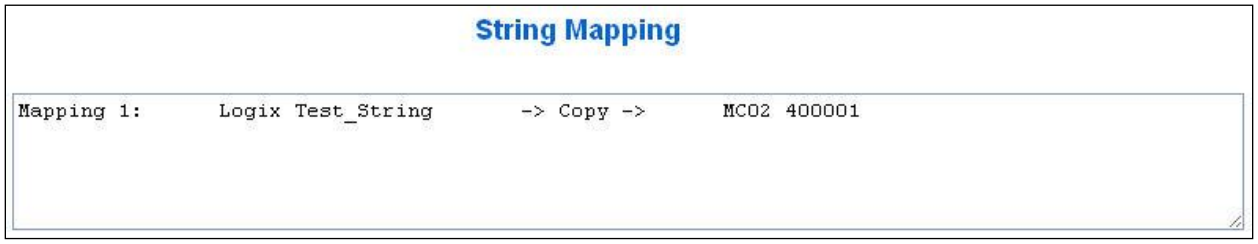
String Mapping

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.



Security Configuration

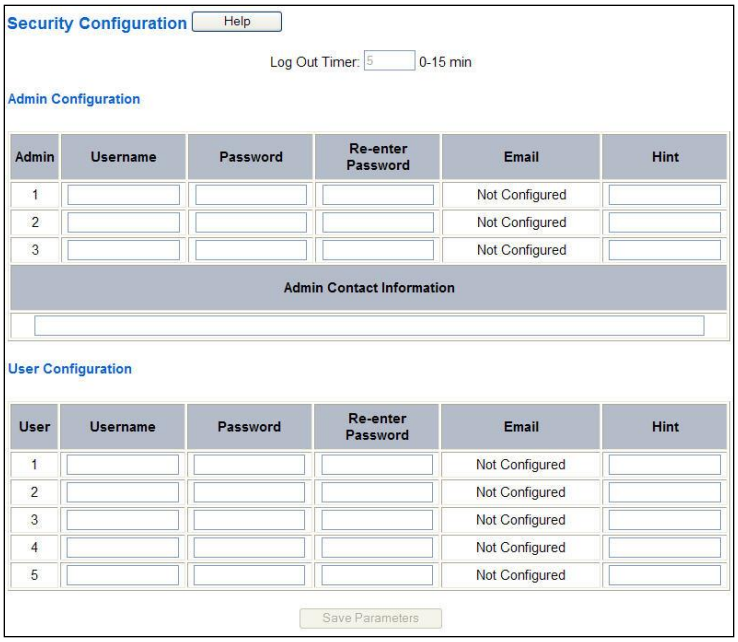
To setup security on the 460 gateway, navigate to **Other->Security Configuration**. You can configure Security for 3 administrators, 5 users, and 1 guest.

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-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.

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.

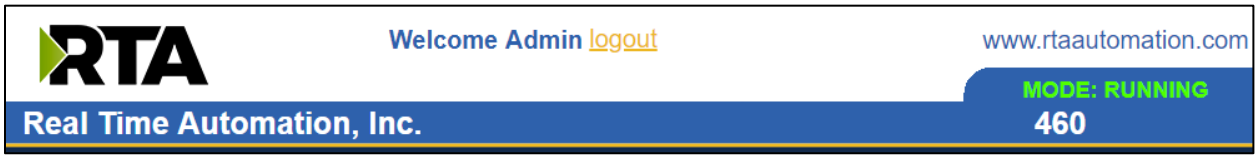
Send Password to Email: Sends the specified User's Password to the email configured for that user.

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.

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.



Closing the browser is not sufficient to log out.

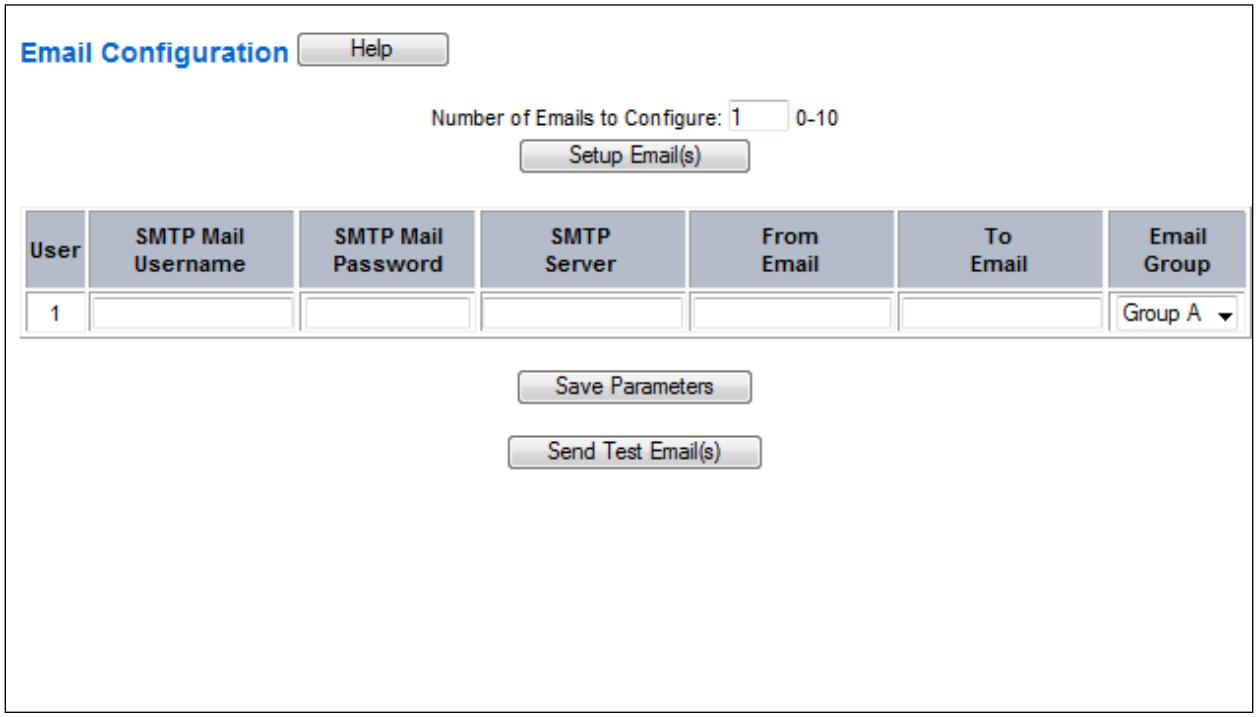
Email Configuration

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.

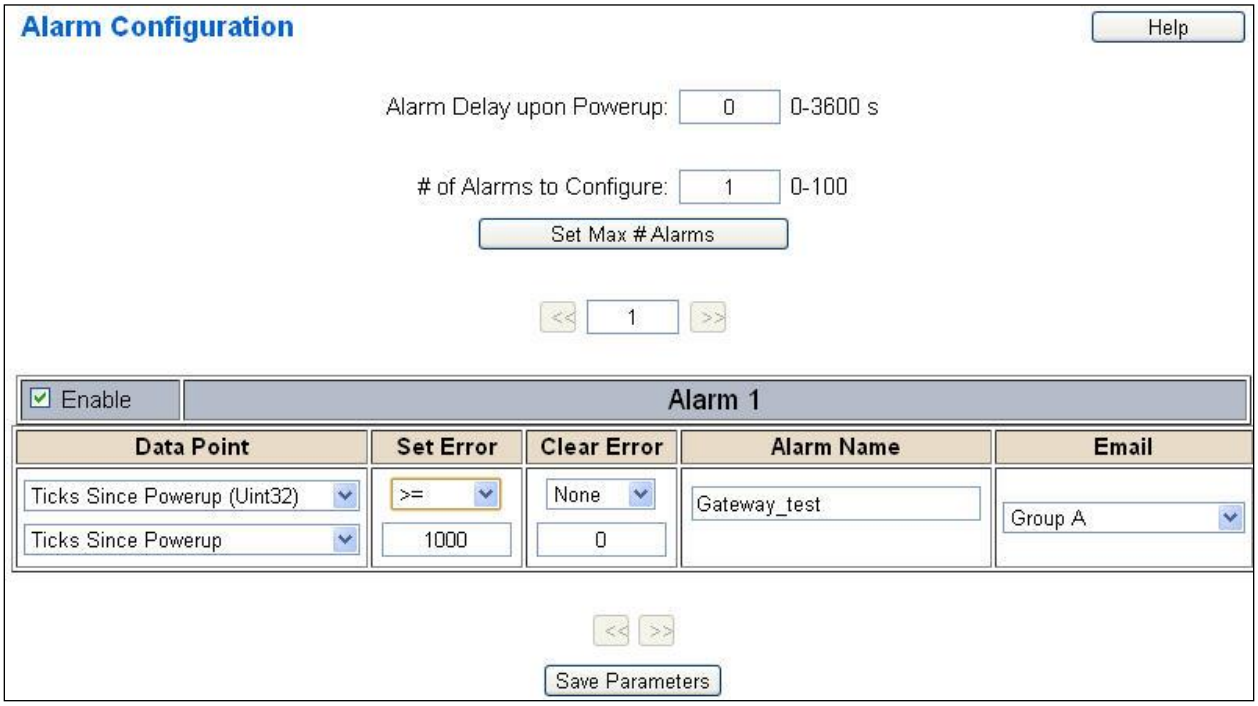
Click the **Save Parameters** button to commit the changes and reboot the gateway.



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.



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.

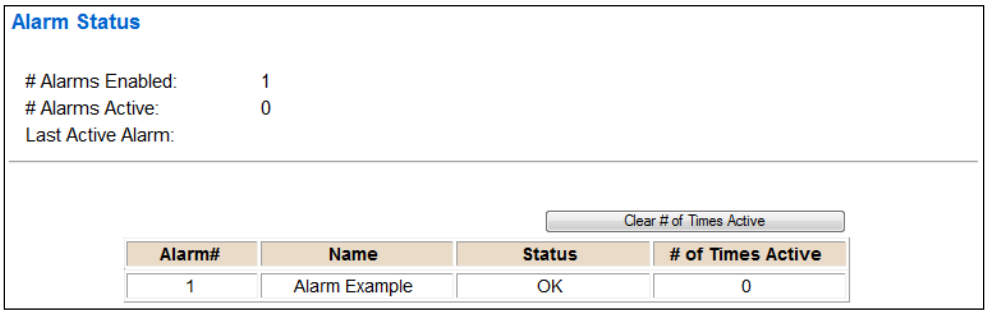
5) In the Clear Error Section:
    a. Select the Clear Error Operation. Available options are <, >, <=, >=, !=, ==, and Change of State (COS). This is the operation that will be used to compare the Data Point value against the Error Value to determine if the alarm needs to be cleared.
    b. Select the 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.

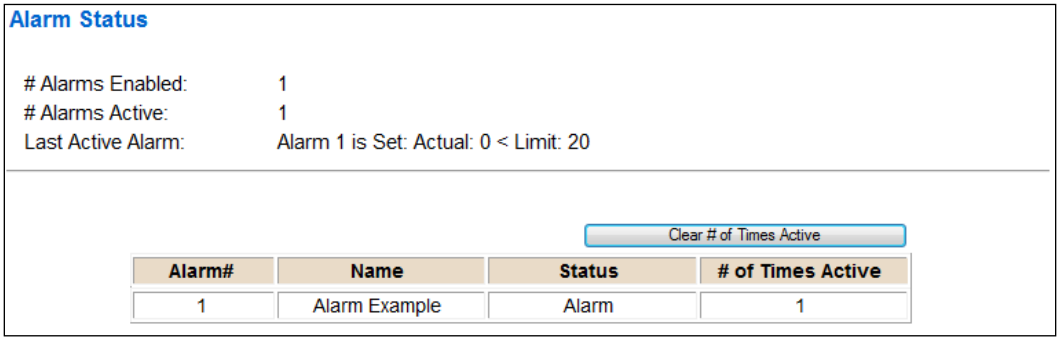


Alarms – Active

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.

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.



Alarms – Clear

When an alarm is cleared, the following will occur:

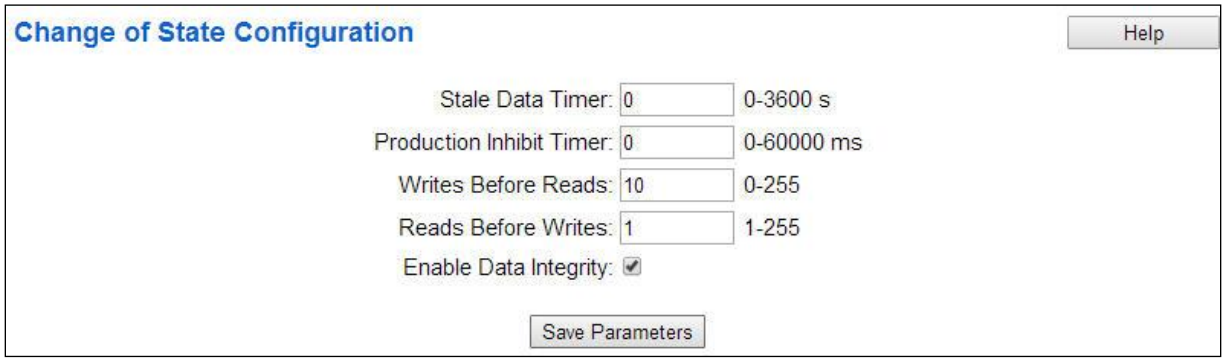
1) A one-time notification will be sent to the email associated with the alarm.
    a. For duplicate emails to occur, the alarm must become active and then be cleared again.
2) Total *# Alarms Active* will decrement. *Last Active Alarm* will not be changed.
3) Status of the Individual Alarm will be reset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



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 – PROFINET IO Server

Select the **PROFINET IO Server** in the dropdown menu on the Diagnostics 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.

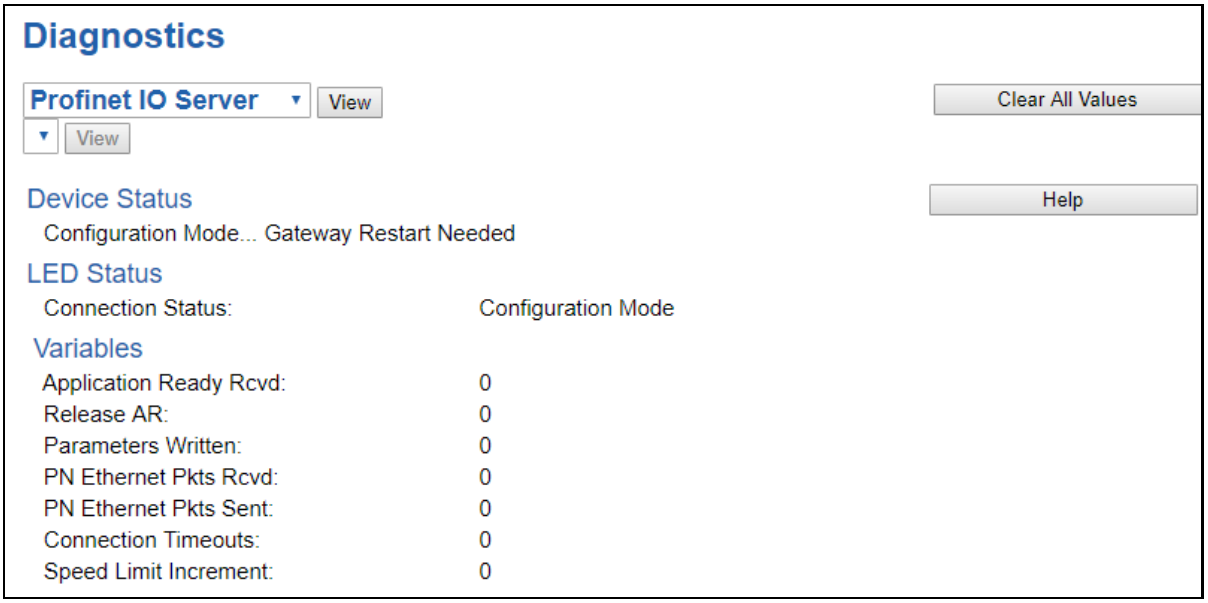
NOTE: This page will auto-refresh every five seconds with the latest data.

Clear All Values - This will only affect displayed values.

1) This will reset all displayed values back to zero.
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 initiated communication to the gateway.
    b. The PROFINET IO Server has an invalid configuration or no parameters configured.



LED Status:

1) Good Communication (Solid Green) – Connected to a PROFINET IO Controller and online.
2) Not Connected (Flashing Green) – Valid Configuration but no communication from the IO controller yet.
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) Application Ready Rcvd:
    a. The Application Ready Command has been received
    b. The gateway has completed the Profinet setup sequence and will start cyclic communication
2) Release AR:
    a. A Release Application Relationship command has been received
    b. Profinet communication have been disconnected from the gateway
3) Parameters Written:
    a. Rollover counter for the number of parameters written by the IO Controller.
4) PN Ethernet Pkts Received:
    a. Number of Layer 2 (Ethernet) Messages received
5) PN Ethernet Pkts Sent:
    a. Number of Layer 2 (Ethernet) Messages transmitted
6) Connection Timeouts:
    a. Number of Connection timeouts between the gateway and the IO Controller
    b. If this counter is incrementing, check your ethernet connection
    c. If this counter is incrementing, verify the gateway is in the IO Controller
7) Speed Limit Increments:
    a. The gateway has received too much traffic to process all the data
    b. The gateway will stop processing Profinet data for a short time

Diagnostics – ASCII

Select ASCII in the top dropdown menu on the Diagnostics Page to view a breakdown of the diagnostics that are displayed on the page. You may also view individual ASCII device counters and messages by selecting the device in the *All ASCII* dropdown and clicking **View**. Additional diagnostic information can be found by clicking the **Help** button.

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

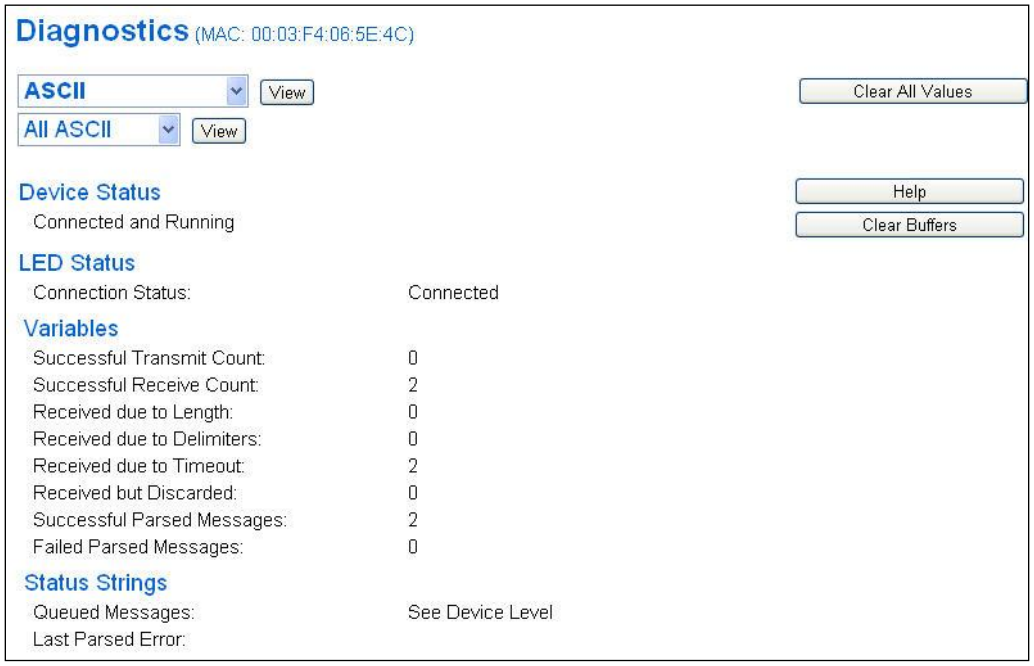
Clear All Values - This will only affect displayed values.

1) This will reset all displayed values back to zero and clear the Status Strings.
   Example: If viewing ASCII – Port 10, this will only clear the values for Port 10. This will reduce the *All ASCII* values indirectly.

Clear Buffers - This will clear the Next Message to Send from Queue buffer and Current Message being received from ASCII buffer and any message stored in the queue.

Device Status - This will only display when viewing *All ASCII*.

1) Connected and Running– The gateway is connected to all the ASCII devices and data is being received/transmitted.
2) Not Connected – There have been no messages received or transmitted.
   a. Verify that the serial / TCP/IP / USB settings match your device.
3) Fatal Error: Hardware Port Not Configured – The port selected on the ASCII Configuration page is not configured.
   a. Verify the ASCII device is enabled and configured.
   b. Verify the port configured matches the port enabled.



LED Status - This is the Status for *All ASCII* or the specific ASCII device selected.

1) Solid Green (Connected) – The gateway is receiving/transmitting data within the Inactivity period for all the ASCII devices that are configured and enabled.
2) Flashing Green (Not Connected/First Time Scan) – Start up state. No messages have been received or transmitted, but port is connected.
3) Flashing Red (Connection Timeout) – The only way to get out of this state is with a valid received message.
    a. Data has been discarded due to the queue being full.
    b. Data has not been received/transmitted within the Inactivity period.
    c. Port not opened.
    d. Message parsing has failed.

Variables - These are the values for *All ASCII* or the ASCII device selected.

Successful Transmit Count:
-Number of messages that the gateway has transmitted to the ASCII device

Successful Receive Count:
-Number of complete messages that the gateway has received from the ASCII device

Received due to Length:
-Number of messages completed due to the Max Message Length being reached

Received due to Delimiters:
-Number of messages completed due to the Start or End Delimiters being seen

Received due to Timeout:
-Number of messages completed due to the Receive Character Timeout being reached

Received but Discarded:
-Number of messages that are complete but discarded due to the queue being full
-Change the Gateway Hold Msg Timeout to be less than what you currently have set

Successful Parsed Messages:
-Number of messages that are complete and have been successfully parsed

Failed Parsed Messages:
-Number of messages that are complete but have not been parsed successfully

Status Strings - These are the values for *All ASCII* or the ASCII device selected.

Queued Messages:
-The gateway will hold up to 20 (configurable) complete messages to send to the other protocol
-This will only increment if the Gateway Hold Msg Timeout is non-zero and messages are being received faster than we can send to the other protocol

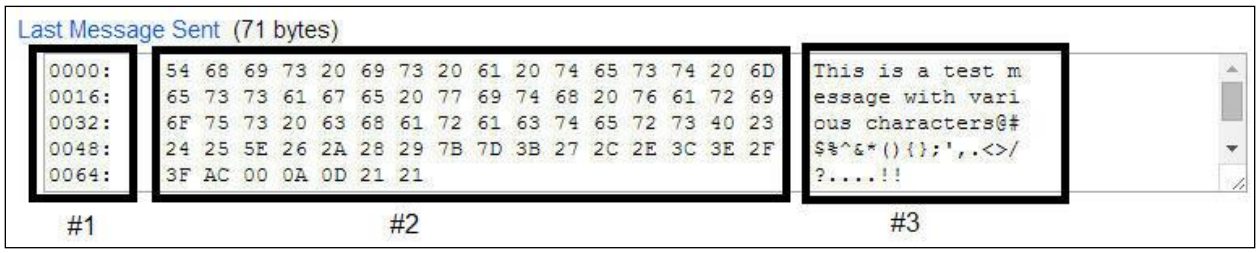
Last Parsed Error:
-Last parsed error the gateway encountered

Common Error Messages:

1) **Number of Fields Invalid:** The total number of parsed fields is greater than the number of fields the gateway was expecting
2) **Discard:** The Field has been discarded
3) **Invalid Length for Field:** Number of characters parsed is greater than the number of characters that the gateway is expecting

4) **Calculated Length of Data exceeds 255 Characters:** Number of characters parsed within a field exceeds 255 characters

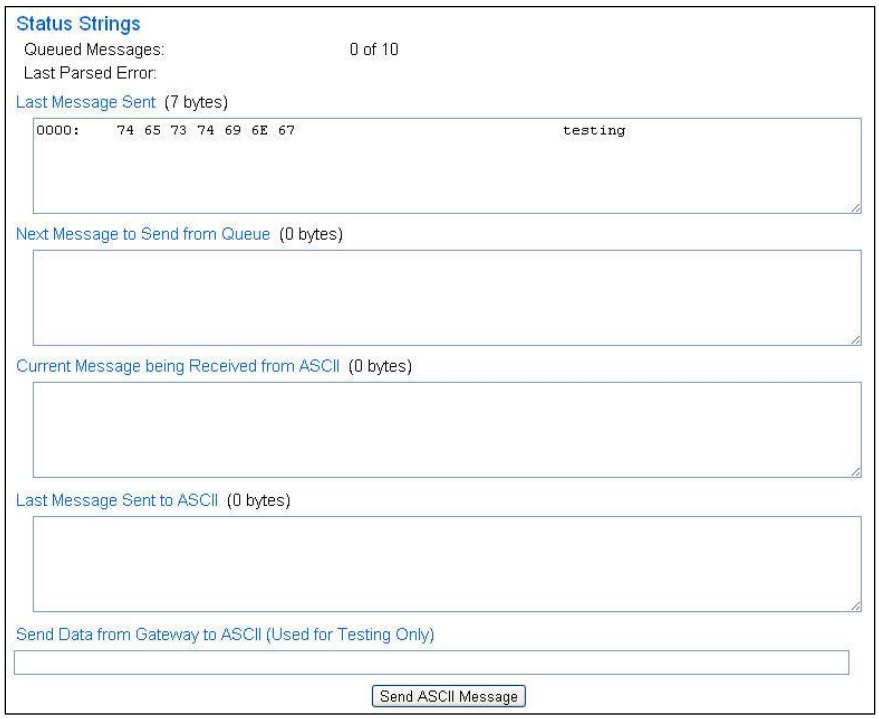
Buffers



Each buffer text area is divided into three separate parts. Refer to screenshot above for labels.

1) Starting byte for that line
2) HEX character representation
3) ASCII character representation

Note: Unprintable ASCII characters (like <CR>) will be displayed as '.' on the right-hand side of the buffer area.



Last Message Sent:

-Last complete message the gateway received from the ASCII device, processed, and sent to the other protocol

Next Message to Send from Queue:

-This is the next complete message that the gateway has already received and processed from the ASCII device, and will be sent next to the other protocol

Current Message being Received from ASCII:

-The current data that the gateway is receiving

-Need to hit one of the three end cases to call a message complete:

1. Max Message Length (max number of characters to receive)
2. Receive Character Timeout (max time to wait after a character to call the current message complete)
3. Delimiters (gateway has not received the delimiters that are specified)

Last Message Sent to ASCII:

-Last message that the gateway sent to the ASCII device

Note: The concatenated delimiters are not displayed in this message but will be transmitted with the message

Send Data from Gateway to ASCII (Used for testing only):

-Enter a message to send to your ASCII device

-Can be used to test communication and test formatting of messages

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.

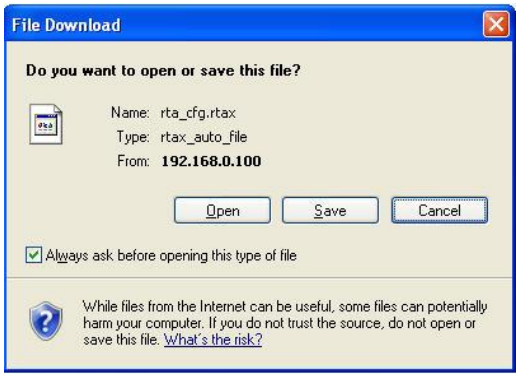
Configuration Files

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.

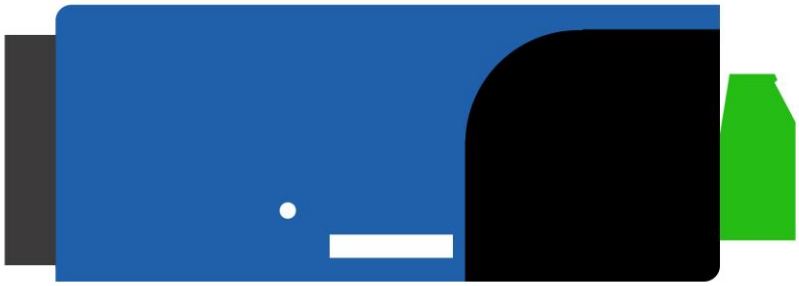
Replacing Configuration Using SD Card

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.

Intelligent Reset Button

If the IP Address of the gateway is forgotten or is unknown, there is an easy way to recover the IP Address using a reset button on the hardware.



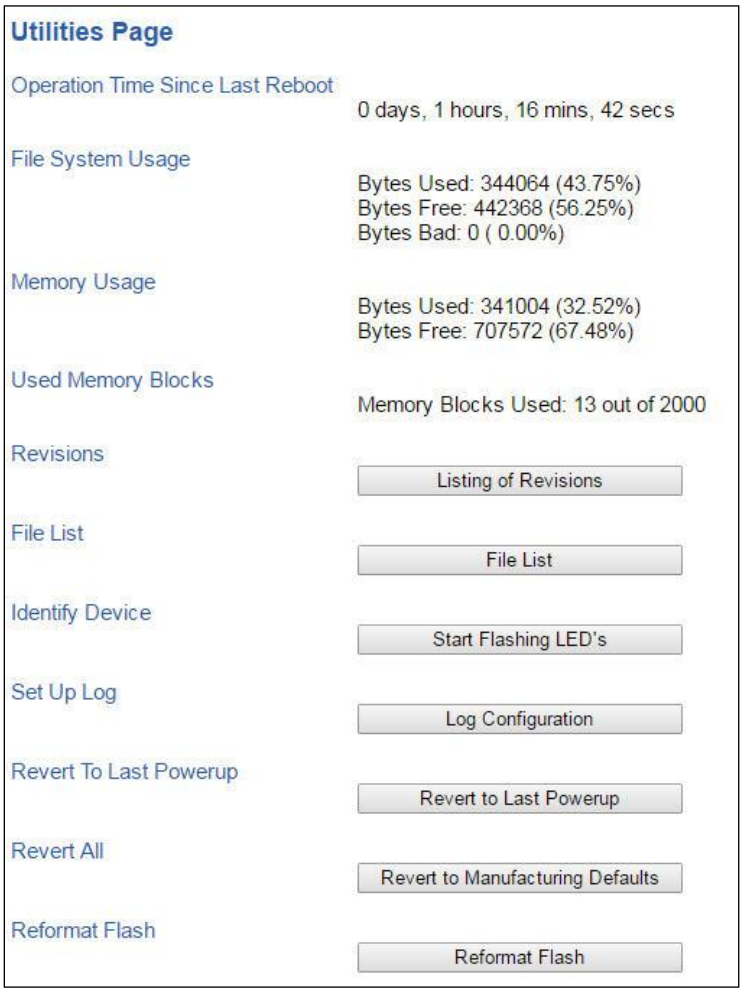
1) On the side of the gateway with the SD card slot, there is a small pinhole. Using a paperclip, press the button through this pinhole and hold the button for at least 5 seconds.

2) After 5 seconds, the unit will acknowledge the command and LED 1 and LED 2 will start an alternate Blink Green quickly pattern.

3) Release the button and the gateway will reset to default IP settings (DHCP).

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.