

435NBX-S2E
Serial ASCII to/from
Allen-Bradley PLC Gateway
Product User Guide

Firmware Version: 1.0.0

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Overview

The 435NBX gateway seamlessly connects a serial ASCII device to a ControlLogix, CompactLogix, FlexLogix, Micro820, Micro850, Micro870, MicroLogix, PLC-5E, SLC5/05 or other legacy PLC featuring a NetENI module.



Tools and documents available online: <http://www.rtautomation.com/product/435-nbx-support/>

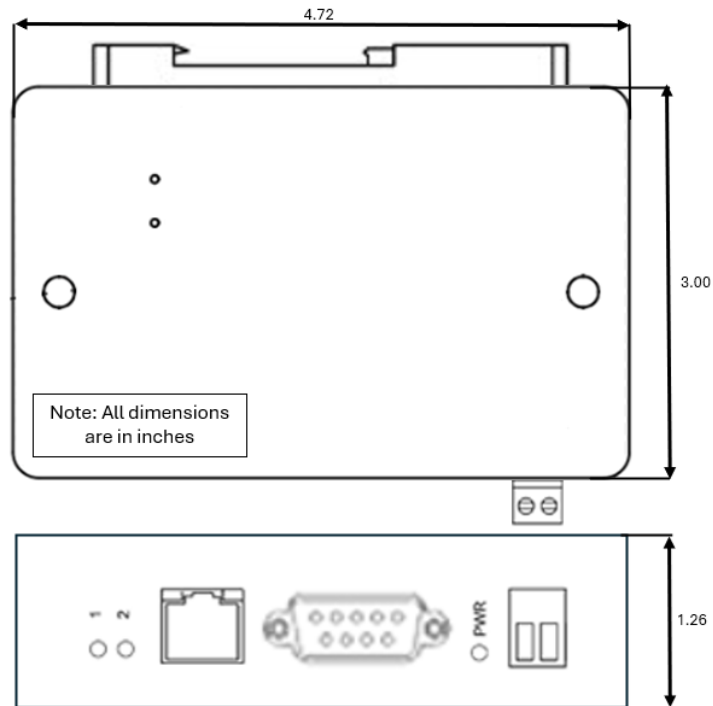
If you need further assistance at any time do not hesitate to call Real Time Automation support. Support

Hours are Monday-Friday 8am-5pm CST

Phone: 800-249-1612

Email: support@rtaautomation.com

Hardware



Powering the Gateway

1. An 8-24 VDC power source to the gateway, Red Wire = (+) Black Wire = (-).
 - a. The gateway draws 156 mA @ 12VDC.
 - b. The gateway draws 83 mA @ 24 VDC.

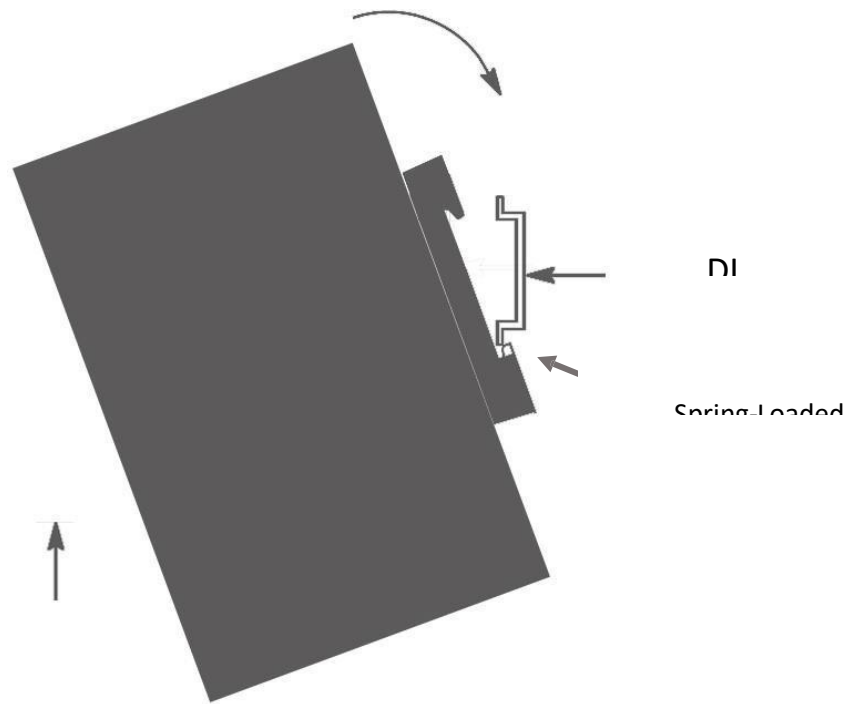


Installing and Removing with the DIN Rail

Installation

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 435NBX 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

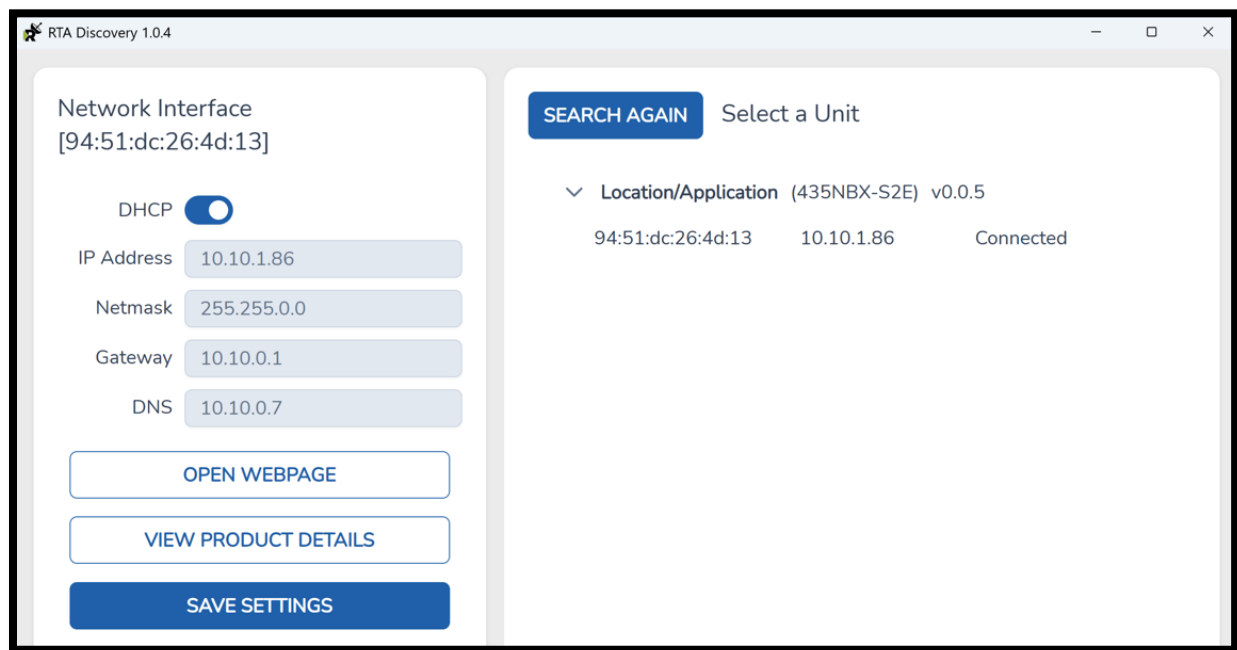
Follow these steps to remove your interface converter.

1. Press up on the unit to engage the spring-loaded lower clip.
2. Swing top of the unit away from the DIN rail.

Accessing the Home 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 [Accessing Browser Configuration](#) document from our support web site.

1. Scan the QR code on the back of the unit or navigate to <https://www.rtautomation.com/435-nbx-support/> and download RTA Discovery.exe.



2. Run the RTA Discovery.exe program.
3. Find the gateway 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 DHCP Client is set up.
 - b. If you do not see the gateway in this tool, then your PC is most likely set up as a static IP.
 - i. Change your PC's network settings to be DHCP. If DHCP fails, then it will change to be on the 169.254.x.y network.
 - ii. Relaunch the RTA Discovery tool to see if gateway can be discovered now.
4. Click Launch Webpage. The Home page should appear.

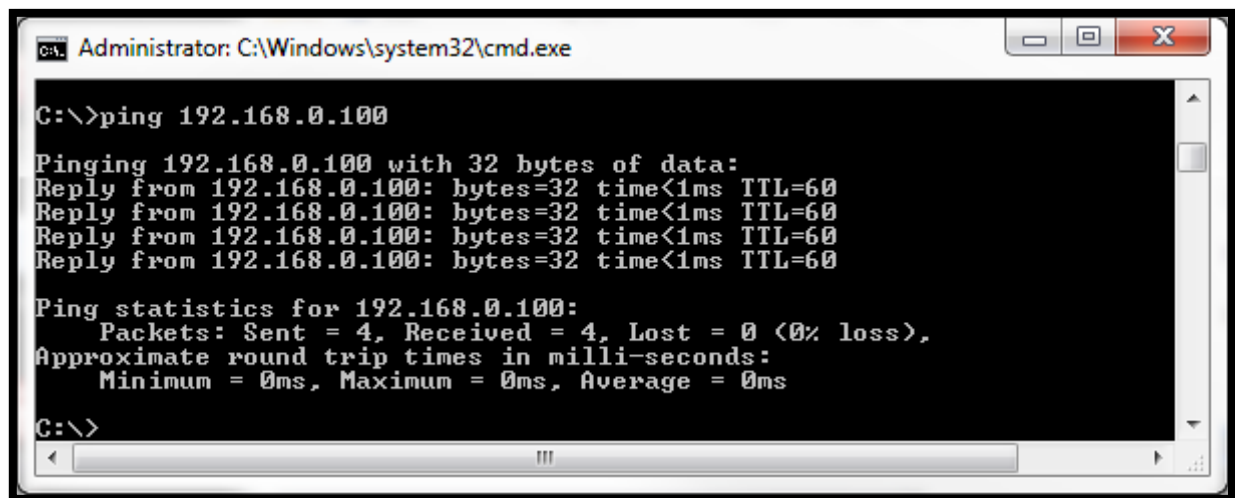
Default setting is set to DHCP. If DHCP fails, default IP Address is 169.254.x.y

Error: Home Page Does Not Launch

If the Home page does not launch, please verify the following:

1. Check that the PC is set for a valid IP Address.
 - a. Open a 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 its set up for DHCP/Static.

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



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

C:\>ping 192.168.0.100

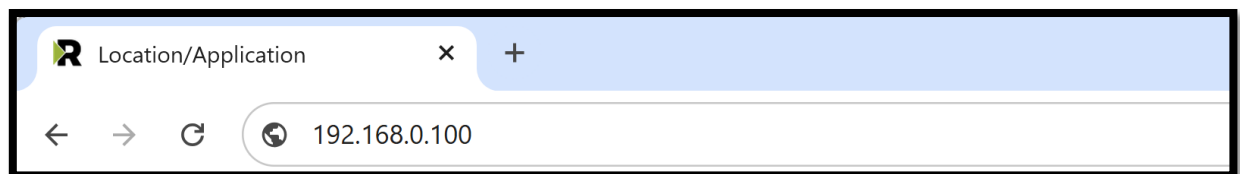
Pinging 192.168.0.100 with 32 bytes of data:
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60
Reply from 192.168.0.100: bytes=32 time<1ms TTL=60

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

C:\>
```

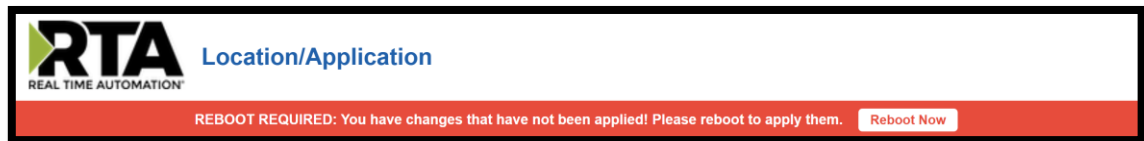
The Screenshot above shows a gateway that is currently set to a static IP Address of 192.168.0.100.

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



Committing Changes to the Settings

- Any changes made to the IP address or DHCP settings will take effect immediately.
- All other changes made to the settings of the gateway will not take effect until the gateway is restarted. Changes will not be stored if the gateway's power is removed prior to a reboot.
- The gateway detects changes and will prompt you with a red notice box to restart the gateway after change.



- 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 Reboot button.
- The reboot can take up to 5 seconds. You will know the save was successful if the red box is no longer present.
 - If the IP address has not been modified, the gateway will automatically redirect to the home page.
 - If the IP address was modified, a message would appear at the top of the page to instruct the user to manually open a new webpage at that new IP.

Home

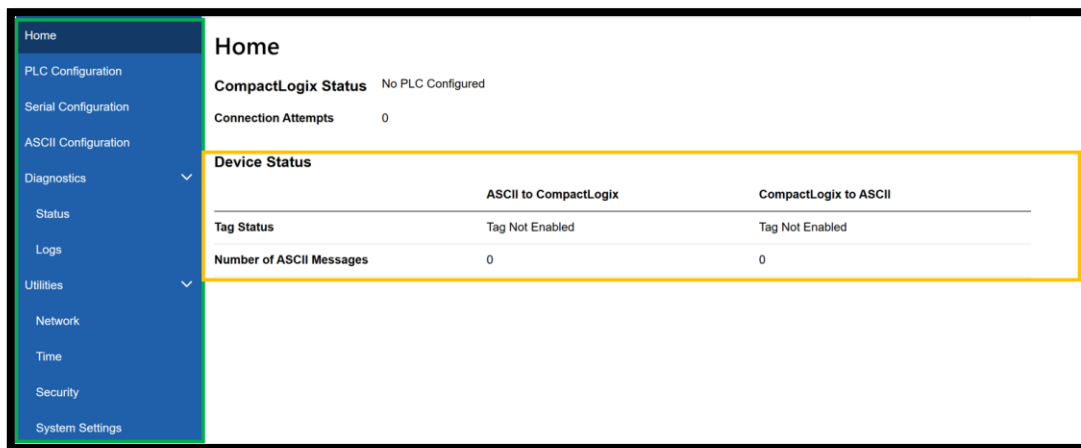
The Home page is where important information about your gateway's PLC Status and ASCII communications are displayed.

Navigation (green box below):

You can easily navigate between pages (Home, Configuration, Diagnostics and Utilities pages) using the navigation panel on the left-hand side.

Device Status (orange box below):

This quickly shows the high-level status of any ASCII Communications. The values on this page mimic the same values that are displayed on the Status Page.



Home		
CompactLogix Status No PLC Configured		
Connection Attempts 0		
Device Status		
	ASCII to CompactLogix	CompactLogix to ASCII
Tag Status	Tag Not Enabled	Tag Not Enabled
Number of ASCII Messages	0	0

PLC Status

1. PLC Status: This shows the status of the PLC connection.
 - a. No PLC Configured – Displays when either a PLC Type is not selected and/or the IP address is set to 0.0.0.0.
 - b. Connection Request Sent to PLC – Displays when a valid PLC Type and IP Address is configured and gateway is attempting to connect to the PLC.
 - c. Connection retry delay – Displays when a valid PLC Type and IP Address is configured and gateway tried to connect to the PLC but failed.
 - i. Verify the PLC Type, IP Address, Controller Slot and Communication Mode to ensure information entered is correct.
 - ii. Normally, Connection Attempts will also increase with this PLC Status.

Device Status

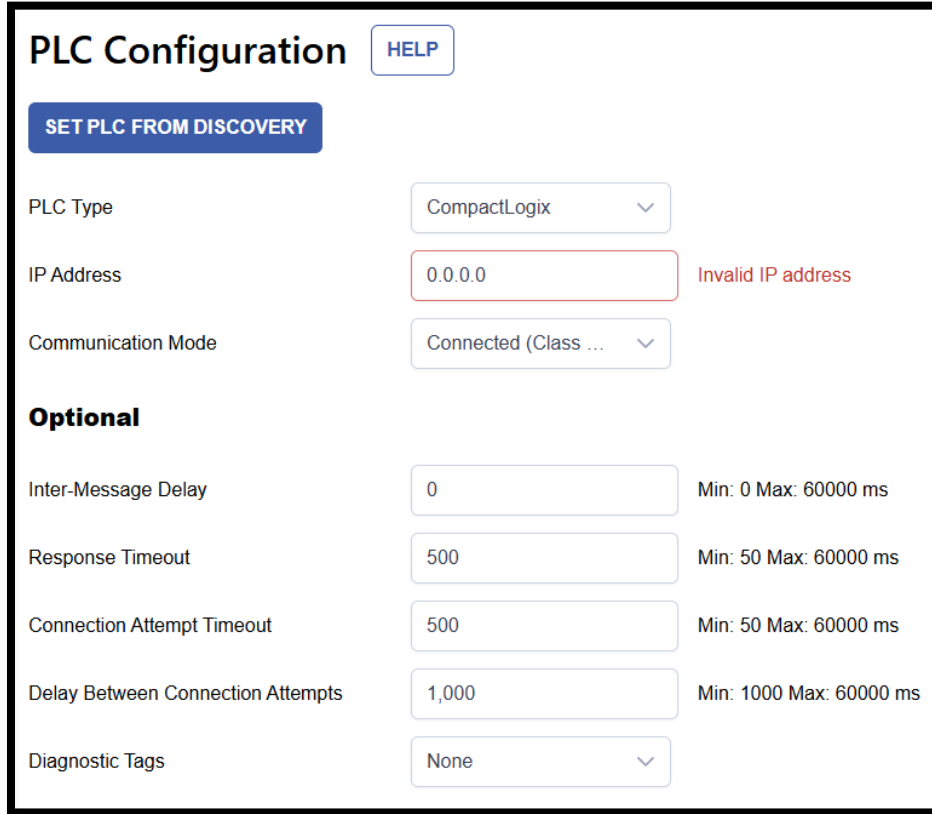
There are 3 columns that make up this status. The status reflected here shows the status for configured parameters. This means that any pending changes made to that parameter since it was last powered up will not display.

Device Status		
	ASCII to CompactLogix	CompactLogix to ASCII
Tag Status	Tag Not Enabled	Tag Not Enabled
Number of ASCII Messages	0	0

1. Left column: The left most column indicates the row header that is for either the Tag Status or Number of ASCII Messages.
2. ASCII to PLC Status and PLC to ASCII Status columns: The two right columns break down the communication on that specific port by direction.
 - a. Tag Status messages are:
 - i. "Tag Not Enabled": Indicates that the direction on that port is not enabled.
 - ii. "Tag/File Not Yet Defined": Indicates that the direction is enabled, but the tag/file name is blank.
 - b. Number of ASCII Messages are:
 - i. A decimal value represents the number of complete messages that the gateway has received or the number of messages that we have received from the PLC and transmitted to the ASCII device.

PLC Configuration

Click the PLC Configuration page.



PLC Configuration [HELP](#)

SET PLC FROM DISCOVERY

PLC Type: CompactLogix

IP Address: 0.0.0.0 Invalid IP address

Communication Mode: Connected (Class ...)

Optional

Inter-Message Delay: 0 Min: 0 Max: 60000 ms

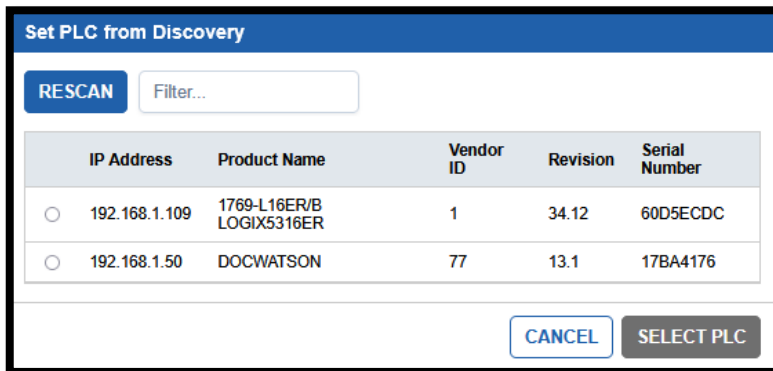
Response Timeout: 500 Min: 50 Max: 60000 ms

Connection Attempt Timeout: 500 Min: 50 Max: 60000 ms

Delay Between Connection Attempts: 1,000 Min: 1000 Max: 60000 ms

Diagnostic Tags: None

1. To Automatically discover the Allen-Bradley PLC, click the Set PLC from Discovery button.
 - a. Select your PLC you wish to add to the 435NBX.
 - b. Click the Select PLC button.
 - c. Configuring the PLC through Discovery, will automatically fill in the PLC Type, IP Address and Controller Slot (ControlLogix PLC Only).
 - d. If you do not see your PLC in the list, then the 435NBX and the PLC are on two separate networks.



Set PLC from Discovery

RESCAN

	IP Address	Product Name	Vendor ID	Revision	Serial Number
☐	192.168.1.109	1769-L16ER/B LOGIX5316ER	1	34.12	60D5ECDC
☐	192.168.1.50	DOCWATSON	77	13.1	17BA4176

CANCEL **SELECT PLC**

2. PLC Type: Select which PLC you are using.
 - a. If using Logix PLC, all processors are compatible.
 - b. If using a PLC5E, then it must be Series C, Revision N.1 or later; Series D, Revision E.1 or later; or Series E, Revision D.1 or later.
 - c. If using a SLC5/05, then it must be: Series A, Version OS501; or FRN5 Series B and Series C or later.
 - d. If using a NetENI module, select based on the Processor it is connected to.
3. IP Address: Enter the IP Address of the PLC.
4. Controller Slot: Enter the slot that the Controller is located in.
 - a. If you are using an Integrated Ethernet Card, enter slot 0.
 - b. For Logix processors, this is not the slot of the Ethernet Adapter.
5. Communication Mode:
 - a. Connected (Class 3 Explicit) messaging relies on reserved resources to transfer data to/from the PLC. Connected (Class 3 Explicit) messaging is recommended if you are reading and writing and always want to keep that connection open to the PLC.
 - b. Unconnected (UCMM) messaging relies on shared resources to transfer data to the PLC. This could result in message timeouts if there are a lot of devices fighting for these shared buffers. If you don't want the RTA gateway to constantly keep the connection open to the PLC but only maintain a connection when there is data needed to be transferred, then Unconnected (UCMM) will work best if you are only writing to the PLC.
6. Inter-Message Delay: The amount of time, in milliseconds, to delay between read and write requests the gateway sends to the PLC.
 - a. This setting will affect the speed at which a message is delivered and the amount of traffic the gateway adds to the network.
 - b. If set to 0, the gateway will communicate as fast as possible to the PLC and generate the most traffic.
 - c. In applications with a heavy network, it is recommended that you increase this delay to limit network traffic.
7. Response Timeout: The amount of time, in milliseconds, the gateway should wait before a timeout is issued for a read and write request.
8. Connection Attempt Timeout: The amount of time, in milliseconds, to wait for an accepted connection to the PLC before issuing a connection timeout.
9. Delay Between Connection Attempts: The amount of time, in milliseconds, to wait between a failed connection and the next attempt.
10. Diagnostic Tags: This Tag or File will act as an incremental counter for messages passed through the gateway.
 - a. For RSLogix5000 Family: This should be an INT Data Type Tag.
 - b. For RSLogix500 Family: This should be an N Register.
 - c. This can be used to monitor if the gateway has stopped communicating with the PLC.
11. Diagnostic UDT Tag/File:
 - a. Enter a Tag/File that is defined in the PLC, based on the selection.
 - b. Heartbeat: Free running counter to let the PLC know that the 435NBX is active.

c. Diagnostic UDT or INT Array:

- i. If using RSlogix 5000, this Tag must use the UDT link provided (right click as save as).
- ii. If using RSlogix 500, create an N file with 6 elements.
 - Bit_Map_Status: bit map of the ASCII devices communicating.
 - Value 1 = Serial Port is TX/RX data
 - ASCII_Event_Delimiter: number of messages called complete due to delimiters.
 - ASCII_Event_Length: number of messages called complete due to max number of characters received.
 - ASCII_Event_Timeout: number of messages called complete due to the timer being reached.
 - ASCII_Event_Discard: number of messages called complete, but the RTA unit had to discard them due to the queue being full.

For step-by-step instruction on how to set up the UDT, please see [Appendix D](#).

Serial Configuration

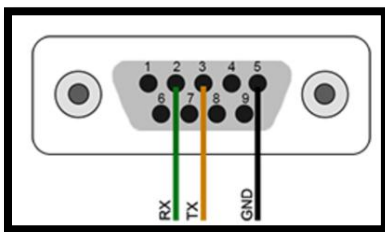
Click the Serial Configuration page.

Serial Configuration

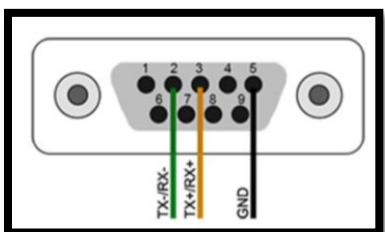
Mode	RS-232
Baud Rate	19200
Parity	None
Data Bits	8
Stop Bits	1
Flow Control	None

- By default, Serial Port is configured for RS232. The Serial Port can be configured for RS232 or RS485 communication.
 - If RS485 is selected, change the hardware switch in the product.
- All serial settings must match the serial device being connected. If any of these fields are incorrect, proper communication will not be possible.

RS232 pinout

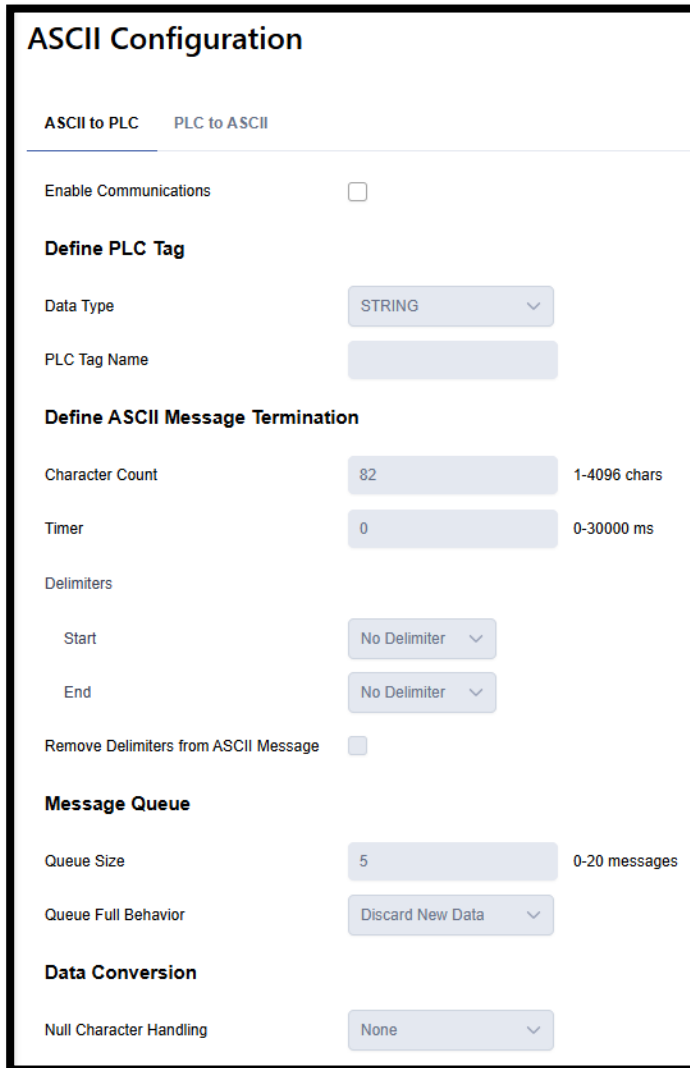


RS485 pinout



ASCII Configuration - ASCII to PLC

Click the ASCII Configuration page and navigate to the ASCII to PLC direction.



The screenshot shows the 'ASCII Configuration' web interface. At the top, there are two tabs: 'ASCII to PLC' (selected) and 'PLC to ASCII'. Below the tabs, there is a section 'Enable Communications' with an unchecked checkbox. The 'Define PLC Tag' section includes a 'Data Type' dropdown menu set to 'STRING' and a text input field for 'PLC Tag Name'. The 'Define ASCII Message Termination' section contains a 'Character Count' input field set to '82' (with a range of '1-4096 chars'), a 'Timer' input field set to '0' (with a range of '0-30000 ms'), and two 'Delimiters' dropdown menus for 'Start' and 'End', both set to 'No Delimiter'. There is also an unchecked checkbox for 'Remove Delimiters from ASCII Message'. The 'Message Queue' section has a 'Queue Size' input field set to '5' (with a range of '0-20 messages') and a 'Queue Full Behavior' dropdown menu set to 'Discard New Data'. The 'Data Conversion' section includes a 'Null Character Handling' dropdown menu set to 'None'.

Define PLC Tag / File

1. Data Type: Select the Data Type for the Tag / File Name that you defined in the PLC.
2. Enter the Tag / File name you want the gateway to move the ASCII message to.
 - a. The Tag / File must be defined in the PLC and must match exactly.
 - b. Most of the time, the Tag Name is defined within the Controller Scope of the PLC for Read/Write Access.
 - i. To configure our gateway for a Program Scope Tag, see [Appendix C](#) for instructions.

Define ASCII Message Termination

1. To define an ASCII message, you must select one or more of the following end cases: Character Count, Timer or Delimiters.
 - a. Character Count: Enter the max number of characters that the device could output.

Example: If your device sends a four-digit temperature, set the length to 4.

 - a. If using an INT Data Type, this is also the dimension size/2 + 1 of the Tag / File.
 - b. If using a SINT Data Type, this is also the dimension size + 2 of the Tag / File.
 - c. For Controllers using RSLogix 5000 or Studio5000 or Logix Designer, the range for each data type is:
 - i. STRING/INT/SINT: 1-4096 characters
 - STRING: If using more than 82 characters, a User Defined Data Type must be created within the PLC and used. Refer to [Appendix B](#) for instructions.
 - ii. For Controllers using RSLogix 500, the range for each data type is:
 - STRING: 1-82 characters
 - INT: 1-200 characters
 - SINT: Not Used
 - iii. For Controllers using Connected Components Workbench (CCW), the range for each data type is:
 - STRING: 1-255 characters
 - INT: 1-200 characters
 - SINT: 1-400 characters
 - b. Timer: Use this option if your device sends data of varying lengths and does not have end delimiters. This is the amount of time we will wait after the last character of a message before considering the message complete.
 - c. Delimiters:
 - i. Start: Select how many Start Delimiters to look for in the ASCII message. Use this feature if the ASCII message has common starting delimiter(s), (characters at the beginning of every message).
 - ii. End: Select how many End Delimiters to look for in the ASCII message. Use this feature if the ASCII message has common end delimiter(s). <CR><LF> is a common example.
 - iii. Remove Delimiters: If using any Start or End Delimiters and you do not want them to be sent to the PLC, then enable this checkbox.

Message Queue

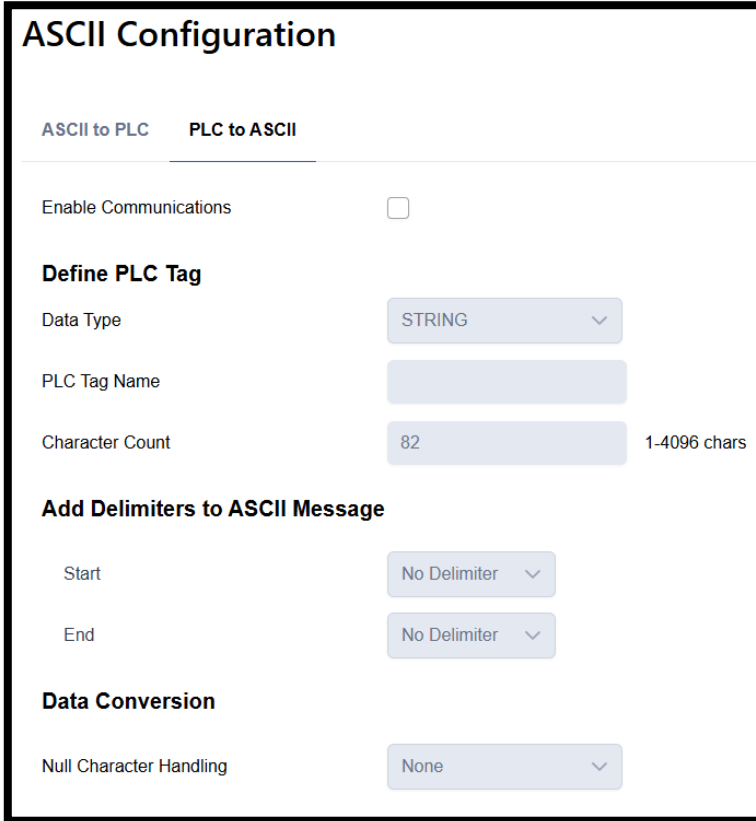
1. Queue Size: Enter the number of complete messages you want the gateway to hold before discarding.
2. Queue Full Behavior: If the Queue is full, the gateway will discard messages in one of the following ways:
 - a. Discard New Data: Gateway will discard any new messages.
 - b. Overwrite Oldest Data: Gateway will overwrite oldest message with new data.

Data Conversion

1. NULL Character Handling: Select how the gateway will handle the NULL Character.
 - a. None (Default): Does no additional conversion on the data before sending it to the PLC.
 - b. Remove All NULLs: Removes all NULL characters from the ASCII Message before sending it to the PLC.

ASCII Configuration - PLC to ASCII

Click the ASCII Configuration page and navigate to the PLC to ASCII direction.



The screenshot shows the 'ASCII Configuration' window with the 'PLC to ASCII' tab selected. The 'Enable Communications' checkbox is unchecked. Under 'Define PLC Tag', 'Data Type' is set to 'STRING', 'PLC Tag Name' is empty, and 'Character Count' is 82 (with a range of 1-4096 chars). Under 'Add Delimiters to ASCII Message', both 'Start' and 'End' are set to 'No Delimiter'. Under 'Data Conversion', 'Null Character Handling' is set to 'None'.

Define PLC Tag / File

1. Data Type: Select the Data Type for the Tag / File Name that you defined in the PLC.
2. Enter the Tag / File name that you want the gateway to monitor for messages.
 - a. The Tag / File must be defined in the PLC and must match exactly.
 - b. Most of the time, the Tag Name is defined within the Controller Scope of the PLC for Read/Write Access.
 - To configure our gateway for a Program Scope Tag, see [Appendix C](#) for instructions.
3. Character Count: Enter the maximum number of characters that the gateway can send to the ASCII device.
 - a. If using an INT Data Type, this is also the dimension size/2 + 1 of the Tag / File.
 - b. If using a SINT Data Type, this is also the dimension size + 2 of the Tag / File.
 - c. For Controllers using RSLogix 5000 or Studio5000 or Logix Designer, the range for each data type is:
 - i. STRING/INT/SINT: 1-4096 characters
 - ii. STRING: If using more than 82 characters, a User Defined Data Type must be created within the PLC and used. Refer to [Appendix B](#) for instructions.
 - d. For Controllers using RSLogix 500, the range for each data type is:
 - i. STRING: 1-82 characters

- ii. INT: 1-200 characters
 - iii. SINT: Not Used
- e. For Controllers using Connected Components Workbench (CCW), the range for each data type is:
 - i. STRING: 1-255 characters
 - ii. INT: 1-200 characters
 - iii. SINT: 1-400 characters

Add Delimiters to ASCII Message

1. Delimiters: Configure the characters to add to the message.
 - a. Start: Use this feature to add a common starting delimiter(s) to messages being sent to the ASCII device.
 - i. Use this feature only if your ASCII device requires such delimiters.
 - ii. All ASCII messages will receive the starting delimiters selected.
 - b. End: Use this feature to add a common end delimiter(s) to messages being sent to the ASCII device.
 - i. Use this feature only if your ASCII device requires such delimiters.
 - ii. All ASCII messages will receive the end delimiters selected.

Data Conversion

1. Data Conversion:
 - a. None (Default): Does no additional conversion on the data before sending it from the gateway to the ASCII device.
 - b. Prepend NULL: Adds a NULL character to the beginning of each message that is to be sent from the gateway to the ASCII device.
 - c. Postpend NULL: Adds a NULL character to the end of each message that is to be sent from the gateway to the ASCII device.

Network Configuration

From the Utilities menu, click the Network page.

Network

Application Description	Location/Application
IP Settings	Static
IP Address	192.168.0.100
Subnet	255.255.255.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0
MAC Address	00:18:C9:01:1B:14

1. Application Description: Enter in a location or application name to differentiate RTA products on your network. This is visible in the browser-based configuration's header and through the discovery tool.
2. IP Settings: Select whether to use DHCP network settings or a Statically set network settings.
3. IP Address and Subnet
4. Default Gateway: This is required if your crossing subnets as this is the IP Address of the Router.
5. Primary DNS and Secondary DNS: This is required if you are using Network Time Protocol (NTP), defined in the Time configuration page, to resolve the name of the device to an IP Address.

NOTE: Once Save Changes is pressed, new IP Settings take effect only after a Reboot.

Time Configuration

From the Utilities menu, click the Time page.

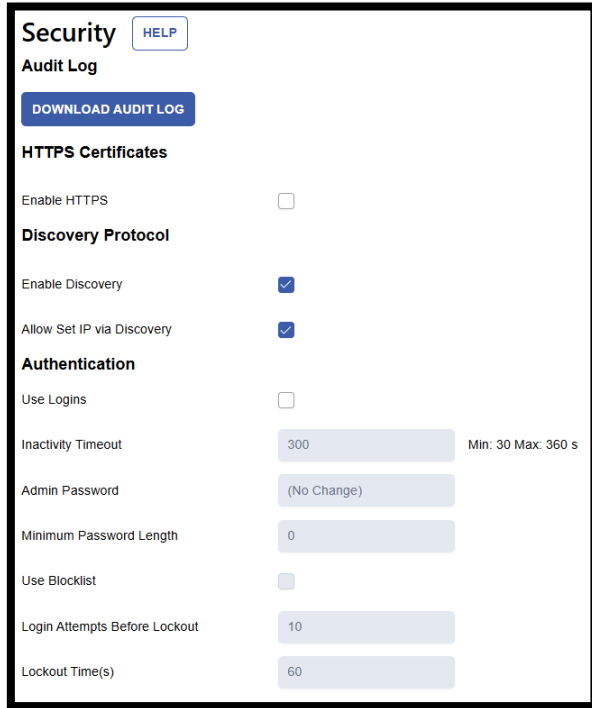
Time

Current Time	1970-01-01 00:08:42.182	
Enable NTP	☐	
Primary NTP Server		
Backup NTP Server		
NTP Sync Interval	120	Min: 10 Max: 86400 s

1. Current Time: Updates about every 1 second and displays the current time.
 - a. If a year or 1970 is displayed, either NTP is not enabled or the Primary/Second NTP Server is not accessible.
2. Enable NTP: Option to obtain the current time from a known source.
3. Primary NTP Server: Name of the NTP Server to try and obtain the current time from.
4. Backup NTP Server: Name of the NTP Server to try and obtain the current time from.
 - a. Only used when the connection to the Primary NTP Server has failed
5. NTP Sync Interval: The amount of time, in seconds, to ask for the current time.
 - a. This is used due to clock drift.

Security Configuration

From the Utilities menu, click the Security page.



The screenshot shows the 'Security' configuration page. At the top, there is a 'Security' header with a 'HELP' button. Below this is the 'Audit Log' section with a 'DOWNLOAD AUDIT LOG' button. The 'HTTPS Certificates' section has an 'Enable HTTPS' checkbox. The 'Discovery Protocol' section has 'Enable Discovery' and 'Allow Set IP via Discovery' checkboxes, both of which are checked. The 'Authentication' section includes 'Use Logins' (unchecked), 'Inactivity Timeout' (300, with a range of 30 to 360 seconds), 'Admin Password' (No Change), 'Minimum Password Length' (0), 'Use Blocklist' (unchecked), 'Login Attempts Before Lockout' (10), and 'Lockout Time(s)' (60).

HTTPS Certificates

1. Enable HTTPS: For the browser-based configuration, HTTPS can be enabled along with the Certificate and Key to be added to the product.
 - a. If the Certificate and Key are invalid, then a secure browser-based configuration will not be available and revert to an unsecure, HTTP, browser-based configuration.

Discovery Protocol

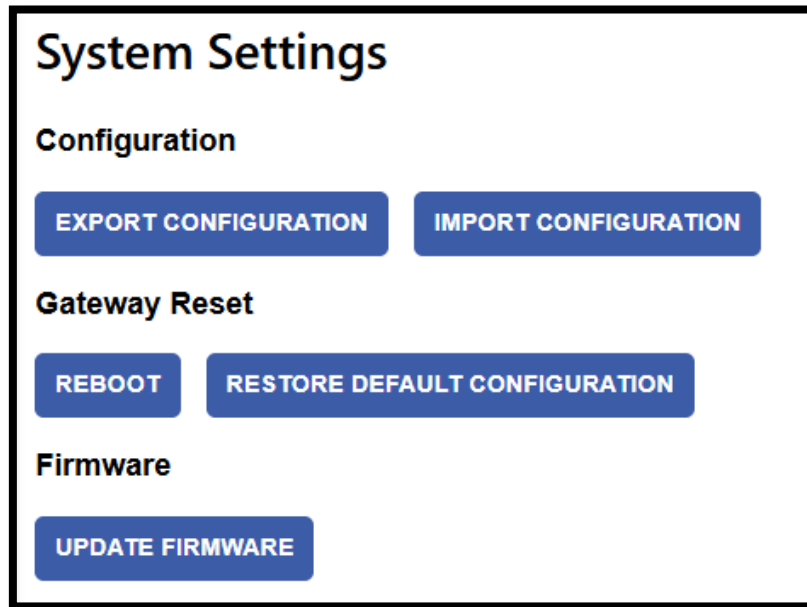
1. Enable Discovery: Allow for the product to be discoverable through the Discovery tool.
2. Allow Set IP via Discovery: Allow the product's Network settings to be set through the Discovery tool.

Authentication

1. Use Logins: Enable to create a username and password
2. Inactivity Timeout: Amount of time that the browser-based configuration is logged in before automatically logging out the user when there is no activity.
3. Admin Password: Enter in a password for the admin account.
4. Minimum Password Length: The minimum number of characters that a password must contain.
5. Use Blocklist: Rejects passwords on a known insecure password list.
6. Login Attempts Before Locked: Number of consecutive failed attempts before locking out the user.
7. Lockout Time(s): Amount of time the browser-based configuration is locked before another log in attempt can be made.

System Settings

From the Utilities menu, click the System Settings page.

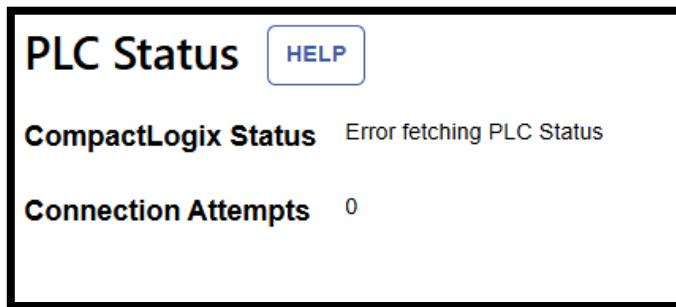


1. Configuration
 - a. Export Configuration: This will save the configuration of the gateway to your PC.
 - b. Import Configuration: This allows load a previously saved gateway configuration into the gateway. If successful, you will be prompted if you want to overwrite the current configuration. If you select OK, you will be required to click the Reboot Now button.
2. Gateway Reset
 - a. Reboot: Execute a software reboot of the gateway.
 - b. Restore Default Configuration: Reverts all settings back to factory defaults, except for the network settings as those remain as currently configured.
3. Firmware
 - a. Update Firmware: This allows you to update the gateway's firmware without needing to the RMA the gateway.

Diagnostics

PLC Status

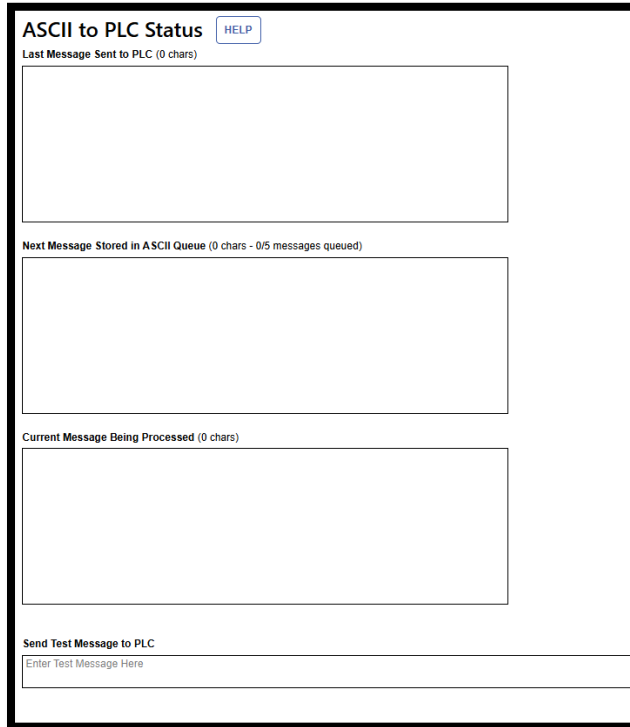
From the Diagnostics menu, click the PLC Status page.



1. PLC Status: Shows the same information that is on the Home page diagnostics. See the [Home Page Device Status](#) section for further explanations.
2. Connection Attempts: This value increases every time the 435NBX loses connection to the PLC and attempts to reconnect.
3. Write Heartbeat to PLC: if the Heartbeat is configured in the PLC Configuration > Diagnostic Tags
 - a. OK: Number of successful write message to the heartbeat Tag/File name.
 - b. Error: Number of failed write messages to heartbeat Tag/File name.
 - c. Last Error: Specific error information pertaining to the last failed heartbeat Tag/File name.
4. Write Diagnostic UDT to PLC: if the Diagnostic UDT is configured in the PLC Configuration > Diagnostic Tags
 - a. OK: Number of successful write message to the diagnostic UDT Tag or INT Array name.
 - b. Error: Number of failed write messages to the diagnostic UDT Tag or INT Array name.
 - c. Last Error: Specific error information pertaining to the last failed diagnostic UDT Tag or INT Array name.

ASCII to PLC Status (Messages)

From the Diagnostics menu, click the Status page and select the ASCII to PLC Status tab.



The screenshot shows the 'ASCII to PLC Status' window. At the top left is the title 'ASCII to PLC Status' and a 'HELP' button. Below the title are three large text input fields. The first is labeled 'Last Message Sent to PLC (0 chars)'. The second is labeled 'Next Message Stored in ASCII Queue (0 chars - 0/5 messages queued)'. The third is labeled 'Current Message Being Processed (0 chars)'. At the bottom, there is a section titled 'Send Test Message to PLC' with a sub-label 'Enter Test Message Here' and a corresponding text input field.

1. Last Message Sent to PLC (chars):
 - a. This buffer shows the last message that was successfully sent to the PLC.
2. Next Message Stored in ASCII Queue (chars – messages queued):
 - a. This buffer shows the next ASCII message waiting to be sent.
 - b. This ASCII message will only be sent to the PLC if the Length field within the Tag/File is set to zero, indicating the last message has been processed.
 - i. When using String Data Type, the .LEN needs to be set to 0.
 - ii. When using INT Data Type, the 1st array index [0] needs to be set to 0.
 - iii. When using SINT Data Type, the 1st and 2nd array index [0] & [1] needs to be set to 0.
3. Current Message Being Processed (chars):
 - a. This buffer shows the real time data that the ASCII device is sending out to the 435NBX gateway.
 - b. All data in this buffer is pending due to one of the three end cases not being met. Those end cases are Character Count, Timer and Delimiters.
4. Send Test Message to PLC:
 - a. Use this field to send a test message to the PLC.
 - b. PLC and ASCII to PLC direction must be configured to use this feature.
 - c. This message will not work if buffer is already full. Message will be discarded.

ASCII to PLC Status (Counters)

Diagnostic Counters

ASCII Event

Delimiter	0
Length	0
Timeout	0
Discards	0

Read Handshake Message from PLC

OK	0
Error	0
Last Error	

Write ASCII Message to PLC

OK	0
Error	0
Last Error	

CLEAR COUNTERS

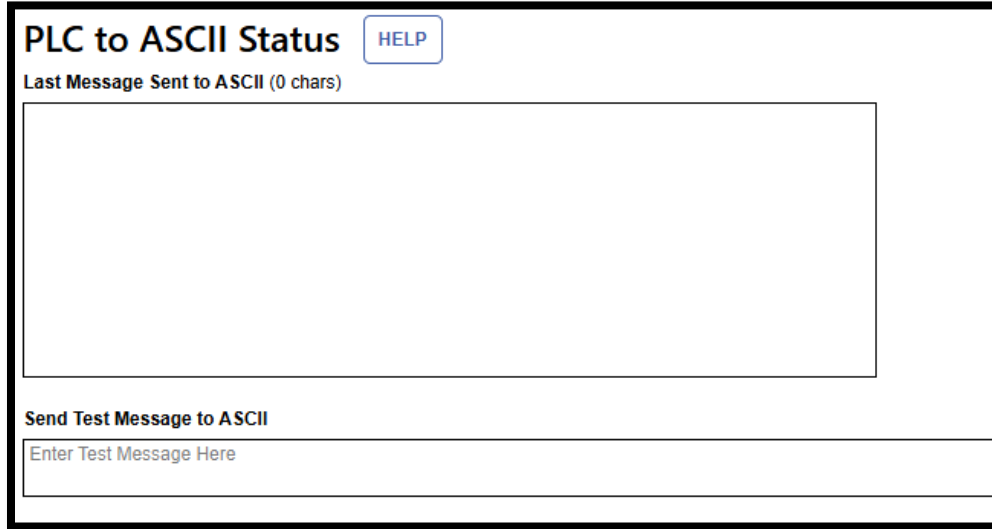
1. ASCII Event:
 - a. Delimiter: Increases if a successful ASCII message was received with delimiters being read.
 - b. Length: Increases if a successful ASCII message was received containing the max character count.
 - c. Timeout: Increases if a successful ASCII message was received with the timer value being reached.
 - d. Discards: Increases if a message was thrown away due to the ASCII queue buffer being full.
2. Read Handshake Message from PLC:
 - a. OK: Increases when the length field is non-zero in the PLC.
 - b. Error: Increases when there is an error with the Tag/File in the PLC.
 - c. Last Error: This will report the most recent error.

Note: Errors that show up here are reported from either the 435NBX or the PLC. For detailed errors and explanations, please see [Appendix A](#).
3. Write ASCII Message to PLC:
 - a. OK: Increases with every successful message sent from ASCII to the PLC.
 - b. Error: Increases when there is an error writing the Tag / File.
 - c. Last Error: This will report the most recent error found.

Note: Errors that show up here are reported from either the 435NBX or the PLC. For detailed errors and explanations, please see [Appendix A](#).

PLC to ASCII Status (Messages)

This page will automatically refresh to show the latest data.



The screenshot shows a web interface titled "PLC to ASCII Status" with a "HELP" button. Below the title, it says "Last Message Sent to ASCII (0 chars)". There is a large empty rectangular box for the message. At the bottom, there is a section titled "Send Test Message to ASCII" with a text input field labeled "Enter Test Message Here".

1. Last Message Sent to ASCII (chars):
 - a. This buffer shows the last message that was sent to the ASCII device.
 - b. Data portion should be filled first and then the Length field. When the Length is non-zero, the gateway will process it and then set to 0, indicating another message can be sent.
 - i. When using String Data Type, length is set using the .LEN field.
 - ii. When using INT Data Type, the length is the 1st array index [0].
 - iii. When using SINT Data Type, the length is the 1st and 2nd array index [0] & [1].
2. Send Test Message to ASCII:
 - a. Use this field to bypass the PLC and send a test message out to the ASCII device from the gateway. All delimiter information configured in the ASCII Configuration section will be applied when a message is sent.
 - b. Use this field to send a test message to the PLC.
 - c. PLC and PLC to ASCII direction must be configured to use this feature.

PLC to ASCII Status (Counters)

Diagnostic Counters
Read ASCII Message from PLC
OK 0
Error 0
Last Error

Write Handshake Message to PLC
OK 0
Error 0
Last Error

[CLEAR COUNTERS](#)

1. Read ASCII Message from PLC:
 - a. OK: Increases with every read request for the length field from the gateway.
 - b. Error: Increases when there is an error with the Tag/File Name in the PLC.
 - c. Last Error: This will report the most recent error found.
[Note: Errors that show up here are reported from either the 435NBX or the PLC. For detailed errors and explanations, please see Appendix A.](#)
2. Write Handshake Message to PLC:
 - a. OK: Increments with every successful message sent from PLC to the ASCII device.
 - b. Error: Increments when there is an error with the Tag/File Name in the PLC.
 - c. Last Error: This will report the most recent error found.
[Note: Errors that show up here are reported from either the 435NBX or the PLC. For detailed errors and explanations, please see Appendix A.](#)

LEDs

When both LEDs blink are red alternating like railroad crossing lights, the gateway's configuration has been changed and is expecting a reboot.

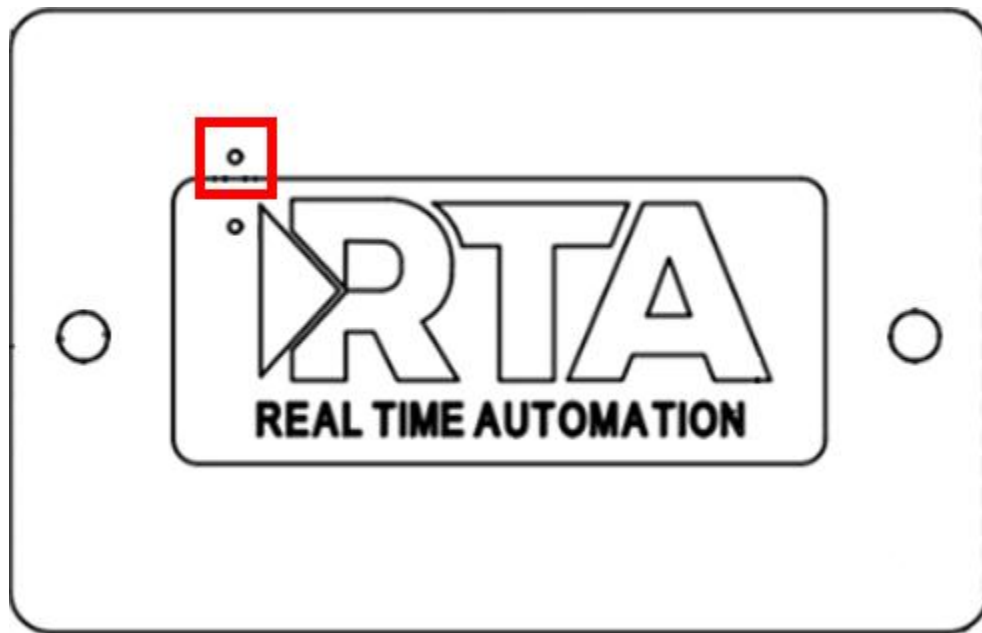
LED 1: ASCII	
Blink Green	No messages sent or received.
Solid Green	Communication is up and running.
Blink Red	1. Queue is full and gateway is discarding messages.
Solid Red	1. No Serial Ports configured/enabled. 2. No ASCII Devices configured/enabled.

LED 2: Allen-Bradley PLC	
Blink Green	No Messages have been Received or Transmitted.
Solid Green	Connection to PLC is valid and communication is good.
Blink Red	1. Had good connection to PLC but have since lost it. 2. No connection has ever been made to the PLC but IP Address is configured.
Solid Red	1. No PLC Configured 2. No IP Address entered
Off	Ethernet cable is unplugged



Intelligent Reset Button

If the IP Address of the gateway is forgotten or 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 RTA logo, there is a small pinhole. Using a small 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 the Comm LED (see section [LEDs](#)) will go to Blink Green at 100ms.
3. Release the button and the gateway will reset to default DHCP IP settings. (Refer to the Accessing_Browser_Configuration doc to setup DHCP on your PC).

Appendix A: Error Definitions

Error	Status Name	Description
0x00	Success	Service was successful
0x01	Controller Slot Doesn't Exist	Connection related service failed along the connection path
0x02	Resource unavailable	Resources needed for the object requested service were unavailable
0x03	Invalid parameter value	See Error 0x20
0x04	Incorrect Tag Data Type Tag Name Doesn't Match (ext: 0000h)	Path segment identifier or the segment syntax was not understood by the processing node. Path processing shall stop when a path segment error is encountered
0x05	Incorrect Controller Type	The path is referencing an object class, instance or structure element that is not known or is not contained in the processing node. Path processing shall stop when a path destination unknown error is encountered
0x06	Partial transfer	Only part of the expected data was transferred
0x07	Connection Lost	The messaging connection was lost
0x08	Incorrect Controller Slot	The requested service was not implemented or was not defined for this object class/instance
0x09	Invalid attribute value	Invalid attribute data detected
0x0A	Attribute list error	An attribute in the Get_Attribute_List or Set_Attribute_List response has a non-zero status
0x0B	Already in requested mode / state	The object is already in the mode/state being requested by the service
0x0C	Object state conflict	The object cannot perform the requested service in its current mode/state
0x0D	Object already exists	The requested instance of object to be created already exists
0x0E	Attribute not settable	A request to modify a non-modifiable attribute was received

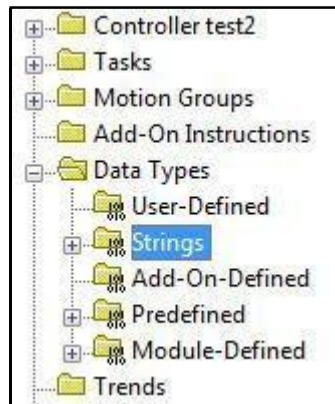
0x0F	Privilege violation	A permission/privilege check failed
0x10	Device state conflict	The device's current mode/state prohibits the execution of the requested service
0x11	Reply data too large	The data to be transmitted in the response buffer is larger than the allocated response buffer
0x12	Fragmentation of a primitive value	The service specified an operation that is going to fragment a primitive data value
0x13	Not enough data	The service did not supply enough data to perform the specified operation
0x14	Attribute not supported	The attribute specified in the request is not supported
0x15	Too much data	The service supplied more data than was expected
0x16	Object does not exist	The object specified does not exist in the device
0x17	Server fragmentation sequence	The fragmentation sequence for this service is not currently active for this data
0x18	No stored attribute data	The attribute data of this object was not saved prior to the requested service
0x19	Store operation failure	The attribute data of this object was not saved due to a failure during the attempt
0x1A	Routing failure, request packet too large	The service request packet was too large for transmission on a network in the path to the destination. The routing device was forced to abort the service
0x1B	Routing failure, response packet too large	The service response packet was too large for transmission on a network in the path from the destination. The routing device was forced to abort the service
0x1C	Missing attribute list entry data	The service did not supply an attribute in a list of attributes that was needed by the service to perform the requested behavior
0x1D	Invalid attribute value list	The service is returning the list of attributes supplied

		with status information for those attributes that were invalid
0x1E	Embedded server error	An embedded service resulted in an error: This can mean the Controller Slot, IP Address or Tag Name does not match. The Tag is not defined in the Controller Scope within the PLC, or the Tag does not have Read/Write privileges.
0x1F	Vendor specific error	A vendor specific error has been encountered. The Additional Code Field of the Error Response defines the particular error encountered. Use of this General Error Code should only be performed when none of the Error Codes presented in this table or within an Object Class definition accurately reflect the error
0x20	Invalid parameter	A parameter associated with the request was invalid. This code is used when a parameter does not meet the requirements of this specification and/or the requirements defined in an Application Object Specification
0x21	Write once value or medium already written	An attempt was made to write to a write-once medium that has already been written, or to modify a value that cannot be changed once established
0x22	Invalid reply received	An invalid reply is received. This status code can serve for other causes of invalid replies
0x23	Buffer Overflow	The message received is larger than the receiving buffer can handle. The entire message was discarded.
0x24	Message format error	The format of the received message is not supported by the server
0x25	Key failure in path	The key segment that was included as the first segment in the path does not match the destination module. The object specific status shall indicate which part of the key check failed
0x26	Path size invalid	The size of the path which was sent with the Service Request is either not large enough for all the Requests to be routed to an object or too much routing data was included

0x27	Unexpected attribute	An attempt was made to set an attribute that is not able to be set at this time
0x28	Invalid member ID	The Member ID specified in the request does not exist in the specified Class/Instance/Attribute
0x29	Member not settable	A request to modify a non-modifiable member was received
0x2C	Attribute not gettable	A request to read a non-readable attribute was received

Appendix B: Create User Defined Tag in RSLogix 5000

1. Within RSLogix 5000, click on **Data Types** and select **Strings**.

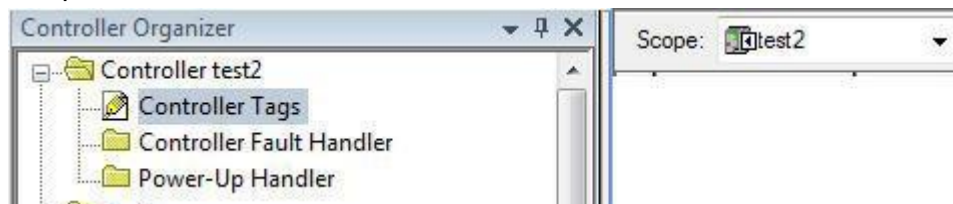


2. Right click on String and select **New String Type**. Give the new data type a name.
3. Select the max number of characters to be transferred.
4. When creating the tag name in the PLC, select the name of the new user defined data type you just created.

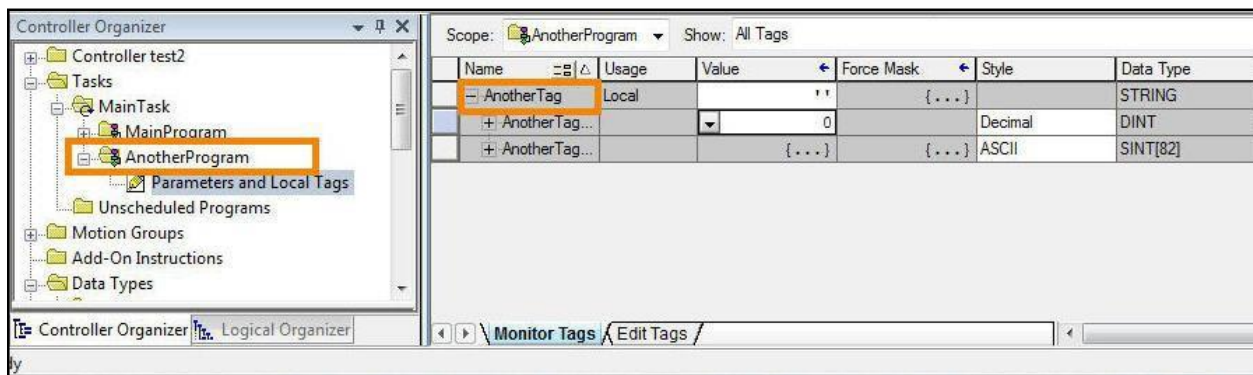
Appendix C: How to Access Program Scope Tags in RSLogix 5000

There are two different types of tags in the PLC: Controller Scope tags and Program Scope tags. With Controller Scope tags, these tag names can be entered into the gateway without any additional syntax. If you are using a tag that is defined within Program Scope, then the tag name inside of the RTA gateway needs additional syntax for it to successfully communicate.

EX: In the picture below, the Controller is set to “test2”.



In the example below, the tag “AnotherTag” is setup in Program Scope named “AnotherProgram.” It is not setup in “test2” Controller Scope:



To access this tag “AnotherTag” in scope “AnotherProgram”, you need to enter it into the gateway using the following syntax:

Tag Name = “**PROGRAM:ProgramName.TagName**”

where *ProgramName* = Scope name & *TagName* = Actual Tag Name

In the previous example, it would be the following: “PROGRAM:AnotherProgram.AnotherTag”

Appendix D: Importing UDT_435NBX_Diagnostics.L5X

To import the UDT from the 435NBX's webpage please follow these steps:

1. To download right click on the UDT_435NBX_Diagnostics.L5X hyperlink on the PLC Configuration page and select "save as" to download into your computer
2. To import into your RSLogix go into the Assets folder and expand the Data Types folder in the project tree. From here you can right click on User-Defined and select import and browse for that L5X file.
3. After importing L5X you can add a tag with the data type of the UDT_435NBX_Diagnostics for this example we used the tag name RTA435.
4. After creating your UDT tag your tag should look like this.

RTA435			UDT_435NBX_Diagnostics
▶ RTA435.Heartbeat			INT
▶ RTA435.Bit_Map_Status			INT
▶ RTA435.ASCII_Event_Delimiter			INT
▶ RTA435.ASCII_Event_Length			INT
▶ RTA435.ASCII_Event_Timeout			INT
▶ RTA435.ASCII_Event_Discards			INT