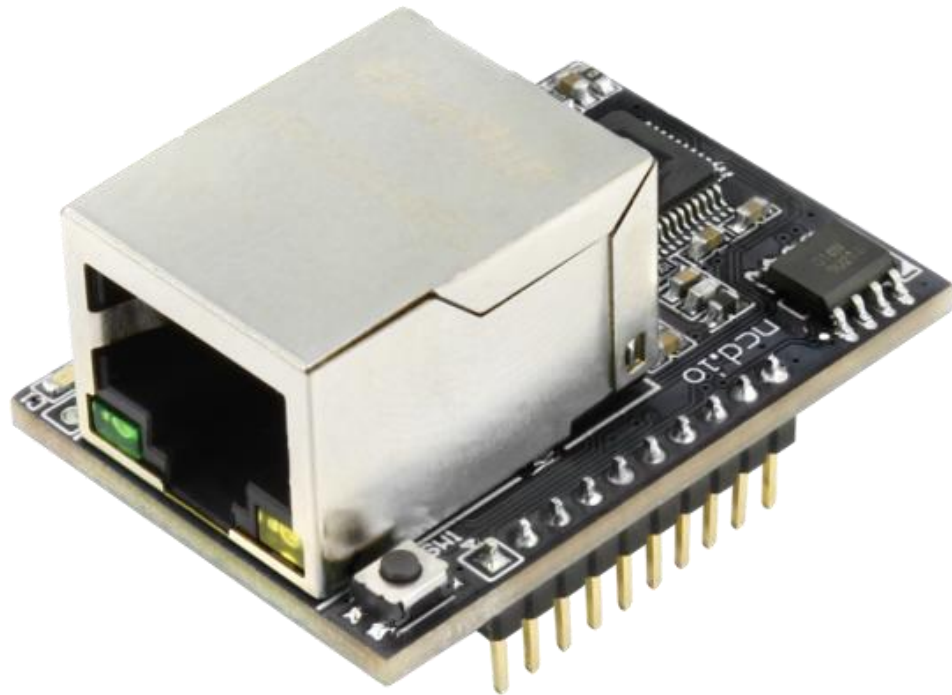


GEN3 ETHERNET MODULE

Ethernet Quick Start Guide



National Control Devices

Introduction

Gen3 Ethernet Module

In this guide we will cover the configuration and use of the NCD Gen 3 Module. We will discuss the configuration software as well as the web interface. The module can be configured through the web interface, however if you have a Windows Computer available, we recommend configuring settings in the module through the configuration software.

Basic Usage

For most users, the Gen 3 Ethernet module will work right out of the box with no settings configuration required. Simply install the Ethernet module into your main control board, connect a standard ethernet cable to the Gen 3 module, connect the other end of the ethernet cable into your network, then power up the main control board. Your main control board Power LED(s) should turn on and the LEDs on the front of the Ethernet module should turn on and begin flashing which indicates the module is in fact powered up normally.

At this point you can open the Base Station software or Alpha Station software and communicate with the main control board through the Gen 3 Module. Both Base Station and Alpha Station should automatically discover the Gen 3 module on the network and allow you to connect to the main control board.

Important Details

DHCP

By default, NCD Gen 3 modules ship in DHCP mode so it is expected that they be connected to a DHCP enabled networks. Most routers support DHCP, however if your network does not support DHCP then you will want to store a static IP address into the controller.

Force Static IP for Configuration

If your network does not support DHCP then power down the main control board. Install a jumper on the two pins directly to the left of the Ethernet Jack then power the board up again. Installing a jumper on these two pins will force the module to use a Static IP address of 192.168.1.88. This will allow you to connect to the Gen 3 Module for configuration on a Non DHCP enabled network or by connecting the Ethernet module directly to the Ethernet port of your PC. When configuring settings in this way you will need to leave the static IP address jumper in place, alter the settings, select “Apply Settings”, power down the control board, wait 2 seconds, remove the static IP jumper, and power the board back up for the settings to be stored in the module.

Factory Reset

There is a hardware method of restoring the Gen 3 module to factory default settings. To do this press and hold the button to the right of the Ethernet Jack for 5 seconds, then release the button. This will factory reset all setting inside the Gen 3 module.

Note

Always connect the Ethernet cable to the Gen 3 module and the network prior to powering the board up.

Applying Settings

Any time settings are altered on the Gen 3 module it is necessary to power cycle the module. This can be done by manually removing power from the host board or by clicking the Reset button in the software/web interface.

NCD Config Tool Software

If you need to make configuration changes to the Gen 3 module and you have a windows computer available, we highly recommend using this NCD Config Tool software to make your configuration changes:

[NCD5500 Configuration Software for Windows](#)

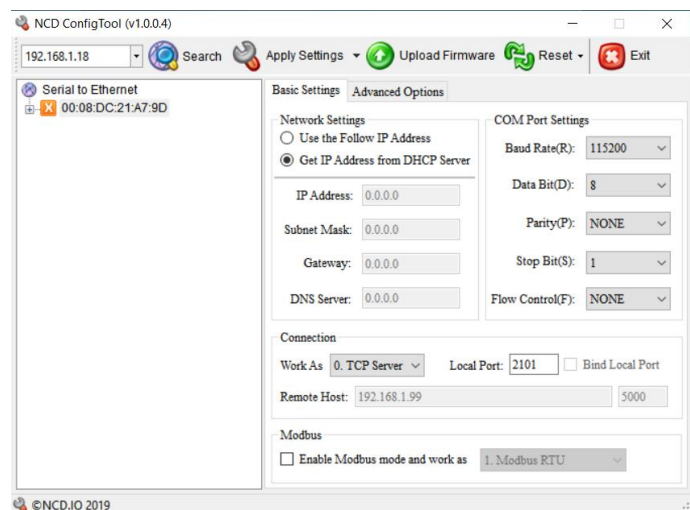
If you do not have a Windows computer available or cannot install this software for another reason, please proceed to the Web Interface Configuration section.

Discovering Gen 3 Modules with the NCD Config Tool

Download and install the NCD Config Tool from the link above on a Windows computer connected to the same network as the Gen 3 module. Once installed open the NCD Config Tool software.

Power on the Main Control board with the Gen 3 module. After 20 seconds or so the module should appear in the list as a MAC address, if it does not click the Search button until the module appears in the list.

From here all settings of the Gen 3 module may be configured.



If the IP address shows up as 0.0.0.0 go ahead and click the Search button again and the IP address should appear in the IP Address Field.

We will now cover all settings that may be configured through the NCD Config Tool Software. You will notice two tabs on the software labeled Basic Settings and Advanced Options. We will cover each of these categories of settings individually.

Once settings are configured as desired click the Apply Settings button to store them into the Gen 3 module. It is also possible to power cycle the module with the Reset Button. **Keep in mind settings entered in the module do not take effect until the module is power cycled.**

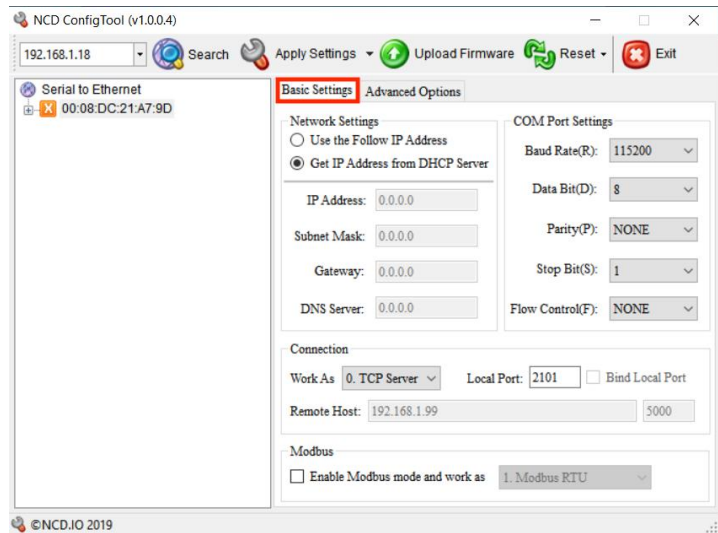
Basic Settings

Network Settings(Use the Follow IP address)

When this radio button is selected it forces the Gen 3 module to utilize the Static IP address settings entered by the user in the IP Address, Subnet Mask, Gateway, and DNS Server fields.

Network Settings (Get IP address from DHCP Server)

When this radio button is selected the Gen 3 module will obtain an IP address from the network router upon boot. Configuration settings entered in the IP Address, Subnet Mask, Gateway, and DNS Server fields will be ignored however these fields will still display current module information.



COM Port Settings

NCD Gen 3 Ethernet module ship with Com Port Settings which make the module compatible with the Main Control board it is installed in. If any settings are made to the COM Port Settings fields it must be assured that these settings are compatible with the Main Control Board. For most applications it is not recommended that these fields be changed.

Connection

These settings determine how Software will communicate with the Gen 3 module in daily use. Socket connection type may be selected from the Work As drop-down menu. Options are TCP Server, TCP Client, or UDP. In TCP Server mode the Gen 3 module will accept TCP socket connections from your Software over the port specified in the Local Port Field. In TCP Client mode the Gen 3 module will automatically establish a TCP socket to a server on the IP specified in the Remote Host Field on the port specified in the port field to the right of the Remote Host field. Lastly UDP mode causes the Gen 3 Module to utilize UDP sockets. This is a good option if the board needs to send information to multiple software applications running on different servers.

Advanced Options

Show Debug Messages

Not recommended for use in NCD Devices

Echo In AT Mode

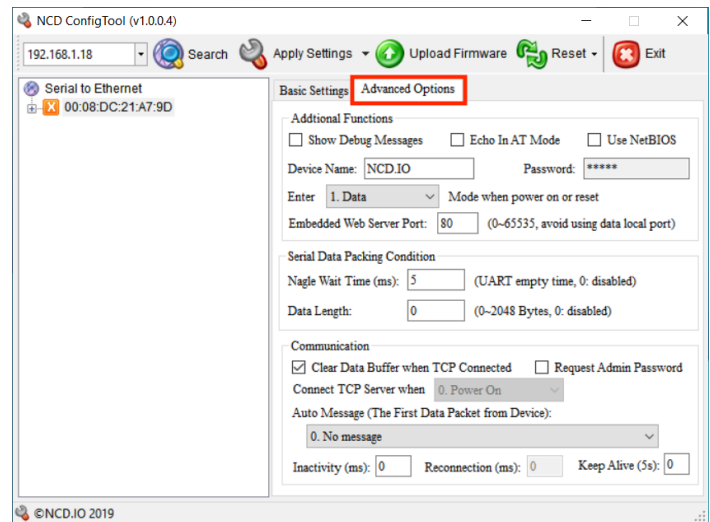
Not recommended for use in NCD Devices

Use NetBIOS

Not recommended for use in NCD Devices

Device Name

Gen 3 module send out discovery packets which allow software to discover them on the network. This Device Name field allows the user to specify the name of this particular device in the discovery packet. This can be used to differentiate between devices if there are multiple on the same network.



Password

The Web interface of the Gen 3 module is password secured. Double click the Password field here and it is possible to edit the web interface password.

Enter Mode when power on or reset

Only Data mode is recommended for NCD Devices.

Enabled Web Server Port

By default the Gen 3 module serves its web interface on port 80 like most normal web servers, however this field allows the user to alter the port the web interface is served on. This field may be set to 0 if it is desired to disable the web interface for the Gen 3 module.

Nagle Wait Time (ms):

This configures the amount of time the Gen 3 module waits after data is initially received over its serial connection to the Main Control Board before sending the data packet over the Network Socket. The default/recommended setting for this field is 5.

Data Length:

This is the amount of data required to be received over the Serial connection to the Main control board before the data packet is sent out over the Network Socket. For use in NCD Devices it is recommended to leave this setting at 0.

Clear Data Buffer when TCP Connected

The Gen3 module has an internal buffer where data received over it's serial connection may be stored. This setting determines whether or not that data buffer should be emptied when a TCP socket connection is established to the board or from the board to the Server. For most applications it is recommended to leave this setting checked.

Request Admin Password

This setting is only available when the Gen 3 module is in TCP Server Mode. This setting requires software connecting to the Gen 3 module to submit a password in order to communicate with it. The Password from the Password field is utilized as the connection authorization password. It should be noted that this setting has not yet been thoroughly tested by NCD Staff.

Connect TCP Server When

This setting is only available when the Gen 3 module is in TCP Client Mode. This setting determines when a socket should be established with the Remote Host TCP server. Options are Power On and Serial Data Received.

Auto Message

This setting determines whether the Gen 3 module should send a message to the Client or Server when a socket is initially established. This is not necessary for most applications as it is possible to retrieve this information from the socket, however it may be utilized to identify the device to the software. Options are No Message, Device Name, Device IP, or Device MAC address.

Inactivity(ms)

This setting determines how long a socket will be maintained if no data is transmitted or received over a network socket connection. After this amount of time the Gen 3 module will disconnect the socket. If it is not desired to automatically disconnect the socket after no data is transferred for a specified amount of time set this field to 0.

Reconnection(ms):

This setting is only applicable in TCP Client mode. This setting determines the amount of time the Gen 3 module will wait after a connection has been closed by the remote Host. After this amount of time the Gen 3 module will attempt to reconnect to the remote Host.

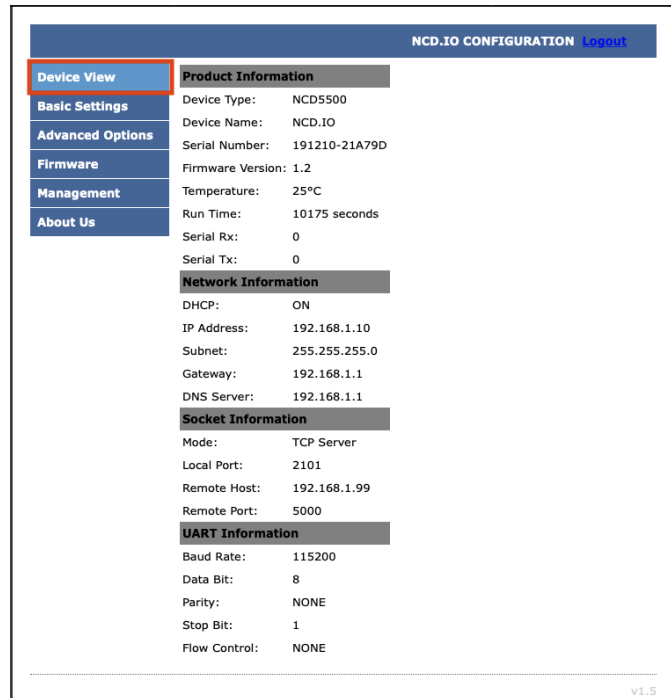
Keep Alive (5s):

This is the interval in 5 second increments the Gen 3 module will send keep alive packets to the remote host/client.

Web Interface Connection

Gen 3 modules have a built-in web interface which may be utilized to configure settings in the module

To access the web interface simply open your web browser and enter the IP address of the Gen 3 module. If you do not know the module's IP address you may be able to discover it by opening the Base Station or Alpha Station software. It is also possible to obtain the module's IP address by checking the DHCP Table of your Router. If your router does not support DHCP simply power the board down and install a jumper on the pins directly to the left of the Ethernet Jack, then power the board back up. This will force the module to use a static IP address of 192.168.1.88. Note however that the module will not utilize user configured settings while this jumper is installed so be sure to power down the board and then remove the jumper once settings are entered as desired.



Device View

The Device View page displays current information about the Gen 3 Module such as its network connection information, it's socket mode information, UART Settings, etc. If you are contacting technical support for help with your Gen 3 module it's a good idea to provide a screen shot of this page as it outlines a lot of very important information about the current configuration of your Gen 3 module.

Basic Settings

Most settings you will be interested in configuring can be found under Basic Settings. Here you can configure A static IP address and the type of socket connection the module should utilize. Here we will review each of these settings.

Use DHCP

If this box is checked the module will obtain an IP Address from your DHCP server on the network router. If this box is checked the IP Address, Subnet Mask, Gateway, and DNS Server fields will be ignored. If you intend to enter Static IP address settings make sure this box is NOT checked.

IP Address

This setting is only applicable if Use DHCP is unchecked. This field configures the Static IP address the module should utilize on the network.

Subnet Mask

This setting is only applicable if Use DHCP is unchecked. This field configures the Subnet Mask the module should use on the Network it is connected to.

Gateway

This setting is only applicable if Use DHCP is unchecked. This field should match the IP address of your network router.

DNS Server

This setting is only applicable if Use DHCP is unchecked. This field will configure the DNS Server the Module uses for DNS requests.

The screenshot shows the 'NCD.IO CONFIGURATION' web interface. On the left, a navigation menu includes 'Device View', 'Basic Settings' (highlighted with a red box), 'Advanced Options', 'Firmware', 'Management', and 'About Us'. The main content area is titled 'Network Setting' and contains several sections:

- Network Setting:** MAC Address: 00:08:DC:21:A7:9D
- Use DHCP:**
- IP Address:** 192.168.1.10
- Subnet Mask:** 255.255.255.0
- Gateway:** 192.168.1.1
- DNS Server:** 192.168.1.1
- Socket Setting:**
 - Start Mode: Data Mode
 - Socket Type: TCP Server
 - Remote Host: 192.168.1.99
 - Remote Port: 5000
 - Local Port: 2101
 - Bind Local Port:
- Modbus option:**
 - Enable Modbus Mode:
 - Select Modbus Mode: Modbus RTU
- UART Setting:**
 - Baud Rate: 115200
 - Data Bit: 8
 - Parity: NONE
 - Stop Bit: 1
 - Flow Control: NONE

At the bottom right, there are 'Save Settings' and 'Reset' buttons, and a version number 'v1.5'.

Start Mode

This field configures the mode the module should utilize on boot. For NCD Devices only Data Mode is recommended.

Socket Type

This field configures how the module handle's socket connections. The options are TCP Server, TCP Client, or UDP. In TCP Server mode the module will boot up and begin listening for socket connections from software applications. In TCP Client mode the module will boot up and attempt to establish a TCP socket to a remote server. In UDP mode the module will send and receive data via a UDP connection.

Remote Host

This field is only applicable when Socket Type is set to TCP Client or UDP. This field configures the IP address the module should attempt to establish a connection to on start up.

Remote Port

This field is only applicable when Socket Type is set to TCP Client or UDP. This field configures the Port the module should attempt to establish a connection to on start up.

Local Port

This field is only applicable when Socket Type is set to TCP Server. This field configures the Port the module will accept TCP client connections on.

Modbus option

Documentation coming soon.

UART Setting

These fields configure how the module handles serial communication with the main control board it is plugged into. NCD Staff test and configure every module prior to shipment so all of these settings should be correct when you receive your product. If any changes are made to these settings it will be necessary to make configuration settings to the main host control board the module is installed in as well.

Save Settings/Reset

Once settings are entered and configured as desired click the Save Settings Button. This will store settings into the Gen 3 module, however these new settings will not be utilized until the next power up of the module so if you would like to implement the new settings now click the Reset button after clicking the Save Settings Button.

Advanced Options

Here we will review each of these settings.

Device Name

Gen 3 module send out discovery packets which allow software to discover them on the network. This Device Name field allows the user to specify the name of this particular device in the discovery packet. This can be used to differentiate between devices if there are multiple on the same network.

Enable NETBIOS

Not recommended for use in NCD Devices

HTTP Port

By default the Gen 3 module serves it's web interface on port 80 like most normal web servers, however this field allows the user to alter the port the web interface is served on. This field may be set to 0 if it is desired to disable the web interface for the Gen 3 module.

Data Packing Size(byte):

This is the amount of data required to be received over the Serial connection to the Main control board before the data packet is sent out over the Network Socket. For use in NCD Devices it is recommended to leave this setting at 0.

Data Packing Time(ms):

This configures the amount of time the Gen 3 module waits after data is initially received over it's serial connection to the Main Control Board before sending the data packet over the Network Socket. The default/recommended setting for this field is 5.

Reconnection Time(ms):

This setting is only applicable in TCP Client mode. This setting determines the amount of time the Gen 3 module will wait after a connection has been closed by the remote Host. After this amount of time the Gen 3 module will attempt to reconnect to the remote Host.

NCD.IO CONFIGURATION Logout	
Device View	Parameter Setting
Basic Settings	Device Name: <input type="text" value="NCD.IO"/>
Advanced Options	Enable NETBIOS: <input type="checkbox"/>
Firmware	HTTP Port: <input type="text" value="80"/>
Management	Data Packing Size(byte): <input type="text" value="0"/>
About Us	Data Packing Time(ms): <input type="text" value="5"/>
	Reconnection Time(ms): <input type="text" value="0"/>
	Inactivity Time(ms): <input type="text" value="0"/>
	Keep Alive Time(5s): <input type="text" value="0"/>
	Verify the Connection: <input type="text" value="No"/> v
	Send Hello Message: <input type="text" value="None"/> v
	Connection Condition: <input type="text" value="Connect Socket after Power On"/> v
	Clear Buffer if Connected: <input checked="" type="checkbox"/>
	Enable Debug Message: <input type="checkbox"/>
	Enable AT Echo: <input type="checkbox"/>
	<input type="button" value="Save Settings"/> <input type="button" value="Reset"/>

Inactivity Time(ms)

This setting determines how long a socket will be maintained if no data is transmitted or received over a network socket connection. After this amount of time the Gen 3 module will disconnect the socket. If it is not desired to automatically disconnect the socket after no data is transferred for a specified amount of time set this field to 0.

Keep Alive Time(5s):

This is the interval in 5 second increments the Gen 3 module will send keep alive packets to the remote host/client.

Verify the Connection

This setting is only available when the Gen 3 module is in TCP Server Mode. This setting requires software connecting to the Gen 3 module to submit a password in order to communicate with it. The Password from the Password field is utilized as the connection authorization password. It should be noted that this setting has not yet been thoroughly tested by NCD Staff.

Send Hello Message

This setting determines whether the Gen 3 module should send a message to the Client or Server when a socket is initially established. This is not necessary for most applications as it is possible to retrieve this information from the socket, however it may be utilized to identify the device to the software. Options are No Message, Device Name, Device IP, or Device MAC address.

Connection Condition

This setting is only available when the Gen 3 module is in TCP Client Mode. This setting determines when a socket should be established with the Remote Host TCP server. Options are Connect Socket after Power On and Connect Socket after UART Received Data.

Clear Buffer if Connected

The Gen3 module has an internal buffer where data received over it's serial connection may be stored. This setting determines whether that data buffer should be emptied when a TCP socket connection is established to the board or from the board to the Server. For most applications it is recommended to leave this setting checked.

Enable Debug Message

Not recommended for use in NCD Devices

Enable AT Echo

Not recommended for use in NCD Devices.

Save Settings/Reset

Once settings are entered and configured as desired click the Save Settings Button. This will store settings into the Gen 3 module, however these new settings will not be utilized until the next power up of the module so if you would like to implement the new settings now click the Reset button after clicking the Save Settings Button.

Management

Password Setting

The Web interface is password protected. The default password for the web interface is admin. If desired, you may change this password using the Password Setting Fields. After the new password is set it will take effect after the next power cycle.

Factory Default

It is possible reset the Gen 3 module to factory default settings by pressing this Default Button

Reset Device

It is possible to power cycle the Gen 3 Module by pressing this Reset Button.

Logout

This button will log the user out of the web interface. Keep in mind password changes will not take effect until a power cycle to the module.

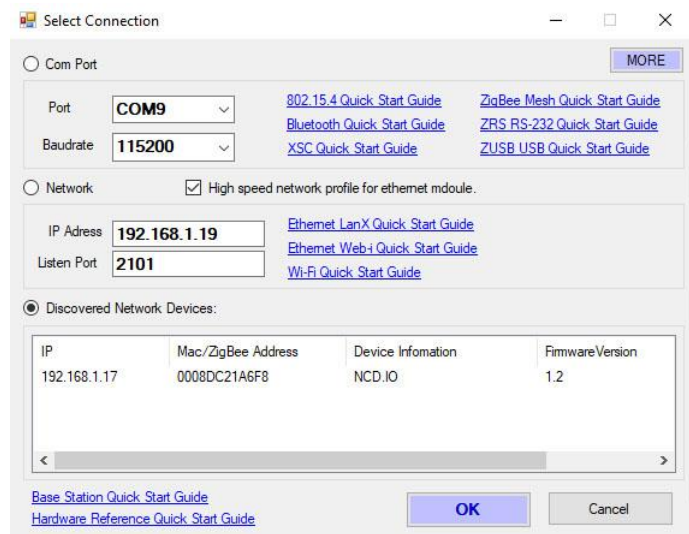


Base Station Software

Base Station Software is our reference tool for designing and testing all currently manufactured NCD Devices. Base Station will assist you in learning how any NCD device functions and will provide valuable diagnostic tools to help determine if your controller is functioning as designed. Base Station software exercises every supported feature of every supported device. It is the ultimate reference tool for learning, diagnosing, and testing NCD devices.

Discovered Network Devices

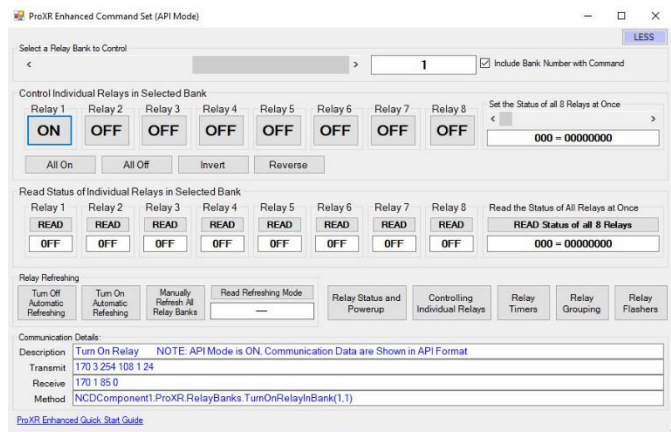
Base Station will discover the Ethernet board on the network and show you the IP address assigned to the board. Select Discovered Network Devices button then click on the IP Address, this will open your browser and show you the Web Interface Connection and all its features. By selecting the Discovered



Network Devices button then clicking OK, Base Station Software will open showing you the command sets that are available for your board.

Device Command Sets

Base Station software asks the controller which command sets are supported. The supported command sets are listed when you run the Base Station software application. Some controllers may show more command sets while other controllers may show fewer command sets. The Base Station program will decide which command sets apply to your board.



Troubleshooting

If you lose communications with the module follow these steps:

Factory Reset

1. Check that the Ethernet Module is seated correctly on the connection socket of the board it is mounted on
2. Power up the module by applying power to the board the module is mounted on
3. Press and hold the factory reset button on the side of the Ethernet module for 5 seconds to reset the module back to factory settings
4. Use the [NCD5500 Configuration Software for Windows](#) to discover the device
 - Make sure that the IP address dropdown box in the top left of the NCD5500 Configuration software is set to your computer's external IP address. If you select the dropdown and only one IP address is listed, then you do not need to change this
 - If the correct network is selected in the top left dropdown and the device is still not being discovered, try the steps in the "Static IP Configuration" section below
5. Use the NCD5500 Software to configure your device to the desired settings
6. Select Apply Settings at the top
7. Select Reset at the top

Static IP Configuration

If the Factory Reset above does not discover the device

1. Check that the Ethernet Module is seated correctly on the connection socket of the board it is mounted on
2. Use a jumper to connect the two pins on the Ethernet Module to force the static IP address of 192.168.1.88 onto the module
3. Power up the module by applying power to the board the module is mounted on
4. Connect the Ethernet Module directly to the Ethernet Port of your computer
5. Use the [NCD5500 Configuration Software for Windows](#) to discover the device
 - Make sure that the IP address dropdown box in the top left of the NCD5500 Configuration software is set to your computer's external IP address. If you select the dropdown and only one IP address is listed then you do not need to change this
 - If the device is not discoverable at this point contact NCD's support team for additional steps
6. Use the NCD5500 Software to configure your device
7. Select Apply Settings at the top
8. Power down the ethernet module by removing power from the board that the Ethernet Module is mounted on
9. Wait 2 seconds
10. Remove the Static IP jumper from the Ethernet Module
11. Power up the board

Technical Support

Base Station Software is

NCD Community

National Control Devices has a forum where you can search and post questions on the operation of the boards. The NCD Community is where you will get the fastest support for all NCD products right from the developers! Discussions are welcome on applications, and you are encouraged to share your experiences with other users. Visit the community here: community.ncd.io/