AN-X3-MOD-MON
Modicon S908
Remote I/O Monitor
Ethernet/IP
Gateway

User Manual

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Current firmware and documentation are at qtsusa.com/dist.

Throughout this manual we use notes to make you aware of safety considerations.

WARNING!

Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

These warnings help to:

- identify a hazard
- avoid the hazard
- recognize the consequences

IMPORTANT!

Identifies information that is especially important for successful application and understanding of the product.

TIP

Identifies information that explains the best way to use the AN-X3-MOD-MON

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AN-X3-MOD-MON Module Overview

The AN-X3-MOD-MON allows an Ethernet/IP Client such as ControlLogix to monitor Modicon S908 RIO network I/O data.

The module monitors inputs and outputs on the S908 network. The module supports 800 series and Quantum remote drops. It supports up to 32 drops. In monitor mode, the AN-X3-MOD-MON never transmits on the Modicon network.

Both the RIO and Ethernet/IP configurations can be generated automatically by the AN-X from data captured from the RIO network.

The AN-X3-MOD-MON module has a web interface for configuration. You can communicate with the module using any standard web browser such as Chrome or Firefox.

A watchdog timer is implemented in the module's hardware. If the firmware does not kick the watchdog within the timeout period, the watchdog times out and places the module into a safe fatal failure state.

A jabber inhibit timer is implemented in the module's hardware. If the network transmitter is on longer than 150% of the longest network frame time, the transmitter is forced off and the module is placed into a safe fatal failure state.

The module firmware can be updated using the web interface. Refer to page 42 for details.

As an Upgrade Tool

This module is primarily intended for users who are planning to upgrade a system from a Modicon controller to an Ethernet/IP client such as ControlLogix with an AN-X3-MOD-MAS acting as the master on the Modicon network. With an AN-X3-MOD-MON, the ControlLogix can monitor live inputs and outputs on the existing system and compare the outputs from the replacement system to those from the existing system. When you are satisfied that the replacement system operates exactly like the existing system, you can install the upgrade.

The AN-X3-MOD-MON uses the same hardware as the AN-X3-MOD-MAS. You simply have to select different firmware using the web interface.

The I/O configuration file for the AN-X3-MOD-MON can be used to configure the AN-X3-MOD-MAS. The Ethernet/IP configuration is different for the two modules since data is mapped differently

Hardware Features

The module has:

- two LEDs to indicate the status of the connection to the Ethernet (100 and Link/Act)
- an LED to indicate the module's internal state and the state of Ethernet communication (MS or SYS)
- an LED to indicate the state of communications on the S908 Remote I/O network (NS or NET)
- an Ethernet connector
- an F connector to connect to the S908 remote I/O network
- a power connector

Package Contents

- AN-X3-MOD module
- 3 pin Phoenix power connector

Current firmware and documentation are at qtsusa.com/dist

Using the MicroSD Card

The AN-X3 microSD card stores configuration data and firmware.

The are no restrictions on the size or speed of the card. The format must be FAT-16 or FAT-32.

The card must be present while the AN-X3 is running.

WARNING! Do not remove the card while the AN-X3 is powered on!

If the AN-X3 is inaccessible from Ethernet because of its settings, you can remove the card and edit the file config.txt. Refer to page 15 for details.

Reinsert the card in the slot at the back of the AN-X3, with the pins facing up.

WARNING! If you remove the card to edit the configuration file, push the card in straight or the card might fall inside the case and you will have to disassemble the AN-X3 to retrieve it (7/64 Allen wrench).

AN-X3 Modes of Operation

There are two AN-X3 modes of operation:

- Maintenance mode. The AN-X3 runs the maintenance firmware at startup. It performs diagnostics (memory tests, etc), copies any changes from the microSD card. If there are no errors, it starts the AN-X3 in production mode.
- Production mode. This is the normal runtime mode of operation.

Installation

Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

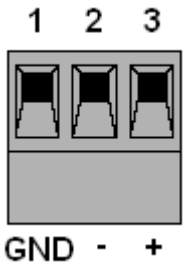
WARNING!

Electrostatic discharge can damage integrated circuits or semiconductors. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential
- Do not touch the connector pins

Power

AN-X requires a DC power input of anywhere from 12 to 24 VDC.



Left to right the pins on the power connector are chassis ground, negative voltage and positive voltage.

The chassis ground should be connected.

Power consumption is 150 mA @ 12VDC or 75 mA @ 24VDC.

The part number for the power connector is Phoenix MSTB 2.5/3-ST-5.08

S908 Cabling and Termination

Refer to the Modicon Remote I/O Cable System Planning and Installation Guide 890 USE 101 00 Version 3.0 for detailed information on cabling and installation.

The module has a standard F connector for connection to the S908 remote I/O network.

The hardware for the AN-X3-MOD-MAS and AN-X3-MOD-MON contains built-in termination.

When you connect the AN-X3-MOD-MON to the network, you can't connect it just like any other node. There's a loss of about 14 dB through a tap to each drop, so if the AN-X were connected as a drop, there would be a loss of at least 28 dB in the signal from other drops to the AN-X3-MOD-MAS, as well as any attenuation along the cables.

Even with the 28 dB loss, in many cases the AN-X3-MOD-MON will work, but this is not guaranteed.

The AN-X3-MOD-MON should be located at the end of the network trunk, at the opposite end from the master, or connected using a Modicon Redundant Controller splitter. Remove the terminator previously at the end of the network trunk.

If it isn't practical to connect the AN-X3-MOD-MON to the end of the network trunk, it can be connected using a Modicon trunk splitter. Refer to the Modicon Remote I/O Cable System Planning and Installation Guide for details.

WARNING! The use of more than one splitter as a branching device on the RIO network is never permitted.

If you remove an AN-X3-MOD-MON from the S908 network, make sure the network is properly terminated after you remove it.

The AN-X module does not connect the S908 cable to earth ground. If a connection to ground is required, use an F connector grounding block.

Ethernet Cabling

AN-X has a standard RJ-45 connector for connecting to Ethernet.

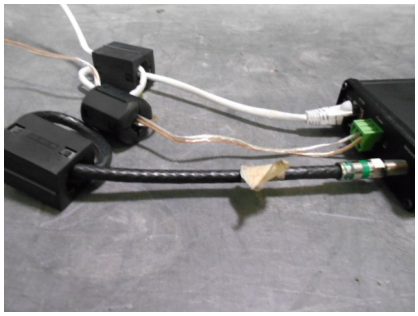
If you are connecting to the AN-X through a router or switch, use a standard Ethernet cable.

If you are connecting directly between a computer and AN-X, a crossover cable may be needed.

CE Installations

If you are installing the AN-X3 in a location which requires CE, install the following ferrites or their equivalents on the cables, to meet the requirements of radiated emissions at 199.98MHz:

Location	Part number
Ethernet, 10cm from AN-X	Ferrite bead, Fair-Rite 0431173551
Power, 10cm from AN-X	Ferrite bead, Fair-Rite 0431164181
Modicon Coax, 10cm from AN-X	Ferrite bead, Fair-Rite 0431173551



Quick Start

Step	Operation	See page
1	Power up the AN-X, connect it to Ethernet and assign an IP address	13
2	Connect AN-X to the Modicon S908 network	10
3	Use the web interface to Auto Configure the AN-X from the attached Modicon network	19
4	Configure the AN-X in RSLogix 5000	24
5	Monitor I/O, read inputs and write outputs	
6	Use the web interface to create aliases for RSLogix 5000	34
7	Import the aliases into RSLogix 5000	34
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9	Create your application using the aliases	

IP Address Configuration

Before you can use the AN-X3, you must configure its IP address on Ethernet.

For the options and best procedures to configure AN-X3 modules, see:

https://qtsusa.com/dist/AN-X3/AN-X3_ReadMe_and_QuickStart.txt

Initial IP Configuration

AN-X can be configured:

- to use a static (unchanging) IP address
- to obtain its IP address from a DHCP server
- to use the fixed link-local address 169.254.42.84

All AN-X modules are shipped with the link-local address 169.254.42.84.

Unless you have control of the DHCP server, in most applications you will assign the AN-X a static IP address. Otherwise the DHCP server may assign a different IP address each time AN-X powers up, and any software that accesses the AN-X module would have to be reconfigured.

IMPORTANT! If you are connecting AN-X to an existing Ethernet network, consult the network administrator to obtain information about how you should configure AN-X or to obtain a static IP address for AN-X.

** Since link-local IP addresses are not always accessible, the recommended method to set the initial IP address is with the Prosoft Discovery Service (PDS).

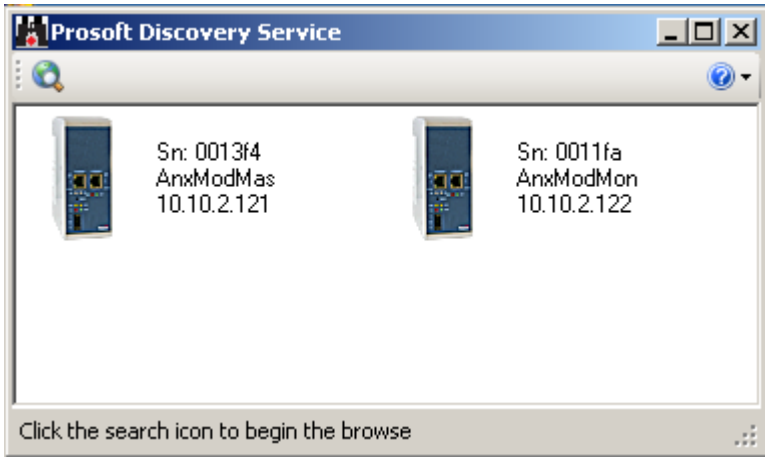
Prosoft Discovery Service

Prosoft Discovery Service (PDS) is a free Windows application available from Prosoft's web page:

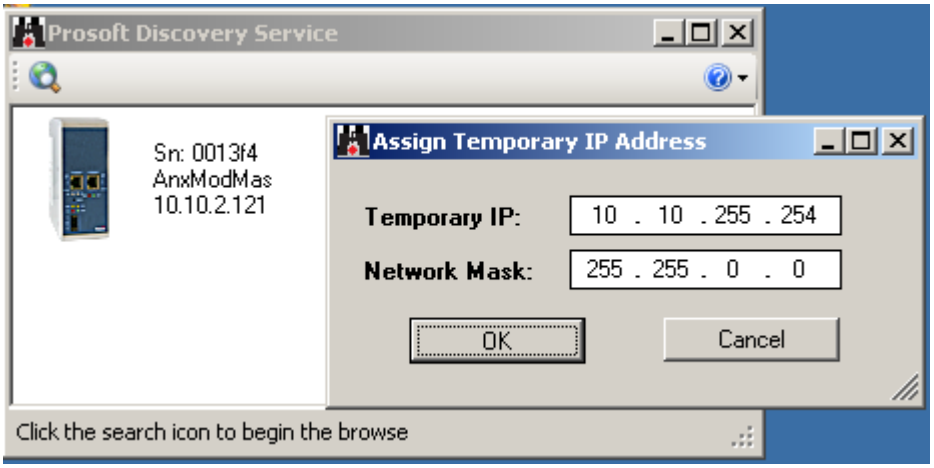
https://www.prosoft-technology.com/Products/ProSoft-Software/ProSoft-Discovery-Service

With the AN-X3 module connected to Ethernet and powered up, run PDS.

It should find any AN-X modules on the network.



Right click on the module icon and choose "Assign Temporary IP".



Generally you can just use the default PDS Temporary IP.

Select OK, then use the Temporary IP address in your web browser to access the module and configure a permanent IP address.

Link-Local IP Configuration

** Many computers do not allow access to link-local addresses by default.

If you are using link-local IP addresses to configure multiple AN-X3 modules, connect and configure one at a time, since initially they will all be set to the same link-local IP address.

Enter the AN-X3's link-local IP address (169.254.42.84) in your web browser.

TIP The AN-X3 must be on the same subnet as the computer to use the link-local IP address. It cannot be connected through a router.

If the AN-X3's web page does not load, it's likely you computer is not configured to allow access to link-local IP addresses.

You can add a link-local route to your computer or use Prosoft Discovery Service or remove the microSD and edit Config.txt.

microSD Config.txt

The microSD card contains a text configuration file named Config.txt.

Config.txt contains the IP configuration and the name of the firmware file to load.

When you perform the *Administration/AN-X Configuration* command from the web interface, it writes the results to config.txt.

Each line consists of a keyword followed by a colon and then a value.

Example:

```
IP: 192.168.1.12
```

Anything after a semicolon on a line is treated as a comment.

Keyword	Possible Values
IP	LOCAL DHCP static IP address
Netmask	Ethernet netmask, used only if IP is a static IP address
DefGtwy	default gateway, used only if IP is a static IP address
Hostname	Ethernet host name, from 1 to 30 characters
Firmware	Firmware file to run at startup, must be present on microSD card

If you edit the file and AN-X3 finds an error during startup, it flashes an error code on the SYS (or MS) LED, see page 46.

Example config.txt files

Example: DHCP

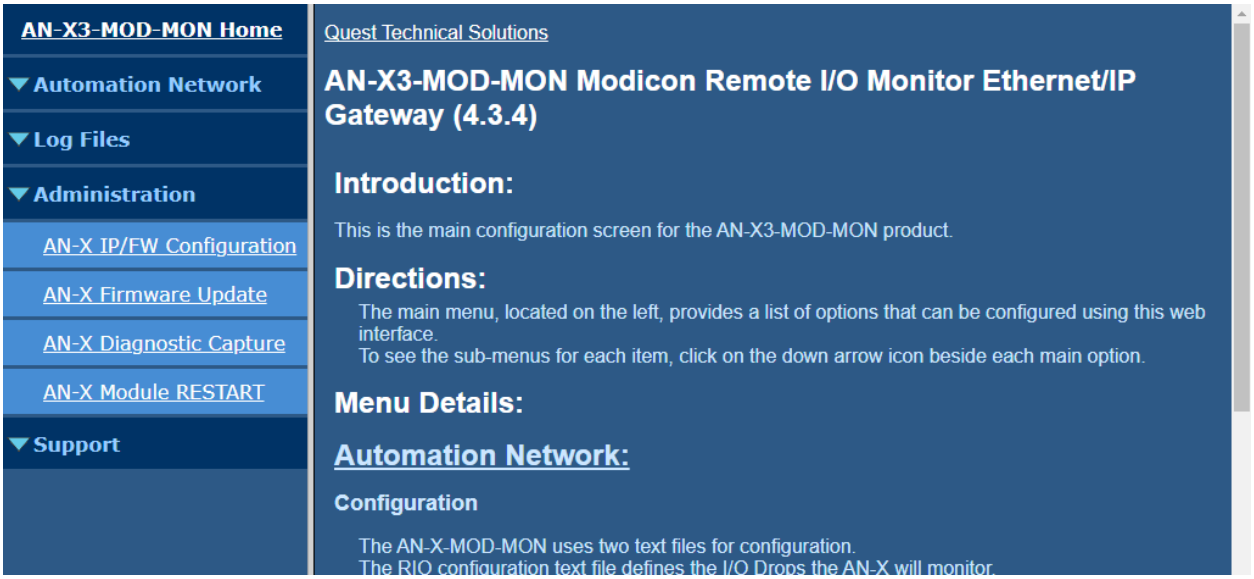
```
IP: DHCP
Hostname: AnxModMon
Firmware: AN-X3-MOD-MON
```

Example: static IP address

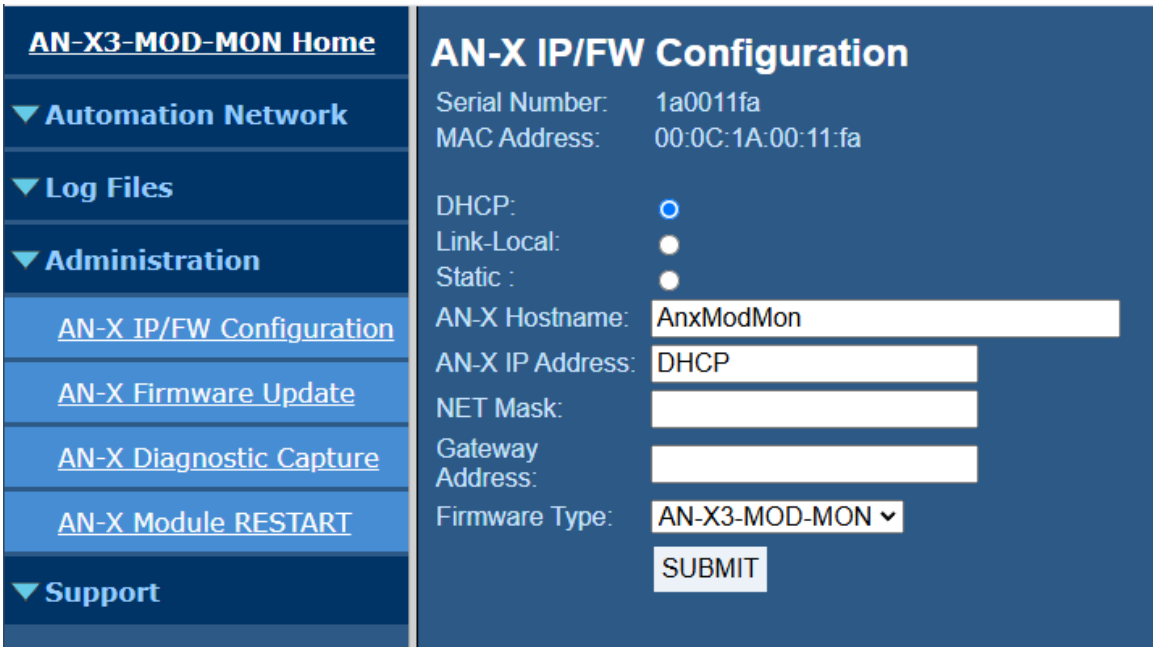
```
IP: 10.10.2.122
NetMask: 255.255.0.0
DefGtwy: 10.10.0.1
HostName: AnxModMon
Firmware: AN-X3-MOD-MON
```

Web Page IP Configuration

Select *Administration/AN-X Configuration*.



The *AN-X Configuration* page appears.



The serial number and MAC address of the AN-X being configured are shown.

Check either DHCP or Static. If Static, fill in the required fields.

DHCP

If the AN-X3 finds a DHCP server on the network, it obtains an IP address and other network parameters (netmask and default gateway) from the DHCP server.

To find the address assigned, you have to look at the DHCP server log.

When you submit the changes, if the AN-X3 does not find a DHCP server, it reverts to the default link local address 169.254.42.84 and repeatedly flashes the SYS (or MS) LED 3 times red followed by a pause.

Static IP Address

If you select static IP address, enter:

- the IP address for the AN-X.
- the netmask for the AN-X
- the default gateway for your network.

You must enter a valid default gateway address even if there is no device at the gateway address on the network.

Hostname

Enter a *Hostname* for the AN-X3. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 30 characters long.

The hostname assigned is also used as the default ClxName when you autoconfigure.

Firmware

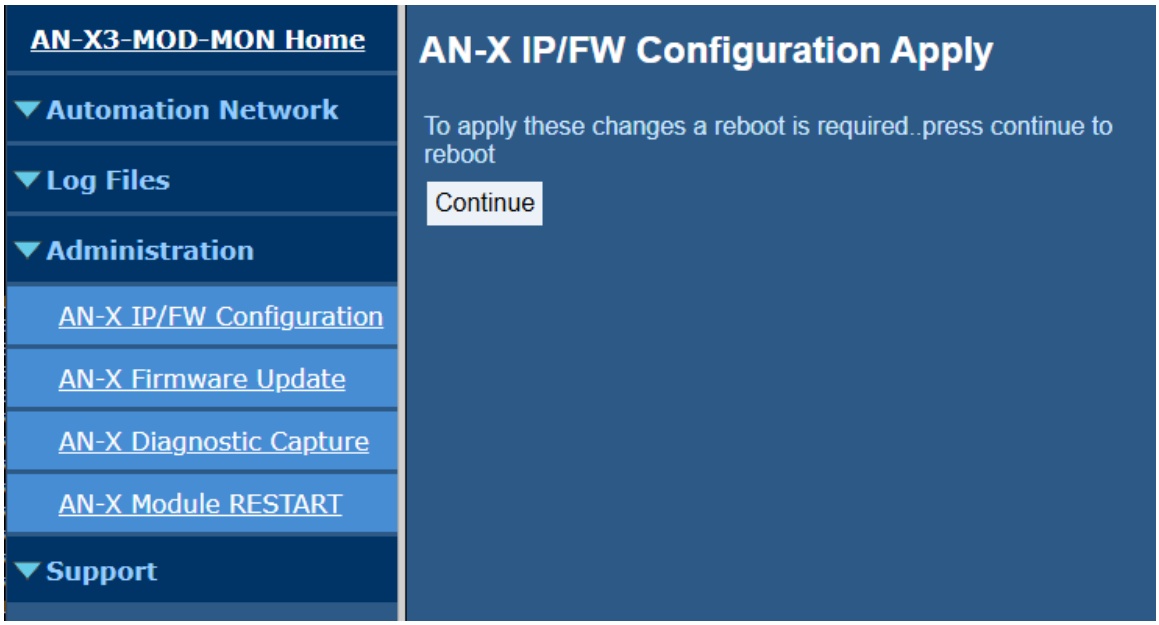
Select the firmware the AN-X is to load from the list provided. AN-X builds the list from the firmware files on the microSD card that are compatible with the AN-X hardware.

The firmware file for Modicon Monitor operation is AN-X3-MOD-MON.v4.x.x.qtf

Submitting the Configuration

Once you have entered all required parameters, click SUBMIT to write the configuration to the file config.txt on the microSD card. The changes do not take effect until the AN-X restarts.

The following page appears when you click SUBMIT.



Click *Continue* to restart the AN-X3, then wait until the AN-X has completely restarted before continuing.

If you have changed the IP address, you will have to enter the new IP address in the browser's address field.

Reconfiguring an AN-X from an Unknown State

It sometimes happens that an AN-X has been previously configured with an IP address that causes it to be inaccessible on the current Ethernet network or the IP address is unknown.

In most cases, the Prosoft Discovery Service will be able to find the AN-X3 module, even if its IP address is not accessible on the computer's subnet.

If not, remove the microSD card and edit the Config.txt file. See pg 15.

Non-Booting AN-X3 or Factory Reinitialize

If the AN-X3 microSD becomes corrupted and the AN-X3 will no longer boot, or if you want to reinitialize the AN-X3 to factory state:

- Download the appropriate factory image file from the QTS web site.

  qtsusa.com/dist/AN-X3 (AN-X3-MOD-uSD.v4.01.01.img.zip for example).

WARNING: This process will erase all AN-X3 configuration files.

If possible, make copies of any configuration files on the microSD you need to preserve before initializing it.

There are many ways to Flash .img.zip files to the microSD. We recommend Balena Etcher. It's free and seems to work very well.

https://www.balena.io/etcher

This factory image will have the LOCAL IP address.

The individual microSD files are available on qtsusa.com/dist/AN-X3 in the appropriate uSD_Files directory.

Configuring the AN-X3-MOD-MON S908 Network

Before you can monitor a Modicon S908 remote I/O network, you must configure the network in the AN-X3-MOD-MON.

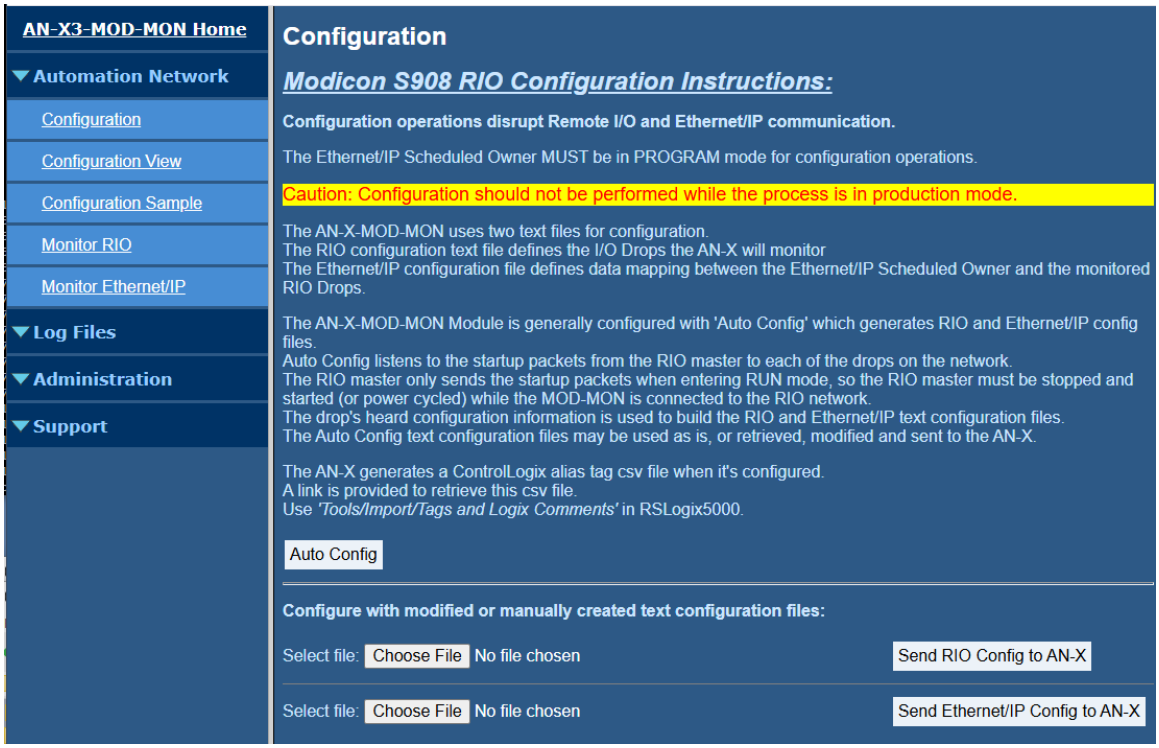
There are two methods of configuring the S908 remote I/O that the AN-X3-MOD-MON is to monitor:

- Auto Config. The AN-X3-MOD-MON reads the network contents by capturing messages from the attached S908 network and builds a configuration file
- Manual configuration. You build the configuration file using a text editor and send it to the AN-X3-MOD-MON. Sample RIO and Ethernet/IP configuration files are provided as a starting point.

You can use Auto Config to build an initial configuration file, transfer the file to your computer, edit the file to add or change features, then perform a manual configuration with the modified file.

Auto Configuration

To perform an Auto Config, in the web interface first select *Automation Network/Configuration*.



Whenever a Modicon master starts up, it sends configuration (traffic cop) information based on its current I/O configuration.

At startup, the Modicon master also sends parameter data to Quantum drops. Typical parameter data includes timeout data, channel configurations for analog modules, and so on. The AN-X3-MOD-MON captures this parameter data and uses it to generate the remote I/O configuration it builds so that it can later be used by the AN-X3-MOD-MAS.

Any previous configuration heard and stored in the AN-X3-MOD-MON is cleared after an Auto Config.

Now stop and start the Modicon master. The AN-X3-MOD-MON captures the configuration traffic sent by the Modicon master on the network.

Click *Auto Config*. The AN-X3-MOD-MON builds a configuration from the configuration heard when the RIO master started.

It also builds an Ethernet/IP configuration that maps the Modicon I/O data to scheduled connections in the ControlLogix.

See page 22 for information on how to transfer the configuration from AN-X and save it to a file.

After the Auto Config is complete the following files are displayed:

- RIO Configuration File
- RIO Configuration Log
- Ethernet/IP Configuration File
- Ethernet/IP Configuration Log
- Auto Configuration Log

Check that all drops and modules have been found.

This can be viewed any time using *Automation Network/Configuration View.*

When Auto Config creates configuration files, it includes comments, based on the information in its module database. If you edit the configuration files, update the comments as well.

See page 22 for information on how to transfer the configuration from AN-X and save it to a file.

Manual Configuration

Manual configuration is useful when the Modicon network is not attached to the AN-X or when you need something other than the default configuration.

Retrieve the sample configuration files and use a text editor to modify them. The file format is described on page 21.

To send the RIO configuration to AN-X:

1. From the AN-X web interface, select *Automation Network/Configuration*.
2. Use the *Choose File* button to select the configuration file
3. Click the *Send RIO Config to AN-X* button to send the file to AN-X.

AN-X parses the file and shows the configuration file sent along with the configuration log.

RIO Configuration File Contents

The RIO configuration file is a text file that contains all the information required for RIO configuration on the AN-X3-MOD-MON.

Fields can be separated by any white space characters such as spaces or tabs, or by commas.

Anything after a semicolon on a line is treated as a comment. Comments can be inserted at the end of a line or on a separate line.

Refer to page 23 for a sample configuration file.

I/O Modules

The remote I/O configuration file defines the contents of the drops on the S908 network.

Begin a drop definition with a line that consists of the keyword Drop, followed by an equals sign and then the drop number, from 1 to 32.

There should be no spaces before or after the equals sign.

Example:

```
Drop=7
```

End the drop definition with a line with just the keyword EndDrop.

Between the Drop and EndDrop lines, enter the rack and slot definitions for the drop.

Begin a rack definition with a line that consists of the keyword Rack, followed by an equals sign and then the rack number, from 1 to 5 for 800 series drops or 1 to 4 for Quantum drops. There should be no spaces before or after the equals sign.

Example:

```
Rack=1
```

After the rack definition, enter the slot definitions. They consist of the keyword Slot, followed by an equals sign and the slot number, a comma, then the keyword Type, an equals sign, and the module type. There should be no spaces before or after the equals sign.

Examples:

```
Slot=4,Type=B804
Slot=7,Type=ACI_030_00
```

For rack 1, the rack definition line can be omitted. It is required for racks 2 to 5. If there is no explicit Rack definition entry, AN-X assumes the following slot definitions are for rack 1.

There is no EndRack command. If there is more than one rack in a drop, just start the new rack with a Rack definition.

To view a list of supported modules, view a configuration file created by Auto Config. AN-X appends a list of supported modules to the end of the file, as comments. You can perform an Auto Config even if there is no network attached to the AN-X. It will generate an empty configuration with the module list appended.

Quantum Parameter Data

Some Quantum modules have additional parameters to define configurable properties of the module.

AN-X captures this parameter data and adds a line after the slot definition that contains the length of the parameter data in words and the parameter data itself.

Example:

```
Slot=6,Type=ACO_020_00
CfgLen=6,0x8001,0x5555,0x0000,0x0000,0x0000,0x0000
```

The leading 0x indicates a hexadecimal number.

Some Quantum discrete output modules, for example, the DRA 840 00, can be configured either to set their outputs to the last value or to set their outputs to a user defined value when they lose communication with the network master. AN-X captures this setting and adds a line after the slot definition that contains the keyword CfgOutLast

Example:

```
Slot=4,Type=DRA_840_00
CfgOutLast
```

Example:

```
Slot=9,Type=DAO_840_00
CfgOutLast
CfgLen=1,0x1191
```

Refer to the document *AN-X3-MOD-Parameters* supplied with the AN-X for detailed information about parameters for specific Quantum modules.

Drop Hold Time

The drop hold time is sent to a drop to tell it how long it should wait before timing out if it hasn't received a packet from the scanner. The units are 100 ms. The value can range from from 1 to 65535. The default is 3 = 300 ms.

Each time the drop gets a packet from the scanner, it sets the timeout to the drop hold time. If the timeout reaches 0, the drop times out.

The drop hold time is what the drop does, not what the scanner does! If the drop goes offline, the scanner sets the bit in the drop error table immediately.

AN-X captures the drop hold time for a drop and adds a line immediately after the drop definition that consists of the keyword HoldTime, an equals sign, and the value.

Example:

```
Drop=1,
HoldTime=3
```

Sending and Retrieving Configurations

To send an RIO configuration file to the AN-X3-MOD-MON, first select *Automation Network/Configuration* in the web interface.

Click the *Choose File* button and select the file, then click the *Send RIO Config to AN-X* button to transfer the configuration.

To retrieve a configuration from the AN-X3-MOD-MON, first select *Automation Network/Configuration View* in the web interface.

Select ‘Retrieve Current RIO Configuration’.

Sample S908 Configuration File

In this example, drop 5 is an 800 series drop and drop 4 is a Quantum drop.

```
;QTS AN-X2-MOD-MON Auto Configuration Utility
;Copyright (c) 2005-2016 Quest Technical Solutions
;Auto Config Mod Mon File - Version 4.3.1

Drop=4,
;HoldTime=3, ; Drop Hold Time (x100ms, Default=3)
,Rack=1
,,Slot=1,Type=CPS_114_xx,;Addr=d4s1,Inp=00,Out=00,AC PS 115/230V 10A,;
InpLen=0,InpCfg=00,InpRef=1,OutLen=0,OutCfg=00,OutRef=1
,,Slot=2,Type=CRA_93x_00,;Addr=d4s2,Inp=00,Out=00,RIO DROP S908,;
InpLen=0,InpCfg=00,InpRef=1,OutLen=0,OutCfg=00,OutRef=1
,,Slot=4,Type=DDI_353_00,;Addr=d4s4,Inp=04,Out=00,DC IN 24V 4x8 Sink,;
InpLen=4,InpCfg=a0,InpRef=1,OutLen=0,OutCfg=00,OutRef=1
,,Slot=5,Type=DDO_353_00,;Addr=d4s5,Inp=00,Out=04,DC OUT 24V 4x8,;
InpLen=0,InpCfg=00,InpRef=1,OutLen=4,OutCfg=a0,OutRef=1
,,,,CfgLen=2,0x0000,0x0000
,,Slot=6,Type=ACI_030_00,;Addr=d4s6,Inp=18,Out=00,AN IN 8CH UNIPOLAR,;
InpLen=18,InpCfg=00,InpRef=1,OutLen=0,OutCfg=00,OutRef=1
,,,,CfgLen=1,0x0001
,,Slot=7,Type=ACO_020_00,;Addr=d4s7,Inp=00,Out=08,AN OUT 4CH CURR,;
InpLen=0,InpCfg=00,InpRef=10,OutLen=8,OutCfg=20,OutRef=1
,,,,CfgLen=6,0x8001,0x5555,0x0000,0x0000,0x0000,0x0000
EndDrop

Drop=5,
;HoldTime=3, ; Drop Hold Time (x100ms, Default=3)
,Rack=1
,,Slot=2,Type=B863,;Addr=d5s2,Inp=08,Out=00,REG 4 CH IN B863,; InpLen=8,OutLen=0
,,Slot=3,Type=B872,;Addr=d5s3,Inp=00,Out=08,ANALG 4 CH O  B872,; InpLen=0,OutLen=8
,,Slot=4,Type=B804,;Addr=d5s4,Inp=00,Out=02,16-OUT B804,; InpLen=0,OutLen=2
EndDrop
```

Exchanging Scheduled Data with a ControlLogix

A Modicon S908 remote I/O network can contain up to 2048 words of input data and 2048 words of output data (32 drops x 64 words per drop).

Each scheduled connection with a ControlLogix contains at most 250 words of input data and 248 words of output data. In order to be able to monitor the largest possible Modicon network, the AN-X3-MOD-MON module supports multiple scheduled connections with a ControlLogix processor over Ethernet.

The AN-X3-MOD-MON module behaves like a 17-slot ControlLogix rack with an ENBT/A module in slot 16 and generic modules in slots 0 to 15.

A ControlLogix processor can open scheduled connections to each of these 16 generic modules. Each scheduled connection consists of up to 248 words of output data from the ControlLogix processor to the AN-X and up to 250 words of input data from the AN-X to the ControlLogix processor. Since all Modicon I/O is mapped to scheduled input data, you usually set the output size of the scheduled connections to the minimum allowed value, 1.

Each connection can have its own RPI, up to 750 ms.

In general, you should try to keep the number of connections as small as possible. There is significant overhead in opening and maintaining each connection.

You map the inputs and outputs for the Modicon I/O modules on the S908 network to input data in these scheduled connections. AN-X can create the mappings automatically or you can create a mapping configuration file manually.

You can also have AN-X create the mapping file automatically, then edit the file to better suit your application. For example, in order to make the most efficient use of the available Ethernet bandwidth, you can organize the data so that items that update quickly are mapped to connections with short RPIs and items that are less time critical are mapped to connections with longer RPIs.

In addition, the AN-X module has diagnostic data that can be mapped to ControlLogix scheduled input data.

The mapping file can also contain options that apply to the entire configuration.

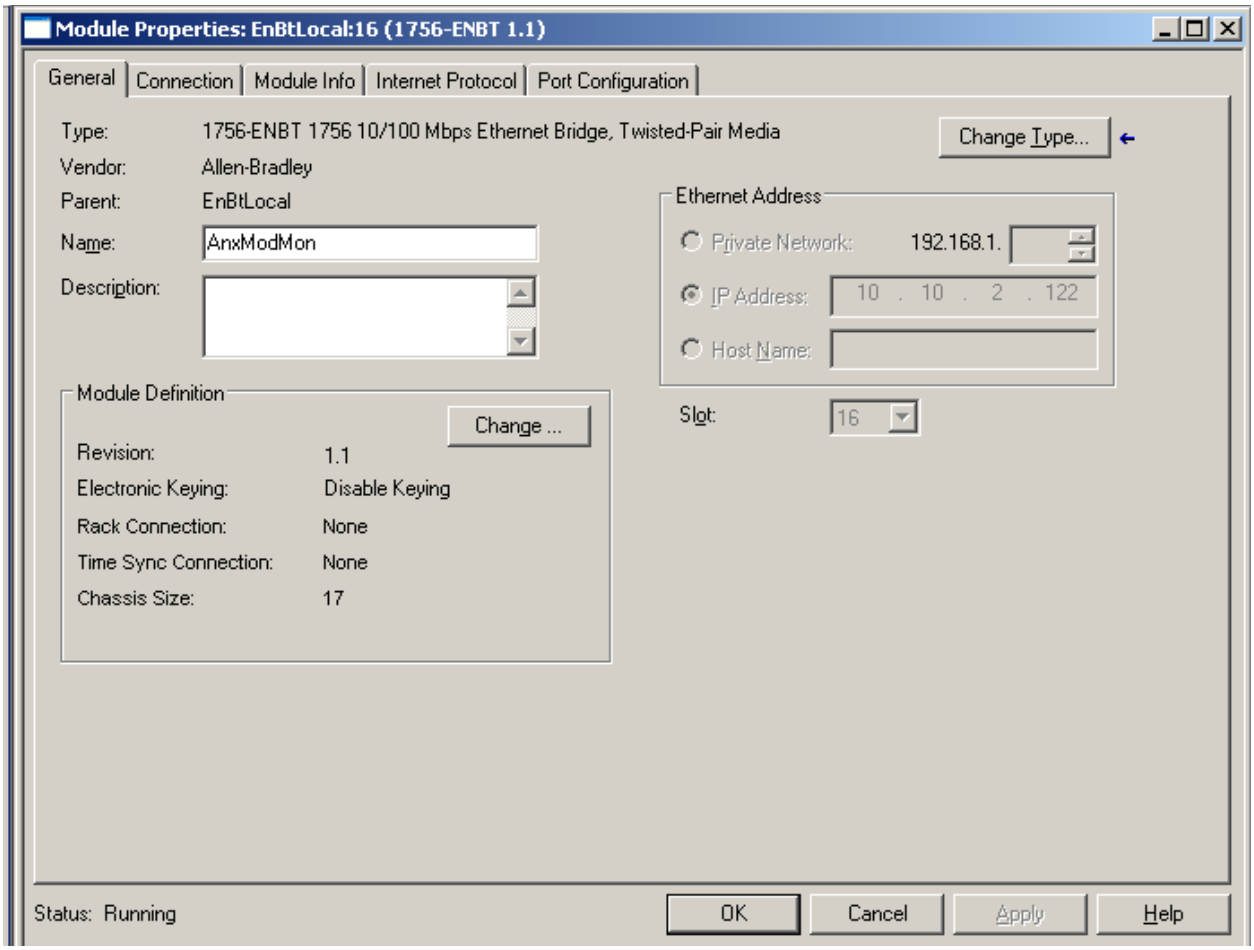
Configuring the AN-X in RSLogix 5000

The AN-X3-MOD-MON emulates a 17-slot 1756 chassis with an ENBT/A in slot 16 and up to 16 generic modules in slots 0 to 15.

Connections to slots 0 to 14 are used for I/O data; the connection to slot 15 is reserved for diagnostic data (see page 29). For large networks, AN-X may assign some of the diagnostic data to connection 14 if the diagnostics overflow connection 15.

To configure the AN-X3-MOD-MON in RSLogix 5000:

1. Right click on the ControlLogix Ethernet bridge module that will be communicating with the AN-X and select *Add Module*. Add a 1756-ENBT/A module.



Enter the *Name*. Use the host name you assigned to AN-X when you configured its IP properties. (see page 17)

Set the *Revision* to 1.

Set *Electronic Keying* to *Disable Keying*.

Set the *Rack Connection* to None.

Set the *Time Sync Connection* to None.

Set the chassis size to 17.

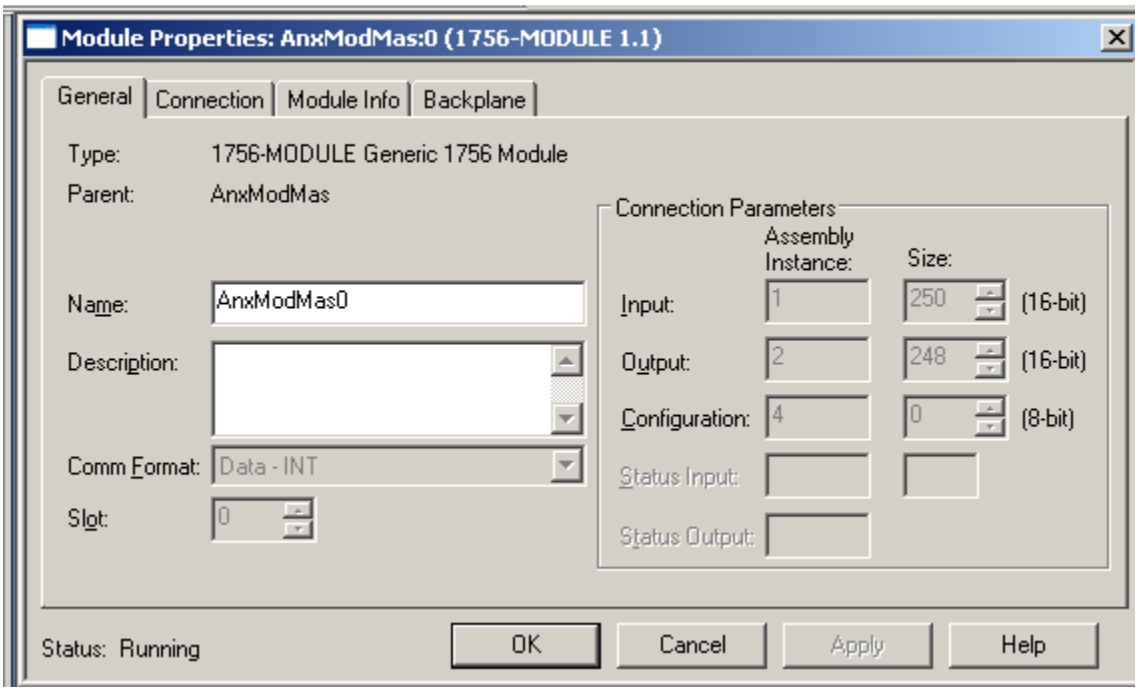
Set the Slot to 16.

Set the IP address to match the AN-X module.

Record the *Name* as it is used to create aliases to access the data.

Click OK to accept the module.

2. Add Generic modules for each required connection, usually at least slot 0 for data and slot 15 for diagnostics. Use *Automation Network/View Active Configuration* in the web interface to determine which connections are in use. In RSLogix 5000, right click on the backplane and select *New Module*. From the *Other* category, select 1756-MODULE and click OK.

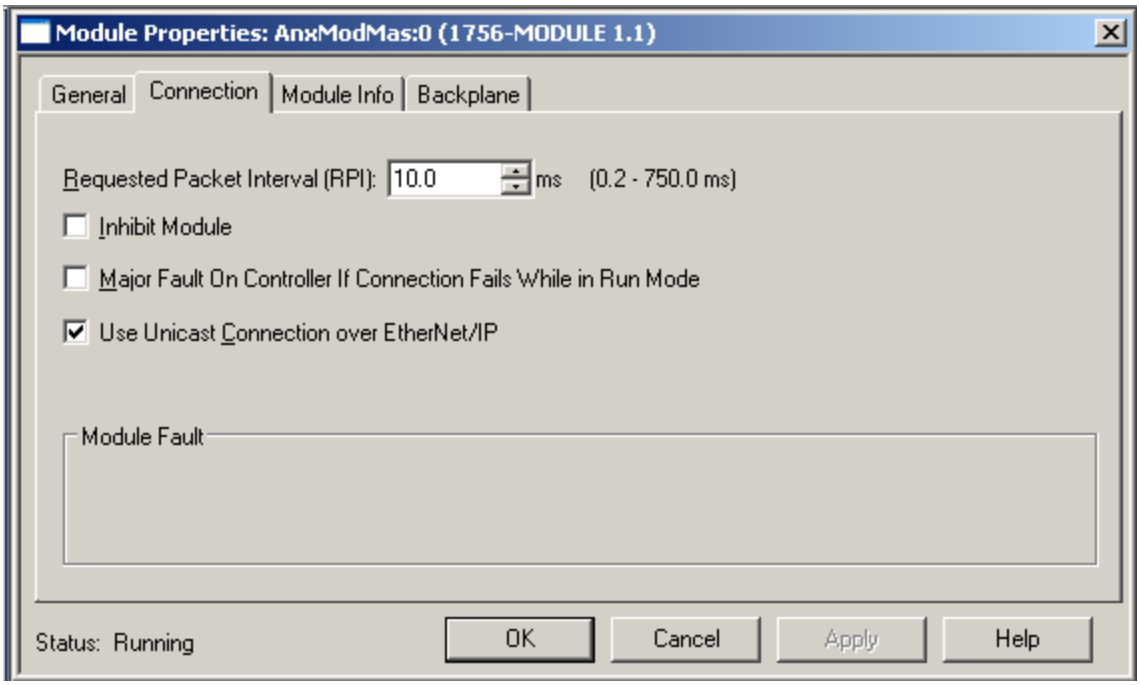


Set the *Name* and *Description* as desired.

Set the *Comm Format* to Data – INT.

Set the other parameters as shown. Set the Slot to 0 for connection 0, 1 for connection 1, and so on.

3. Set the RPI for each connection.



AN-X accepts RPIs from 1 to 750 ms.

Select an RPI appropriate to the remote I/O network scan time and to your application.

TIP The AN-X3-MOD-MON supports Unicast connections from the ControlLogix.

TIP Use the web interface of the ENBT module that connects to the AN-X to view the communication loading of the ENBT module.

Mapping I/O Data

You map Modicon input and output data to the ControlLogix scheduled data with a text file that defines the mappings

The file consists of sections for each scheduled connection. Within each scheduled connection there are definitions for the input and output data for that connection that refer to the Modicon module (drop, rack and slot) where the data is to be found.

When you create a mapping for a module, all the input or output data for the module is mapped; you cannot map individual registers.

AN-X automatically creates a default mapping file when you Auto Configure I/O. See page 19 for details.

Anything after a semicolon on a line is treated as a comment.

ClxName

The ClxName line in the file identifies the AN-X module. AN-X uses this name in the ControlLogix tags it creates for the Modicon data. The ClxName definition consists of a line with the keyword ClxName, followed by a comma and the name you gave the emulated ENBT (see page 31)

Example:

```
ClxName, AnxModMon
```

When AN-X automatically creates a configuration file during Auto Config, it uses the Ethernet host name as the default ClxName.

ClxPrefix

The ClxPrefix is used in the tagnames AN-X creates for import into RSLogix 5000. AN-X prefixes each tagname with the ClxPrefix. The ClxPrefix can be used to distinguish tags for the same Modicon address when the ControlLogix processor has connections to more than one AN-X3-MOD-MON.

For example, if the ControlLogix has connections to two AN-X3-MOD-MON modules, each monitoring a different Modicon network, both networks could contain I/O modules with the same drop and slot address. Using a different ClxPrefix in the configuration files for each AN-X3-MOD-MON makes the tagnames for the two modules distinct.

The ClxPrefix consists of a line with the keyword ClxPrefix, followed by a comma and the prefix text.

Example:

```
ClxPrefix, MOD_
```

Scheduled Connection Data

Each scheduled connection to the AN-X begins with a line that consists of the keyword ClxSlot followed by a comma and then a number from 0 to 15

Example:

```
ClxSlot, 0
```

Each scheduled connection consists of output data and input data.

Scheduled outputs from the ControlLogix processor for that connection begin with a line with just the keyword DataOutput. Since all monitored data is mapped to scheduled inputs, the DataOutput section can be omitted for connections that contain just monitored I/O data, since all monitored inputs and outputs are mapped to ControlLogix inputs.

Scheduled inputs to the ControlLogix processor for that connection begin with a line with just the keyword DataInput.

Data definitions consist of lines that define the mapping between the ControlLogix data table and the Modicon I/O module location (drop, rack and slot).

They consist of lines of the form

CLX_offset (optional), Modicon_Location, tagname

The CLX_offset is the offset into the data for the connection. You can select the offset where the data is located or you can leave it out and AN-X will automatically assign the offset. If the offset is omitted, the line must start with a comma.

The Modicon_location consists of an address in the form dxrysz where x is the drop number, from 1 to 32, y is the rack number, from 1 to 5 for 800 series drops and 1 to 4 for Quantum drops, and s is the slot number, from 1 to 11 for 800 series drops and 1 to 16 for Quantum drops..

If the rack number is 1, the explicit rack number (ry) can be omitted.

Example:

To associate ControlLogix offset 27 with the Modicon module at address drop 4, rack 2, slot 4 and assign it tagname tag1

```
27, d4r2s4, tag1
```

Example:

To map the Modicon module at address drop 14, rack 1, slot 3 to the next available ControlLogix location and assign it tagname tag2

```
,d14r1s3, tag2
```

or, since the rack number is 1, you can also use

```
,d14s3, tag2
```

Swap Option

For some modules, the data is swapped when it should not be. You can add keyword swap to the mapping to change the bit order.

Example:

```
1,d1s2,d01s2_Out,swap
```

If the module has both inputs and outputs, you can apply swap to the input mapping, the output mapping, or both.

Other Mappable Data

In addition to the I/O data, there are other items that can be mapped to connection input data.

For all these items, you can assign an offset for the data within the ControlLogix input data, or you can leave out the offset and let AN-X assign the offset automatically. If you omit the offset, the line must start with a comma.

All items are of the form

offset [optional], ItemKeyword

If you create the ControlLogix configuration automatically when you Auto Configure the S908 network, these items are mapped by default to ClxSlot 15 and below.

TIP If you map the diagnostic data to a separate connection, use a long RPI to reduce the Ethernet traffic, since the diagnostics do not need to be updated as frequently as I/O data.

Diagnostic Counters

The AN-X3-MOD-MON maintains the following diagnostic counters.

Offset	Description
0	Received frames with good status
1	Input frame length mismatch
2	Output frame length mismatch
3	Received frame drop number mismatch
4	Received frames with a noise error
5	Timeout errors
6	Received frames with a CRC error
7	Received frames too long
8	Received frames with an abort error
9	Received frames too short
10	Error mask for protocol errors
11	Protocol error mask

To map the diagnostic counters, include a line with the keyword DiagCtrs in the input section of a connection. This maps all the diagnostic counters; they cannot be mapped individually.

If you omit the offset, the line must start with a comma.

Examples:

```
,DiagCtrs
10, DiagCtrs ; offset 10
```

To clear the diagnostic counters set bit 0 in word 0 of the output data for connection 15. This clears the diagnostic counters and the connection statistics.

You can also clear the diagnostic counters and connection statistics separately from the web interface.

Drop Error Table

The drop error table consists of 2 16-bit words, one bit per drop. Bit 0 of the first word corresponds to drop 1, bit 1 corresponds to drop 2, and so on.

If a configured drop is in error, the bit is 1. If a configured drop is responding correctly, the bit is 0. The bit is 0 for an unconfigured drop.

To map the drop error table, include a line with the keyword DropErr.

If you omit the offset, the line must start with a comma.

Examples:

```
,DropErr
10, DropErr ; offset 10
```

TIP

Map the drop error table to the first two words of input data of each connection. If the connection to the AN-X module is lost, the ControlLogix sets the first 2 words of the connection to FFFF hexadecimal. If your program is monitoring the drop error table, it will see the error bit as set.

Module Health Bits

Each Modicon drop returns 5 words of module health data. Each word corresponds to a rack – the first word corresponds to rack 1, the second corresponds to rack 2, and so on. Bits in the word correspond to a slot.

The bit is 1 for a correctly functioning module and 0 otherwise.

To map the health bits for a given drop, include a line with the keyword ModnHlth, where n is the drop number, from 1 to 32, in the input section of a connection.

If you omit the offset, the line must start with a comma.

Example: To map the health bits for drop 2

```
, Mod2Hlth
20, Mod2Hlth ; offset 20
```

Note: the module health bits do not update if the drop is offline or if the connection to the AN-X module is lost.

Quantum Module Status Data

Quantum modules each return a byte of module status data. Refer to the documentation for each module for details on what the module status contains for a specific module.

There are 8 words of module status data for each rack, up to 32 words for each drop. The status byte for slot 1 is found in the low byte of the first word, the status byte for slot 1 is found in the high byte of the first word, and so on.

The table shows the locations of the Quantum module status byte for each possible location. For example, the byte for rack 3 slot 7 is found at offset 19, low byte.

Rack	Location																
Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	0L	0H	1L	1H	2L	2H	3L	3H	4L	4H	5L	5H	6L	6H	7L	7H	Offset
2	8L	8H	9L	9H	10L	10H	11L	11H	12L	12H	13L	13H	14L	14H	15L	15H	Offset
3	16L	16H	17L	17H	18L	18H	19L	19H	20L	20H	21L	21H	22L	22H	23L	23H	Offset
4	24L	24H	25L	25H	26L	26H	27L	27H	28L	28H	29L	29H	30L	30H	31L	31H	Offset

To map the module status data for a given Quantum drop, include a line with the keyword dnModSts, where n is the drop number, from 1 to 32, and the length of the module status data, in 16-bit words, in the input section of a connection.

The length must be large enough to include all modules in the configuration. For example, if the last module is in rack 1 slot 3, the size must be at least 2.

If the length is omitted, AN-X uses a default length of 10. If a length of 10 is not large enough to include all modules in the drop, AN-X generates an error when you download the configuration to the AN-X.

If you omit the offset, the line must start with a comma.

Examples:

```
,d4ModSts,17
30, d4ModSts ; offset 30
```

Connection Statistics

The module maintains statistics for each exclusive owner scheduled connection. In the following table, O represents the connection originator (ControlLogix) and T represents the connection target (AN-X).

There are 10 words of connection statistics data for each connection, of which three are used.

Offset	Description
0	Average update time, average of last 32 updates
1	Reserved
2	Minimum update time since last reset of statistics
3	Reserved
4	Maximum update time since last reset of statistics
5	Reserved
6	Reserved
7	Reserved
8	Reserved
9	Reserved

The units for the times are 0.1 milliseconds. A value of 87 means 8.7 ms.

To map the statistics for a given connection, include a line with the keyword ConnStatsn, where n is the connection number, from 0 to 15, in the input section of a connection.

If you omit the offset, the line must start with a comma.

Examples:

```
,ConnStats2
40, ConnStats2 ; offset 40
```

To clear the connection statistics, set bit 0 in word 0 of the output data for connection 15. This clears the diagnostic counters and the connection statistics.

You can also clear the diagnostic counters and connection statistics separately from the web interface.

Sending and Retrieving ControlLogix Configurations

To transfer a ControlLogix configuration file to the AN-X3-MOD-MON, first select *Automation Network/Configuration* in the web interface.

Click the *Choose File* button, select the file, then click the *Send Ethernet/IP Config to AN-X* button to transfer the configuration.

To transfer a configuration from the AN-X3-MOD-MON, first select *Automation Network/ Configuration View* in the web interface.

Select 'Retrieve Current Ethernet/IP Configuration'.

Sample Ethernet Configuration File

The following is a file generated by AN-X during an Auto Config.

```
;QTS AN-X2-MOD-MON Auto Configuration Utility
;Copyright (c) 2005-2016 Quest Technical Solutions
;Auto Config Ethernet/IP File - Version 4.3.1

ClxName,AnxModMon
ClxPrefix,MOD_
ClxPrefixOut,MOD_MONOUT_

; ---- Modicon Inputs ----

ClxSlot,0

DataInput   ; Inputs to ControlLogix
  0,DropErr
  2,d4s4_Inp,d04s4_Inp,; Len= 2 DDI_353_00 DC IN 24V 4x8 Sink
  4,d4s6_Inp,d04s6_Inp,; Len= 9 ACI_030_00 AN IN 8CH UNIPOLAR
 13,d5s2_Inp,d05s2_Inp,; Len= 4 B863 REG 4 CH IN B863


; ---- Modicon Monitored Outputs ----
 17,d4s5_Out,d04s5_Out,; Len= 2 DDO_353_00 DC OUT 24V 4x8
 19,d4s7_Out,d04s7_Out,; Len= 4 ACO_020_00 AN OUT 4CH CURR
 23,d5s3_Out,d05s3_Out,; Len= 4 B872 ANALG 4 CH O  B872
 27,d5s4_Out,d05s4_Out,; Len= 1 B804 16-OUT B804

;The following lines map Diagnostics into ClxSlot 15

ClxSlot,15

DataOutput
  0,DiagCtl   ; Len=1 Set Bit 0 to clear diagnostic counters


DataInput  ; Inputs to ControlLogix
  0,DiagCtrs, ; Len=15
 15,d4ModHlth,; Len=5
 20,d5ModHlth,; Len=5

;Module Status Byte for Quantum Only
 25,d4ModSts,  4

;ControlLogix Connection Statistics
 30,ConnStats0, ; Len=10
```

Monitoring I/O

ControlLogix Alias Tags

AN-X uses the S908 remote I/O and ControlLogix configurations to create alias tags that can be imported into RSLogix 5000. Use these tags in your RSLogix 5000 program to access the data on the AN-X. Even if the ControlLogix address for a Modicon address changes, all you have to do is re-import the tags to point to the current I/O data.

WARNING! If you change the Modicon I/O or ControlLogix configuration, re-import tags so that the ControlLogix processor uses the correct addresses.

In the web interface, select *Automation Network/Configuration View*.

To retrieve the alias files, click 'Logix Aliases'.

Ethernet/IP Configuration File:

```
;QTS AN-X2-MOD-MON Auto Configuration Utility
;Copyright (c) 2005-2016 Quest Technical Solutions
;Auto Config Ethernet/IP File - Version 4.3.1

ClxName,AnxModMon
ClxPrefix,MOD_
ClxPrefixOut,MOD_MONOUT_


; ---- Modicon Inputs ----

ClxSlot,0

DataInput   ; Inputs to ControlLogix
  0,DropErr
  2,d4s4_Inp,d04s4_Inp,; Len= 2 DDI_353_00 DC IN 24V 4x8 Sink
  4,d4s6_Inp,d04s6_Inp,; Len= 9 ACI_030_00 AN IN 8CH UNIPOLAR
 13,d5s2_Inp,d05s2_Inp,; Len= 4 B863 REG 4 CH IN B863


; ---- Modicon Monitored Outputs ----
 17,d4s5_Out,d04s5_Out,; Len= 2 DDO_353_00 DC OUT 24V 4x8
 19,d4s7_Out,d04s7_Out,; Len= 4 ACO_020_00 AN OUT 4CH CURR
 23,d5s3_Out,d05s3_Out,; Len= 4 B872 ANALG 4 CH O  B872
 27,d5s4_Out,d05s4_Out,; Len= 1 B804 16-OUT B804


;The following lines map Diagnostics into ClxSlot 15

ClxSlot,15
```

Retrieve Current Ethernet/IP Configuration Logix Aliases

Importing Tags in RSLogix 5000

To import the tags into RSLogix 5000, you must be offline. Select *Tools/Import Tags* and import the tag file.

Tag Format

AN-X builds the tags from the ControlLogix configuration. Each tag is a ControlLogix alias. For example,

```
ALIAS,"","MOD_d01s5_Inp","B805","","AnxModMon:0:I.Data[2]"
```

In this example, the tag name is MOD_d01s5_Inp. The name is made up of the ClxPrefix (MOD_) and the tagname (d01s5_Inp) from the ControlLogix configuration file.

If there is more than one word of data for the module, AN-X appends an underscore and a number to the tagname, for example

```
ALIAS,"","MOD_d02s3_Inp_0","DDI_353_00","","AnxModMon:0:I.Data[7]"
ALIAS,"","MOD_d02s3_Inp_1","DDI_353_00","","AnxModMon:0:I.Data[8]"
```

For monitored outputs, AN-X generates two sets of tags, one for the actual monitored output data (which is an input to ControlLigx), and another that points to a ControlLogix internal array that holds the output value generated by the ControlLogix program while in monitor mode.

For example,

```
ALIAS,"","MOD_MONOUT_d01s4_Out","B804","","AnxModMon:0:I.Data[18]"
ALIAS,"","MOD_d01s4_Out","16-OUT B804","","AnxModMonTempOut[0,18]"
```

The tagname for the monitored output data is MOD_MONOUT_d01s4_Out, which is made up of the ClxPrefixOut (MOD_MONOUT_) and the tagname (d01s4_Out) from the ControlLogix configuration file.

The internal array tagname is made up of the ClxPrefix (MOD_) and the tagname (`MOD_d01s4_Out`) from the ControlLogix configuration file. This is the same as what is generated when in master mode.

The internal array name is made up of the ClxName (AnxModMon) from the ControlLogix configuration file appended with TempOut.

The user should create this array of INTs, with two dimensions.

The first dimension matches the number of ClxSlot connections that are configured on the AN-X.

The second dimension matches the size of the ClxSlot output data, usually 248 INTs.

The AN-X creates the output alias, for monitor mode, to the same location in the internal TempOut array (`AnxModMonTempOut[0,18]` in the example) as the Monitored output in the IO tag (`AnxModMon:0:I.Data[18]` in the example).

When checking outputs in monitor mode, the value in the AnxModMonTempOut[clxslot,ofs] in the CLX program generated output, and should match AnxModMon:clxslot:I.Data[ofs].

When switching to master mode, when the master aliases are imported, the output tag (`MOD_d01s4_Out` in the example) will be overwritten and point to AnxModMas:clxslot:O.Data[ofs], which goes to the AN-X and the real output.

Using the Ethernet/IP Log

If there are problems with scheduled connections to the AN-X, use the Ethernet/IP log to identify the cause.

From the web interface, select *Log Files/Ethernet/IP Log* to display the log. Look for error messages that describe in detail the cause of any problem with the current configuration.

Converting an Application to AN-X3-MOD-MAS

After you have used the AN-X3-MOD-MON to monitor an existing application, the next step is to replace the AN-X3-MOD-MON with the AN-X3-MOD-MAS.

It is recommended that you change the IP address of the AN-X when you convert it from monitor to master operation.

To convert the module, select the AN-X3-MOD-MAS firmware in the web interface and restart the AN-X.

The remote I/O configuration file used to configure the monitor should not require any changes to be used with the master.

However the Ethernet/IP file will be different. In the AN-X3-MOD-MON, both input and output Modicon data is mapped to ControlLogix inputs. In the AN-X3-MOD-MAS, Modicon output data is mapped to ControlLogix output data.

The recommended procedure is to Auto Configure the AN-X3-MOD-MAS module to create both remote I/O and Ethernet/IP files, then load the remote I/O configuration file from the monitor. That way, the remote I/O configuration will have the same parameter data as the original control system that the AN-X3-MOD-MON module monitored.

Refer to the application note *Using AN-X3-MOD-MON to upgrade a control system* on qtsusa.com/dist for detailed instructions.

Using the Web Interface

The AN-X module contains a webserver capable of communicating with standard web browsers such as Firefox or Chrome.

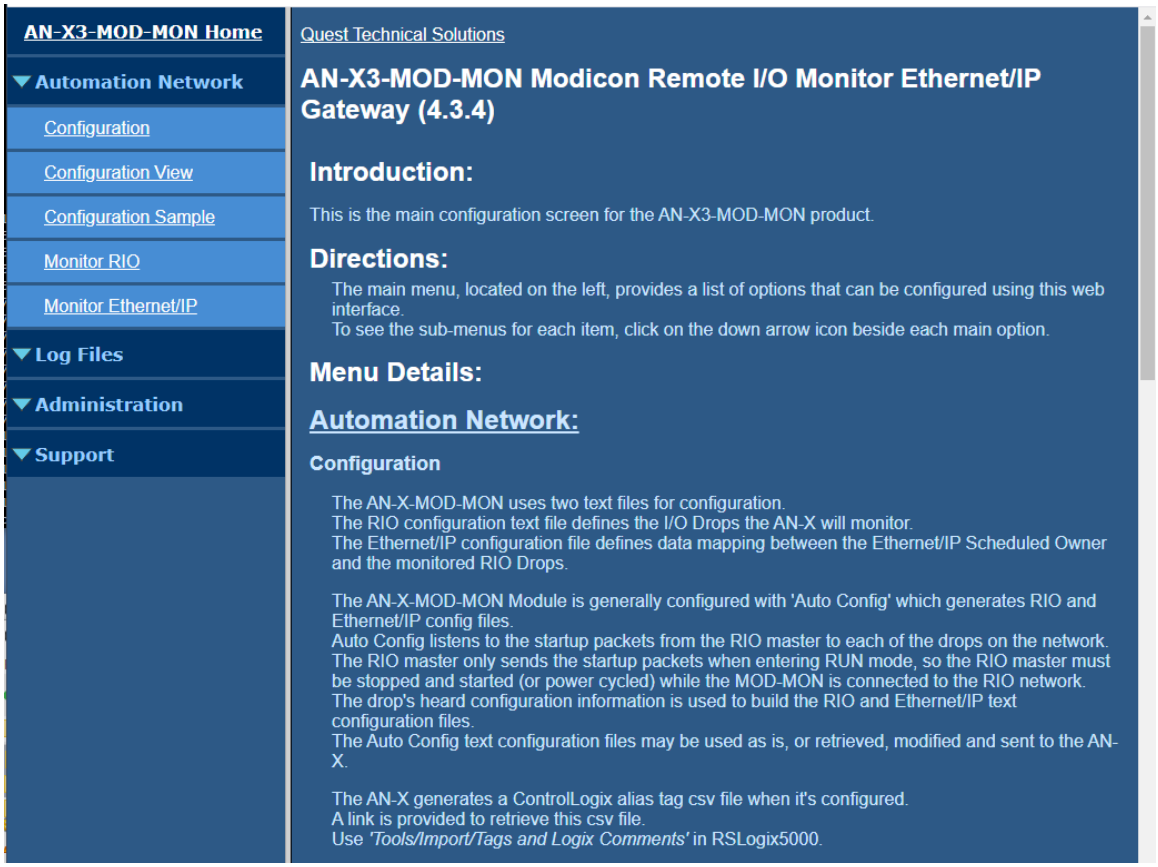
Use the web interface to:

- Configure the AN-X, either by Auto Config or manually
- Transfer configuration files to and from the AN-X
- View the results of the configuration
- Monitor I/O and Ethernet diagnostic counters
- Configure the Ethernet settings and select the firmware to run
- Archive the AN-X configuration
- Update the AN-X firmware
- Restart the AN-X
- View AN-X logs

It also contains contact information for support.

To use the web interface, you must know the IP address of the AN-X.

To access the web interface, start your web browser and type the AN-X IP address where you normally enter web addresses in the browser.



The left pane contains commands. Click on the arrows at the left of the main headings to expand or contract the sections.

The contents of the right pane depend on the current command being executed.

TIP

Browsers may display cached data rather than rereading data that has changed on the AN-X.

If you run into a problem where data appears not to have changed, flush the cache in the browser or run the browser in the mode where it doesn't cache data (incognito in Chrome, Private browsing in Firefox and Safari, etc.)

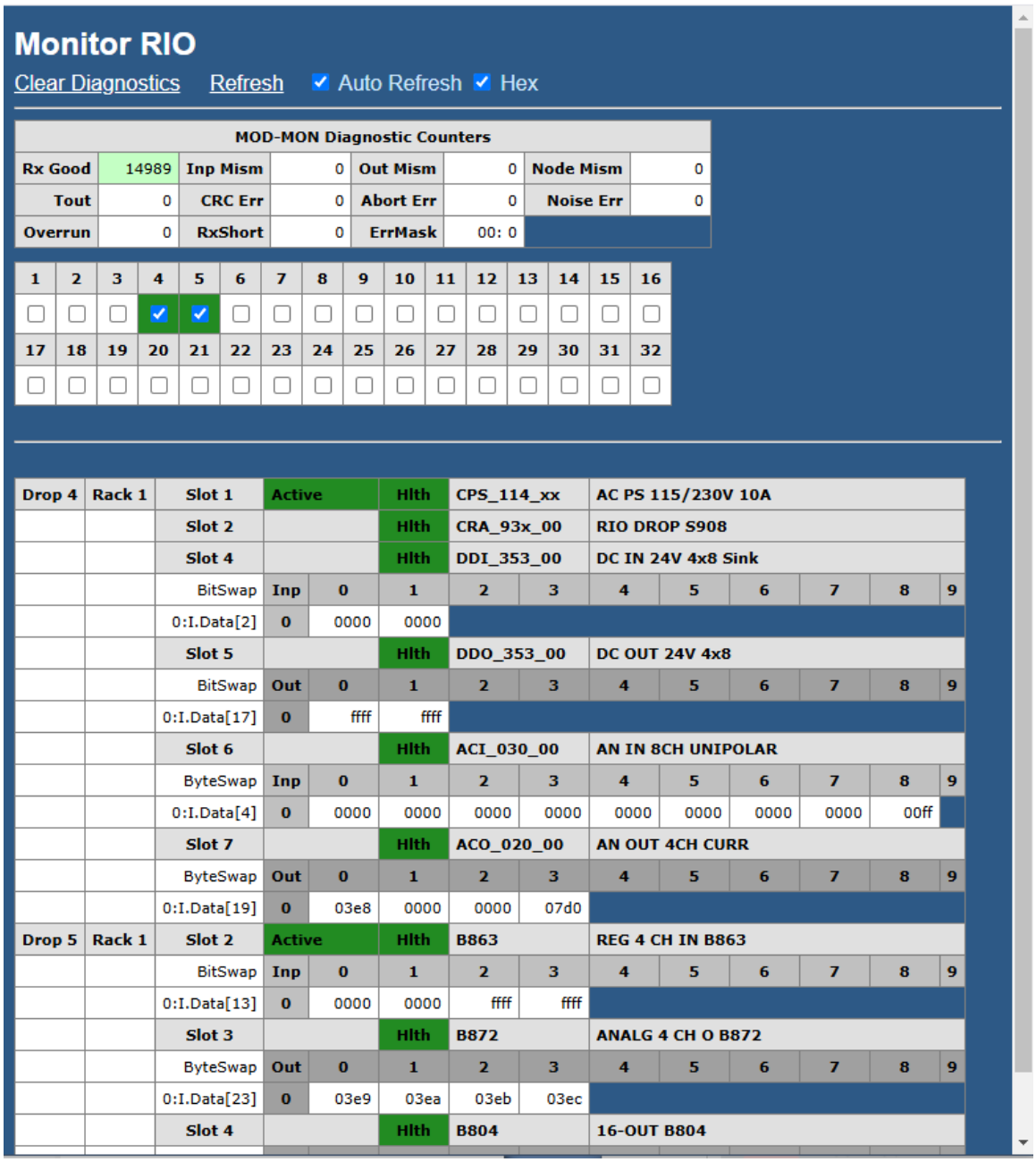
In addition, in most browsers you can reload a page while overriding the cache. For example, you can use Ctrl-F5 in Firefox or Internet Explorer, or Shift-F5 in Google Chrome.

Automation Network

The Automation Network Configuration functions are described previously in this document.

Monitor RIO

Select *Automation Network/Monitor RIO* to display RIO scanner status, diagnostic counters and I/O data.



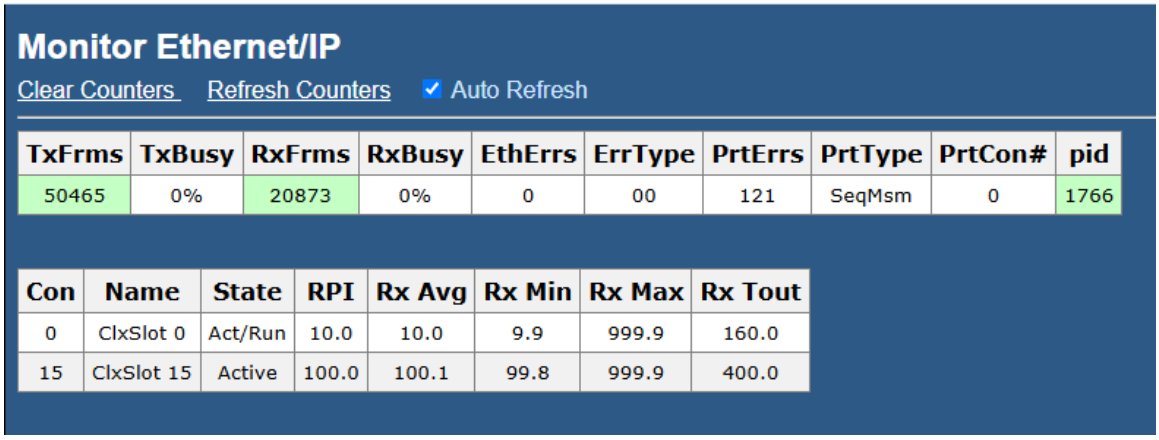
Checkboxes may be used to choose which drops to display.

S908 Remote I/O Diagnostic Counters

Counter	Description
Rx Good	Count of good received packets
Inp Mism	Input data received but the length didn't match what was expected
Out Mism	Output monitored data received but the length did not match what was expected
Node Mism	Packet received but the drop number did not match what was expected
Tout	Count of times a packet was transmitted to a drop and no reply was received
CRC Err	Count of received packets with CRC errors
Abort Err	Count of received packets with abort errors
Noise Err	Count of received packets with noise errors
Overrun	Count of received packets with overrun errors
RxShort	Count of received packets that were shorter than expected
ErrMask	Right of the colon is the Drop Number of the most recent error Left of the colon shows the protocol error code in hex (useful for technical support)

Monitor Ethernet/IP

Select *Automation Network/Monitor Ethernet/IP* to display Ethernet/IP status and diagnostic counters.



TxFrms	TxBusy	RxFrms	RxBusy	EthErrs	ErrType	PrtErrs	PrtType	PrtCon#	pid
50465	0%	20873	0%	0	00	121	SeqMsm	0	1766

Con	Name	State	RPI	Rx Avg	Rx Min	Rx Max	Rx Tout
0	ClxSlot 0	Act/Run	10.0	10.0	9.9	999.9	160.0
15	ClxSlot 15	Active	100.0	100.1	99.8	999.9	400.0

Ethernet/IP UDP Statistics

The Ethernet/IP Statistics consist of two portions:

- Global counters

- Statistics for each connection

The Global Counters consist of:

Counter	Description
TxFrms	Count of transmitted frames
TxBusy	Percentage of time the transmitter is not idle
RxFrms	Count of received frames
RxBusy	Percentage of time the receiver is not idle
EthErrs	Count of Ethernet errors
EthType	Type of last error
PrtErrs	Count of Ethernet protocol errors
PrtType	Type of last protocol error
PrtCon#	Connection number of last protocol error

The global counters cannot be cleared.

The Connection Statistics consist of:

Counter	Description
Connection number	0 to 15
Name	Name on Connection
State	Active or Idle
RPI	Requested Packet Interval
Rx Avg	The average of the last 32 update times, in ms.
Rx Min	The minimum update time since the last counter reset, in ms.
Rx Max	The maximum update time since the last counter reset, in ms
Rx Tout	The receive timeout, calculated from the RPI

Log Files

AN-X maintains various logs to record diagnostic and error messages. Use the *Log Files* menu in the web interface to view these logs.

Ethernet/IP Log

The *Ethernet/IP Log* shows messages and errors associated with the Ethernet/IP operation.

System Info Log

The *System Info Log* records informational messages during startup and normal operation.

View All Logs

Use *View All Logs* to list and view all the AN-X logs. To view a log file, click on the file name.

Administration Menu

The Administration Menu is used to set the AN-X IP address and to view and edit files on AN-X.

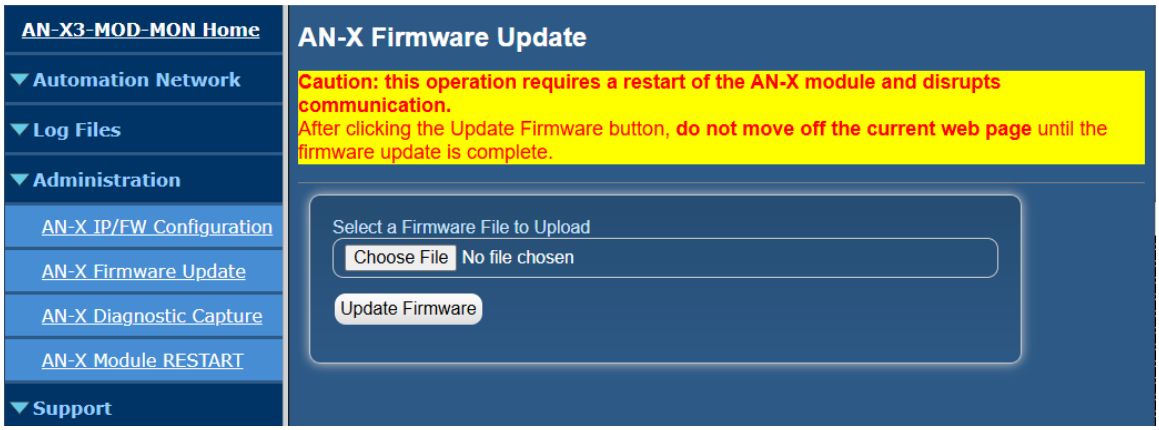
AN-X IP/FW Configuration

See page 16 for details.

AN-X Firmware Update

Use *AN-X Firmware Update* to transfer a firmware file to the microSD card on the AN-X. Firmware files for the AN-X3 have names that begin with AN-X3 and have extension *.qtf.

WARNING! Do not update firmware in the AN-X while applications that use the AN-X are running.



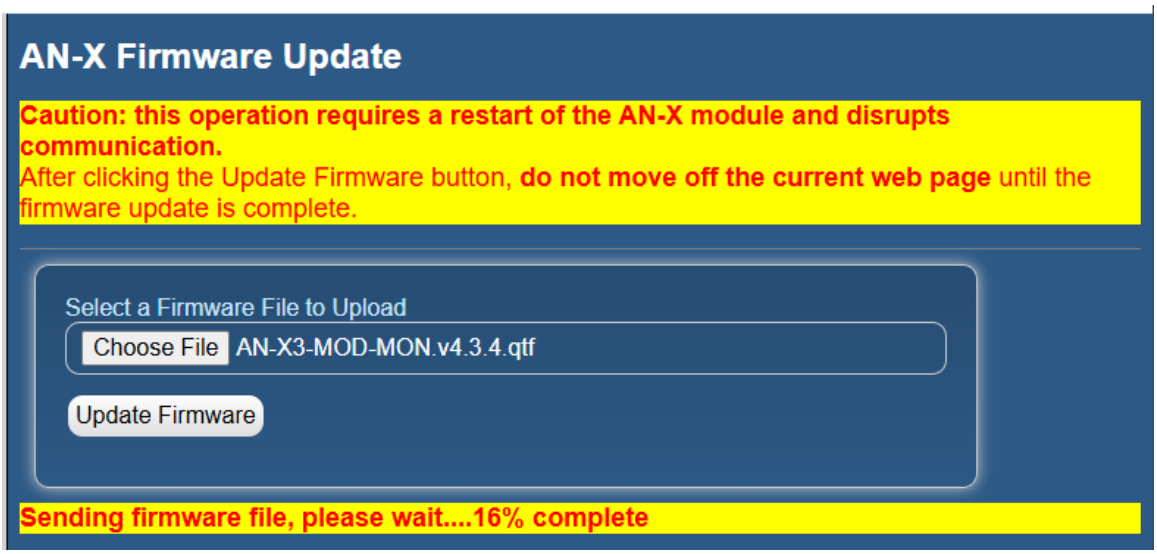
Browse to select the file, then click the *Update Firmware* button to transfer the file.

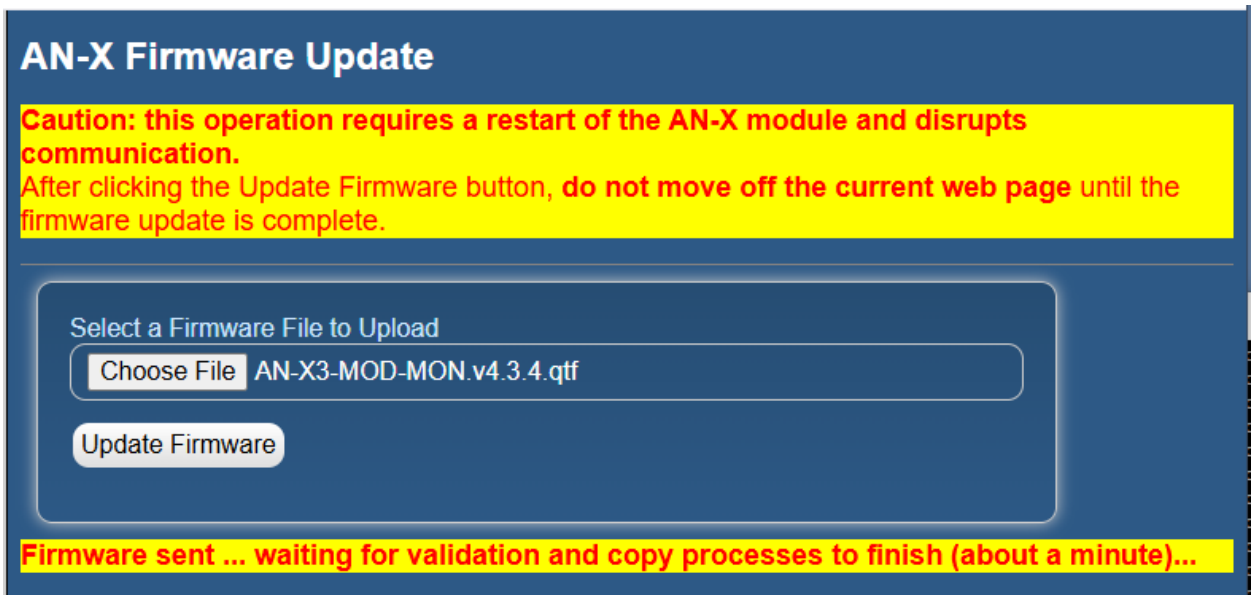
WARNING!

It is essential that you do not disrupt power while updating firmware, especially maintenance firmware, to the AN-X3 or while the AN-X3 is restarting following a firmware update.

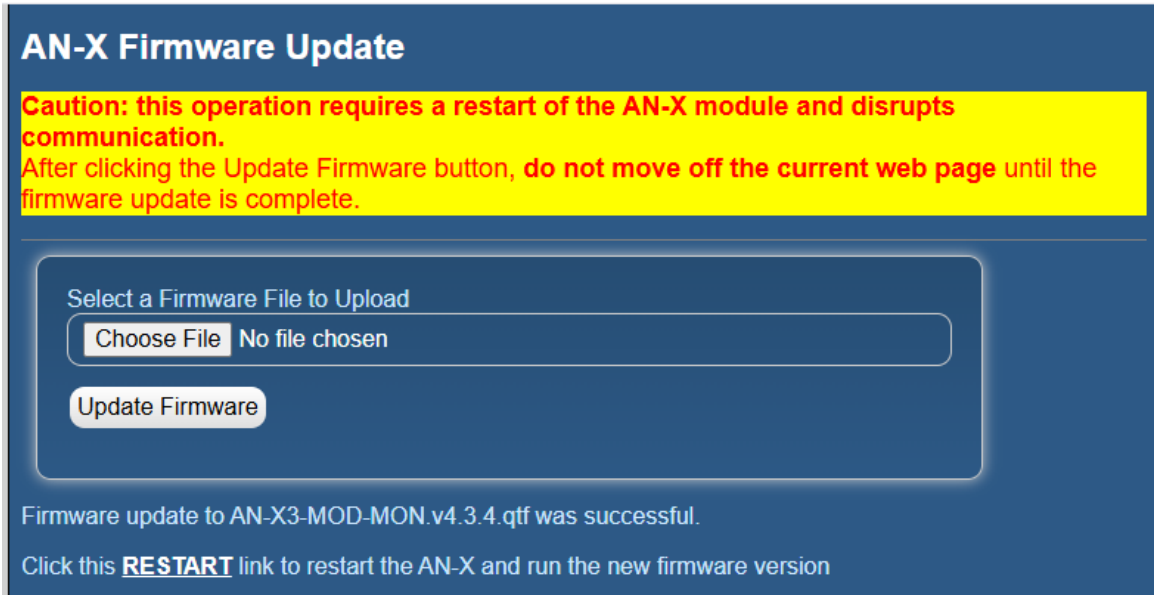
Interrupting power at some points in the update process could render the AN-X inoperative and it will have to be returned to the factory for reinitialization.

AN-X displays progress and status information as the firmware is updated.





When the update is complete, AN-X displays a message that indicates the success or failure of the update.

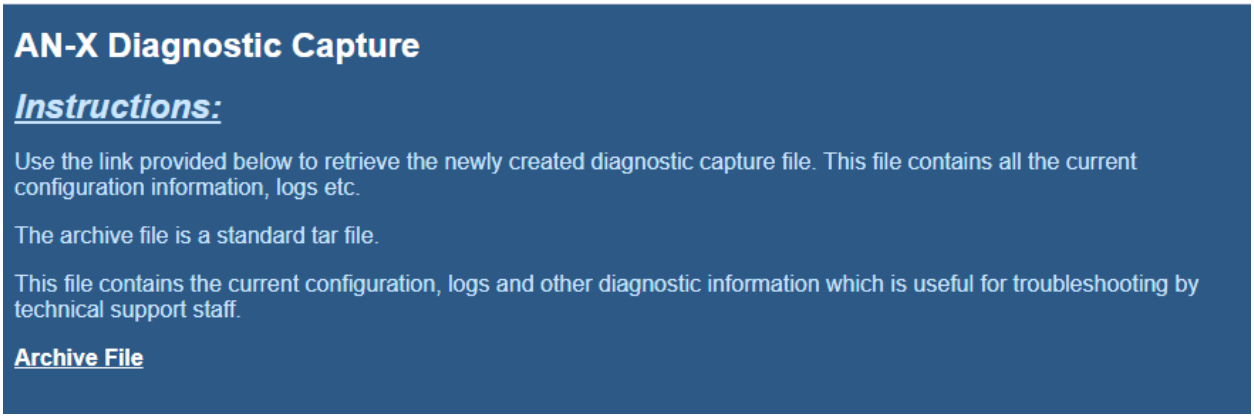


If you have other files to transfer, return to the main page and continue. Otherwise, restart the AN-X in order to run the updated firmware.

Diagnostic Capture

You can archive all the current AN-X configuration files and log files from the web interface. The archive file is a standard tar archive. It intended for technical support only.

Select *Administration/Archive Configuration.*

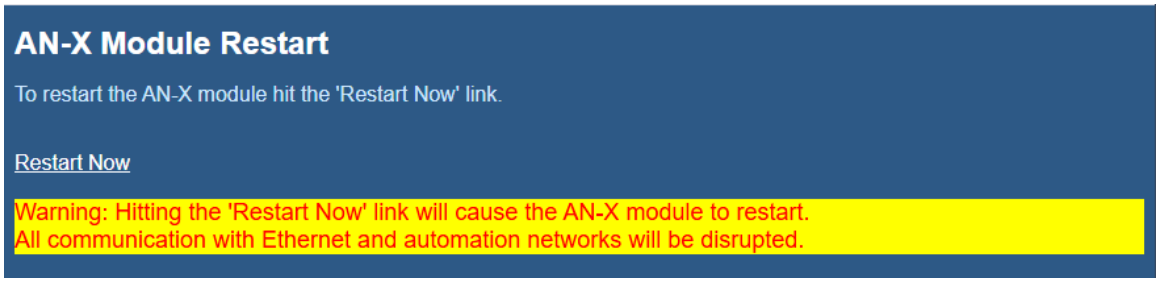


Click the *Archive File* link. There may be a slight delay while AN-X builds the archive file.

Select the destination where the file will be stored and save the file.

AN-X Module Restart

Use the *AN-X Module Restart* command to restart the AN-X module, for example, after changing Ethernet parameters or after updating firmware.



Support Menu

The Support menu contains Contact Information.

Troubleshooting

LEDs

The AN-X3-MOD-MON has LEDs that indicate the state of the Ethernet connection, the overall module state and the connection to the remote I/O network.

Ethernet LEDs

There are two LEDs that indicate the state of the Ethernet connection.

The upper, yellow LED, labeled 100, is on if the link is running at 100 Mbits/second and is off otherwise.

The lower green Link/Act LED is off if the link is inactive and is on if the link is active. If activity is detected, the link blinks at 30 ms intervals and continues blinking as long as activity is present.

If the AN-X3 is not connected to Ethernet, the 10/100 LED is on.

SYS or MS LED

The SYS or MS LED is used by the AN-X operating system and software to indicate the state of operations and errors. Errors or status indication in boot mode cause the LED to flash yellow. Otherwise, the LED flashes red.

The SYS or MS LED should be used in conjunction with the logs to locate the cause of problems.

In the following, red 3 means three red flashes followed by a pause, and so on.

SYS (or MS) LED State	Possible cause
Red 3	DHCP configuration failed
Yellow 2	microSD card not present
Yellow 3	AN-X3 Maintenance firmware file not found on microSD card
Yellow 4	config.txt file not found on microSD card or error parsing file
Yellow 5	Production firmware filename was not specified in config.txt
Yellow 6	AN-X3 production firmware file not found on microSD card
Yellow 7	Production firmware file invalid or error programming to flash
Yellow 8	Daughterboard mismatch
Yellow 9	Error processing option file or file not found
Yellow 10	Option file mismatch
Flashing red/green	Unscheduled messaging, addressing or connection problem
Flashing red/off	Configuration file problem

“Railroading” – SYS (or MS) and NET (or NS) LEDs

AN-X3 alternates (railroads) flashing the SYS (or MS) and NET (or NS) LEDs to indicate its state.

It railroads the LEDs yellow while it is copying new maintenance or production firmware files from the microSD card to flash memory.

It railroads the LEDs green for 20 to 30 seconds as it starts production mode.

MS and NS LEDs: Runtime

IMPORTANT!

There are two possible runtime LED modes.

Standard mode is the new default mode and is compliant with the Ethernet/IP specification.

Debug mode provides more information about the state of the I/O network.

Debug mode was the mode used in earlier versions of the firmware.

To set debug mode, enter a line with just the keyword LedModeDebug in the ControlLogix configuration file.

When you Auto Configure the AN-X, it enables debug mode in the file it creates.

Standard Mode

The MS and NS LEDs are used by the AN-X operating system and software to indicate the state of operations and errors.

In standard mode, the MS and NS LEDs should be used in conjunction with the logs to locate the cause of problems.

Condition	LEDs
All OK	MS Solid Green, NS Solid Green
Missing connections	MS Solid Green, NS Flashing Green
Error event	MS Solid Green, NS Pulses Red
Bad Config	MS Flash Red, NS Flash Green

Debug Mode

SYS or MS LED

The SYS or MS LED is used by the AN-X operating system and software to indicate the state of operations and errors.

The SYS or MS LED should be used in conjunction with the logs to locate the cause of problems.

SYS (or MS) LED State	Possible cause
Flashing red/green	Unscheduled messaging, addressing or connection problem
Flashing red/off	Configuration file problem

NET or NS LED – Network Status

The NET (or NS) LED shows the status of I/O communication.

Color	Meaning
Flashing or solid red	Network error or no frame received in the last second
Green	Good frames being received

Fatal Errors

AN-X3 monitors its operation for “impossible” conditions and generates a fatal error if it detects one. It generates a fatal error code on the SYS (or MS) LED by flashing 8 bits followed by a pause. The least significant bit is first, with green for 1 and red for 0.

If a fatal error occurs, record the SYS or MS LED sequence and contact technical support.

Updating the Firmware

The AN-X3 operating software consists of the maintenance firmware and the runtime firmware.

The maintenance firmware runs at startup. It performs diagnostics, updates any firmware that has been transferred to the AN-X, and starts the runtime firmware.

The firmware files are supplied in files that begin with AN-X3 and have extension *qtf*. They are updated using the web interface. Run the command *Administration/Update AN-X Firmware* and select the file you wish to transfer.

WARNING! Do not update firmware on the AN-X while applications that use the AN-X are running.

The web page displays the update progress at the bottom left of the page.

You must restart the AN-X3 to run the firmware that you transferred.

WARNING!

It is essential that you do not disrupt power while updating firmware, especially maintenance firmware, to the AN-X3 or while the AN-X3 is restarting following a firmware update.

Interrupting power at some points in the update process could render the AN-X inoperative and it would have to be returned to the factory for reinitialization.

The web interface displays the version of the firmware the AN-X3 is running on the home page and on the tab at the top of the page.

You can also update the firmware by copying qtf files to the microSD card from a computer. If you do, make sure that there is only one version of each qtf file on the microSD card, the one you want AN-X to use.

Obtaining the Latest Software

Version numbers and software for the most recent AN-X3 releases are available from the QTS website, qtsusa.com/dist

Specifications

Parameter	Specification
Function	Bridge between Ethernet and Modicon S908Remote I/O network
Maximum Power Consumption	150 mA @ 12 VDC or 75 mA @ 24 VDC
Maximum Power dissipation	1.8W
Environmental Conditions:	
Operational Temperature	0-50°C (32-122°F)
Storage Temperature	–40 to 85°C (–40 to 185°F)
Relative Humidity	5-95% without condensation

Support

How to Contact Us: Sales and Support

Sales and Technical Support for this product are provided by ProSoft Technology. Contact our worldwide Sales or Technical Support teams directly by phone or email:

Asia Pacific

Languages Spoken: Chinese, English

+603.7724.2080, support.AP@prosoft-technology.com

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Languages Spoken: French, English

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+55.11.5083.3776, support.brazil@prosoft-technology.com

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Languages Spoken: Spanish, English

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Warranty

Quest Technical Solutions warrants its products to be free from defects in workmanship or material under normal use and service for three years after date of shipment. Quest Technical Solutions will repair or replace without charge any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by Quest Technical Solutions personnel.

All warranties hereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without Quest Technical Solutions approval or which have been subjected to accident, improper maintenance, installation or application, or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables nor to any damage resulting from battery leakage.

In all cases Quest Technical Solutions' responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this Warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above Quest Technical Solutions disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of Quest Technical Solutions for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the Product.

Revisions

Version	Date	Changes
1.1	Jan 21/24	Initial Release
1.2	Feb 18/25	Fixed Typos and screen captures
1.3	Oct 25/25	Clarified TempOut array definition and use