AN-X2-MOD-MAS
Modicon S908
Remote I/O
Scanner Module

User Manual

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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-X2-MOD-MAS

AN-X2-MOD-MAS Module Overview

The AN-X2-MOD-MAS communications module connects a ControlLogix PLC or other device to a Modicon S908 remote I/O network, over Ethernet.

The module acts as a scanner on the S908 network, reading inputs and writing outputs. The module supports 800 series and Quantum remote drops. It supports up to 32 drops.

The module supports scheduled connections with a ControlLogix processor, over Ethernet, so the ControlLogix processor can read inputs from the Modicon network and write outputs.

The AN-X-MOD-MAS module has a web interface for configuring the module, for monitoring logs and diagnostics and for performing administrative functions. You can communicate with the module using any standard web browser such as Internet Explorer.

The module firmware can be updated using the web interface. Refer to page 58 for details.

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 S908Remote I/O network (NS or NET)
- an Ethernet connector
- a power connector
- an F connector to connect to the S908 remote I/O network

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.

Package Contents

- AN-X2-MOD module
- microSD to SD card adapter
- CD containing software and documentation
- rubber feet for desktop use

Using the MicroSD Card

The AN-X2 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.

An adapter is provided so you can insert the microSD card in an SD slot in your computer.

The card must be present while the AN-X2 is running.

WARNING! Do not remove the card while the AN-X2 is powered on!

If the AN-X2 is inaccessible from Ethernet because of its settings, you can remove the card and edit the file config.txt. Refer to page 16 for details.

Reinsert the card in the slot at the back of the AN-X2, 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-X2 to retrieve it .

AN-X2 Modes of Operation

There are two AN-X2 modes of operation:

- Maintenance mode. The AN-X2 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-X2 in production mode.
- Production mode. This is the normal runtime mode of operation.

Installation

Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

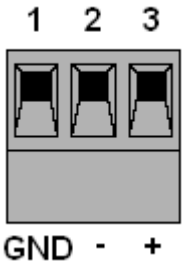
WARNING!

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-X-MOD-MAS and AN-X-MOD-MON contains built-in termination.

When you connect the AN-X-MOD-MAS to the network, it usually replaces a Modicon master and no wiring changes are necessary.

When you connect the AN-X-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-X-MOD-MAS, as well as any attenuation along the cables.

The AN-X-MOD-MON should be located at the end of the network trunk. Remove the terminator previously at the end of the network trunk.

If you remove an AN-X-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.

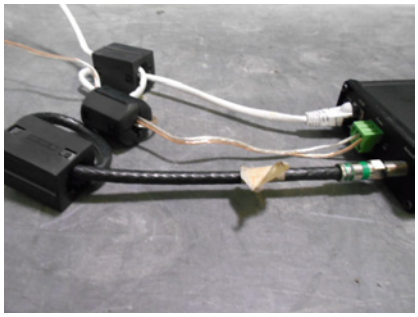
If you are connecting to the AN-X through a router or switch, use a standard Ethernet cable.

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

CE Installations

If you are installing the AN-X2 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 autoconfigure the AN-X from the attached Modicon network	20
4	Configure the AN-X in RSLogix 5000	27
5	Scan I/O, read inputs and write outputs	40
6	Use the web interface to create aliases for RSLogix 5000	40
7	Import the aliases into RSLogix 5000	40
8	Use the aliases to access the Modicon I/O	
9	Create your control application using the aliases	

Ethernet Configuration

The AN-X2-MOD-MAS module connects a computer or other device such as a ControlLogix processor on Ethernet to an S908 remote I/O network..

Before you can use the AN-X2-MOD-MAS, you must configure its network properties on Ethernet.

Ethernet 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 same link-local address 169.254.42.84.

Unless you have control of the DHCP server, in most applications you will assign a static IP address tp the AN-X. 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.

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

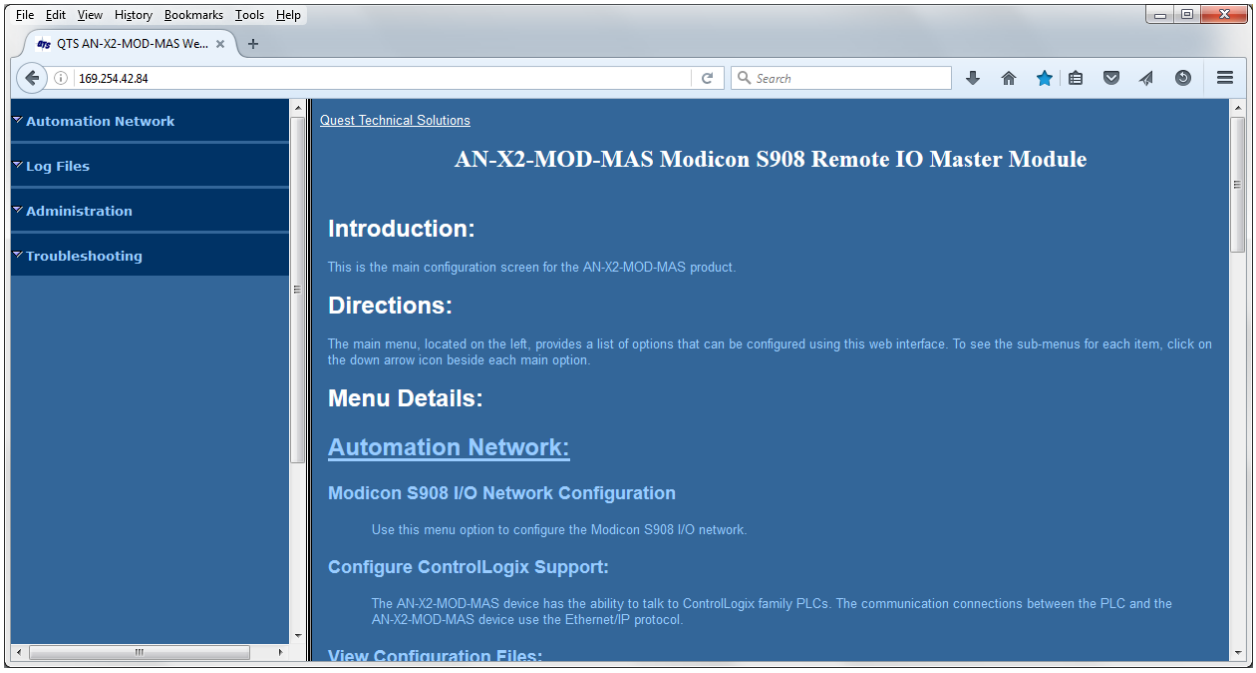
IMPORTANT! If you are connecting AN-X to an existing Ethernet network, consult the network administrator to obtain information about how you should configure AN-X or to obtain a static IP address for AN-X.

You configure the Ethernet properties using the web interface.

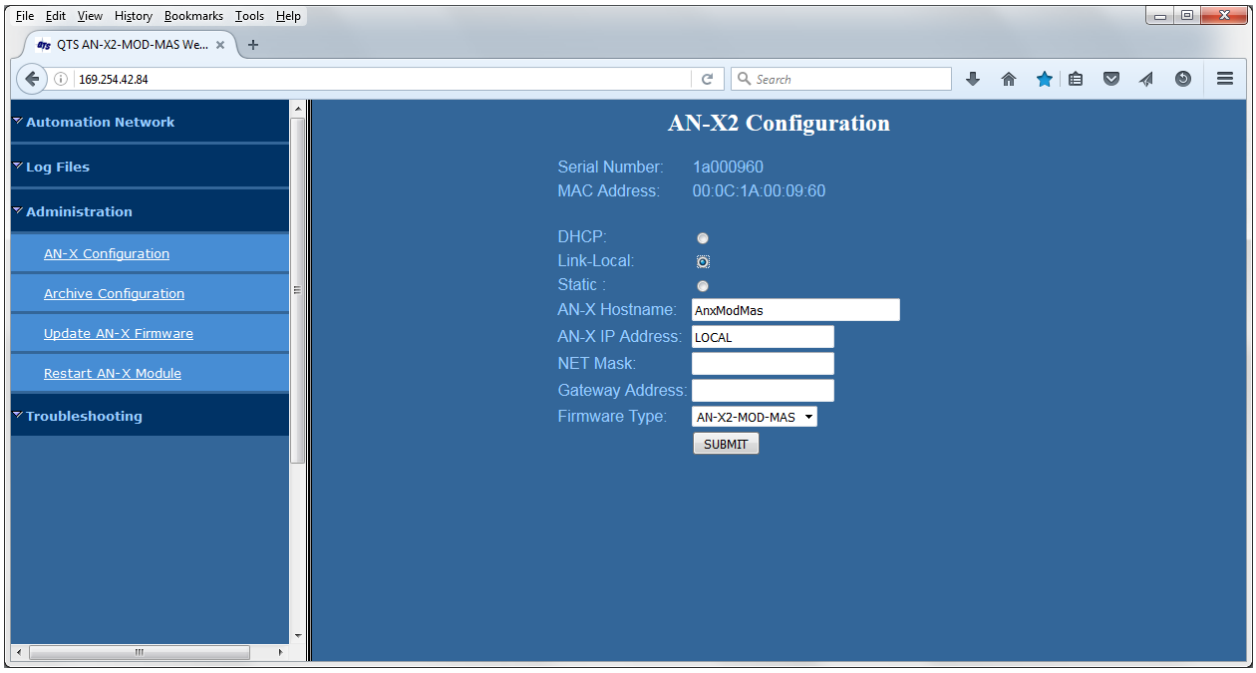
Start a web browser and enter the address 169.254.42.84

TIP The AN-X2 must be on the same subnet as the computer to use the link-local IP address. It cannot be connected through a router.

Select *Administration/AN-X Configuration*.



The *AN-X2 Configuration* page appears.



At the top, the screen shows the serial number and MAC address of the AN-X2 being configured.

Check either DHCP or Static.

DHCP

If the AN-X2 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, look at the DHCP server.

When you submit the changes, if the AN-X2 does not find a DHCP server, it reverts to the default link local address 169.254.42.84 and repeatedly flashes the SYS 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-X. 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 and should contain only alphanumeric characters, no hyphens or underscores.

TIP

When you configure the AN-X in RSLogix 5000, use this same name for the emulated ENBT. See page 27.

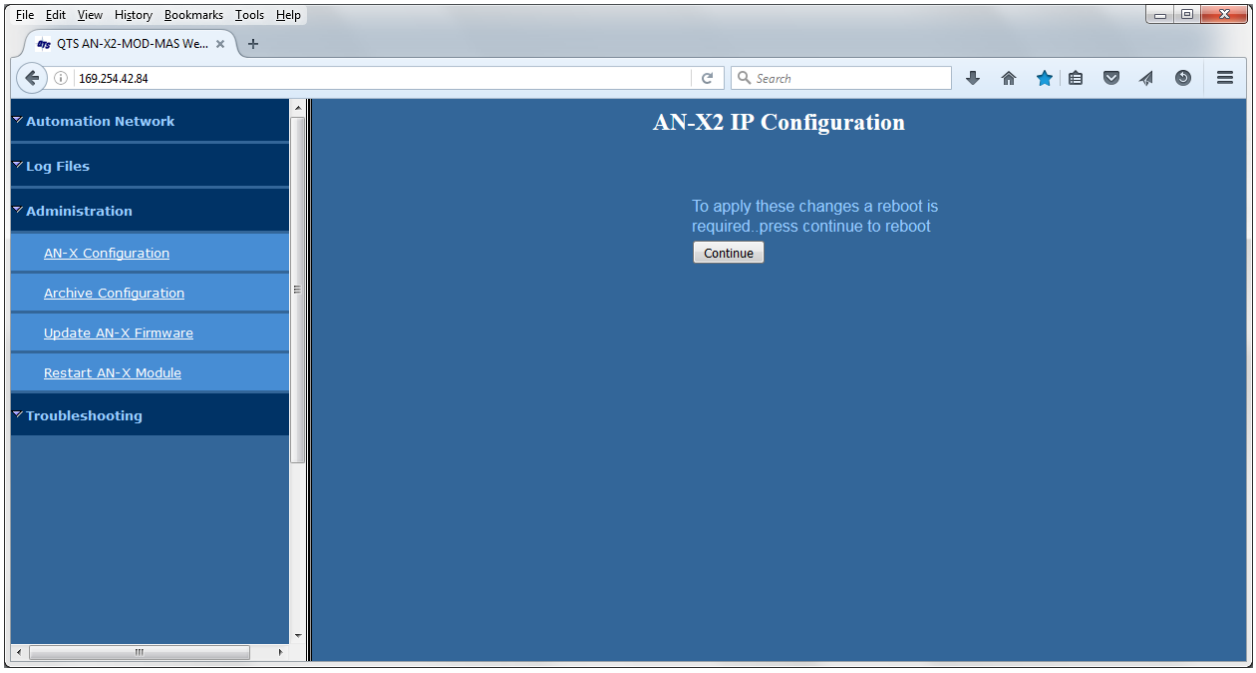
Firmware

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.

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-X2, 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.

Remove the microSD card and edit the file config.txt using a text editor such as Windows Notepad to set the AN-X2 to the desired configuration.

The Configuration File

The Ethernet configuration and the name of the production firmware file to load are stored in the text file config.txt on the microSD card.

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-X2 finds an error during startup, it flashes an error code on the MS LED, see page 60.

Example config.txt files

Example: Link- Local IP address

```
IP: LOCAL
Hostname: ANX2Mod
Firmware: AN-X2-MOD-MAS
```

Example: DHCP

```
IP: DHCP
Hostname: ANX2Mod
Firmware: AN-X2-MOD-MAS
```

Example: static IP address

```
IP: 192.168.1.14
NetMask: 255.255.255.0
DefGtwy: 192.168.1.1
HostName: ANX2Mod
Firmware: AN-X2-MOD-MAS
```

If the link-local address is not accessible…

Addresses 169.254.1.0 to 169.254.254.255 are reserved for use on a local network. AN-X2 modules are shipped set to the address 169.254.42.84 for initial configuration. This address is almost always accessible from a computer on the same local Ethernet as the AN-X.

If you cannot access the AN-X2 at address 169.254.42.84 using a web browser, there are two options for setting the AN-X Ethernet parameters.

Option 1: Edit config.txt on the SD card

Turn off power to the AN-X, remove the microSD card, insert it in a card reader in your computer, and edit the file config.txt. Refer to page 7 for details on the file contents.

Replace the microSD card in the AN-X and turn on the power. Confirm that you can access the AN-X at the address you set.

Option 2: Add a route to 169.254.42.84

Open a command prompt window and type

route print

TIP It may be necessary to start the command prompt as administrator.

The routing table appears

```
===========================================================================
Interface List
0x1 ........................... MS TCP Loopback interface
0x2 ...00 18 8b c5 9d f7 ...... Broadcom 440x 10/100 Integrated Controller -
Packet Scheduler Miniport
===========================================================================

===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0        10.10.0.1      10.10.0.20       20
        10.10.0.0    255.255.255.0       10.10.0.20      10.10.0.20       20
       10.10.0.20  255.255.255.255        127.0.0.1       127.0.0.1       20
   10.255.255.255  255.255.255.255       10.10.0.20      10.10.0.20       20
   64.215.255.122  255.255.255.255        10.10.0.1      10.10.0.20       20
        127.0.0.0        255.0.0.0        127.0.0.1       127.0.0.1       1
      169.254.0.0      255.255.0.0       10.10.0.20      10.10.0.20       20
        224.0.0.0        240.0.0.0       10.10.0.20      10.10.0.20       20
  255.255.255.255  255.255.255.255       10.10.0.20      10.10.0.20       1
Default Gateway:         10.10.0.1
===========================================================================
Persistent Routes:
  None
```

If there is no entry in the network destination column that starts with 169.254.0.0 (highlighted above), add a route using

```
route add 169.254.0.0 mask 255.255.0.0 10.10.0.20 metric 20
```

where 10.10.0.20 is replaced with the IP address of the interface (network card) in your computer that is to communicate with the AN-X2.

Repeat the route print command and confirm that the table now has an entry similar to the one shown.

Now try pinging the AN-X2 at 169.254.42.84. You should now be able to access it using a browser to set the desired Ethernet configuration.

When you add a route in Windows and you want it to be 'persistent', use the -p option:

```
route –p add 169.254.0.0 mask 255.255.0.0 10.10.0.20 metric 20
```

That puts the route in the registry and it is added at each start up.

Configuring the AN-X2-MOD-MAS S908 Network

Before you can scan a Modicon S908 remote I/O network, you must configure the network in the AN-X-MOD-MAS.

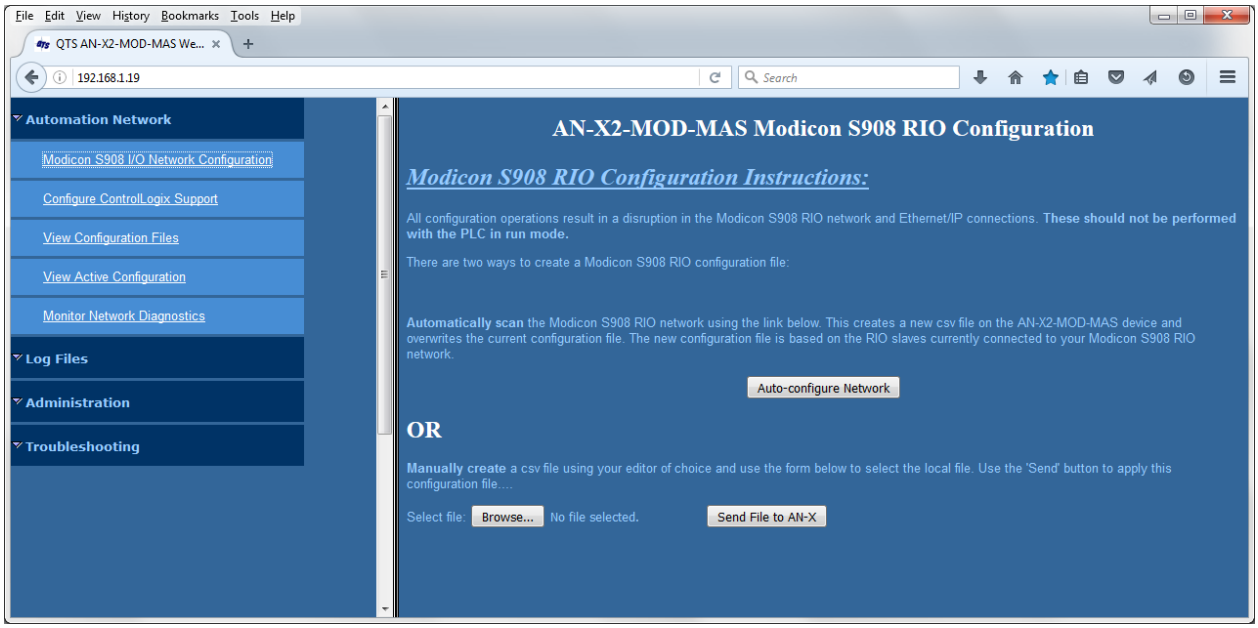
There are two methods of configuring the S908 remote I/O that the AN-X-MOD-MAS is to scan:

- autoconfiguration. The AN-X2-MOD-MAS reads the network contents by sending messages to the attached network and builds a configuration file
- manual configuration. You build the configuration file using a text editor and send it to the AN-X2-MOD-MAS.

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

Auto Configuration

To perform an autoconfiguration, in the web interface first select *Automation Network/Modicon S908 I/O Network Configuration*.



Click the *Auto-configure Network* button.

AN-X sends messages to all possible drops and builds a configuration based on the replies it receives. AN-X then displays the configuration it generated. AN-X also generates a default ControlLogix data mapping configuration based on the I/O it finds (see page 24).

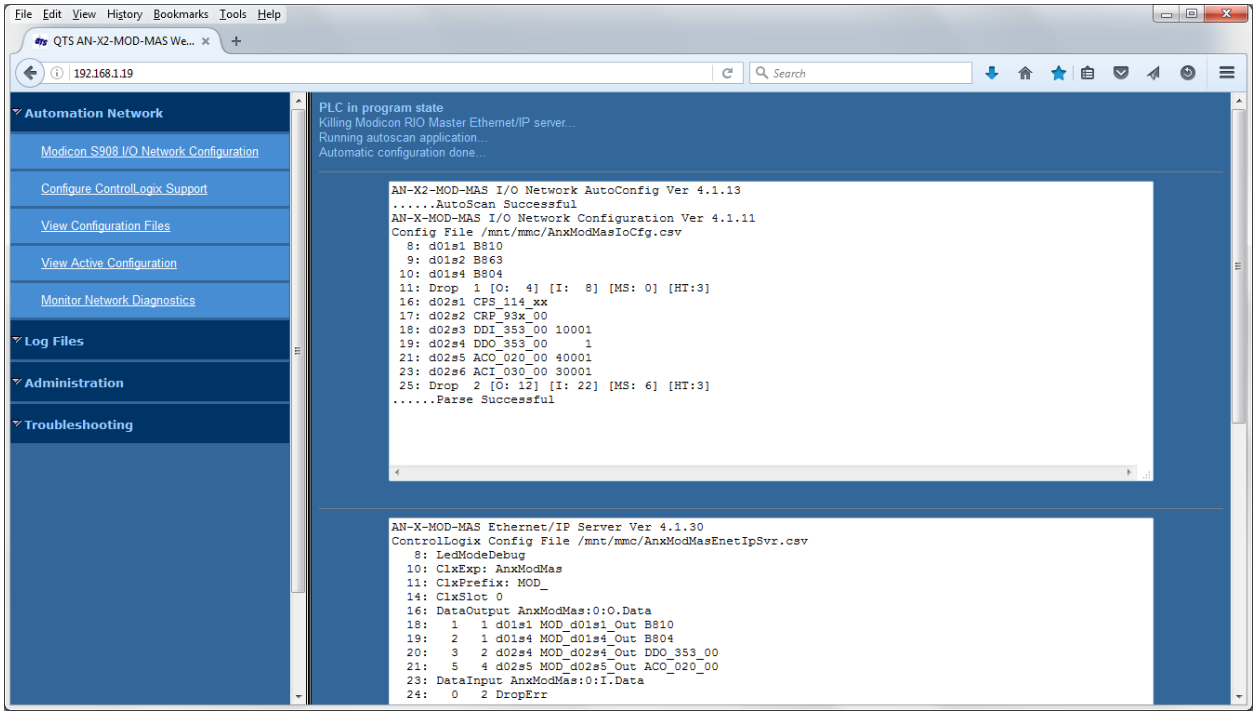
After the autoconfiguration is complete, check that all drops and modules have been found. Select *Automation Network/View Configuration Files* and click *AN-X2-MOD-MAS RIO Network Configuration File*.

Example:

```
;QTS AN-X2 MOD RIO Scan Configuration Utility

;Copyright (c) 2005 Quest Technical Solutions

;Auto Config Mod I/O File

Drop=1,

;HoldTime=3, ; Drop Hold Time (x100ms, Default=3)

,Rack=1,

,,Slot=1,Type=B810,;Addr=d1s1,Inp=00,Out=01,8-OUT ISO B810

,,Slot=2,Type=B863,;Addr=d1s2,Inp=08,Out=00,REG 4 CH IN B863

,,Slot=4,Type=B804,;Addr=d1s4,Inp=00,Out=02,16-OUT B804

EndDrop

Drop=2,

;HoldTime=3, ; Drop Hold Time (x100ms, Default=3)

,Rack=1,

,,Slot=1,Type=CPS_114_xx,;Addr=d2s1,Inp=00,Out=00,AC PS 115/230V 10A

,,Slot=2,Type=CRP_93x_00,;Addr=d2s2,Inp=00,Out=00,RIO HEAD S908

,,Slot=3,Type=DDI_353_00,;Addr=d2s3,Inp=04,Out=00,DC IN 24V 4x8 Sink

,,Slot=4,Type=DDO_353_00,;Addr=d2s4,Inp=00,Out=04,DC OUT 24V 4x8

,,,,CfgLen=2,0x0000,0x0000

,,Slot=5,Type=ACO_020_00,;Addr=d2s5,Inp=00,Out=08,AN OUT 4CH CURR

,,,,CfgLen=6,0x8001,0x5555,0x0000,0x0000,0x0000,0x0000

,,Slot=6,Type=ACI_030_00,;Addr=d2s6,Inp=18,Out=00,AN IN 8CH UNIPOLAR

,,,,CfgLen=1,0x0001

EndDrop
```

When AN-X creates a configuration file, it includes comments in the file it creates, based on the information in its module database. If you edit the automatically generated configuration file, edit the comments as well.

See page 25 for information on how to transfer the configuration from AN-X and save it to a file.



After an autoconfiguration, AN-X displays the screen shown above. The upper pane shows the S908 configuration file it created as a result of the autoconfiguration.

AN-X displays the I/O modules it has found, as well as a summary for each drop that shows the number of outbytes for the drop, the number of input bytes for the drop, the number of Quantum status bytes for the drop, and the hold time for the drop.

Example:

```
25: Drop  2 [O: 12] [I: 22] [MS: 6] [HT:3]
```

The lower pane shows the corresponding ControlLogix configuration created by the autoconfiguration.

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.

Create the configuration file using a text editor and save it as a comma separated variable (CSV) file, with extension csv. The file format is described on page 21.

To send the configuration to AN-X:

1. From the AN-X web interface, select *Automation Network/Modicon S908 I/O Network Configuration.*

2. Use the *Browse* button to select the configuration file

3. Click the *Send File To AN-X* button to send the file to AN-X.

AN-X parses the file and shows either the current configuration if configuration was sent successfully or an error message if there was a problem with the file.

Configuration File Contents

The I/O configuration file is a comma-separated variable (csv) text file that contains all the information required to configure the AN-X2-MOD-MAS.

Fields can be separated by any whitespace 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 26 for a sample configuration file.

I/O Modules

The remote I/O configuration file defines the contents of the drops to be scanned 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 autoconfiguration. AN-X appends a list of supported modules to the end of the file, as comments. You can perform an autoconfiguration 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.

You can send this parameter data by adding 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 to either set their outputs to the last value or set their outputs to a user defined value when they lose communication with the network master. To set these modules to hold their last state, add a line after the slot definition that contains the keyword CfgOutLast

Example:

```
Slot=4,Type=DRA_840_00

CfgOutLast
```

If you use both CfgOutLast and additional numerical parameters, place them on separate lines.

Example:

```
Slot=9,Type=DAO_840_00

CfgOutLast

CfgLen=1,0x1191
```

If you do not enter any parameter data, AN-X uses the default parameters from its module database.

Refer to the document *AN-X-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.

To set the drop hold time for a drop, add a line immediately after the drop definition that consists of the keyword HoldTime, an equals sign, and the value. There should be no spaces before or after the equals sign.

Example:

```
Drop=1,

HoldTime=3
```

Sending and Retrieving Configurations

To transfer an S908 configuration file to the AN-X2-MOD-MAS, first select *Automation Network/Modicon S908 I/O Network Configuration* in the web interface.

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

To transfer a configuration from the AN-X2-MOD-MAS, first select *Automation Network/View Configuration Files* in the web interface.

Right click on *AN-X2-MOD-MAS RIO Network Configuration File* and select *save link as* and save the file on your computer.

Sample S908 Configuration File

In this example, drop 1 is an 800 series drop and drop 2 is a Quantum drop.

```
Drop=1,
;HoldTime=3, ; Drop Hold Time (x100ms, Default=3)
,Rack=1,
,,Slot=1,Type=B810,;Addr=d1s1,Inp=00,Out=01,8-OUT ISO B810
,,Slot=2,Type=B863,;Addr=d1s2,Inp=08,Out=00,REG 4 CH IN B863
,,Slot=4,Type=B804,;Addr=d1s4,Inp=00,Out=02,16-OUT B804
EndDrop

Drop=2,
;HoldTime=3, ; Drop Hold Time (x100ms, Default=3)
,Rack=1,
,,Slot=1,Type=CPS_114_xx,;Addr=d2s1,Inp=00,Out=00,AC PS 115/230V 10A
,,Slot=2,Type=CRP_93x_00,;Addr=d2s2,Inp=00,Out=00,RIO HEAD S908
,,Slot=3,Type=DDI_353_00,;Addr=d2s3,Inp=04,Out=00,DC IN 24V 4x8 Sink
,,Slot=4,Type=DDO_353_00,;Addr=d2s4,Inp=00,Out=04,DC OUT 24V 4x8
,,,,CfgLen=2,0x0000,0x0000
,,Slot=5,Type=ACO_020_00,;Addr=d2s5,Inp=00,Out=08,AN OUT 4CH CURR
,,,,CfgLen=6,0x8001,0x5555,0x0000,0x0000,0x0000,0x0000
,,Slot=6,Type=ACI_030_00,;Addr=d2s6,Inp=18,Out=00,AN IN 8CH UNIPOLAR
,,,,CfgLen=1,0x0001
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 scan the largest possible Modicon network, the AN-X-MOD-MAS module supports multiple scheduled connections with a ControlLogix processor over Ethernet.

The AN-X-MOD-MAS 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 word of input data from the AN-X to the ControlLogix processor.

Each connection can have its own RPI, from 5 to 750 ms.

In general, you should try to keep the number of connections small. 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 these scheduled connections. AN-X can create the mappings automatically or you can create a mapping configuration 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 must 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.

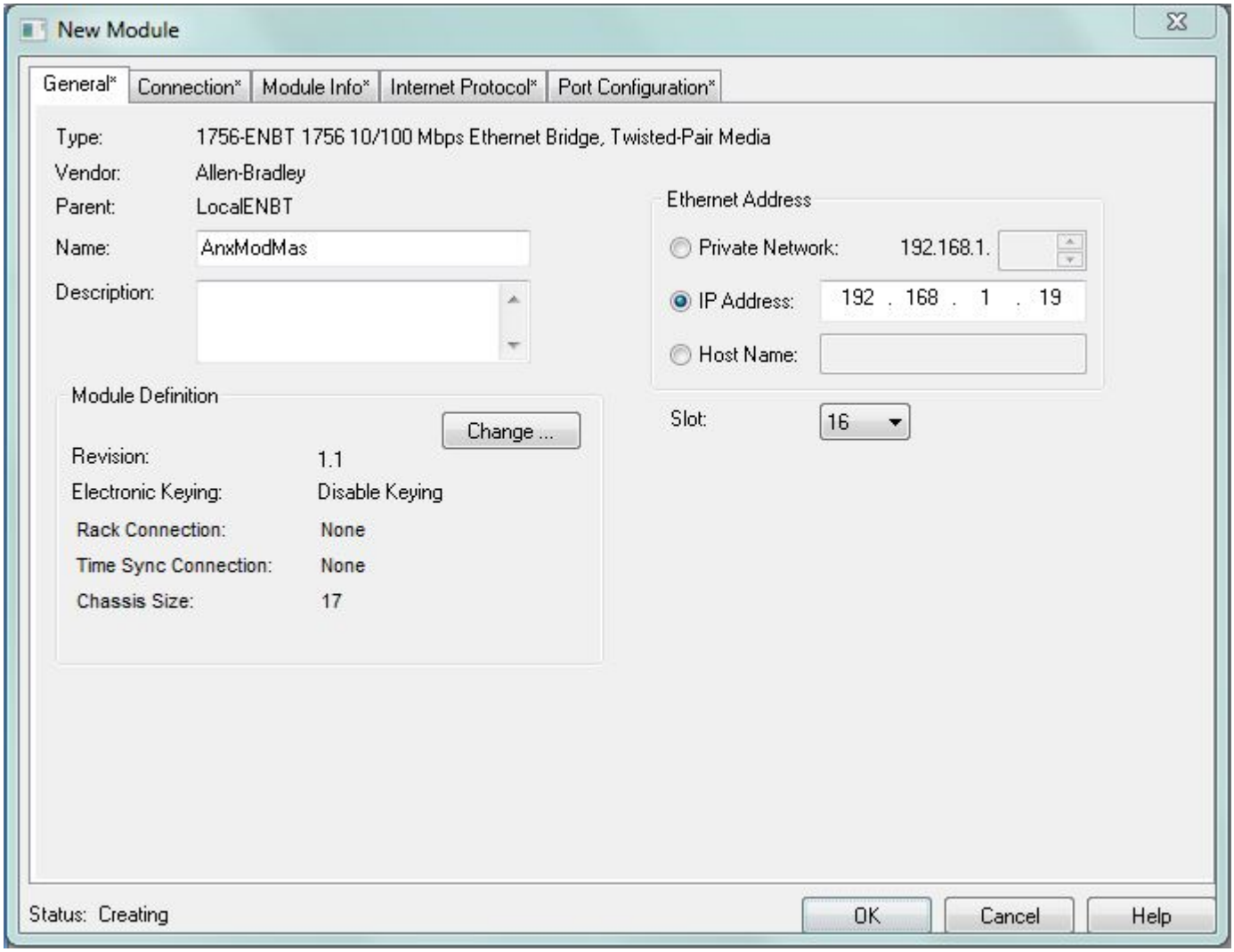
Configuring the AN-X in RSLogix 5000

The AN-X2-MOD-MAS 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 33).

To configure the AN-X2-MOD-MAS 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 15)

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.

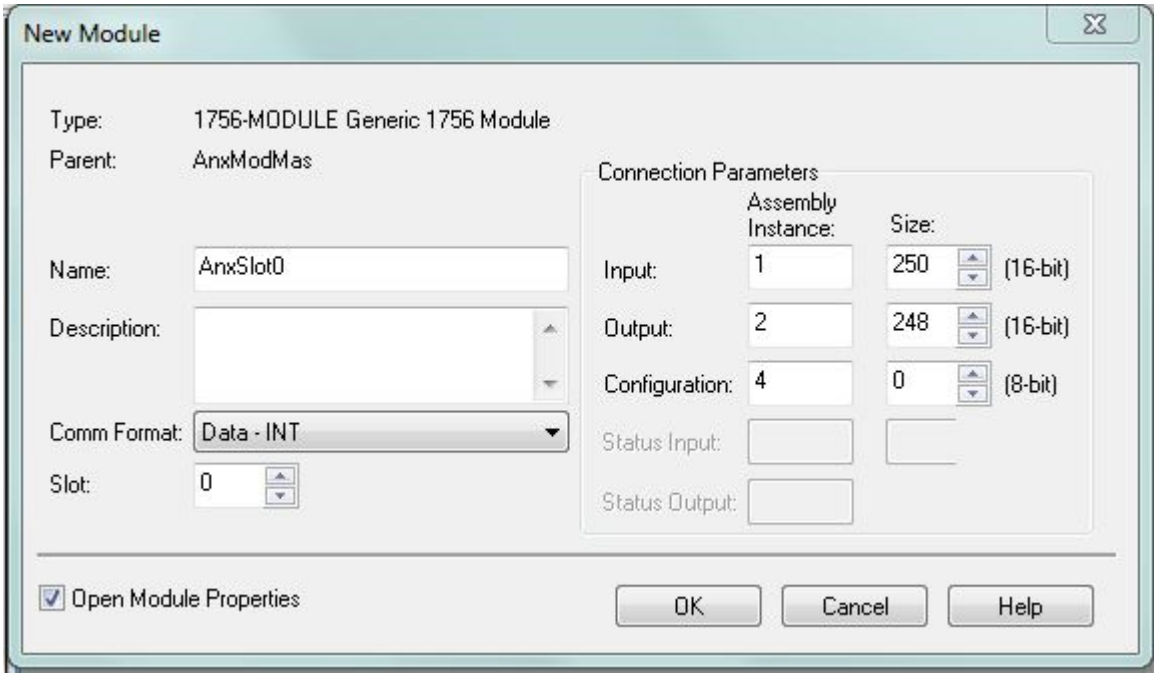
Set the Slot to 16.

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.

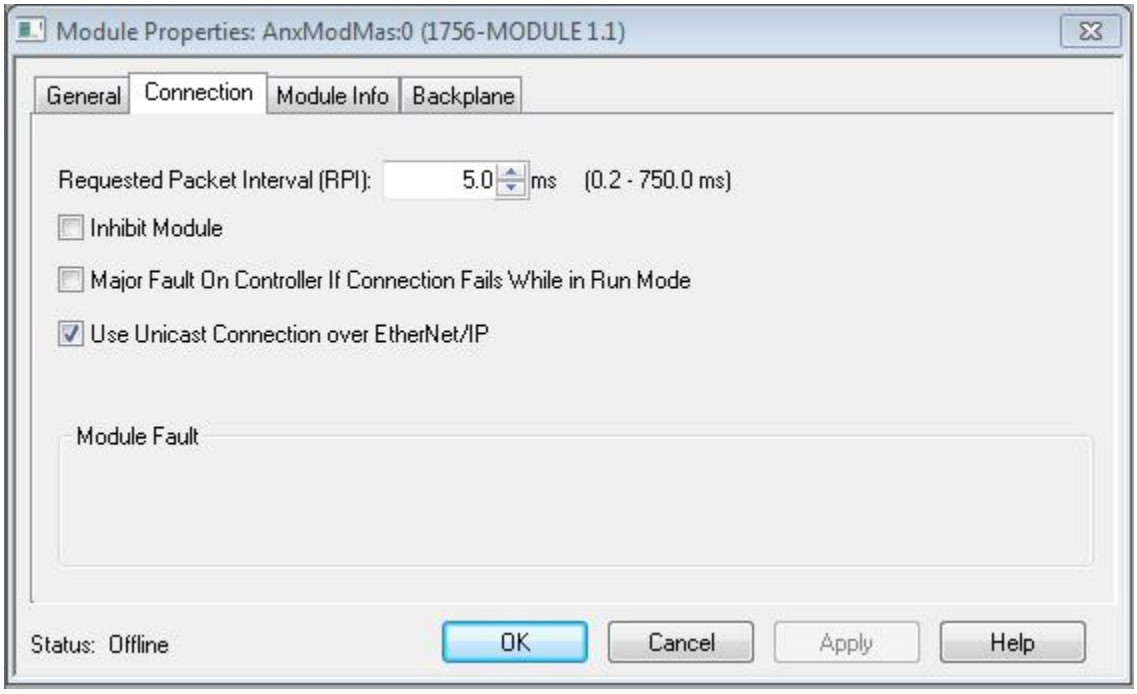


Set the *Name* and *Description* as desired.

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. You can use the diagnostic counters (see page 52) to obtain the remote I/O network scan time.

TIP The AN-X-MOD-MAS 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 by creating a comma separated variable 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 autoconfigure I/O. See page 20 for details.

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

ClxName

The first 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, AnxModMas
```

When AN-X automatically creates a configuration file during autoconfiguration, 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-X-MOD-MAS.

For example, if the ControlLogix has connections to two AN-X-MOD-MAS modules, each controlling a different Modicon network, both networks could contain modules with the same drop and slot address. Using a different ClxPrefix in the configuration file for each AN-X-MOD-MAS makes the tags 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.

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 16.

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
```

Example: Simple Configuration File

```
ClxName, AnxModMas

ClxPrefix,MOD_

ClxSlot, 0

DataOutput

,d4s4, Drop4Slot4Outputs

DataInput

,d4s7, Drop4Slot7Inputs
```

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.

Controlling Program Mode Behaviour

The ControlLogix processor that is the exclusive owner of the connection in slot 0 controls how the AN-X-MOD-MAS module scans the S908 network. For that reason, when you map the data, you must always include a connection to the generic module in slot 0.

When the ControlLogix processor with the exclusive owner connection to slot 0 on the AN-X is in program mode or the connection is stopped, the AN-X stops scanning the S908 network, just as a Modicon scanner would. Even if other ControlLogix processors have exclusive owner connections to other slots on the AN-X and are in run mode, AN-X does not scan the network.

You can override this behaviour by including a line with the keyword ScanModProg in the configuration file. This causes the AN-X-MODMAS module to continue to communicate with the S908 network when the ControlLogix processor is in program mode. Similarly ControlLogix processors with exclusive owner connections to other AN-X slots will also update. If the exclusive owner connection to slot 0 stops, AN-X stops all communication with the S908 network.

WARNING!

The ScanModProg option is included for debugging since it allows inputs to update in the ControlLogix. It is NOT recommened for normal operation. For maximum compatibility with Modicon hardware, it should not be used in normal operation.

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 autoconfigure the S908 network, these items are mapped by default to ClxSlot 15.

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-X-MOD-MAS maintains the following diagnostic counters.

Counter	Offset	Description
TxCount	0	Transmitted network frames
RxGood	1	Received frames with good status
RxPrtcl	2	Received frames with a protocol error
RxNoise	3	Received frames with a noise error
RxTout	4	Scanner sent a message to a drop but did not receive a reply within the timeout period
RxCrc	5	Received frames with a CRC error
RxOvr	6	Received frames too long
RxAbort	7	Received frames with an abort error
RxShort	8	Received frames too short
RxErrMask	9	Error mask for protocol errors

To map the diagnostic counters, include a line with the keyword DiagCtrs in the input section of a connection. This maps all ten 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.

Scan Status

AN-X maintains a block of five words that show the state of the S908 remote I/O scan.

Scan status consists of:

Offset	Description
0	Scan state, 0 = idle, 1 = monitor, 2 = scanning, 3 = scan halted
1	Scan counter
2	Init counter, increments when a drop is reinitialized

Offset	Description
3	Current scan time
4	Maximum scan time, maximum in the last 6.5 seconds

To map the scan status, include a line with the keyword ScanSts in the input section of a connection. This maps all five words; they cannot be mapped individually.

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

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 configuratuion 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.

Other Parameters

The following options affect the overall operation of the AN-X.

LongInp

800 series drops send inputs only when the data on the drop changes.

To force drops to send all inputs on every scan, include a line that contains just the keyword LongInp

LedModeDebug

There are two modes of operation for the NET or NS LED. Refer to page 37 for details.

RedundEna,MOD_A_

Enable Redundant configuration and specify Redund Prefix

Refer to the AN-X technical note on redundant operation.

Sending and Retrieving Configurations

To transfer a ControlLogix configuration file to the AN-X2-MOD-MAS, first select *Automation Network/ControlLogix Support* in the web interface.

Click the *Browse* button, select the file, then click the *Send to AN-X* button to transfer the configuration.

To transfer a configuration from the AN-X2-MOD-MAS, first select *Automation Network/View Configuration Files* in the web interface.

Right click on *AN-X2-MOD-MAS RIO ControlLogix Configuration File* and select *save link as* and save the file on your computer.

Sample Ethernet Configuration File

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

```
;QTS AN-X2 MOD RIO Scan Configuration Utility

;Copyright (c) 2005 Quest Technical Solutions

;Auto Config Ethernet/IP File Ver4.1.13

;ScanModProg

;RedundEna,MOD_A_  ; Enable Redundant configuration and specify Redund Prefix

;LongInp           ; Force drops to send all inputs on every scan

LedModeDebug       ; Not ODVA Compliant, but useful for debugging network

ClxName,AnxModMas

ClxPrefix,MOD_

ClxSlot,0

DataOutput ; ,<ClxBaseTag> Outputs from ControlLogix

;  0,RedundCtl  ; Len=1 Redundancy Control

  1,d1s1,d01s1_Out,; Len= 1 B810 8-OUT ISO B810

  2,d1s4,d01s4_Out,; Len= 1 B804 16-OUT B804

  3,d2s4,d02s4_Out,; Len= 2 DDO_353_00 DC OUT 24V 4x8

  5,d2s5,d02s5_Out,; Len= 4 ACO_020_00 AN OUT 4CH CURR

DataInput ; ,<ClxBaseTag> Inputs to ControlLogix

  0,DropErr  ; *** Always Map to Ofs 0 Since Logix will set to all 1's if AN-X
Connection is lost
```

```
  2,d1s2,d01s2_Inp,; Len= 4 B863 REG 4 CH IN B863
  6,d2s3,d02s3_Inp,; Len= 2 DDI_353_00 DC IN 24V 4x8 Sink
  8,d2s6,d02s6_Inp,; Len= 9 ACI_030_00 AN IN 8CH UNIPOLAR
;The following lines map Diagnostics into ClxSlot 15
ClxSlot,15
DataOutput ; ,<ClxBaseTag> Inputs to ControlLogix
  0,DiagCtl   ; Len=1 Set Bit 0 to clear diagnostic counters
DataInput  ; ,<ClxBaseTag> Inputs to ControlLogix
  0,DiagCtrs, ; Len=10  S908 Diagnostic Counters
 10,ScanSts   ; Len=5   S908 Scan Status
 15,d1ModHlth,; Len=5
 20,d2ModHlth,; Len=5
;Module Status Byte for Quantum Only
 25,d2ModSts, 3 ;
;ControlLogix Connection Statistics
 30,ConnStats0, ; Len=10
 40,ConnStats15, ; Len=10
```

Scanning I/O

Program/Run

The ControlLogix processor that controls the connection in slot 0 determines how the AN-X2-MOD-MAS module scans the S908 network. For that reason, when you map the data, you must always include a connection to the generic module in slot 0.

When the ControlLogix processor with the connection to slot 0 on the AN-X is in program mode or connection 0 is inhibited or stopped, the AN-X stops scanning the S908 network, just as a Modicon scanner would.

You can override this behaviour by including a line with the keyword ScanModProg in the ControlLogix configuration file. This causes the AN-X2-MOD-MAS to continue to scan the S908 network when the ControlLogix processor is in program mode. Inputs update in the ControlLogix. If you manually change outputs in the ControlLogix, they update in the I/O modules.

If the connection to slot 0 is inhibited or stops, AN-X stops all communication with the S908 network.

WARNING!

The ScanModProg option is included for debugging since it allows inputs to update in the ControlLogix. It is NOT recommened for normal operation. For maximum compatibility with Modicon hardware, it should not be used in normal operation.

Required Connections

All ControlLogix connections that have I/O data mapped to them must be configured and running without errors before the AN-X will scan the Modicon S908 network

Connections that have just diagnostic data are not required connections.

ControlLogix Alias Tags

AN-X uses the Ethernet/IP configuration 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!

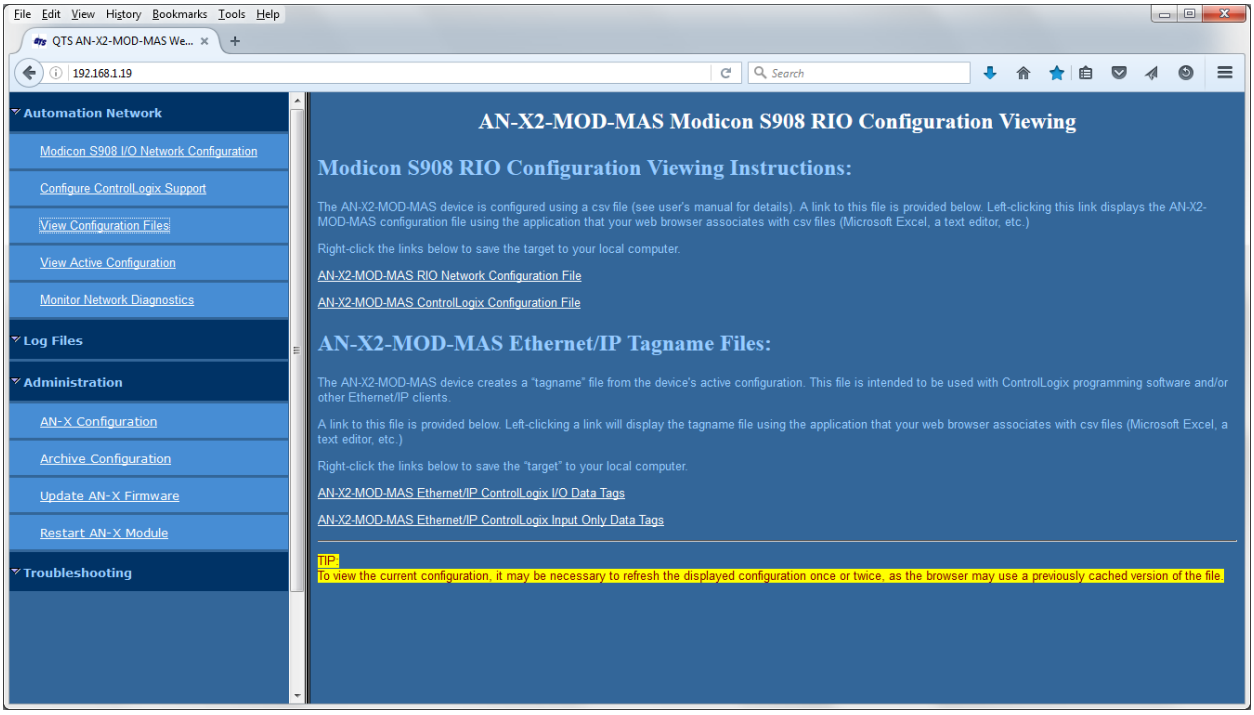
If you change the Modicon I/O or ControlLogix configuration, re-import tags so that the ControlLogix processor uses the correct addresses.

There are two sets of tag files, one for the exclusive owner connections and one for the input only connections.

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

To view the files, click either *AN-X2-MOD-MAS Ethernet/IP ControlLogix I/O Data Tags* or *AN-X2-MOD Ethernet/IP ControlLogix Input Only Data Tags*.

To save the file to your computer, right click on the link and select *Save Target As…*



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_d05s4_Out","B804","","AnxMod:0:O.Data[0]"

In this example, the tag name is MOD_d05s4_Out. The name is made up of the ClxPrefix and the tagname 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_d05r4s4_Inp_0","B863","","AnxMod:0:I.Data[8]"

ALIAS,"","MOD_d05r4s4_Inp_1","B863","","AnxMod:0:I.Data[9]"

ALIAS,"","MOD_d05r4s4_Inp_2","B863","","AnxMod:0:I.Data[10]"

ALIAS,"","MOD_d05r4s4_Inp_3","B863","","AnxMod:0:I.Data[11]"

The address is AnxMod:0:O.Data[0]. The address is made up of the ClxName and the data location. The default ClxName assigned by autoconfiguration is the hostname.

Using the ControlLogix Log

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

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

Redundancy

The AN-X2-MOD-MAS includes features to make it easy to enable and disable AN-X I/O scanners. It can be used to implement redundant I/O scanners, redundant controllers, etc.

One ControlLogix and AN-X is designated the primary and acts as the scanner; the other is designated the secondary and acts as a backup.

If the primary ControlLogix decides there is a problem, it takes its AN-X offline and the backup takes over.

The backup AN-X constantly monitors the S908 network. When it becomes the primary, it has the current state of inputs, drop status, etc. Each ControlLogix processor has access to current I/O data from the S908 network.

The backup AN-X listens to the S908 network when it is told to go online as a scanner. It waits for 10 ms of silence on the network before it takes over. It does not start scanning if it hears another master already online.

There have been changes and additions to the ControlLogix configuration file to support redundancy. No changes are required to the S908 I/O Configuration file.

The firmware is backwards compatible. Existing applications do not need to be modified.

The AN-X distribution CD and website have technical notes that describe in detail the procedure for using redundant AN-X modules.

ControlLogix Ethernet Configuration File

The ControlLogix configuration file has the following elements to support redundancy.

Parameter	Description
RedundEna, RedundPrefix	Must be included at the beginning of the ControlLogix configuration file RedundPrefix is used to create aliases for data

Parameter	Description
RedundCtl	Must be mapped to the output data for the connection to slot 0
ScanSts	Scan status, can be mapped to the input data for any connection
LongInput	Forces 800 series drops to send inputs on every scan
DataOutput, arrayname DataInput, arraynamename	In redundant scanner applications, the array names can be used to creates aliases for the internal ControlLogix arrays used for the data for the connection

RedundEna

Include a line with the RedundEna parameter, followed by a comma and a unique name for the AN-X at the start of the ControlLogix configuration file.

RedundPrefix

The AN-X uses the RedundPrefix when it generates aliases for elements that are unique to each AN-X module, such as diagnostics.

RedundCtl

Map RedundCtl to the output data for the connection to slot 0 in the AN-X.

RedundCtl consists of a single 16-bit word. Only bit 0 is used. To set an AN-X to act as the scanner, set bit 0 to 1. To set an AN-X to act as a backup, set bit 0 to 0.

If the configuration file contains RedundEna, you must map RedundCtl.

ScanSts

ScanSts is an array of 5 INTs that contain information about the current operation. Only the first 3 are used.

Offset	Description
0	Scan state, 0=idle, 1=monitor, 2=scanning, 3=scan halted
1	Scan counter, increments at the start of each scan
2	Init counter, increments whenever a drop is reinitialized
3	not used
4	not used

Map ScanSts to input data for any connection.

By default, when you perform an autoconfiguration, AN-X maps ScanSts to the connection to slot 15, but comments out the mapping.

LongInput

Most 800 series drops send inputs only when the inputs change. You can force 800 series drops to send inputs on every scan by including the LongInput parameter in the ControlLogix configuration file. That way, when you switch between AN-X modules, you can be sure that the backup has the latest inputs.

Aliases

The AN-X-MOD-MAS creates aliases that can be imported into RSLogix 5000.

Item	Alias name prefix	Base tag
Unique elements, such as diagnostics	RedundPrefix	ClxName
I/O inputs	ClxPrefix	DataInput name, if present
I/O outputs	ClxPrefix	DataOutput name, if present

Criteria for Switching between AN-X Modules

The ControlLogix processor maintains connections to both AN-X modules. It can monitor data on both AN-X modules and can switch between them based on:

- diagnostic counters
- drop error table
- module health bits

Switchover

To switch between AN-X modules:

1. Set RedundCtl on the backup AN-X to 1. The backup AN-X will not go online while it ses the primary AN-X as master on the network.
2. Set RedundCtl on the primary AN-X to 0. The backup AN-X will now become master on the S908 network.

When you turn on the RedundCtl bit for an AN-X-MOD-MAS module, it waits for 10 ms of silence on the network before it starts scanning as master.

WARNING!

If the RedundCtl bits on both AN-X modules are on, only one will act as master. However, if the bits are set on both AN-X modules and the current master is disconnected from the S908 network, even for a very short period, the backup will take over. When the module that was

disconnected comes online, both modules will be master on the S908 network. YOUR APPLICATION MUST ENSURE THAT THE RedundCtl BITS ARE BOTH ON ONLY DURING SWITCHOVER!

Other factors to consider…

Do not use the ScanModProg parameter if you are using redundancy.

Do not set the RedundCtl bits on both primary and backup AN-X modules at the same time, except during switchover.

When you modify the ControlLogix configuration file and add elements, the mapped data may become larger than the maximum for a connection, especially for large I/O networks or for networks with many analog modules. It may be necessary to change some of the mappings. Also, when you add elements, the offsets in the comments generated by the autoconfiguration will no longer be correct.

Make sure the mappings in the ControlLogix configurations in both AN-X modules are the same. Each AN-X module cannot check the configuration in the other AN-X module.

LEDs

When the AN-X-MOD-MAS is used in redundant mode, the network LED is green when scanning, orange when monitoring and red when there has been an error or during switchover.

Using the Web Interface

The AN-X module contains a webserver capable of communicating with standard web browsers such as Internet Explorer.

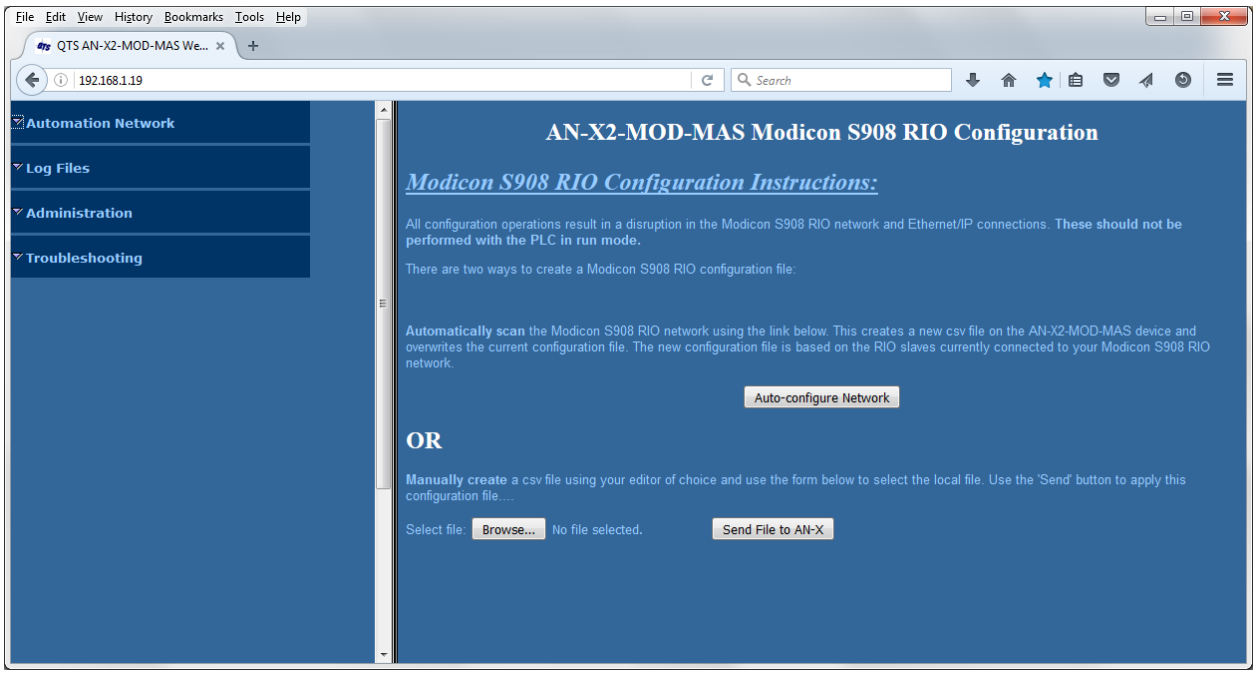
Use the web interface to:

- Configure the AN-X, either by autoconfiguration or manually
- Transfer configuration files to and from the AN-X
- View the results of the last configuration
- Monitor I/O and Ethernet diagnostic counters
- Configure the Ethernet settings and select firmware
- 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.

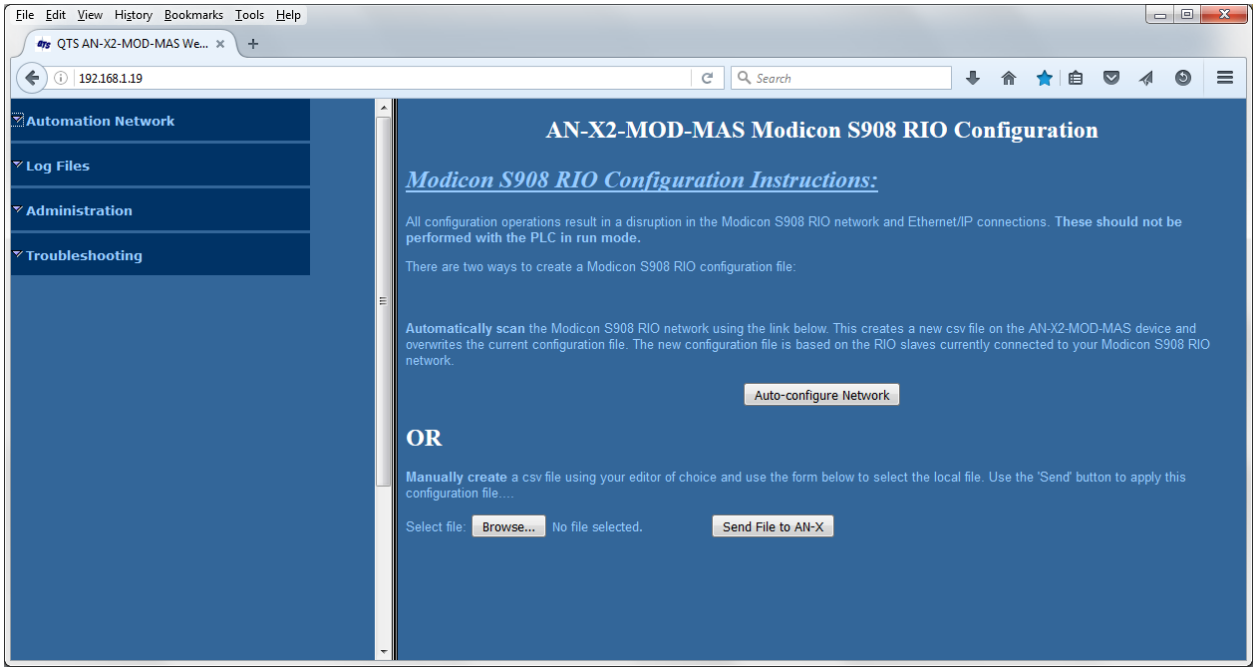
If you run into a problem where data appears not to have changed, flush the cache in the browser or run the browser in the mode where it doesn't cache data (incognito in Chrome, Private browsing in Firefox and Safari, etc.)

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

Modicon S908 I/O Network Configuration

Select *Automation Network/Configure RIO to Enet/IP* to autoconfigure the AN-X or to send a configuration file to the AN-X.



To manually configure the AN-X, first create a configuration file. Refer to page 23 for details on the file format.

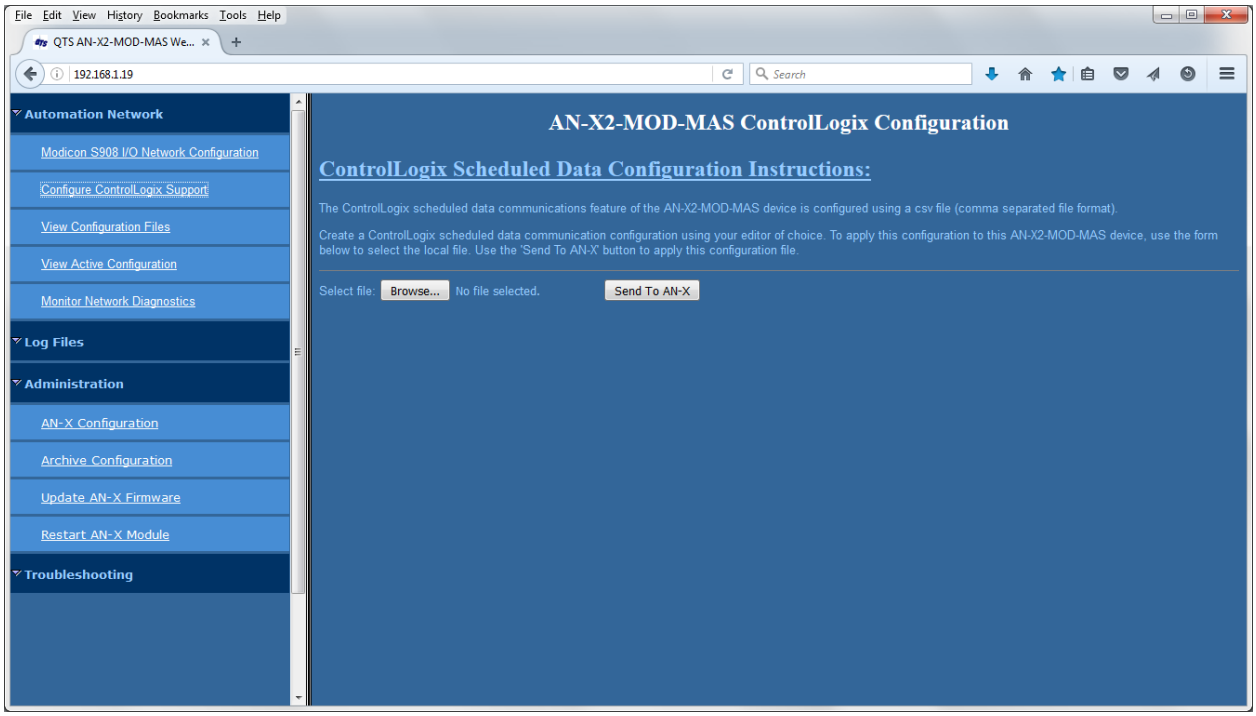
Use the *Browse* button to select the file.

Click the *Send File to AN-X* button to send the file to the AN-X.

AN-X parses the file and displays either the configuration if it has been successful or a message that indicates the source of the error if it fails.

Configure ControlLogix Support

Select *Automation Network/Configure ControlLogix Support* to send a ControlLogix configuration file to the AN-X.



First create a configuration file. Refer to page 30 for details on the file format.

Use the *Browse* button to select the file.

Click the *Send File to AN-X* button to send the file to the AN-X.

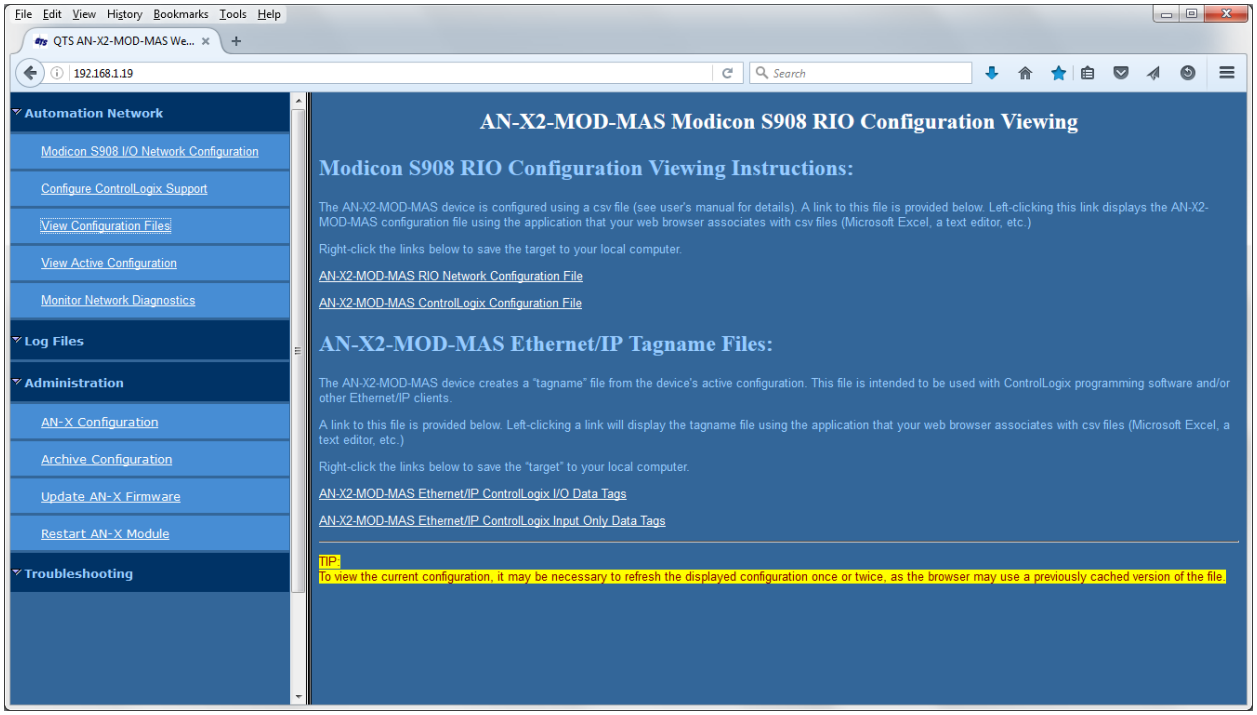
AN-X parses the file and displays either the configuration if it has been successful or a message that indicates the source of the error if it fails.

View Configuration Files

Select *Automation Network/View Configuration Files* to view or save the S908 remote I/O configuration file, the ControlLogix configuration file, or the alias tag files.

Click on the links to view the files using the application that is associated with CSV files.

Right click on the links to retrieve the files from AN-X and store them on your computer.


File Edit View History Bookmarks Tools Help
QTS AN-X2-MOD-MAS We...
192.168.1.19
Search
Automation Network
Modicon S908 I/O Network Configuration
Configure ControlLogix Support
View Configuration Files
View Active Configuration
Monitor Network Diagnostics
Log Files
Administration
AN-X Configuration
Archive Configuration
Update AN-X Firmware
Restart AN-X Module
Troubleshooting
AN-X2-MOD-MAS Modicon S908 RIO Configuration Viewing
Modicon S908 RIO Configuration Viewing Instructions:
The AN-X2-MOD-MAS device is configured using a csv file (see user's manual for details). A link to this file is provided below. Left-clicking this link displays the AN-X2-MOD-MAS configuration file using the application that your web browser associates with csv files (Microsoft Excel, a text editor, etc.)
Right-click the links below to save the target to your local computer.
AN-X2-MOD-MAS RIO Network Configuration File
AN-X2-MOD-MAS ControlLogix Configuration File
AN-X2-MOD-MAS Ethernet/IP Tagname Files:
The AN-X2-MOD-MAS device creates a "tagname" file from the device's active configuration. This file is intended to be used with ControlLogix programming software and/or other Ethernet/IP clients.
A link to this file is provided below. Left-clicking a link will display the tagname file using the application that your web browser associates with csv files (Microsoft Excel, a text editor, etc.)
Right-click the links below to save the "target" to your local computer.
AN-X2-MOD-MAS Ethernet/IP ControlLogix I/O Data Tags
AN-X2-MOD-MAS Ethernet/IP ControlLogix Input Only Data Tags
TIP:
To view the current configuration, it may be necessary to refresh the displayed configuration once or twice, as the browser may use a previously cached version of the file.

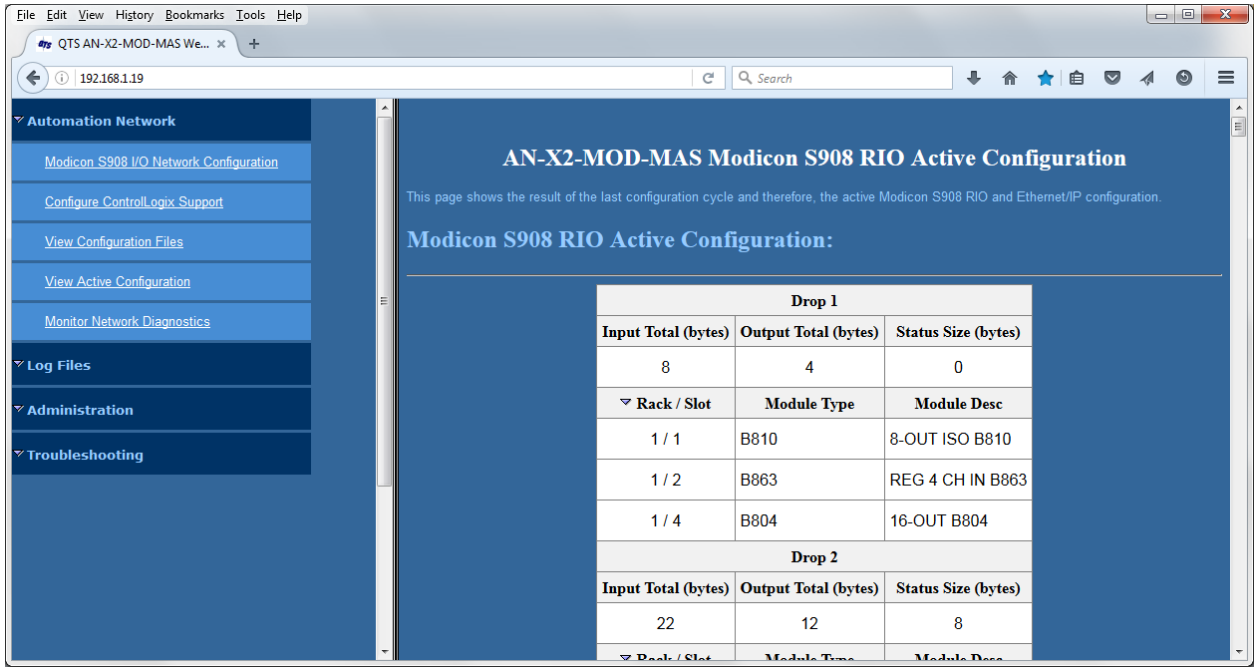
View Active Configuration

Select *Automation Network/View Active Configuration* to display the result of the last configuration transfer.

The upper portion of the page shows in detail the contents of each drop.

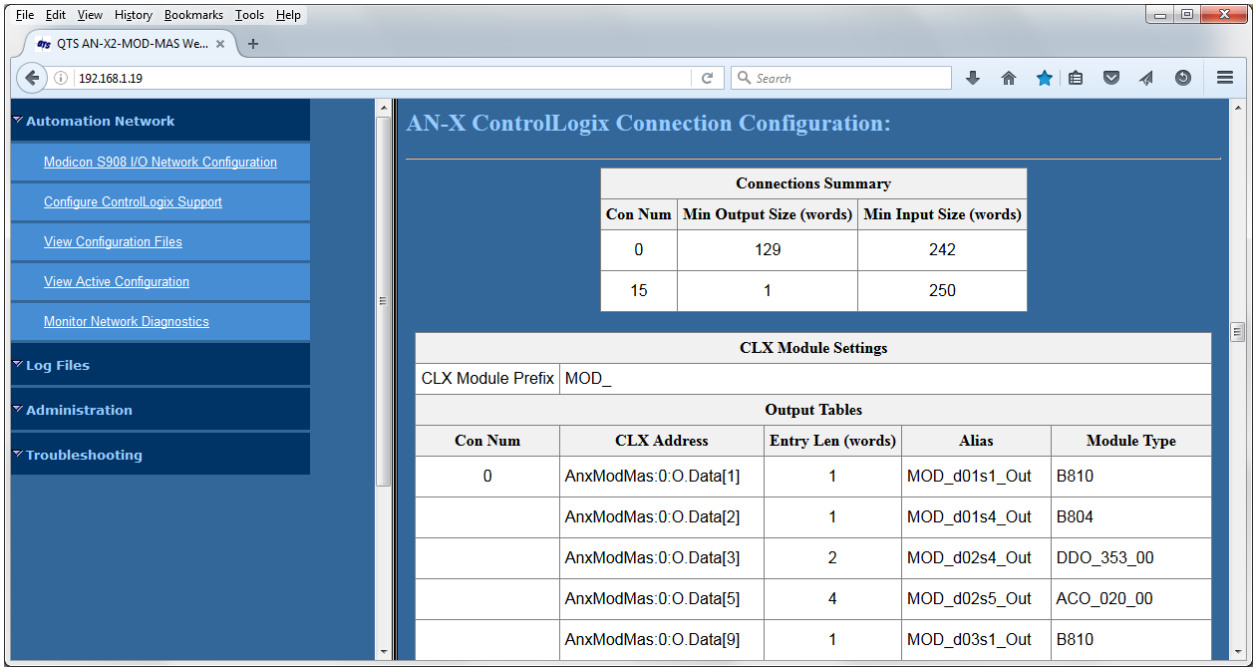
First it shows a summary for the drop, the total number of bytes of input data, output data and Quantum status data.

Click on the arrow next to Rack/Slot to display the contents of each occupied rack and slot, the module type and a description of the module, taken from the AN-X internal database.



Scroll down to see a summary of the ControlLogix connections, the connection number, and the minimum output and input sizes for that connection.

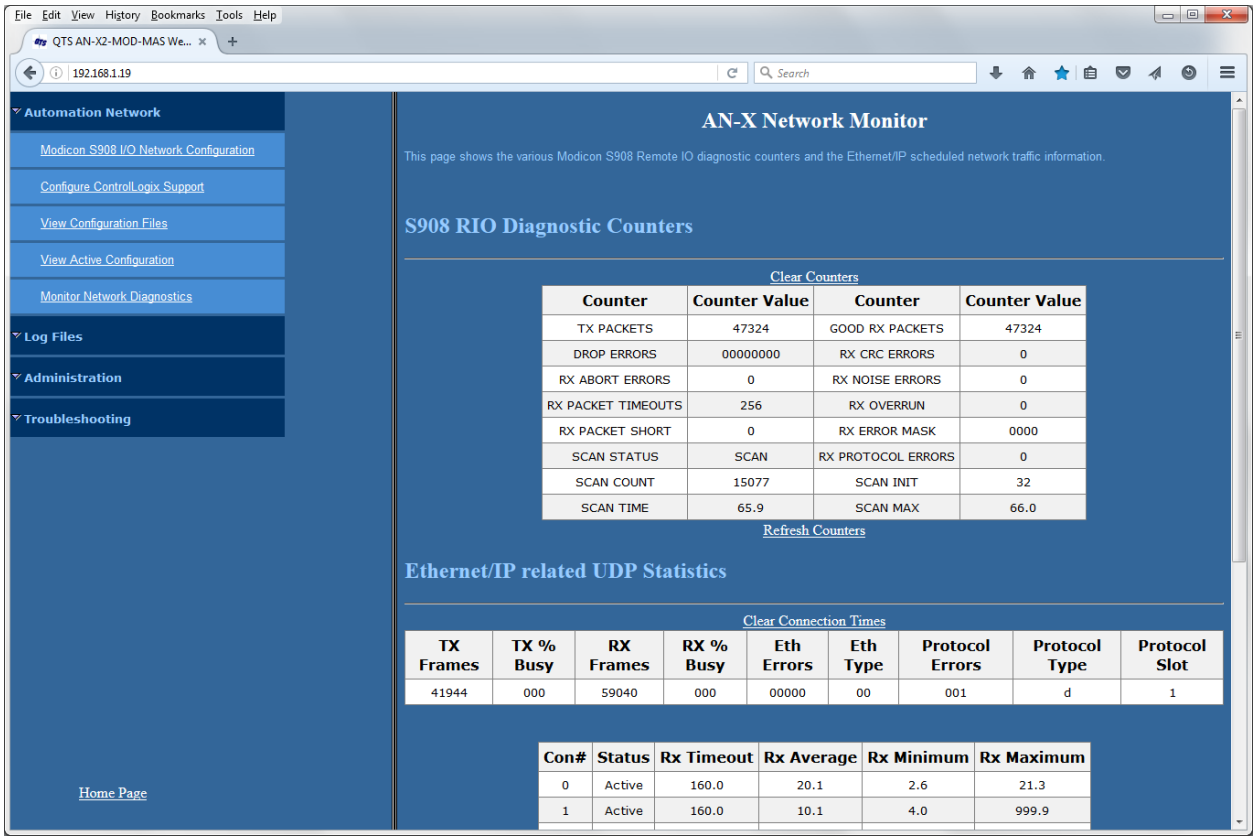
Next are the contents of each connection, the ControlLogix starting address and length of each mapping, the corresponding alias, and the module type mapped to that location.



From this page you can also click on the link to view the *current main configuration file* or right click on the *link (right-click – save link as* link to save the current configuration file to your computer.

Monitor Network Diagnostics

Select *Automation Network/Monitor Network Diagnostics* to display the remote I/O network diagnostic counters and the Ethernet/IP related UDP Statistics.



To refresh the counters, use the corresponding *Refresh Counters* button or click anywhere in the table.

To clear either set of counters, use the corresponding *Clear Counters* link.

After clearing the counters, refresh the counters.

S908 Remote I/O Diagnostic Counters

Counter	Description
TX PACKETS	Count of transmitted packets
GOOD RX PACKETS	Count of good received packets
DROP ERRORS	Shows drops in error. Data is displayed in hex, low digit for drops 1-4, and so on
RX CRC ERRORS	Count of received packets with CRC errors
RX ABORT ERRORS	Count of received packets with abort errors

Counter	Description
RX NOISE ERRORS	Count of received packets with noise errors
RX PACKET TIMEOUTS	Count of times a packet was transmitted to a drop and no reply was received
RX OVERRUN	Count of received packets with overrun errors
RX PACKET SHORT	Count of received packets that were shorter than expected
RX ERROR MASK	High byte shows the cause of protocol errors, low byte shows drop number. Displayed in hex.
SCAN STATUS	Scan status, idle or scan
RX PROTOCOL ERRORS	Count of received packets that did not make sense in terms of the S908 network protocol
SCAN COUNT	Running count of I/O scans
SCAN INIT	Running count of drops being ininiatized
SCAN TIME	Current scan time, units of 100 microseconds
SCAN MAX	Maximum scan time in the last 6.5 seconds

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
TX Frames	Count of transmitted frames
TX % busy	Percentage of time the tranmitter is not idle
RX frames	Count of received frames
RX % Busy	Percentage of time the receiver is not idle
Eth Errors	Count of Ethernet errors
Eth Type	Type of last error
Protocol Errors	Count of Ethernet protocol errors
Protocol Type	Type of last protocol error
Protocol Slot	Connection number of last protocol error

The global counters cannot be cleared.

The Connection Statistics consist of:

Counter	Description
Connection number	0 to 15
Status	Active or Idle
Rx Timeout	The receive timeout, calculated from the RPI
Rx Average	The average of the last 32 update times, in ms.
Rx Minimum	The minimum update time since the last counter reset, in ms.
Rx Maximum	The maximum update time since the last counter reset, in ms

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.

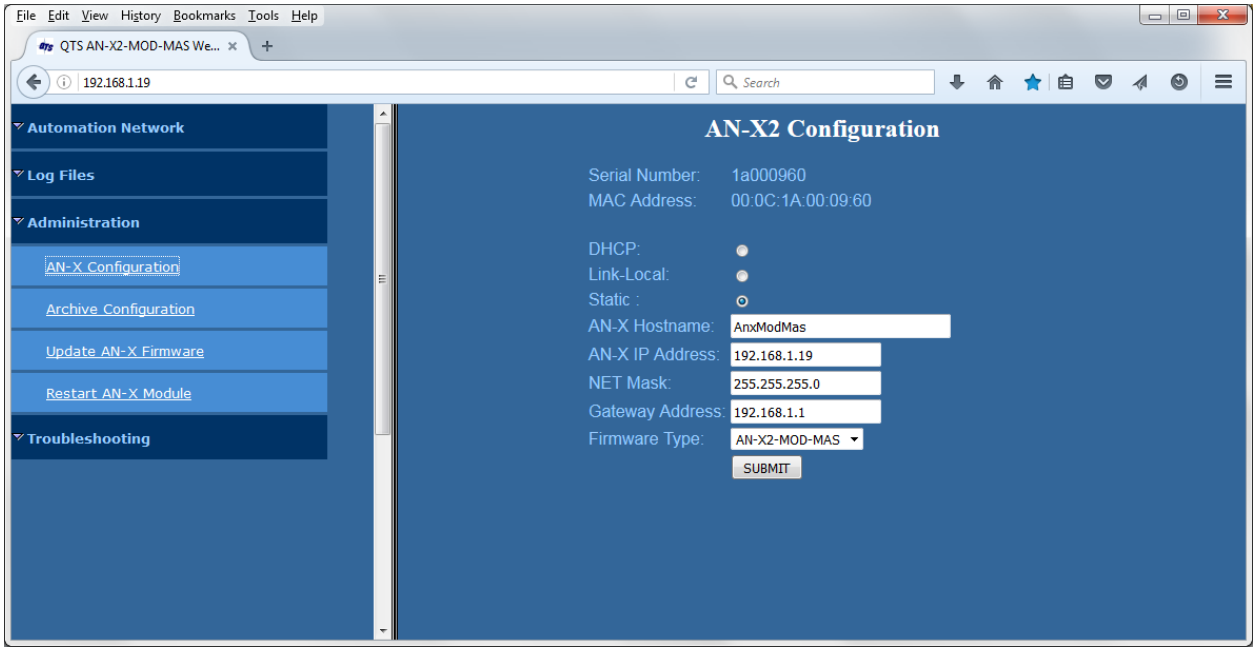
Administration Menu

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

AN-X IP Configuration

You can change the AN-X IP configuration from the web interface. This requires that you know the currect IP address and can use it to access the web interface.

Select *Administration/AN-X IP Configuration*.



The top of the screen shows the serial number and MAC Address of the AN-X2 being configured.

Check either DHCP or Static.

DHCP

If the AN-X2 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 DHCP server.

When you submit the changes, if the AN-X2 does not find a DHCP server, it reverts to the default link local address 169.254.42.84 and repeatedly flashes the SYS LED 3 times red followed by a pause.

Static IP Address

To select a 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-X2. 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.

AN-X uses the hostname as a default ClxName when you perform an autoconfiguration. See pages 20 and 31.

Firmware Type

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 Modicon hardware.

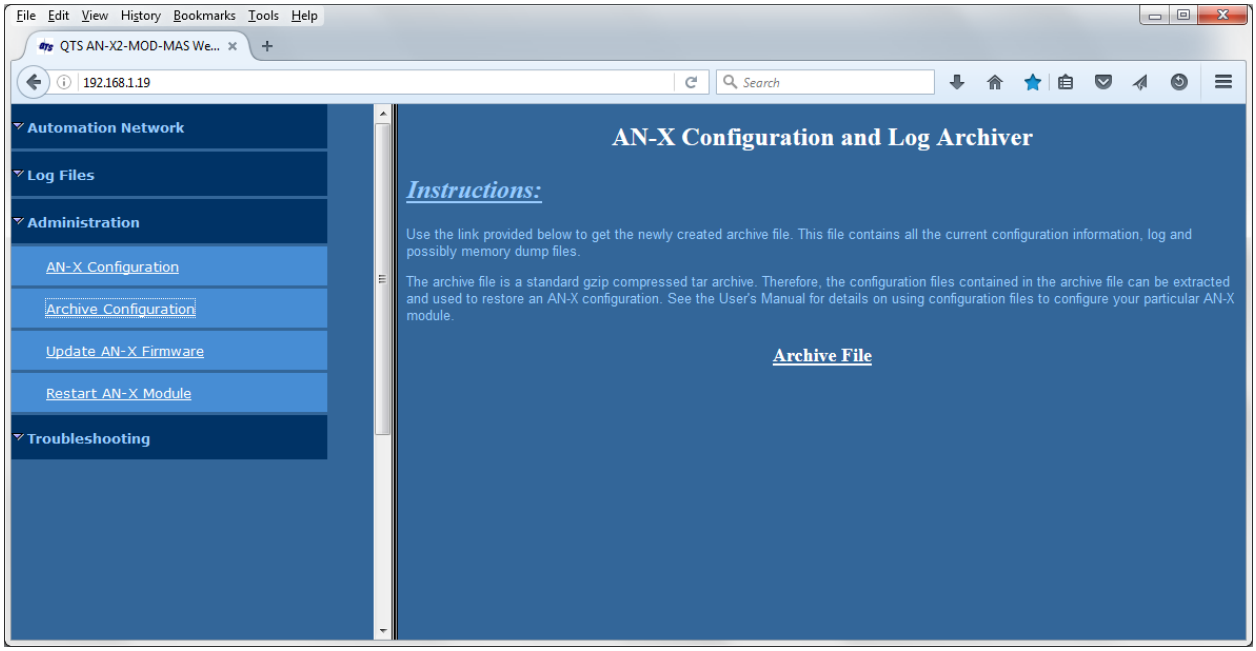
Submitting the Configuration

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.

Archive Configuration

You can archive all the current AN-X configuration files and log files from the web interface. The archive file is a standard gzip compressed 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.

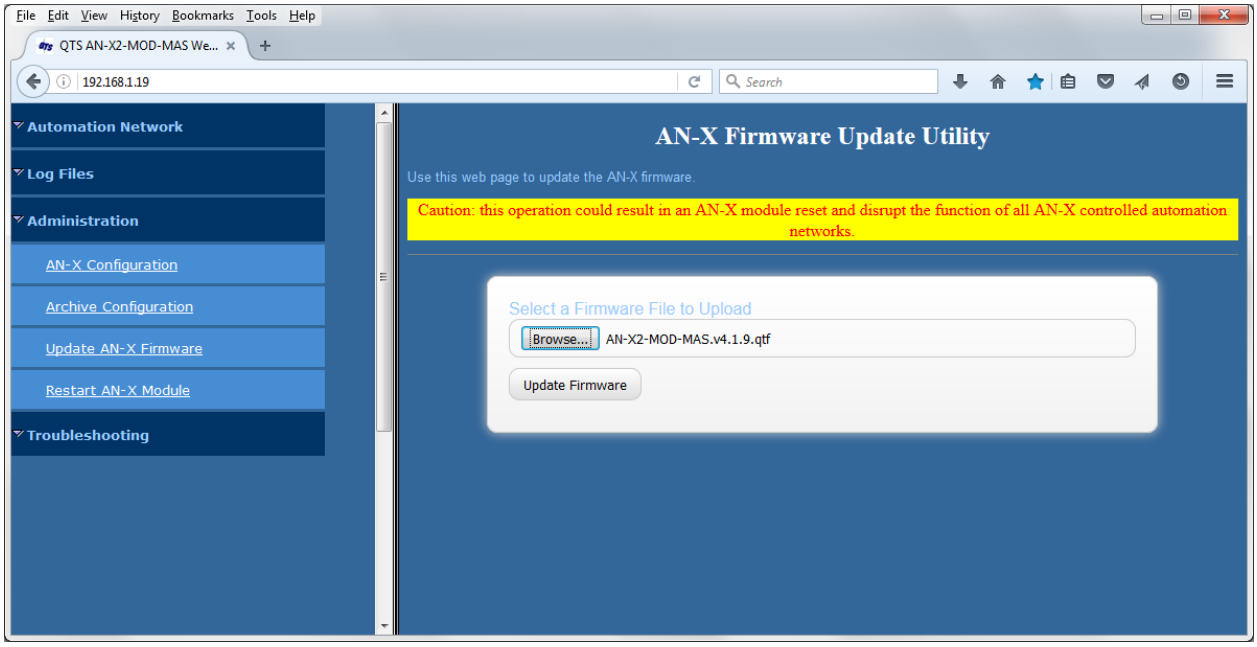
Select the destination where the file will be stored and save the file.

Update AN-X Firmware

Use *Update AN-X Firmware* to transfer a firmware file to the microSD card on the AN-X. Firmware files for the AN-X2 have names that begin with AN-X2 and have extension *.qtf.

WARNING!

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



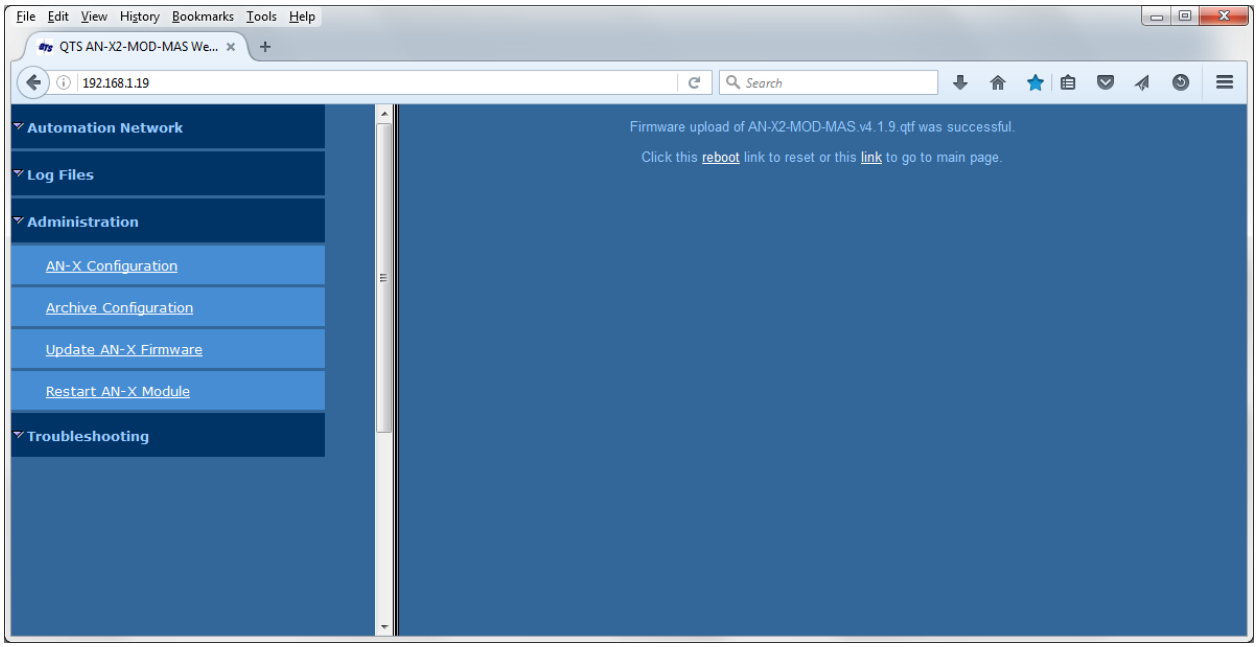
Browse to select the file, then click the *Update Firmware* button to transfer the file.

WARNING!

It is essential that you do not disrupt power while updating firmware, especially maintenance firmware, to the AN-X2 or while the AN-X2 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 status messages in the lower left corner of the page. 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.

Restart AN-X Module

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

Troubleshooting Menu

The troubleshooting menu contains information that is specific to an automation network, as well as support information.

Troubleshooting

LEDs

The AN-X2-MOD-MAS 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, labelled 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-X2 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-X2 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-X2 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-X2 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

There are two possible runtime LED modes.

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

IMPORTANT!

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 withjust the keyword LedModeDebug in the ControlLogix configuration file.

When you autoconfigure 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
Flashing green/off	Not all required connections open

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
Yellow	No configured Modicon I/O
Green	All configured drops are responding Some modules may be in error

Fatal Errors

AN-X2 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-X2 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-X2 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-X2 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-X2 or while the AN-X2 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-X2 is running 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.

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

Europe – Middle East – Africa

Languages Spoken: French, English

+33 (0) 5.34.36.87.20, support.EMEA@prosoft-technology.com

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+1.661.716.5100, support@prosoft-technology.com

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Languages Spoken: Portuguese, English

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

Latin America (Spanish Speaking Countries)

Languages Spoken: Spanish, English

+52.222.399.6565, latinam@prosoft-technology.com

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.