AN-X3-PBS-DRV

Profibus DP

Ethernet/IP Drive

Gateway

User Manual

A product of Quest Technical Solutions

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ProSoft Technology Inc.
www.prosoft-technology.com

Cautions

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards. In no event will Quest Technical Solutions be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Quest Technical Solutions does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

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

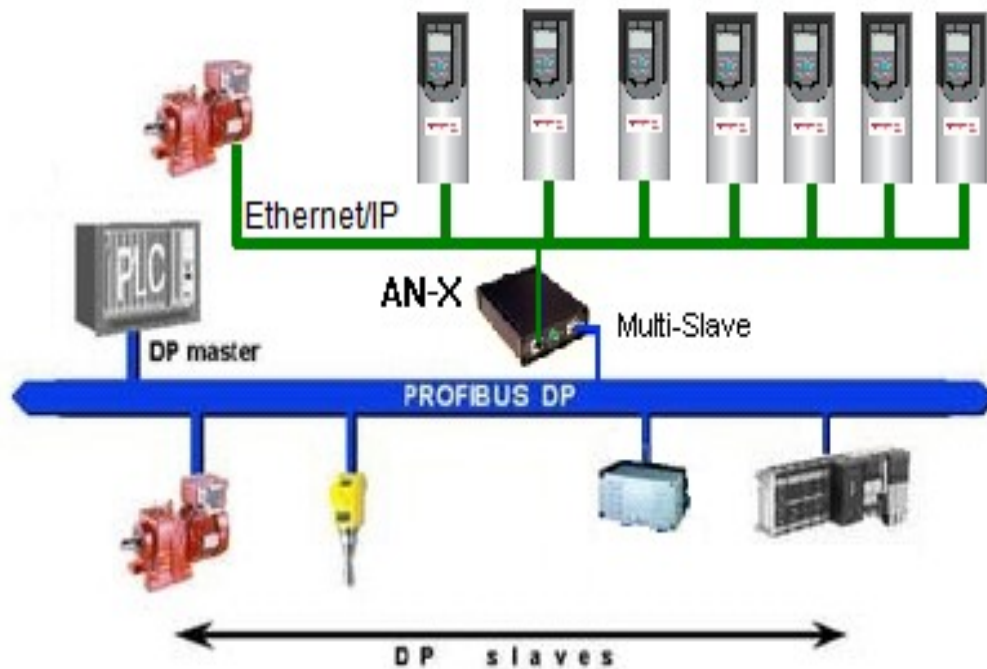|	
	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.
	These warnings help to:
WARNING!	• Identify a hazard
	• Avoid the hazard
	• Recognize the consequences
IMPORTANT!	Identifies information that is especially important for successful application and understanding of the product.
TIP	Identifies information that explains the best way to use the AN-X3-PBS.

AN-X-PBS Module Overview

The AN-X3-PB module running AN-X3-PBS-DRV firmware (referred to hereafter as AN-X) acts as a gateway between a Profibus DP Master and Ethernet/IP motor drives and other Ethernet/IP devices that support Scheduled Connections.

The AN-X supports the following:

- Data re-mapping – move data to/from any position in the frame
- Int/Dint to Int/Dint with integer multiply and divide
- Int/Dint to Real with real multiply
- Real to Int/Dint with real multiply
- Real to Real with real multiply
- Single-bit copy with invert option

The AN-X module has a web interface for configuration of Profibus and Ethernet properties.

Profibus DP

The AN-X3-PBS-DRV module connects directly to a Profibus network.

The module:

- Acts as one to eight Active DP Slave Nodes, each mapped to an Ethernet/IP drive
- Emulates any Device ID
- HMI Firmware allows capture of existing nodes I/O size and Device ID
- Maintains Profibus DP Slave Node list
- Maintains Profibus Diagnostic Counters
- Supports baud rates from 9600 bps to 12 Mbps (12m 6m 3m 1m5 500k 187k5 93k75 19k2 9k6)

Ethernet/IP Scheduled Connections

The AN-X is an Ethernet/IP Scheduled Connection Originator.

Each scheduled connection can have up to:

250 INTs or 125 DINTs or REALs of input data, in any combination

248 INTs or 124 DINTs or REALs of output data, in any combination.

Hardware Features

The module has:

- LEDs to indicate the status of the connection to the Ethernet, its own internal state, and the state of the Profibus DP Slaves on the network
- An Ethernet RJ45 connector
- A 9-pin D Shell connector to connect to the Profibus network
- A 3-pin Phoenix power connector
- A microSD card for storage of configuration data and firmware

Package Contents

- AN-X3-PB module
- Phoenix Power connector

Using the MicroSD Card

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

There are no restrictions on the size or speed of the card.

The format must be FAT-16 or FAT-32.

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

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

TIP	The most recent firmware for the AN-X is available at qtsusa.com/dist

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.

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).

Installation

Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

WARNING!

Electrostatic discharge can damage integrated circuits and 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 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.
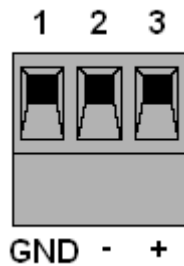
Power consumption is 160 mA @ 12VDC or 80 mA @ 24VDC.

The part number for the power connector is:

Phoenix 1757022 (Old part number: MSTB 2.5/3-ST-5.08)

Profibus Cabling and Termination

Use a cable with a standard Profibus 9-pin connector to connect the module to the network.

The network must be terminated at the physical ends of the network. There should be two and only two terminators on the network.

Ethernet Cabling

The AN-X has a standard RJ45 connector for connecting to Ethernet.

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

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

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.

<table>
<tr><td><strong style="color:red">IMPORTANT!</td><td>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.</td></tr>
</table>

** 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 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.
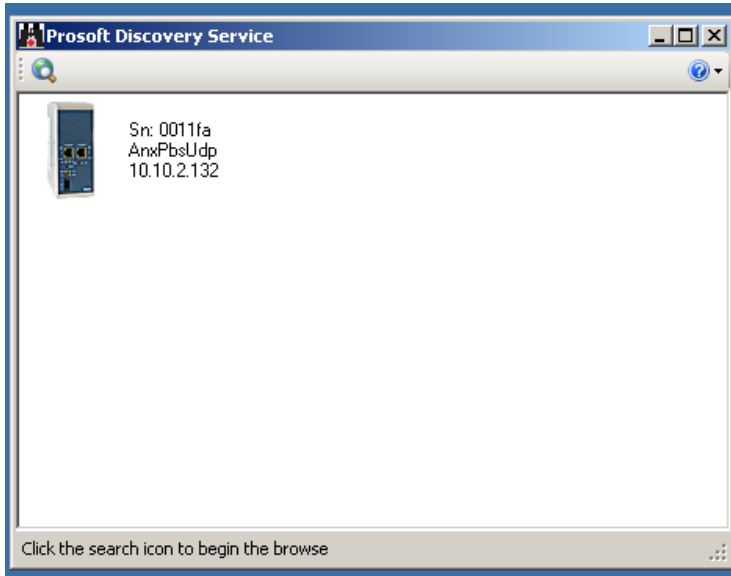
Right click on the module icon and choose 'Assign Temporary IP'.
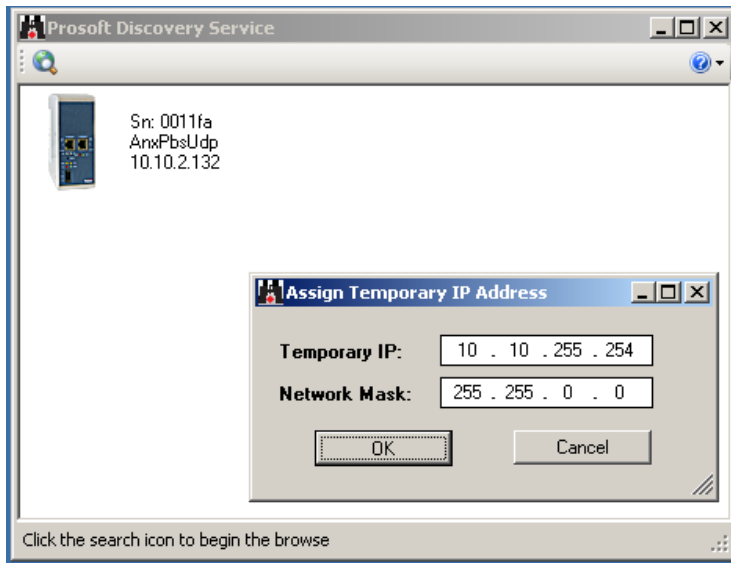
Generally you can just use the default PDS Temporary IP.

Select '*OK*', then use the Temporary IP address in your web browser to access the module and configure a permanent IP address with the web interface (see page 14).

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 your 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 IP/FW 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 LED, see page 37.

Sample config.txt files

DHCP

```
IP: DHCP
Hostname: AnxPbsUdp
Firmware: AN-X3-PBS-DRV
```

Static IP Address

```
IP: 10.10.2.132
NetMask: 255.255.0.0
DefGtwy: 10.10.0.1
HostName: AnxPbsUdp
Firmware: AN-X3-PBS-DRV
```

Web Page IP Configuration

Select 'Administration/AN-X IP/FW Configuration'.

The AN-X IP/FW 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 LED 3 times red followed by a pause (see page 37).

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.

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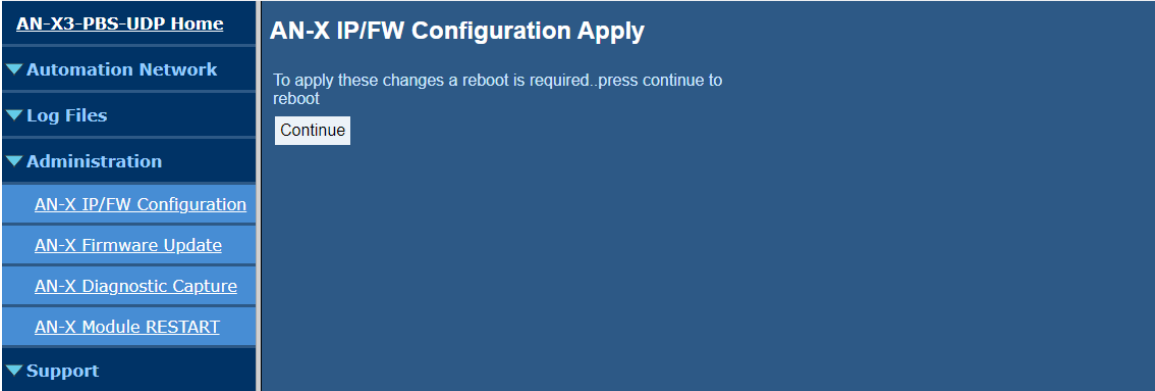
Click Continue to restart the AN-X3, then wait until the AN-X has completely restarted before continuing.

If you have changed the IP address, you will need 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 page 13).

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 website.

  qtsusa.com/dist/AN-X3 (AN-X3-PBS-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.

Configuration

The AN-X3-PBS-DRV Module is configured using a zip file that includes, at least, the following:

- AnxPbsDrvCfg.txt: The top-level configuration text file that may include other Template files.

The zip file may also include Template files for repeating devices and mappings.

For example:

- EthDev_*.csv: Ethernet Device files that define Ethernet/IP device parameters for specific drives or devices.

- EthDef_*.csv: Ethernet Definition files that define Ethernet/IP I/O sizes and tags.

- PbsDef_*.csv: Profibus Mapping files that map Profibus I/O (PZD) to Ethernet/IP tags or data.

* Note: EthDev information may be in a separate file or included in the EthDef file.

Choose a Configuration Sample that matches your application as much as possible.

'Automation Network/Configuration Samples' or use this link: QTS Web Page Samples
1. Create/edit the configuration file and templates with a text editor in a single folder.

2. Zip the files.

3. Send the zip file to the AN-X3-PBS-DRV Module.

Choose your Configuration zip file, then select '*Send zip File to AN-X*'.

```
PowerFlex70.zip (2010 bytes, application/x-zip-compressed) saved.File transfer Complete...

Restarting RIO DRV Ethernet/IP server...Restart Complete...


Configuration File:
; PowerFlex 70 Top Level Configuration
;----------------------------------------------------------------
; Top Level drive configuration file
; Options, Profibus Baud & Slave definitions
; Template links to:
; - EthDev Ethernet/IP device parameters (may be included in EthDef)
; - EthDef Ethernet/IP mapping tags, may include device parameters
; - PbsDef Profibus Slave mappings to Ethernet/IP tags
;----------------------------------------------------------------

BaudRate 12m
FaultPbSlave      ; Fault Profibus Slave Node if Ethernet/IP Target is not active

;     Node ILen OLen DeviceID
PbSlave 10   4    4 0x08a5    ; Replace Node, Lens and DeviceID with Profibus drive being replaced
PKWLen  0                     ; PKW Header Int Len (0 or 4), PZD DataOffset: 0 PKW, 2 PZD
Name "PF70_198"              ; Replace with a name appropriate to the process
IpAddr 10.10.0.198           ; Ethernet/IP drive IP address
RPI 10                        ; 1 to 750ms, as supported by Ethernet/IP drive
Template, EthDef_PF70_20CE    ; include file that defines drive Ethernet tags
Template, PbsDef_PF70         ; include file that maps Profibus I/O to Ethernet/IP tags
EndPbSlave
```

```
Configuration Log:
AN-X3-PBS-DRV Configuration Ver 4.1.1

Baud Rate   12m

Fault Profibus Slave Node if Ethernet/IP Target is not active

--+-Profibus-------+-Ethernet/IP---------------+
Cn|Slv|ByteLen|Slv |               |  |ByteLen|
 #|Nde|Inp|Out|ID  |Target IP      |RPI|Inp|Out|Name
==+===+===+========+===============+===+===+===+====================
 0| 10   4    4 08a5|10.10.0.198      10  10  10|PF70_198
==+===+===+========+===============+===+===+===+====================
Configuration Successful
Starting Profibus...
```

The top-level Configuration File sent is shown along with the Configuration Log that shows the results of the configuration.

Configuration File Format

```
;------------------------------------------------------------------
; AnxPbsDrvCfg.txt is the top-level configuration file and must always
; exist in the zip file.
; Options, Profibus Baud & Slave and mappings.
; Template links to:
; - EthDev Ethernet/IP device parameters (may be included in EthDef)
; - EthDef Ethernet/IP mapping tags, may include device parameters
; - PbsDef Profibus Slave mappings to Ethernet/IP tags
; *** Note: Although Template files have a csv extension, they MUST be
;           edited with a text editor and commas are not required!
;------------------------------------------------------------------

; Anything after a semicolon is considered a comment and is ignored

; Template files are simple "Include" files.
; Configuration commands can all be in the top level AnxPbsDrvCfg.txt
; file, but repetitive and device specific commands and mappings may
; be moved to Template files and included several times in the top level

; Configuration Commands are not case sensitive.
; The following Configuration Commands are supported:

; --- Specify the Baud Rate of the connected Profibus Network.
BaudRate <baud>
    <baud> is 12m, 6m, 3m, 1m5, 500k, 187k5, 93k75, 19k2 or 9k6
    Example:
    BaudRate 12m

; --- Fault Profibus Slave Node if Ethernet/IP Target is not active
FaultPbSlave

; --- Include Template File (optional)
Template <TplFile>
    <TplFile>        Template file to be included in-line - '.csv' is added
    Example:
    Template EthDef_PowerFlex_40   ; include file that defines drive Ethernet tags

; --- Begin Profibus Slave Configuration
PbSlave <ProfiNode> <InpByteLen> <OutByteLen> <SlaveDeviceID>
    <ProfiNode>      0-125
    <InpByteLen>     0-244 bytes
    <OutByteLen>     0-244 bytes
    <SlaveDeviceID> Usually hex (0x). Must match Slave Device ID configured in
                     Profibus Master. Set to Device ID of replaced Profibus drive.
                     For testing, QTS Device ID may be used (0x08a5).
    Example:
    PbSlave 11    8    8 0x08a5

; --- PKW Header integer Length - Siemens parameter mechanism
PKWLen  <IntLen>
    <IntLen>         0-120 integers, usually 0 or 4
                     Pbs Mappings (PZD Data) are offset by this number

; --- Scheduled Connection Name
Name "<Name>"
    <name>           User defined name shown on 'Monitor Ethernet/IP' web page
    Example:
    Name "ACS880_198"

; --- Ethernet/IP Target Device IP Address
IpAddr <IPAdress>
    Example:
    IpAddr 10.10.0.198

; --- Requested Packet Interval for Ethernet/IP Scheduled Connection
RPI <Time>
    <Time>           1 to 750ms
    Example:
    RPI 10
```

```
; --- Minimum Requested Packet Interval supported by Ethernet/IP Target Device
MinRPI <Time>
    <Time>          1 to 750ms Usually defined in EthDev file to limit RPI value in
                               top level configuration file. Device manufacturer my
                               specify this. Default is 1.
    Example:
    MinRPI 1

; --- Ethernet/IP Target Device Product Key Definition
Key <VendID> <ProdType> <ProdCode> <MajorRev> <MinorRev>
    <VendID>        Vendor ID - 0x0001 for Rockwell
    <ProdType>      Product Type
    <ProdCode>      Product Code
    <MajorRev>      Major Rev - prefix with 'c' for compatible mode
    <MinorRev>      Minor Rev
    ; Product Key information may be provided by the Device manufacturer.
    ; It can also be obtained from RSLinx or a *.eds file.
    ; If not defined, no Product Key is sent and Target Device may or
    ; may not accept the connection.
    Example:
    Key 0x0001 0x007B 0x490 c3 2

; --- Ethernet/IP Assembly Instance
AssemIns <Instance>
    <Instance>      1 to 65535 - Usually 4 or 6, defined by Device manufacturer
    Example:
    AssemIns 6

; --- Ethernet/IP Output or Originator to Target Connection Point
OutConnPt  <ConnPnt>
O_T_ConnPt <ConnPnt>
    <ConnPnt>       1 to 65535 - defined by Device manufacturer
    Example:
    OutConnPt 2

; --- Ethernet/IP Input or Target to Originator Connection Point
InpConnPt  <ConnPnt>
T_O_ConnPt <ConnPnt>
    <ConnPnt>       1 to 65535 - defined by Device manufacturer
    Example:
    InpConnPt 1

; --- CIP Path to Ethernet/IP Device
CipPath <CipPath>
    <CipPath>       Path to Ethernet/IP Target - Usually not needed since device is
                    on the local Ethernet network.
    Example:
    CipPath  0x01  0    ; Port 1 (Backplane), Slot 0

; Configuration Integer value(s) sent with Forward Open
CfgInt  <CfgVal>
CfgDint <CfgVal> ...
    <CfgVal>        Int/Dint Val, 0x for hex
    Examples:
    CfgInt  0x0023 0x0054 0x0000 1 2 -3 -4 0x1234
    CfgDint 0x0x12345678 -1000 1000 0x00000000

; --- Begin Inputs Configuration - Optional Ethernet/IP Input/T_O Length
Inputs [EIP_InpLen]
    [EIP_InpLen]    2 to 502 - Ethernet/IP Input Length in bytes
    ; Inputs/EndInputs can occur many times per device
    ; [EIP_InpLen] Specified once per device
    ; Len includes 2 byte CIP Sequence Number
    Example:
    Inputs 10   ; ByteLen: 'Seq'2 + 'StsHdr'4 + 'Payload'4 (2 int)

; --- End Inputs Configuration
EndInputs

; --- Begin Outputs Configuration - Optional Ethernet/IP Output/O_T Length
Outputs [EIP_OutLen]
    [EIP_OutLen]    6 to 502 - Ethernet/IP Output Length in bytes
```

```
        ; Outputs/EndOutputs can occur many times per device
        ; [EIP_OutLen] Specified once per device
        ; Len includes 2 byte CIP Sequence Number + 4 byte Run/Idle Header
        Example:
        Outputs 10  ; ByteLen: 'Seq'2 + 'Run/IdlHdr'4 + 'Payload'4 (2 int)

; --- End Outputs Configuration
EndOutputs

; --- End Profibus Slave and Ethernet/IP Device configuration
EndPbSlave

; Mappings
----------

; --- Define Ethernet/IP I/O Tag - Optional
EthTag <TagName> <EthAddr>
    <TagName>   Unique for Device, separate for Inputs and Outputs
                Up to 63 chars long
                Alpha Numeric plus '_'
                Not case sensitive
                Max 256 tags for Inputs and 256 tags for Outputs per Device
    <EthAddr>   Int[Ofs]    Map 16-bit integer
                Dint[Ofs]   Map 32-bit integer
                Real[Ofs]   Map 32-bit real value (IEEE 754)
        [Ofs]   Int (16-bit) offset within Ethernet Frame, after 2 byte Sequence and 4 byte Header
                Int must be 16-bit aligned
                Dint/Real must be 32-bit aligned (even words)
                Modifiers:
                Header Start before Status Header (Inputs) or Run/Idle header (Outputs)
                Byte   Offset is in bytes
                Int    Offset is in Ints  (16-bit) Default
                Dint   Offset is in Dints (32-bit)
                Real   Offset is in Reals (32-bit)
        .<bit>  Bit number 0 to 15 for Int, 0 to 31 for Dint

    Ethernet/IP Output data always includes a 32-bit Run/Idle header, so Output data cannot be mapped there.
    Ethernet/IP Input data may include a 32-bit Status header, many devices don't map data there.
    The 'Header' modifier allows mapping to the header areas.

    Examples:
    EthTag Drive_Ready  int[Header 0].0    ; Byte ofs 0 + (0*'Int'2)
    EthTag Drive_Over   int[Header 1].0    ; Byte ofs 2 + (1*'Int'2)
    EthTag Drive_Under  int[Header 2].0    ; Byte ofs 4 + (2*'Int'2) same as int[0] below
    EthTag Drive_Active int[      0].0     ; Byte ofs 4 'Header'4 + (0*'Int'2) Same as int[Header 2] above

    EthTag Drive_Speed  real[Real  2].0    ; Byte ofs 12 'Header'4 + (2*'Real'4)
    EthTag Drive_Accel  int[Byte  8].0     ; Byte ofs 12 'Header'4 + (8*'Byte'1)
    EthTag Drive_Decel  Dint[Int   4].0    ; Byte ofs 12 'Header'4 + (4*'Int'2)
    EthTag Drive_Under  int[Dint   2].0    ; Byte ofs 12 'Header'4 + (2*'Dint'4)

    [Header x]: 0 1 2 3 4...
          [x]:    0 1 2...

; --- Map Profibus Input Data
 PbsInt[PbsOfs] <AsignOper> <EthTag> or <EipAddr> [Mult] [Div]
PbsDint[PbsOfs] <AsignOper> <EthTag> or <EipAddr> [Mult] [Div]
PbsReal[PbsOfs] <AsignOper> <EthTag> or <EipAddr> [Mult] [Div]
    [PbsOfs]    Profibus Input Int (16-bit) offset
                Dint/Real must be even (32-bit aligned)
    <AsignOper> <- Direct Data
                {- Swap   Data - Int 01 to 10 Dint 0123 to 3210
                <~ or {~  Invert (Bits only)
    <EthTag>    As defined above
    <EthAddr>   As defined above
    [Mult]      Int/Dint - 32-bit integer, Real
    [Div]       Int/Dint only, 1 to 65535

    Supports:
    Int  from Int
    Int  from Dint
    Dint from Dint
    Dint from Int
```

```
    Int  from Real
    Dint from Real
    Real from Int
    Real from Dint
    Real from Real
    All Int to Dint are sign extended.

    Examples:
    PbsDint[0].03   <- Drive_Ready   ; Ethernet Tag
    PbsDint[0].04   <~ dint[0].28     ; Ethernet Address, Invert
    PbsInt[1]       {- OutputFreq   *32767/600  ; Int from Int with swap and int Mult Div
    PbsReal[8]      <- dint[8]  *1000           ; Real from Dint with swap real mult
    PbsDint[10]     {- dint[10] *100/4          ; Dint from Dint with swap and int Mult Div

; --- Map Profibus Output Data
 PbsInt[PbsOfs] [Mult] [Div] <AsignOper> <EthTag> or <EipAddr>
PbsDint[PbsOfs] [Mult] [Div] <AsignOper> <EthTag> or <EipAddr>
PbsReal[PbsOfs] [Mult] [Div] <AsignOper> <EthTag> or <EipAddr>
    [PbsOfs]    Profibus Output Int (16-bit) offset
                Dint/Real must be even (32-bit aligned)
    <AsignOper> -> Direct Data
                -> Swap    Data - Int 01 to 10 Dint 0123 to 3210
                ~> or ~}  Invert (Bits only)
    <EthTag>    As defined above
    <EthAddr>   As defined above
    [Mult]      Int/Dint - 32-bit integer, Real
    [Div]       Int/Dint only, 1 to 65535

    Supports:
    Int  to Int     with dint Mlt & Div
    Int  to Dint    with dint Mlt & Div
    Dint to Dint    with dint Mlt & Div
    Dint to Int     with dint Mlt & Div
    Int  to Real    with real Mlt
    Dint to Real    with real Mlt
    Real to Int     with real Mlt
    Real to Dint    with real Mlt
    Real to Real    with real Mlt
    All Int to Dint sign extended

    Examples:
    PbsDint[0].03   -> Drive_Ready   ; Ethernet Tag
    PbsDint[0].04   ~} dint[0].28     ; Ethernet Address, Swap & Invert
    PbsInt[1]       -} OutputFreq   *32767/600  ; Int to Int with swap & int Mult Div
    PbsReal[8]      -} dint[8]  *1000           ; Real to Dint with swap real Mult
    PbsDint[10]     -} dint[10] *100/4          ; Dint to Dint with swap and int Mult Div
```

Configuration View

Select '*Automation Network/Configuration View*' to view the current top-level configuration and configuration log. The current configuration zip file can also be retrieved.

Configuration View

Configuration File:

```
; PowerFlex 70 Top Level Configuration
;----------------------------------------------------------------
; Top Level drive configuration file
; Options, Profibus Baud & Slave definitions
; Template links to:
; - EthDev Ethernet/IP device parameters (may be included in EthDef)
; - EthDef Ethernet/IP mapping tags, may include device parameters
; - PbsDef Profibus Slave mappings to Ethernet/IP tags
;----------------------------------------------------------------

BaudRate 12m
FaultPbSlave     ; Fault Profibus Slave Node if Ethernet/IP Target is not active

;      Node ILen OLen DeviceID
PbSlave 10   4    4 0x08a5      ; Replace Node, Lens and DeviceID with Profibus drive being replaced
PKWLen  0                       ; PKW Header Int Len (0 or 4), PZD DataOffset: 0 PKW, 2 PZD
Name "PF70_198"                 ; Replace with a name appropriate to the process
IpAddr 10.10.0.198              ; Ethernet/IP drive IP address
RPI 10                          ; 1 to 750ms, as supported by Ethernet/IP drive
Template, EthDef_PF70_20CE      ; include file that defines drive Ethernet tags
Template, PbsDef_PF70           ; include file that maps Profibus I/O to Ethernet/IP tags
EndPbSlave
```

Retrieve Current Configuration (right-click - save link as)

Configuration Log:

```
AN-X3-PBS-DRV Configuration Ver 4.1.1

Baud Rate   12m

Fault Profibus Slave Node if Ethernet/IP Target is not active

--+-Profibus-------+-Ethernet/IP---------------+
Cn|Slv|ByteLen|Slv |              |  |ByteLen|
 #|Nde|Inp|Out|ID  |Target IP     |RPI|Inp|Out|Name
==+===+===+========+==============+===+===+===+===================
 0| 10   4    4 08a5|10.10.0.198     10  10  10|PF70_198
==+===+===+========+==============+===+===+===+===================
Configuration Successful
Starting Profibus...
```

Configuration Samples

Select '*Automation Network/Configuration Samples*' to view and retrieve Samples from the distribution image on the QTS web page.

Index of /dist/AN-X3/PB/PBS-DRV/Templates

Name	Last modified	Size	Description
Parent Directory		-	
ABB/	2025-07-05 17:56	-	
Altivar/	2025-07-05 17:56	-	
Cognex/	2025-07-05 17:56	-	
DeltaRMC75E/	2025-07-05 17:57	-	
FANUC/	2025-07-05 17:57	-	
Festo/	2025-07-05 17:57	-	
MettlerToledo/	2025-07-05 17:57	-	
Numatics/	2025-07-05 17:56	-	
PowerFlex40/	2025-07-05 17:56	-	
PowerFlex70/	2025-07-05 17:57	-	
PowerFlex523/	2025-07-05 17:57	-	
PowerFlex525/	2025-07-05 17:56	-	
PowerFlex753/	2025-07-05 17:57	-	
PowerFlex755/	2025-07-05 17:58	-	
PowerFlex7000/	2025-07-05 17:58	-	
PowerFlexDC/	2025-07-05 17:58	-	
RiceLake/	2025-07-05 17:58	-	
SEWEuroDrive/	2025-07-05 17:58	-	
Siemens/	2025-07-05 17:56	-	
Yaskawa/	2025-07-05 17:56	-	
zArchive/	2025-07-05 17:58	-	

Capture Profibus I/O Size & Device ID

Existing Profibus Node Device IDs and I/O sizes may be captured by temporarily using the AN-X3-PBS-HMI firmware.

See the 'Profibus DP Auto Config' section in AN-X3-PBS-HMI_UserManual_vx.x.pdf.

Note that I/O sizes can be captured without restarting the Profibus Master, but in order to capture Device IDs, the Profibus Master must be restarted.

Monitor

Monitor Profibus DP

To monitor Profibus Diagnostic Counters, Active Node List and Profibus DP I/O data, select '*Automation Network/Monitor Profibus DP'*.

Monitor Profibus DP

Clear Diagnostics   Refresh   ☑ Auto Refresh   ☑ Hex   ☑ Lo-Hi   ☐ 8-Bit   ☑ 16-Bit   ☐ 32-Bit

Profibus Diagnostics

| TX Good | 6727 | RX Good | 41483 | | | Global Control | RUN |

Errors

Stop Bit	0	Parity Bit	0	Start Delim	0	Repeat	0
Under-run	0	Check Sum	0	End Delim	0	Over-run	0
Dup Frame	0	Tns Over-run	0	Long Frames	0	Long Node	0

2	3	4	5	6	7	8	9	All	Act	Good	None
☐	☐	☑	☑	☑	☑	☑	☑	☐	☐	☐	☐

Node 4	Active		Good				OLen	60	ILen	60
Out	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
20	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Inp	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
20	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Node 5	Active		Good				OLen	24	ILen	24
Out	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000								
Inp	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000								

Node 6	Active		Good				OLen	24	ILen	24
Out	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000								
Inp	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000								

Node 7	Active		Good				OLen	24	ILen	24
Out	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000								
Inp	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

Standard Profibus Diagnostic Counters are shown as well as some specific to the AN-X.

If Error Counters are incrementing, this may indicate wiring, grounding or electrical noise problems.

A list of Active DP Slave Nodes is shown as well as check boxes to select DP Slave Nodes to monitor.

Data from any or all Active or Monitored Profibus DP slaves may be displayed.

The Mode (Active or Monitor) and State (Good or Timeout) is also shown for displayed Nodes.

Data can be displayed in Hexadecimal or Signed Integer.

Data display size can be 8, 16 or 32 bit.

For 16 and 32 bit, byte ordering can be low to high (Lo-Hi, Little Endian) or high to low (Big Endian).

Monitor Ethernet/IP

To monitor Ethernet/IP Scheduled Connections, select '*Automation Network/Monitor Ethernet/IP*'.

Monitor Ethernet/IP
Clear Counters   Refresh Counters   ✔ Auto Refresh

TxFrms	TxBusy	RxFrms	RxBusy	EthErrs	ErrType	PrtErrs	PrtType	PrtCon#	pid
7925	0%	7926	0%	0	00	0	OK	0	2638

Con	Name	State	RPI	Rx Avg	Rx Min	Rx Max	Rx Tout
0	IODintSlv 2	Act/Run	10.0	10.0	9.9	10.1	160.0
1	IODintSlv 3	Act/Run	10.0	10.0	9.9	10.1	160.0
2	IODintSlv 4	Act/Run	10.0	10.0	10.0	10.1	160.0
3	IODintSlv 5	Act/Run	10.0	10.0	9.9	10.1	160.0
4	IODintSlv 6	Act/Run	10.0	10.0	10.0	10.1	160.0
5	IODintSlv 7	Act/Run	10.0	10.0	9.9	10.1	160.0
6	IODintSlv 8	Act/Run	10.0	10.0	9.9	10.1	160.0
7	IODintSlv 9	Act/Run	10.0	10.0	9.9	10.1	160.0

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 Connection Statistics consist of:

Counter	Description
Connection number	0 to 15
Name	Name of 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

Profibus DP Log

The Profibus DP log shows events related to Parameter and Config frames from the Master during Slave initialization.

The Log is contained in two files that are rotated when they become full.

Ethernet/IP Log

The Ethernet/IP log shows messages and errors associated with Ethernet/IP communication.

This may be useful for troubleshooting Target Device Scheduled Connections.

System Info Log

The *System Info Log* records informational messages during AN-X startup and normal operation. This is mostly used by technical support and does not contain information useful to the end user.

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

The *Administration* menu contains items used to configure, control and update the AN-X.

AN-X IP/FW Configuration

See page 14 for details on setting the IP address.
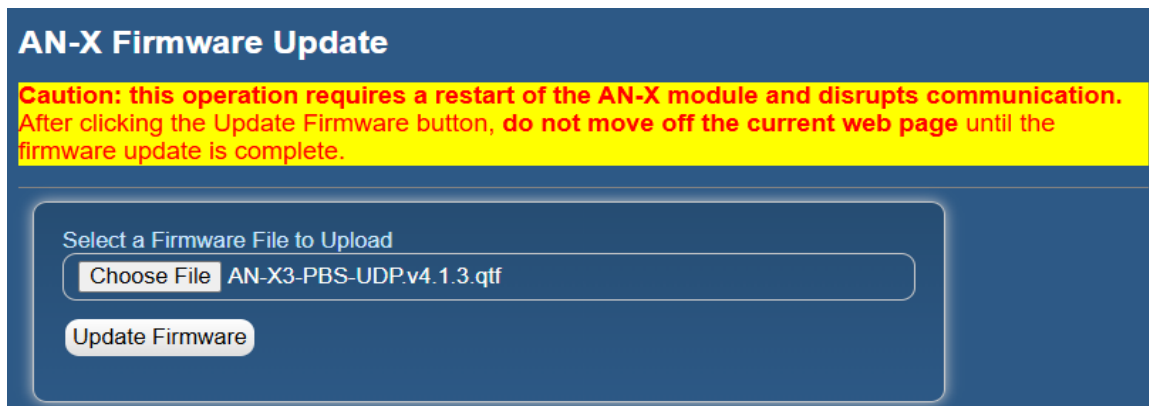
If other firmware images are available and on the microSD card, you can select this firmware with the '*Firmware Type*' Drop Down box.

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.

TIP   The most recent firmware for the AN-X is available at qtsusa.com/dist

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 re-initialization.

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

AN-X Firmware Update

Caution: this operation requires a restart of the AN-X module and disrupts communication.
After clicking the Update Firmware button, do not move off the current web page until the
firmware update is complete.

Select a Firmware File to Upload
Choose File AN-X3-PBS-UDP.v4.1.3.qtf

Update Firmware

Sending firmware file, please wait....13% complete

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

AN-X Firmware Update

Caution: this operation requires a restart of the AN-X module and disrupts communication.
After clicking the Update Firmware button, do not move off the current web page until the
firmware update is complete.

Select a Firmware File to Upload
Choose File AN-X3-PBS-UDP.v4.1.3.qtf

Update Firmware

Firmware sent ... waiting for validation and copy processes to finish (about a minute)...

AN-X Firmware Update

Caution: this operation requires a restart of the AN-X module and disrupts communication.
After clicking the Update Firmware button, do not move off the current web page until the
firmware update is complete.

Select a Firmware File to Upload
Choose File No file chosen

Update Firmware

Firmware update to AN-X3-PBS-UDP.v4.1.3.qtf was successful.

Click this **RESTART** link to restart the AN-X and run the new firmware version

Manual Firmware Update

AN-X Firmware qtf files can be copied and updated on the microSD manually.

- Remove the microSD and insert it into your computer. You should see the current qtf file (AN-X3-PBS-DRV.v4.1.1.qtf for example).

- Delete or change the name of the current qtf file (zzAN-X3-PBS-DRV.v4.1.1.qtf for example). Renaming may be useful in case we need to revert back to the previous version.

- Copy the new qtf file to the microSD.

- Remove the microSD from your computer and insert it back into the AN-X. Be careful not to insert it above the connector (see page 8).

TIP   The most recent firmware for the AN-X is available at qtsusa.com/dist

IMPORTANT!   Make sure there is only one qtf filename that starts with the '*Firmware Type:*' specified. If not, the AN-X may use the wrong one.

Diagnostic Capture

Use '*Administration/AN-X Diagnostic Capture*' to create an archive tar file that contains the current AN-X configuration and logs for use by technical support. There may be a slight delay while AN-X builds the archive file.

AN-X Diagnostic Capture

Instructions:

Use the link provided below to retrieve the newly created diagnostic capture file. This file contains all the current configuration information, logs etc.

The archive file is a standard tar file.

This file contains the current configuration, logs and other diagnostic information which is useful for troubleshooting by technical support staff.

Archive File

Click the Archive File link.

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

AN-X Module RESTART

Use the '*AN-X Module RESTART*' page to restart the AN-X module.

AN-X Module Restart

To restart the AN-X module hit the 'Restart Now' link.

Restart Now

Warning: Hitting the 'Restart Now' link will cause the AN-X module to restart.
All communication with Ethernet and automation networks will be disrupted.

Support Menu

Contact Information

The Support contains contact information and links if you need help with the AN-X.

Troubleshooting

LEDs

The AN-X3-PB has LEDs that indicate the state of the Ethernet connection, the overall module state and the connection to the Profibus 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 300 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 LED

The SYS 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 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.

Powerup/Reboot

SYS LED	Meaning
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

'Railroading' – SYS and NET LEDs

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

It railroads the LEDs red while it is copying new maintenance firmware files from the microSD card to flash memory.
* Make sure power is not removed while railroading red.

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

It railroads the LEDs green for 15 to 20 seconds as it starts normal production mode.

SYS and NET LEDs: Runtime

SYS – AN-X Status

The SYS is used by the AN-X operating system and software to indicate the state of configuration and Ethernet communication.

SYS LED	Meaning
Flashing green/off	One or more configured Scheduled Connection is not active
Flashing green/red	Unscheduled messaging, addressing or connection problem
Flashing red/off	Configuration file problem

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

NET LED – Network Status

The NET LED indicates the status of the Profibus DP Network.

NET LED	Meaning
Red	One or more AN-X DP Slaves has not been updated from the Profibus DP master within the Timeout period
Green	All AN-X DP Slaves are being updated successfully

Specifications

Parameter	Specification
Function	Gateway between Profibus DP and Ethernet/IP
Maximum Power Consumption	160 mA at 12 VDC, 80 mA at 24 VDC
Maximum Power Dissipation	2 Watts
Operational Temperature	0-50°C (32-122°F)
Storage Temperature	–40 to 85°C (–40 to 185°F)
Relative Humidity	5-85% 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

+60.3.2247.1898
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Languages Spoken: Spanish, English

+52.222.264.1814
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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 the 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 that have been modified or repaired without Quest Technical Solutions approval or that 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 instructions shall be a condition of this warranty.

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Revisions

Version	Date	Changes
1.1	July 7/25	Initial Release
1.2	July 8/25	Added words about Device ID emulation and capturing I/O sizes and Device IDs