



EtherNet/IP™

**ReadyLink™ EtherNet/IP™ LDT
with RapidRecall™**

Network LDT - Configuration Manual

EtherNet/IP™
conformance tested



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Manual Overview

The ReadyLink™ Network LDT manual will be divided into two separate manuals, one for Mechanical Installation & Wiring, and one for Network Configuration. This Network Configuration manual contains all of the details on how to configure the Network LDT, establish an IP address and how to interface into the Host network. For installation, wiring or specifications please refer to either 953N or 957N Mechanical Installation manuals.

NOTE: Ametek has checked the accuracy of this manual at the time it was approved for printing. This manual may not provide all possible ways of installing and configuring the LDT. Any errors or additional possibilities to the installation and configuration of the LDT will be added in subsequent editions. Comments for the improvement of this manual are welcome. Ametek reserves the right to revise and redistribute the entire contents or selected pages of this manual. All rights to the contents of this manual are reserved by Ametek.

Function of this Document

These operating instructions are designed to address the technical aspects of commissioning our Ethernet/IP™ Network LDT into the Host network. Please read the entire chapter before working with the Network LDT. These instructions are written for trained personnel who are responsible for commissioning Ethernet based sensors into the host network.



Turning on power - Note that the system may execute uncontrolled movement when power is first applied when the Network LDT is part of a closed loop system whose parameters have not yet been configured.

Contents

Introduction	3
Chapter 1 Dimensions.....	4
Chapter 2: Wiring Overview.	6
Chapter 3: Quick Start.....	8
Chapter 4: EtherNet/IP™ Network Overview	13
Chapter 5: Configuration Data / LDT Memory	18
Chapter 6: Web Server / Page	19
Chapter 7: How to Configure Ethernet/IP™ adapter with Studio 5000.....	20
Chapter 8: LED Summary	22
Chapter 9: Part Numbering	24



Introduction

AMETEK Factory Automation markets, engineers, and manufactures sensors and controls for demanding and harsh industrial environments. Products include GEMCO® linear and rotary sensors. Our sensors are absolute and never require homing or calibrating in the event of a power loss and are built in the USA to meet global application needs.

The ReadyLink™ EtherNet/IP LDT with RapidRecall™ is our newest linear displacement transducer (LDT) being developed with an EtherNet/IP network interface. The Network LDT provides maximum flexibility for installation and ease of use in demanding, high-performance, networked industrial applications. EtherNet/IP™ is an Industrial Ethernet implementation of the Common Industrial Protocol (CIP), managed by the Open DeviceNet Vendor Association (ODVA). EtherNet/IP™ was introduced in 2001 and today is the most developed, proven and complete industrial Ethernet network solution available for manufacturing automation. EtherNet/IP™ systems require only a single point network connection for both configuration and control, thus simplifying installation and wiring.

Our linear displacement transducer line utilizes advanced, proven Magnetostrictive technology to provide highly precise and absolute non-contact position feedback down to 1 micron resolution. We package these sensors to survive in the most demanding and hostile environments. The position of the magnet on the sensing element is precisely determined by a time of flight method. The LDT converts this position value where it is transmitted to the customer controller via the Ethernet Network.

The Network LDT supports Star, Line and Device Level Ring (DLR) topology and supports static IP address setting or DHCP (Dynamic Host Control Protocol). DLR provides device level network rerouting in the event of a break in the ring. The static IP address can be assigned via a PC, or the last octet can be set manually via three rotary DIP switches. There are five diagnostic LEDs located on the cover next to the connectors that indicate the status of the LDT and Network communication.

The AMETEK ReadyLink™ EtherNet/IP™ LDT is a smart device; it has a RapidRecall™ Configuration Module to help aid in the configuration of the LDT. This module can be used to help configure the static IP address of the LDT as well as other functions. The module has three rotary DIP switches that allow the user to configure how the IP address will be assigned. The RapidRecall™ module can also store all user configurations. Once the LDT has been configured, these settings can be uploaded to the module.

Data is communicated over the Ethernet Network using two types of messaging:

- I/O Messaging (Position, Velocity and Status Bits)
- Explicit Messages (Parameters & Configuration)

I/O Messaging is used for time critical data such as position, velocity and status bits. Explicit messages are used for configuration data such as position scaling, resolution and count direction, among other parameters. The Network LDT module conforms to the Encoder device profile device type 22h.

The Network LDT is available in two different package styles; the 953N is our Rod Style package that is suitable for installation into hydraulic cylinders, and our 957N Brik Low Profile Style package that incorporates the same electronics but is housed in an aluminum style extrusion.

The Ethernet Network LDT has three connectors. The incoming power is supplied via a 4-pin M12-A style connector. The Network communication will be through either of the two 4-pin M12-D coded connectors. There are diagnostic LED's located on the cover next to the connectors that will indicate the health of the LDT and its Network communication status.

The Network LDT is totally configurable and can be set for your exact needs. Parameters such as counting direction, position and velocity format, resolution, zero position, velocity upper and lower end limits as well as position end limits are all programmable.

Position Update

The position of the magnet along the active measuring range is precisely determined by a time of flight method. The Network LDT converts this position value where it is transmitted to the host controller via the Network. All displacement outputs are absolute and do not lose their position after loss of power.

LDT Position update frequencies are available up to 1,000 measurements per second (Length dependant). The network Requested Packet Interval (RPI) is configured in the host controller and is typically between 2mSec to 20mSec.

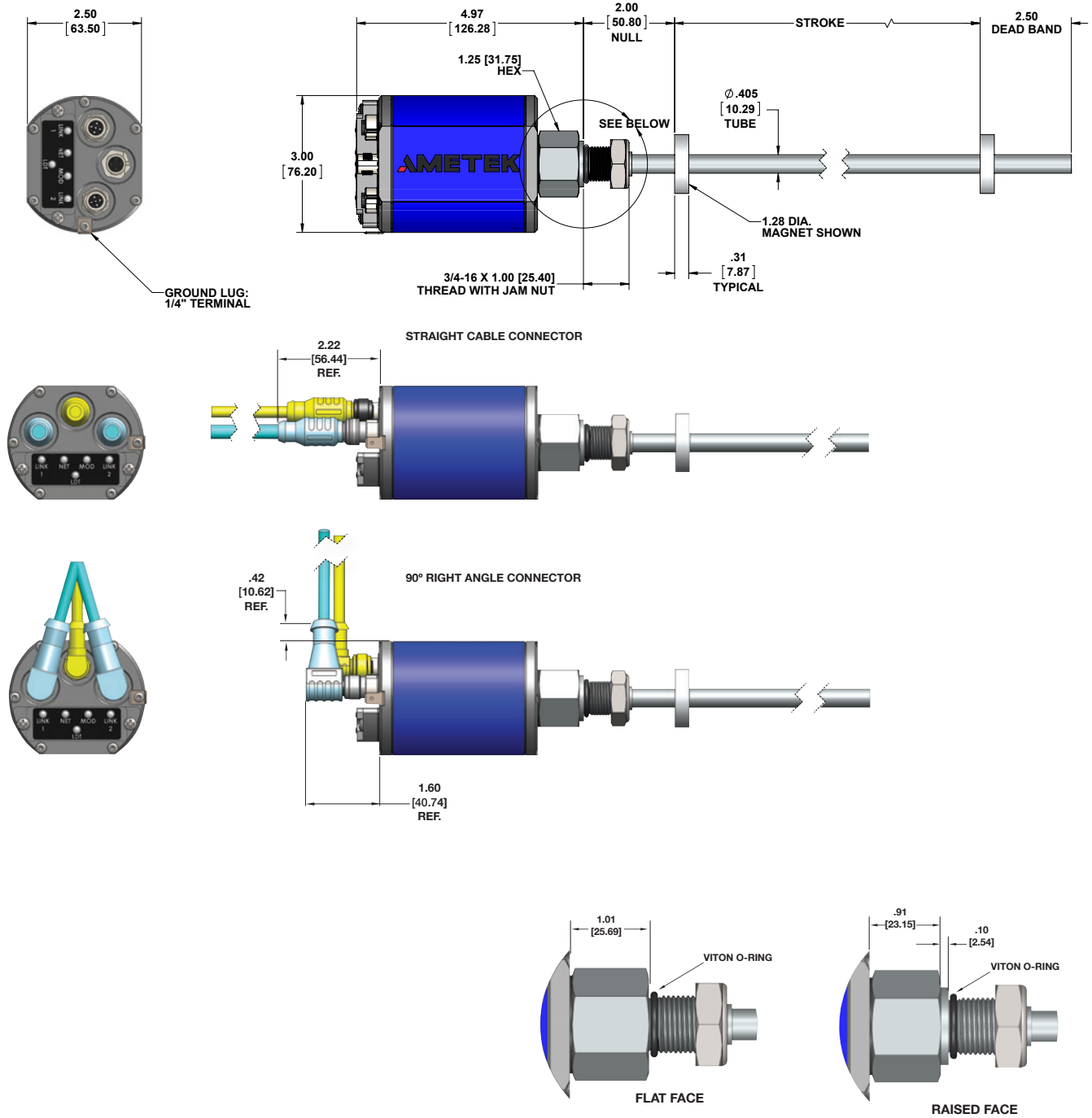
Counting Direction & Resolution

The Network LDT can be configured increasing, decreasing, position, or velocity counts, along with the desired resolution. These parameters will all be configured during the LDT Network configuration. Measure Direction Forward will increase counts as the magnet moves from the head of the LDT to the tip. The default zero position will be closest to the head of the LDT, but can be user configured at time of set up to be located anywhere along the active stroke range (Area between Null & Dead Bands). The resolution of the positional output is selectable and can be set for English (Imperial) or metric units.

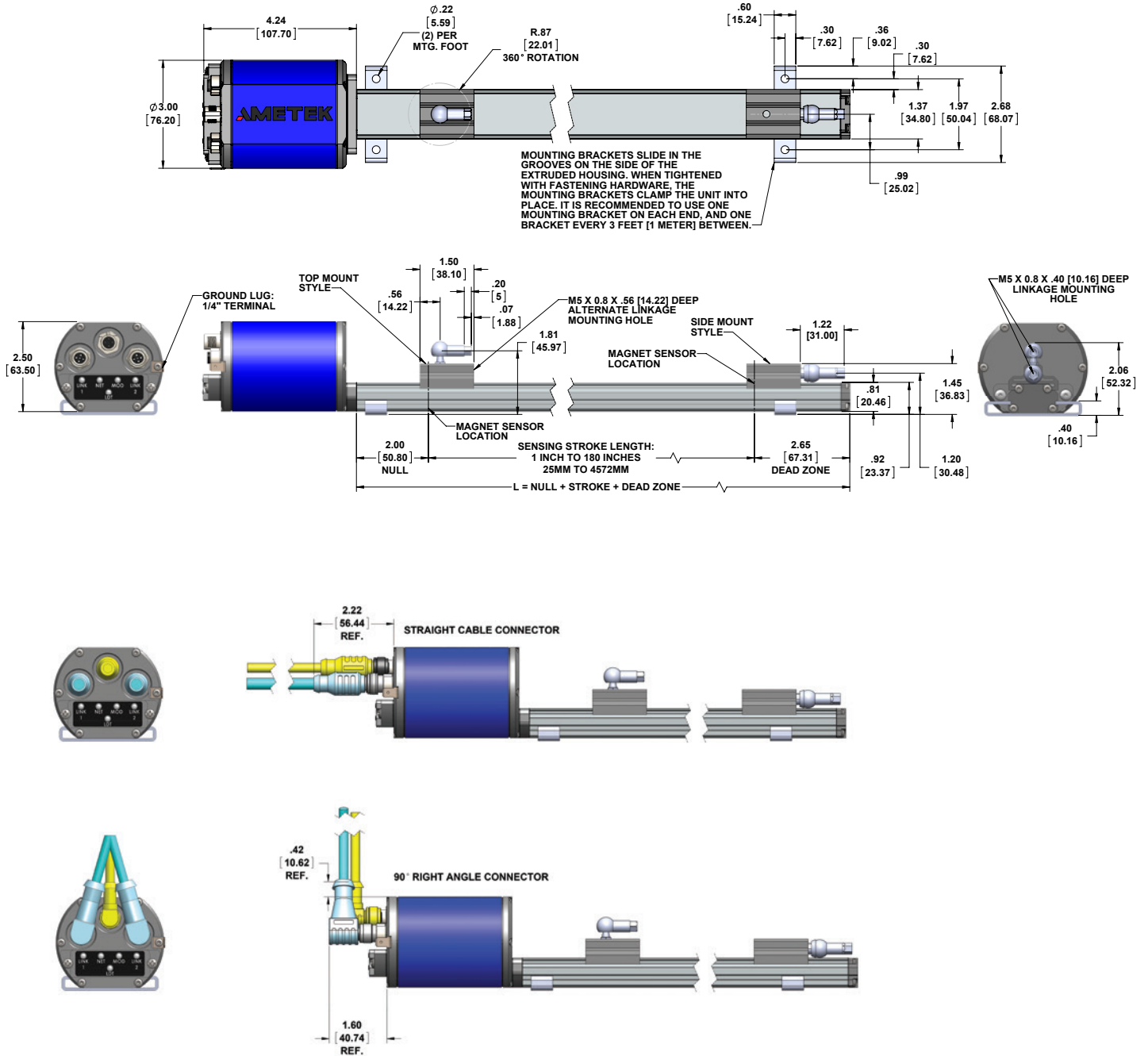
Network LDT Default Settings	
Position Measurement	Increasing from Head to Tip
Position Format	Inches
Position Measuring Increment	0.0001"
Preset	Zero position will be located closest to head. At 2" Null point, LDT will default to 2.0000"
Velocity	Increasing from Head to Tip
Velocity Format	Inches / Second
Velocity Resolution	0.01"/sec

Chapter 1 – Dimensions

Rod Style Dimension Drawing (PD-0124400)



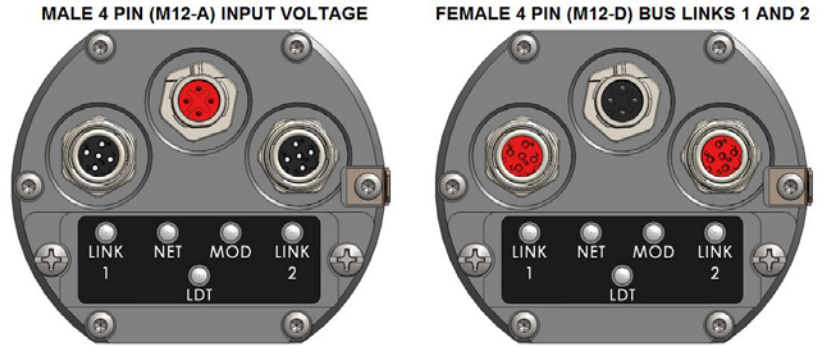
Profile Style Dimension Drawing (PD-0124500)



Chapter 2: Wiring

The Ethernet Network LDT has three connectors. The incoming power is supplied via a 4-pin M12-A style connector. The Network communication will be through either of the two 4-pin M12-D coded connectors. The LDT supports Star, Line and Device Level Ring (DLR) topology and supports DHCP (Dynamic Host Control Protocol)

Note: Any unused connectors should be covered using our 04-521619 connector end cap.



INPUT VOLTAGE		
PIN NUMBER	WIRE COLOR	SUPPLY VOLTAGE
1	BROWN	+24 VDC
2	WHITE	NO CONNECTION
3	BLUE	DC GROUND (FOR SUPPLY)
4	BLACK	NO CONNECTION

BUS CONNECTIONS LINK 1 AND 2		
PIN NUMBER	WIRE COLOR	FUNCTION
1	WHITE/ORANGE	Tx+
2	WHITE/GREEN	Rx+
3	ORANGE	Tx-
4	GREEN	Rx-

2.1 Wiring Connections

Once the LDT has been installed, wiring connections can be made. There are two groups of connections you will need to make. They are as follows:

- Power Supply Connections (including ground and shield)
- LDT Input/output Network Connections

Power Supply/Ground Connections

The incoming power cable is a 4-Pin, M12-A, Euro Style cordset. It has 4 conductors of 22ga, with a shield; these cables are available in either Straight or Right Angle versions. To reduce electrical noise, the shield must be properly used. When grounding the LDT, a single earth ground should be connected to the power supply common. The LDT power supply common should be connected to the power supply common (-) terminal. On our Straight version cable the shield is tied to the cables coupling nut, and should not be connected to the controllers ground (See figure 4-2 Grounding Connections). However, if you are using one of our 949-044LXX Right Angle version cables, the cables shield is not tied to the cables coupling nut, in this case it is recommended to tie the shield to the power supply common. *Any unused wires should be insulated and tied back.*

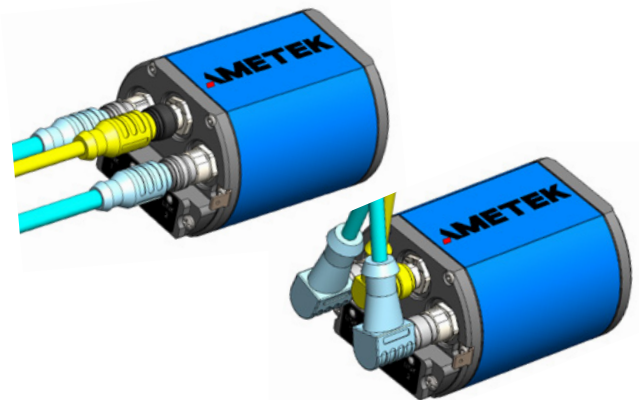
On corsets where the shield is tied to the coupling nuts, the LDT's shield should NOT be tied to the earth ground at the power supply (See figure 4-2 Grounding Connections).

In order for the Network LDT to operate properly, the LDT's external power supply must provide a voltage between +7 to +30 VDC. Each LDT will draw approximately 3 watts of power. The power supply must be rated at 150mA minimum. The power supply should provide less than 1% ripple and 10% regulations. (The power supply should be dedicated to the LDT to prevent noise from external loads from affecting the position readings.) It is preferable that the cable between the LDT and the power supply be one continuous run. If you are using a junction box, it is highly recommended that the splice junction box be free of AC and/or DC transient-producing lines. The shield should pass straight thru this enclosure and not tied to ground.

Network Connections

The Network communication will be two 4-pin M12-D coded connectors. Our Network LDT supports Star, Line & DLR topology.

These connections will require M12-D cables; these are available in either Straight or Right Angle versions, as well as M12-D on one end and RJ45 on the other. All cables have 4 conductors of 24ga, with an aluminum/polyester/aluminum foil with an overall braid of tinned copper shield. These cables meet the Requirements of TIA/EIA568-C, Category 5e Cable for 10 and 100 Base-T Ethernet. Always observe proper grounding techniques such as single point grounding and isolating high voltage (i.e. 120/240 VAC) from low voltage cables, whenever possible.

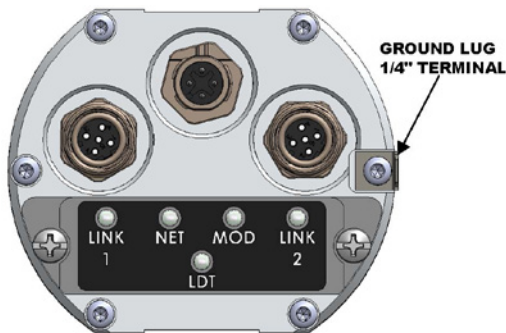


WARNING: Do not route the ReadyLink™ Network LDT cables near high voltage sources.

Network Cable lengths

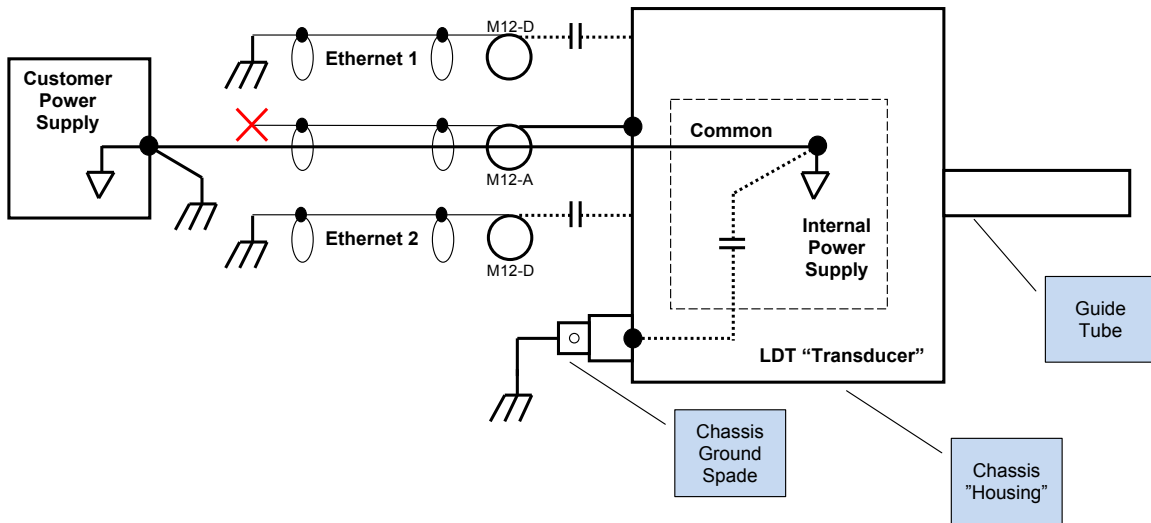
Per ODVA specifications, it is recommended that the maximum total cable run length be 100 meters or less. Typical cable lengths are 1 and 5 meters, cables greater than 10 meters are available; however, proper care must be taken during installation. It is recommended that one uninterrupted piece of cable is always used. Any extension to the existing cabling should be mounted in a junction box free of any other cabling, the cable should be a twisted shielded pair with a braided shield. The shield should pass straight thru this enclosure and not tied to ground.

2.2 Grounding Connections



There is a 1/4" terminal ground lug provided on the LDT's head / cover assembly to help ensure a good ground. This lug should be tied to the chassis of the machine. This ground is internally isolated for the ground provided by the Power Supply shields ground.

Always observe proper grounding techniques such as single point grounding and isolating high voltage (i.e. 120/240 VAC) from low voltage (7-30 VDC cables).



Power Supply cable shield IS connected to connector coupling nut

Chapter 3 Quick Start

Overview

The AMETEK *ReadyLink™ EtherNet/IP™* LDT with *RapidRecall™* is a smart device; it has a *RapidRecall™* Configuration Module to help aid in configuration of the LDT. This module is located on the head assembly of the LDT, next to the connectors. The *RapidRecall™* module can be used to help configure the static IP address of the LDT and store all user defined configurations. In the module there are three rotary DIP switches that will allow the user to configure how the IP address will be assigned. Once the LDT has been configured, these settings can be uploaded to the module. One of the key benefits to uploading the configuration data to the *RapidRecall™* module is that, if anything was to ever go wrong with the LDT, the *RapidRecall™* module with the entire user programmed settings could be removed from the original unit and installed on the replacement unit. With a simple command from the DIP switches the user configuration settings can be downloaded from the *Rapid Recall™* Module to the new LDT.



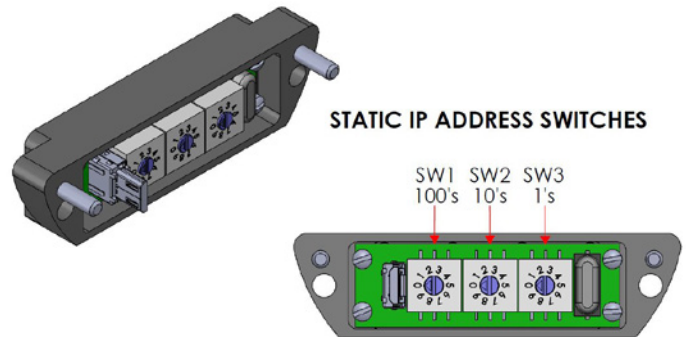
This module is held in place with two 6-32 x 1/2" screws. The network configuration module connects to the LDT thru a Micro USB-B connector.

3.1 - Programming the IP Address

This chapter will describe how to program the IP address, the subnet mask and the gateway for the Ethernet/IP™ LDT.

There are four ways to program the IP address in the Network LDT.

- Through our IPconfig Network utility program (Switches must be set to 255)
- Through BootP/DHCP server (Switches must be set to 255)
- Through a web browser (DHCP) or static IP addressable (Switches must be set to 255)
- Through the rotary DIP switches on the *RapidRecall™* Configuration module



These modes are determined by how the DIP switches are set in the RapidRecall™ Configuration Module. The default out of the box settings for these switches will be 255 DHCP enabled.

3.2 - IP Addressing Modes

Static IP Address Selection – Via Rotary DIP Switches

DIP Switch Position	Function	IPconfig, BOOTP, Web page Programmability	DHCP	Static IP Address
000	DHCP	No	Enabled	Disabled
001 to 254	Static IP address lower octet value; upper 3 octets from previous setup stored in LDT non-volatile memory	No	Disabled	Enabled
255	Entire Address assigned in LDT non-volatile memory - IP Address 203.078.111.147 (User entered) - On power up, will default to last known IP address or if set for DHCP setting	Yes	Programmable	Programmable

Note: Changing the Node address via the DIP switches, will only take effect on power up. Changing the IP address with power applied to the LDT will generate a minor fault.

When the DIP switches are set to 000 – 254, you cannot set the IP address using the IPconfig, BootP or the internal web browser.

3.3 - Default Settings

The ReadyLink™ Ethernet/IP™ LDT out of the box default settings will be DHCP Enabled and the switches will be set to 255.

(Initialized to "out of box" condition)	
IP Address:	192.168.1.1
Subnet Mask:	255.255.255.0
Gateway Address:	192.168.1.254

The default baud rate and duplex mode are Auto/Auto. Auto/Auto, supports autonegotiation on both the baud rate (100/10) and the duplex mode (full/half).

3.4 - Using IPconfig Utility Program

An IPconfig utility program as well as the EDS files are available on our website www.ametekfactoryautomation.com. The IPconfig utility program allows the user to detect any AMETEK Network LDT on the network, even if the unit's configuration is outside the host's subnet.

Step 1: Connect Network LDT to your network.

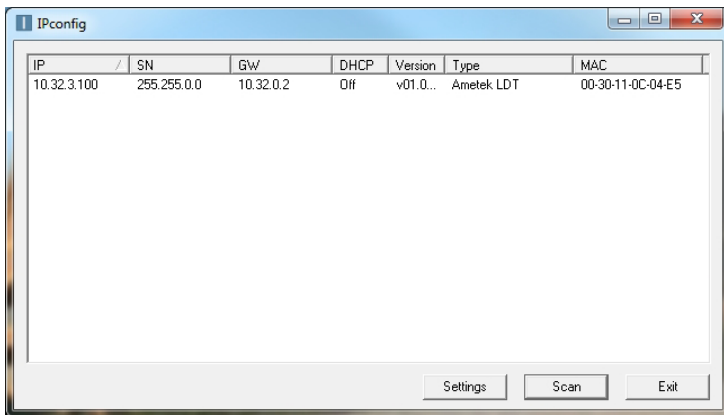
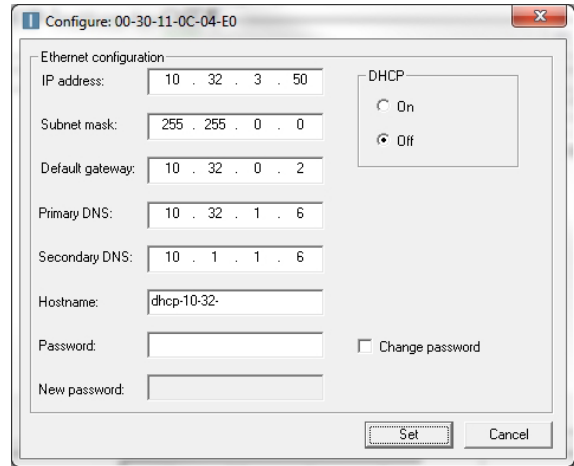
Cable connections must be made to the Network LDT for both communications and power and the switches in the *Rapid Recall™* module must be set to 255.

Step 2: Access Network LDT

1. Make sure the configuration DIP switches are set to 255.
2. Turn Power on to the LDT.
3. Open the utility program and press scan. The IP configuration for the AMETEK Network LDT will be displayed.

Step 3: Program new IP address

1. Double click on the IP address you wish to change.
2. Enter the desired IP address, subnet mask and gateway. Verify that the DHCP button is set to Off.
3. Select "Set".
4. The new IP address will be assigned and the screen will default back to the home page. To see the new IP address press "Scan".



3.5 - Using BOOTP/DHCP Utility Program

Studio 5000 BOOTP/DHCP application can be used to assign an IP address to the Network LDT via DHCP. Cable connections must be made to the Network LDT for both communications and power. DHCP must be enabled and the switches in the Rapid Recall™ module must be set to 255.

Note: The Network LDT's factory out of the box state has the DIP switches set to 255 and the DHCP enabled.

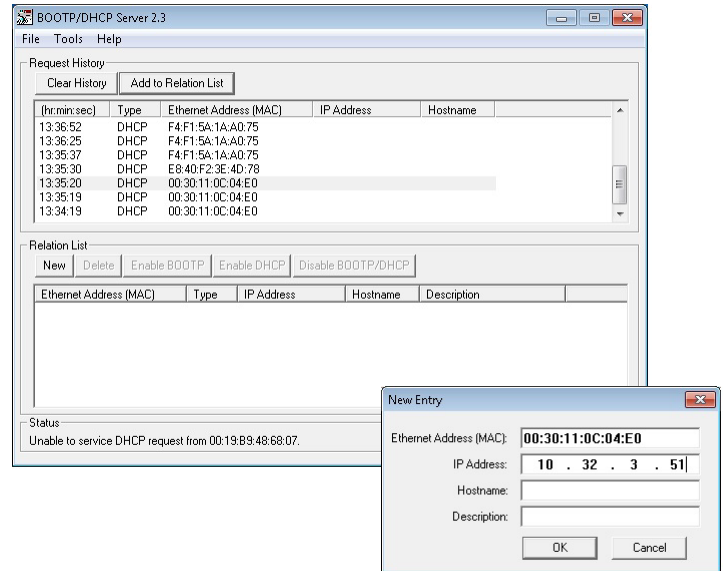
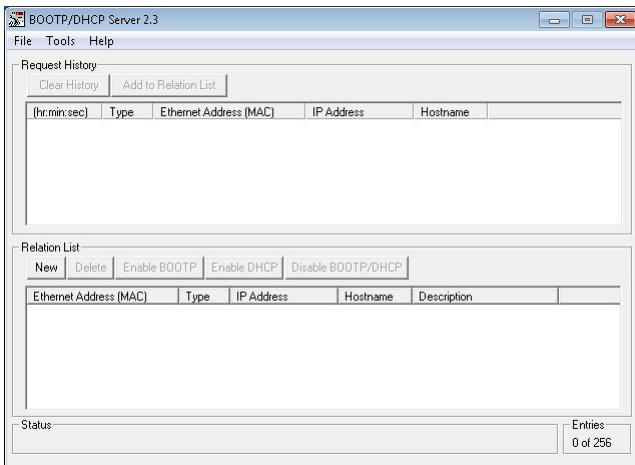
Attention: DHCP is not recommended for a plant floor environment due to the risk involved when an IP address changes.

Perform the following steps:

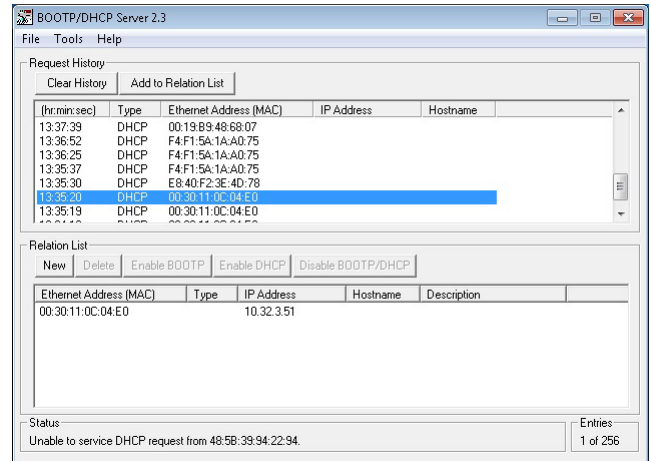
Step 1: Connect LDT to network with power off. Open the BOOTP/DHCP Server Software in the Windows browser with the Network LDT in an unpowered state. A module configuration screen will open to configure or modify the EtherNet/IP address. In the Request History Pane you will see the time a message came from an EtherNet module, data type and MAC Addresses of the devices on the network. No IP addresses are shown for the devices with the DHCP enabled.

Step 2: Power up the Network LDT, an incoming request for an IP address that the server has received from the LDT will appear in the Request History Pane. The LDT can be identified by its MAC address that appears in the pane. Click on the MAC address to highlight that row and then click on the "Add to Relation List" button, which will open the New Entry dialog box.

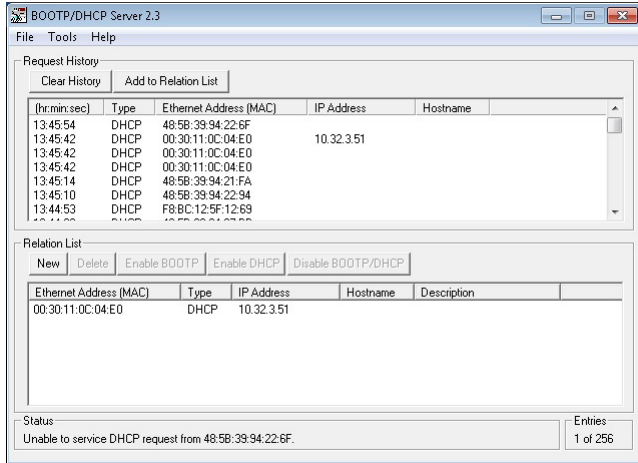
Enter the desired IP address and click OK.



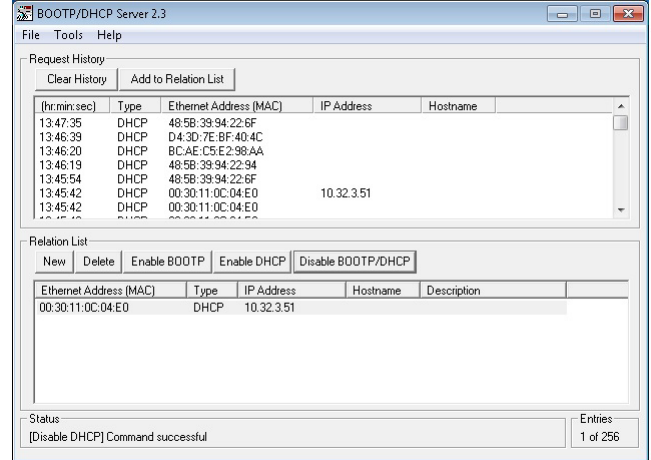
The desired IP address and its MAC address will appear in the Relation List Pane.



Step 3: A new incoming request for an IP address will appear in the Request History Pane. If it does not, cycle power to the LDT and new incoming request for an IP address will appear. This time the pane will include the new IP address along with the time, data type, and MAC address. *At this point the IP address is only temporary since the DHCP is still enabled.*



Step 4: Click on the IP address in the Relations List Pane to highlight that row, then click the Disable BOOTP/DHCP button to make the new IP address permanent. The Status bar will display the (Disable DHCP) Command Successful.



Step 5: Exit the BOOTP/DHCP Server.

3.6 - Using a Web Browser

In order to use the internal webpage you must know the LDT's IP address. The default out of the box setting is 192.168.1.1 with the DIP switches set to 255 DHCP enabled. If power is applied to the Network LDT in this mode your Network will assign the next available IP address. If this happens you will need to use the IPconfig or BootP utility tools to select the appropriate IP address and to disable the DHCP mode.

Step 1: Connect the Network LDT to your network

Cable connections must be made to the Network LDT for both communications and power. DHCP must be disabled using the IPconfig or BootP utilities, and the switches in the Rapid Recall™ module must be set to 255.

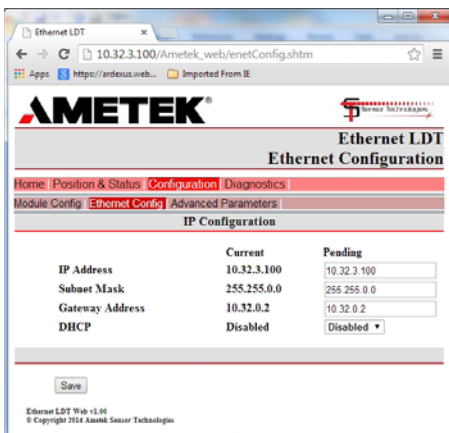
Step 2: Access Network LDT Configuration Module

1. With power off, remove the RapidRecall™ Configuration module. Make sure the configuration switches are set to 255. Reassemble unit.
2. Turn Power On to the LDT.
3. Open a web browser and type in the IP address for the unit in the address field. The network LDT webpage will be displayed.



Step 3: Program a New IP address (Alternate way to program the IP address)

1. Under the Configuration tab, select Ethernet Config.
 - a. Enter the Desired IP address, Subnet Mask and Gateway.
 - b. Select "Save"
 - c. Cycle power to the unit to allow the new IP address to be set.
2. See Chapter 6 – Web Page Layout for LDT configurations.



3.7 - DIP Switch Setting 000 DHCP

The 000 DHCP DIP switch setting is a back door that can be used to force the Network LDT into the DHCP mode. This would typically only be used if you do not know the units IP address or cannot access the Network LDT using the IPconfig or BootP utilities.

Step 1: Set the DIP switches to 000.

Step 2: Apply power to the Network LDT – The network will search and assign the next available IP address.

Step 3: Once the new IP address has been assigned, un-power the unit and remove the RapidRecall™ Configuration Module and set the DIP switches to 255.

Step 4: Reapply power. The network will now assign the next available IP address. From here you should be able to follow the IPconfig or BootP instructions.

3.8 - DIP Switch Setting 001-254

The ReadyLink™ Ethernet/IP™ LDT out of the box default settings will be DHCP Enabled and the switches will be set to 255), and the IP address will be set to 192.168.1.1.

If the RapidRecall™ Configuration Module is set to 001-254 before power is applied to the unit, the Static IP address lower octet value will be set to the value of these three switches; the upper 3 octets will be set for what was previous stored in LDT non-volatile memory. For example, the out of box setting is 192.168.1.1. If the DIP switch settings were set to 005 then the IP address would be set to 192.168.1.5. However, if network communication was established to the LDT in question prior to the switches being set to 005, then the LDT's IP address will default to whatever the host network assigned.

The key to the 001 to 254 DIP switch settings are that they can be used to set the lower octet of the LDT's IP address. The units default IP address was set to 192.168.1.1 at time of shipment; however by using one of the IP configuration utilities the IP address can be set to any desired address. Once the new IP address is established the DIP switched can be used to set the lower octet. A good example may be that you are interested in using the DIP switches to set the units IP address but your network is not 192.168.1.XXX. In this case simply set the DIP switches to 255 and use one of the IP configuration utilities to assign the IP address, once set disable DHCP. Power down the network LDT and change the DIP switch settings to any value between 1 and 254. Reassembly the unit and reapply power. On power up the upper 3 octets will be what you just set using the IP address utility and the lower octet will be equal to the three DIP switches.

Chapter 4 – Network Programming for Ethernet/IP™

Description

Data is communicated over Ethernet using two types of messaging:

- I/O Messaging (Position & Velocity)
- Explicit Messages (Parameters & Configuration)

I/O Messaging is used for time critical data such as position & velocity status. Explicit messages are used for configuration data such as Positions scaling, resolution and count direction. The Network LDT module will conform to the Encoder device profile which is device type 22h.

4.1 I/O data Transfer

The Network LDT is classified as an Input only device. The following Assembly object instances are supported: (See Chapter 3 for complete listing off all Instances & Attributes).

#	Instance
1	Position
2	Position, Warning and Alarm Flags
3	Position and Velocity
100	Position, Velocity and Status
110	Configuration
180	Diagnostic
199	Input Only Heartbeat

Instance Only Heartbeat Assembly (Instance 199)

This assembly instance is used for the heartbeat connection point for Input Only connections. The data size is 0.

4.2 Explicit Messages:

Configuration data is transferred to the Network LDT through explicit messages. The Network LDT uses the Position Sensing Class 0x23 (hex). These values are listed in the following tables.

4.2.1 Assembly Object (Class ID 04h)

The following Assembly object instances are supported.

#	Instance	Data Access	Set_Attribute_Single Support
1	Position	R	No
2	Position, Warning and Alarm Flags	R	No
3	Position and Velocity	R	No
100	Position, Velocity and Status	R	No
101	Position, Velocity and Extended Status	R	No
110	Configuration	RW	Yes
180	Diagnostic	R	No
199	Input Only Heartbeat	N/A	N/A

4.2.1.1 Position Assembly (Instance 1)

Buffer Offset		Length	Data	Mapped Attribute		
Byte	Bit			Cls	Inst	Attr
0	0	4 bytes	Position	23h	1	10

Total size: 4 bytes

4.2.1.2 Position, Warning and Alarm Flags Assembly (Instance 2)

Buffer Offset		Length	Data	Mapped Attribute		
Byte	Bit			Cls	Inst	Attr
0	0	4 bytes	Position	23h	1	10
4	0	1 bit	Alarm Flag	23h	1	46
	1	1 bit	Warning Flag	23h	1	49
	2	6 bits	Reserved (set to 0)			

Total size: 5 bytes

4.2.1.3 Position and Velocity Assembly (Instance 3)

Buffer Offset		Length	Data	Mapped Attribute		
Byte	Bit			Cls	Inst	Attr
0	0	4 bytes	Position	23h	1	10
4	0	4 bytes	Velocity	23h	1	24

Total size: 8 bytes

4.2.1.4 Position, Velocity and Status Assembly (Instance 100)

Buffer Offset		Length	Data	Mapped Attribute			
Byte	Bit			Cls	Inst	Attr	Bit
0	0	4 bytes	Position	23h	1	10	
4	0	4 bytes	Velocity	23h	1	24	
8	0	1 bit	Lost Magnet Signal	23h	1	44	12
	1	1 bit	Signal in DEAD Zone	23h	1	44	13
	2	1 bit	Signal in NULL Zone	23h	1	44	14
	3	1 bit	Extra Signals	23h	1	44	15
	4	1 bit	Position Above Upper Limit	23h	1	21	1
	5	1 bit	Position Below Lower Limit	23h	1	21	2
	6	1 bit	Velocity Above Upper Limit	23h	1	47	7
7	1 bit	Velocity Below Lower Limit	23h	1	47	6	

Total size: 9 bytes

The Position & Velocity values are each 4 bytes long, with byte 0 = Least Significant byte and byte 3 = Most Significant Byte. These are Hexadecimal values.

Ametek_LDT:I1.Data[0] =LSB byte
 Ametek_LDT:I1.Data[1] = Byte 1
 Ametek_LDT:I1.Data[2] = Byte 2
 Ametek_LDT:I1.Data[3]=MSB byte

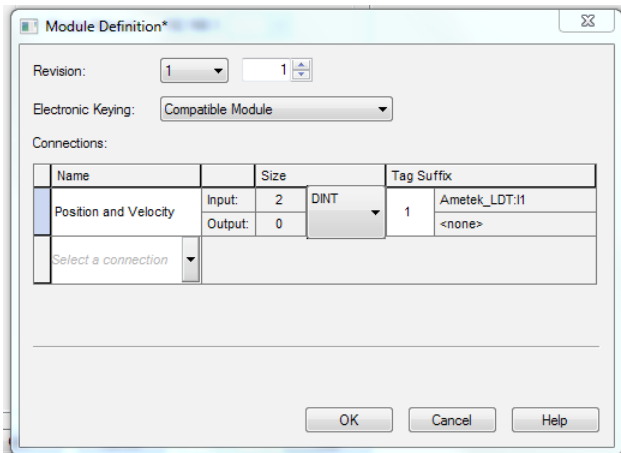
These can easily be converted in your ladder Logic to display in a decimal format.



Transmitting position & velocity data in the 4 byte format is typically the fastest and most efficient way. However; if this is causing a problem in your programming you can use Assembly Instance 101. Instance 101 is 12 bytes in length. In Instance 101 positional and velocity data looks like a decimal value in the correct order.

Another alternative way of viewing position and velocity data without doing the copy and divide ladder logic as shown above. Assembly Instance 1 or Assembly Instance 3 are 4 bytes and 8 bytes in length respectively. Because they are divisible by 4, you can choose for them to be displayed as a DINT type instead of a SINT type. This creates 1 variable for the position and 1 variable for the velocity.

The user selects either Assembly Instance 1 or Assembly Instance 3 in the Module Definition and under Size then select DINT instead of SINT. This is shown in the screen shot below.



Studio 5000 Screen shot. See Chapter 7 for further details.

4.2.1.5 Position, Velocity and Status Assembly (Instance 101)

Same as Instance 100, except 12 bytes in length. Position & Velocity data will look like a decimal value in the correct order.

Buffer Offset		Length	Data	Mapped Attribute			
Byte	Bit			Cls	Inst	Attr	Bit
0	0	4 bytes	Position	23h	1	10	
4	0	4 bytes	Velocity	23h	1	24	
32	0	1 bit	Lost Magnet Signal	23h	1	44	12
	1	1 bit	Signal in DEAD Zone	23h	1	44	13
	2	1 bit	Signal in NULL Zone	23h	1	44	14
	3	1 bit	Extra Signals	23h	1	44	15
	4	1 bit	Position Above Upper Limit	23h	1	21	1
	5	1 bit	Position Below Lower Limit	23h	1	21	2
	6	1 bit	Velocity Above Upper Limit	23h	1	47	7
	7	1 bit	Velocity Below Lower Limit	23h	1	47	6
	8-31	12 bits	Reserved for future use				

Total size: 12 bytes

4.2.1.6 Configuration Assembly (Instance 110)

Buffer Offset		Length	Data	Mapped Attribute		
Byte	Bit			Cls	Inst	Attr
0	0	2 bytes	Position Format	23h	1	15
2	0	1 byte	Direction Counting Toggle	23h	1	12
3	0	1 bytes	Reserved (set to 0)			
4	0	4 bytes	Position Measuring Increment	23h	1	18
8	0	4 bytes	Position Low Limit	23h	1	22
12	0	4 bytes	Position High Limit	23h	1	23
16	0	2 bytes	Velocity Format	23h	1	25
18	0	2 bytes	Reserved (set to 0)			
20	0	4 bytes	Velocity Resolution	23h	1	26
24	0	4 bytes	Minimum Velocity	23h	1	27
28	0	4 bytes	Maximum Velocity	23h	1	28
32	0	1 byte	Position Filter Type	23h	1	100
33	0	1 byte	Velocity Filter Size	23h	1	101
34	0	1 byte	Fault Output Type	23h	1	102
35	0	1 byte	Sync Mode	23h	1	103

Total size: 36 bytes



4.2.1.7 Input Only Heartbeat Assembly (Instance 199)

This assembly instance is used for the heartbeat connection point for Input Only connections. The data size is 0.

4.3 Position Sensor Object (Class ID 23h)

4.3.1 Class Attributes

#	Name	Access	Memory	Type	Default Value
1	Revision	R	NV	UINT	2

4.3.2 Instance Attributes

Hex #	Dec #	Name	Access	Memory	Type	Default Value
1	1	Number of Attributes	R	NV	USINT	40
2	2	Attribute List	R	NV	USINT[]	
a	10	Position Value Signed	R	V	DINT	
b	11	Position Sensor Type	R	NV	UINT	0
c	12	Direction Counting Toggle	RW	NV	BOOL	0
f	15	Position Format	RW	NV	ENGUNIT	0802h
12	18	Position Measuring Increment	RW	NV	UDINT	1
13	19	Preset Value	RW	V	DINT	0
15	21	Position State Register	R	V	BYTE	0
16	22	Position Low Limit	RW	NV	DINT	-16777215
17	23	Position High Limit	RW	NV	DINT	16777215
18	24	Velocity Value	R	V	DINT	0
19	25	Velocity Format	RW	NV	ENGUNIT	2B01h
1a	26	Velocity Resolution	RW	NV	UDINT	10000
1b	27	Minimum Velocity Setpoint	RW	NV	DINT	-16777215
1c	28	Maximum Velocity Setpoint	RW	NV	DINT	16777215
29	41	Operating Status	R	V	BYTE	0
2c	44	Alarms	R	V	WORD	0
2d	45	Supported Alarms	R	NV	WORD	
2e	46	Alarm Flag	R	V	BOOL	0
2f	47	Warnings	R	V	WORD	0
30	48	Supported Warnings	R	NV	WORD	04C0h
31	49	Warning Flag	R	V	BOOL	0
33	51	Offset Value	R	NV	DINT	0
64	100	Position Filter Type	RW	NV	USINT	3
65	101	Velocity Filter Size	RW	NV	USINT	3
66	102	Fault Output Type	RW	NV	USINT	0
67	103	Sync Mode	RW	NV	BOOL	0

Number of Attributes (Attribute 1)

The total number of instance attributes supported. This will be a fixed value of 28.

Attribute List (Attribute 2)

The list of supported instance attributes. This will be an array consisting of all supported attribute numbers in numerical order.

Position Value Signed (Attribute 10)

The current position value read by the module. This value will be scaled based on the Position Format engineering units and the Position Measuring Increment and offset by the Offset Value.

Position Sensor Type (Attribute 11)

The type of sensor. This will be a fixed value of 8, specifying an absolute linear encoder.

Direction Counting Toggle (Attribute 12)

The direction that the Position Value increases. A value of 0 indicates that the position increases when moving away from the Head (electronics). A value of 1 indicates that the position increases when moving toward the Head (electronics).

Position Format (Attribute 15)

The engineering units used for the Position Value. This setting will determine the scaling for the Position Value.

Allowable values for this attribute are:

Value	Position Units
2202h	centimeter
2203h	millimeter
2204h	micron
2207h	inch
0800h	0.01 inch
0801h	0.001 inch
0802h	0.0001 inch

Position Measuring Increment (Attribute 18)

The size of "steps" in the Position Value measurement. The steps are specified in the engineering units selected by the Position Format. Example: Position Format is set to micron. Position Measuring Increment is set to 5. The Position Value will move in steps of 5 microns.

Preset Value (Attribute 19)

The Preset Value is used to calibrate the Offset Value at the current measured position. When the Preset Value is set, the Offset Value will be calculated so that

$$\text{Position Value} = \text{Preset Value} = (\text{internal scaled position value}) + \text{Offset Value}$$

The value returned when the Preset Value is read will be the last value written; it is meaningless once the position sensor has moved.



Position State Register (Attribute 21)

Indicates the state of the Position Value relative to the Position High Limit and Position Low Limit.

The attribute is an 8 bit bitstring with the following bit assignments.

Bits	Description
0	Position is out of range (above or below the set limits)
1	Position is above the High Limit
2	Position is below the Low Limit
3-7	Reserved (set to 0)

Position Low Limit (Attribute 22)

If the Position Value is below this limit, it will be indicated in the Position State Register. The attribute value is expressed in the engineering units selected by Position Format.

Position High Limit (Attribute 23)

If the Position Value is above this limit, it will be indicated in the Position State Register. The attribute value is expressed in the engineering units selected by Position Format.

Velocity Value (Attribute 24)

The current velocity value read by the module. This value will be scaled based on the Velocity Format engineering units and the Velocity Resolution.

Velocity Format (Attribute 25)

The engineering units used for the Velocity Value. This setting will determine the scaling for the Velocity Value.

Allowable values for this attribute are:

Value	Velocity Units
2B01h	centimeter/sec
2B07h	inch/sec

Velocity Resolution (Attribute 26)

The resolution steps of the Velocity Value. This setting specifies a divider used to calculate Velocity Value in the units selected by the Velocity Format.

Example: Velocity Format is set to inch/sec. Velocity Resolution is set to 100. The resulting Velocity Value will be expressed in 0.01 inch/sec.

Measuring Unit	Velocity Resolution	Velocity Value
inch/sec	1000	0.001 inch/sec
inch/sec	100	0.01 inch/sec
centimeter/sec	100	0.01 centimeter/sec
centimeter/sec	10	0.1 centimeter/sec

Minimum Velocity Setpoint (Attribute 27)

If the Velocity Value is below this limit, it will be indicated in the Warnings attribute. The attribute value is expressed in the engineering units selected by Velocity Format.

Maximum Velocity Setpoint (Attribute 28)

If the Velocity Value is above this limit, it will be indicated in the Warnings attribute. The attribute value is expressed in the engineering units selected by Velocity Format.

Operating Status (Attribute 41)

The attribute is an 8 bit bitstring with the following bit assignments.

Bits	Description
0	Direction (0=position increasing, 1=position decreasing)
1	Scaling (set to 1)
2-7	Reserved (set to 0)

Alarms (Attribute 44)

The current alarm status of the module.

The attribute is a 16 bit bitstring with the following bit assignments.

Bits	Description
0	Position Error
1-11	Reserved (set to 0)
12	Lost Magnet Signal
13	Signal in DEAD Zone
14	Signal in NULL Zone
15	Extra Signals

Supported Alarms (Attribute 45)

The alarms that are supported by the module.

The attribute is a 16 bit bitstring with the same bit assignments as shown above for the Alarms attribute. The value is fixed and all non-reserved bits are set. (F001h)

Alarm Flag (Attribute 46)

Indicates that one or more of the supported alarms are active.

Warnings (Attribute 47)

The current warning status of the module.

The attribute is a 16 bit bitstring with the following bit assignments.

Bits	Description
0-5	Reserved (set to 0)
6	Minimum Velocity Flag
7	Maximum Velocity Flag
8-9	Reserved (set to 0)
10	Position Limits Exceeded
11-15	Reserved (set to 0)



Supported Warnings (Attribute 48)

The warnings that are supported by the module.

The attribute is a 16 bit bitstring with the same bit assignments as shown above for the Warnings attribute. The value is fixed and all non-reserved bits are set. (04C0h)

Warning Flag (Attribute 49)

Indicates that one or more of the supported warnings are active.

Offset Value (Attribute 51)

The current offset that is used for calibration when calculating the Position Value. The value is represented in the units selected by the Position Format.

Position Filter Type (Attribute 100)

The filter to be used when filtering the Position Value. This is an enumerated value with the following allowable values.

Value	Position Filter Type	Description
0	Unfiltered	No filtering applied
1	Average	20 point rolling filter average
2	Advanced Filter	AMETEK Standard – Filter is based off of speed of magnet. The faster the speed the less filtering, the slower the speed the more filtering.

Velocity Filter Size (Attribute 101)

The rolling filter size to be used when filtering the Velocity Value. Default value is set to 3.

Fault Output Type (Attribute 102)

The action to be taken with the position data when a fault occurs. This is an enumerated value with the following allowable values.

Value	Fault Output Type
0	Hold Last Data
1	Zero Data

Sync Mode (Attribute 103)

The synchronization mode to be used by the module. This mode will be used in future expansion. At the current time the only version available is Asynchronous.

This is an enumerated value with the following allowable values.

Value	Sync Mode
0	Async
1	Sync

4.3.3 Services

Service	Code	Class Support	Instance Support
Get_Attribute_Single	0Eh	Yes	Yes
Set_Attribute_Single	10h	No	Yes
Save	16h	Yes	No
Restore	15h	Yes	No
Reset	05h	Yes	No

Save (Service 16h)

Save all attribute values to NV memory.

The Save service has an optional 1 byte of service data with the following meaning.

Save Data Value	Behavior
00h or no data	Save to USERConfiguration store
01h	Reserved
02h	Save to Rapid Recall Module

Restore (Service 15h)

Load all attribute values from NV memory. The values will be loaded from the USER Configuration Store.

Reset (Service 05h)

Reset / reinitialize the object and reload the configuration.

The Reset service has an optional 1 byte of service data with the following meaning.

Reset Data Value	Behavior
00h or no data	Reinitialize the object and load the configuration from the User Configuration store.
01h	Reinitialize the object and load the configuration from the Manufacturing Configuration store and update the User Configuration store with the loaded values.
02h	Reinitialize the object and load the configuration from the Rapid Recall module and update the User Configuration store with the loaded values.

4.4 Advanced Parameter Object (Class ID 64h)

4.4.1 Class Attributes

#	Name	Access	Memory	Type	Default Value
1	Revision	R	NV	UINT	2

4.4.2 Instance Attributes

Hex #	Dec #	Name	Access	Memory	Type
0C	12	Memory Checksum	R	NV	USINT[]
32	50	Part Number	R	NV	SHORT_STRING
33	51	Serial Number	R	NV	SHORT_STRING

Memory Checksum (Attribute 12)

The list of memory checksum values for the position sensing variables starting with RAM, NVRAM and Rapid Recall memory. The purpose of this attribute is to quickly verify that the memory in RAM is the same that is in NVRAM and that no parameters have been changed either through an explicit message or through the webpage

Memory Checksum[0] = RAM
 Memory Checksum[1] = NVRAM
 Memory Checksum[2] = Rapid Recall Module

The Checksum values can be found in our Advanced parameter Object. They can be retrieved by issuing an explicit message to class 100, instance 1, attribute 12. The response will return 3 bytes of data. The first byte is the RAM checksum, the second byte is the NVRAM checksum and the third byte is the Rapid Recall checksum. The Explicit message expects the Class and Attribute numbers to be in hexadecimal. Class 64 (hex), Instance 1, Attribute 0C (hex).

Part Number (Attribute 50)

This read only value will display the part number printed on the label of the unit.

Serial Number (Attribute 51)

This read only value will display the Serial number printed on the label of the unit.

4.4.3 Services

Service	Code	Class Support	Instance Support
Get_Attribute_Single	0Eh	Yes	Yes

Chapter 5 Configuration Data

Network LDT Memory

The Network LDT has three memory locations as shown below. These are called Factory, User and RAM. Both the Factory and User memories are stored in E2 memory. The Factory settings can be used to reset the LDT back to factory defaults. All configuration settings can be made from our Webpage or PLC and "Loaded" into RAM for testing purposes. Note: These values will not be written to USER memory until the "Save" command is issued. If they are not saved to USER they will be lost on power down. On power-up the configuration settings in USER will be transferred to RAM.

The LDT's RapidRecall™ Configuration Module is a smart device that can store all user configurations. Once the LDT has been configured these settings can be uploaded to the module by setting the DIP switches to "606". Refer to Chapter 8 for all setting and features of the Rapidrecall™ Configuration Module, or a Save(2) command can be sent to store these values in the RapidRecall™ Module.

One of the key benefits to uploading the configuration data to the RapidRecall™ Configuration Module is that, if anything was to ever go wrong with the LDT, the module could be removed from the original unit and installed on the new unit. (In order to upload the configuration data the DIP switches would need to be set to "616"). Or a Reset(2) command can be sent to restore these values from the RapidRecall Module

The non-volatile attribute values in the Position Sensor and Advanced Parameters objects are stored in the E2 (EEPROM) or flash memory.

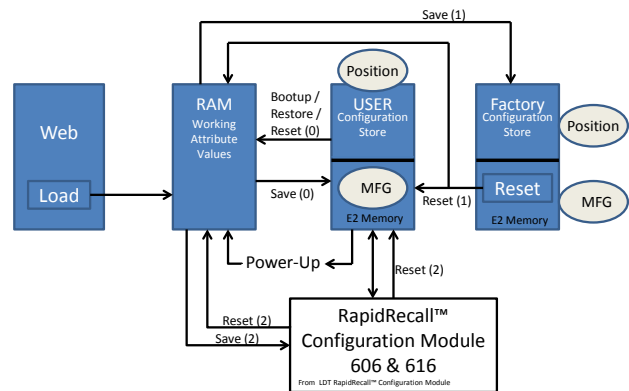
The E2 memory is divided into 2 sections:

USER Configuration Store – The USER Configuration Store holds the attribute values that have been set in the field by the customer.

FACTORY Configuration Store – The FACTORY Configuration Store holds the attribute values that have been set during manufacturing. These are the "factory default" values for the attributes.

The following diagram illustrates the flow of attribute values between the application and E2.

Network Memory Block Diagram - Diagnostics



The current attribute values being used by the application are determined as follows:

- On bootup
 - All attribute values will be loaded from the USER Configuration Store to RAM (Working Attribute Values).
- When a Set_Attribute service is issued
 - The attribute will be set to the requested value and the new value will be used immediately.
- When a Restore service is issued
 - All attribute values for the associated object will be loaded from the USER Configuration Store to RAM.
- When a Reset(0) service is issued
 - All attribute values for the associated object will be loaded from the USER Configuration Store to RAM.
- When a Reset(1) service is issued
 - All attribute values for the associated object will be loaded from the FACTORY Configuration Store to the USER Configuration store.

Attribute values are saved to the configuration stores as follows:

- When a Save(0) service is issued
 - All attribute values for the associated object will be written to the USER Configuration Store.
- When a Reset(1) service is issued
 - All attribute values in the FACTORY Configuration Store will be written to the USER Configuration Store.

Chapter 6 Web Server

To help aid in configuring the units IP address and user settings, there is an internal web server in the Network LDT. These web pages can be used to monitor and configure the Network LDT. The intent of the web pages are to provide nearly the same functionality that exists through the CIP network interface.

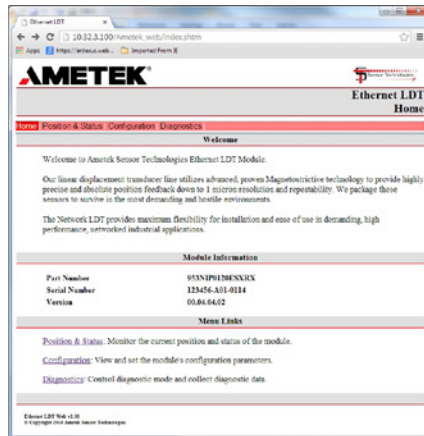
6.1 Main Web Page

The Main web page is loaded when the module's IP address is specified by the users' web browser. The Main page provides an introduction to the module, its capabilities and the modules identification information.

Navigation through the site is done with the tabbed menu or the menu links on the home page. The Configuration menu has multiple pages and a tabbed submenu will be displayed on those pages.

Displayed on the Home page:

- General product and company introduction
- Menu to all other web pages
 - Position & Status
 - Configuration
 - Diagnostics
- Module Part Number
- Module Serial Number

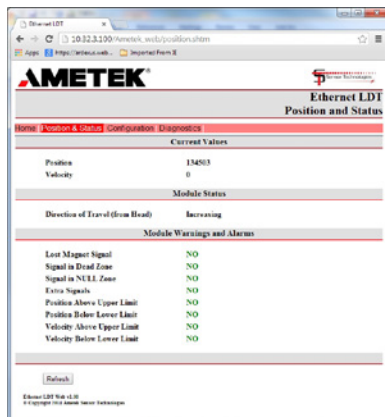


6.2 Position Status Page

The Position Status web page displays the current position and status data of the module.

Displayed on the Position Status page:

- Position Value
- Velocity Value
- Direction of Travel
- Status and Alarm Flag Status

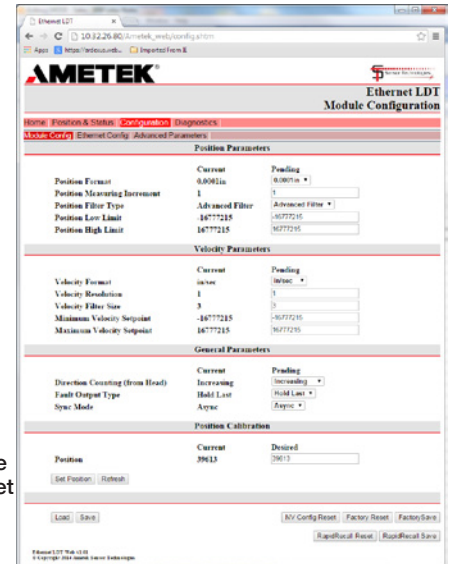


6.3 Position Sensor Configuration Page

The Position Sensor Configuration web page provides an interface to view and set the position sensor parameters.

Displayed and settable via the Position Sensor Configuration page:

- Direction Counting Toggle
- Position Format
- Position Measuring Increment
- Position Filter Type
- Position Low Limit
- Position High Limit
- Velocity Format
- Velocity Filter Type
- Minimum Velocity Setpoint
- Maximum Velocity Setpoint
- Fault Output Type
- Sync Mode



The page will also provide the ability to set the Preset Value to calibrate the position to the current location.

The Load button will load the pending values into the working parameters in memory; no save to non-volatile will be done.

The Save button will load the pending values into the working parameters in memory and write the resulting configuration to the User configuration storage.

The Factory Save button will load the pending values into the working parameters in memory and write the resulting configuration to the Factory configuration storage. – Note: This button appears on the screen but is non functional unless the appropriate password has been entered under the Diagnostics Tab. The Factory Save values should never be altered unless instructed to do so by the factory.

REMOVE this sentence. The Factory Save and Factory Reset buttons will only appear if the current diagnostic mode allows it.

The RapidRecall™ Reset button will take the current values stored in the RapidRecall Module and save them to the LDTs RAM and User Configuration Store. This function acts the same as if the DIP switches on the RapidRecall™ Module were set to “616”

The RapidRecall™ Save button will take the current values stored in the LDTs RAM and write them to the RapidRecall™ Module. This function acts the same as if the DIP switches on the RapidRecall Module were set to “606”

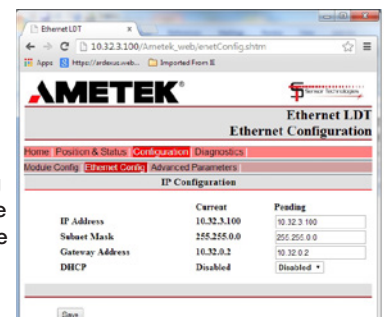
6.4 Ethernet Configuration Web Page

The Ethernet Configuration web page provides the ability to view and set the Ethernet configuration parameters.

Displayed and settable via the Ethernet Configuration web page:

- IP Address
- Subnet Mask
- Gateway Address
- DHCP Enable

The Save button will load the pending values into the working parameters in memory and write the resulting configuration to the User configuration storage.

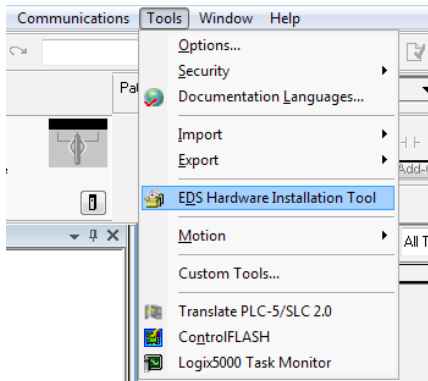


Chapter 7 EtherNet/IP™ Configuration

To configure the PLC and the Ethernet/IP™ you will need to use the Studio 5000 software. Open the Studio 5000 interface and follow the steps below:

1. EDS Hardware Install Tool:

Click the Tools menu and select **EDS Hardware Installation Tool**



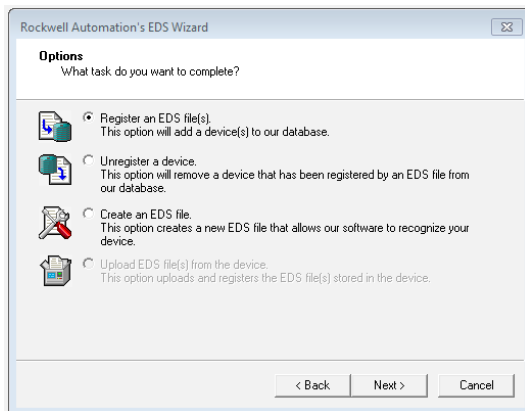
2. Register EDS Files: Welcome screen

The EDS Wizard will open, click **Next**



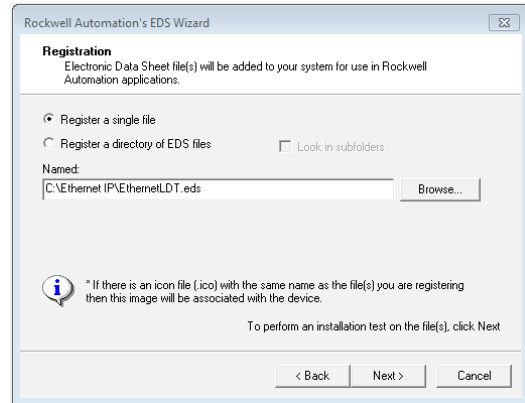
3. Options Window

In the Options window, select **Register an EDS File**, then click **Next**



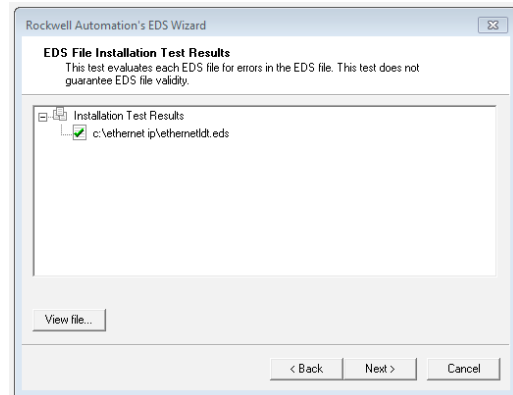
4. Registration: Register a single file

The Registration windows opens, click **Browse** and select **EDS file** downloaded from the www.ametekapt.com website. Click **Next**



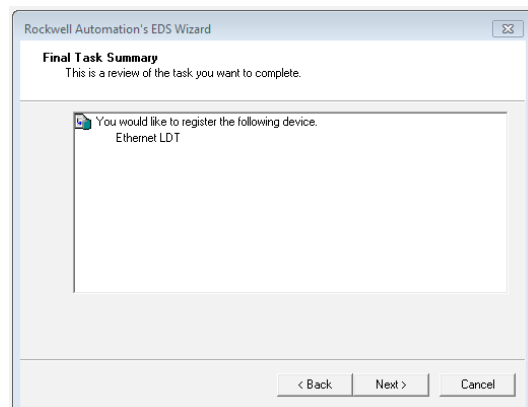
5. EDS File Installation Test Results

Check ethernet ldt.eds file box below, then hit **Next**



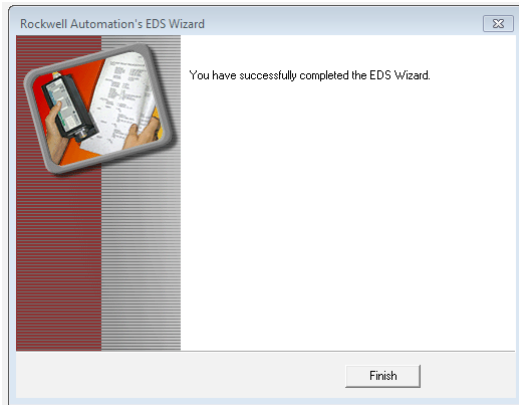
6. Final Task Summary

The Final task Summary window opens, and displays would you like to register the following device, click **Next**



7. Finish

The message “You have successfully completed the EDS Wizard appears, Click Finish

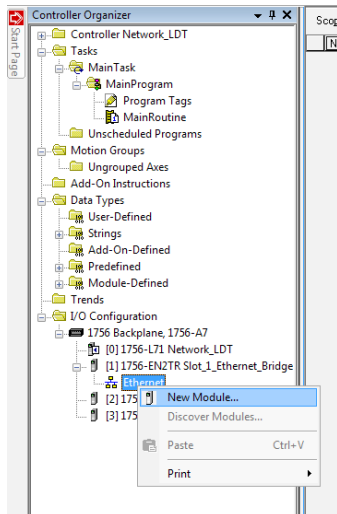


Adding a Module to the 1756 Control Logix

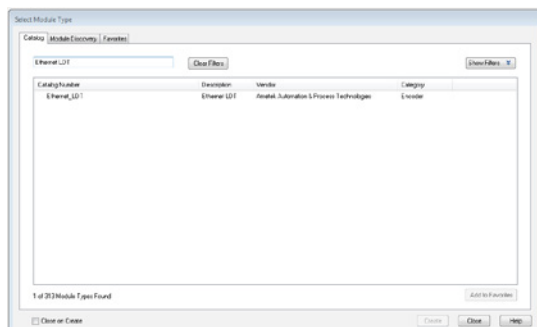
After completing the EDS Wizard, shown in the previous steps 1 – 7, return to the main window of the RS Logix 5000.

Follow the steps below:

1. Select New Module from drop down menu under I/O Configuration
In the Controller sidebar, expand the I/O configuration and right-click on your network. Select New Module.

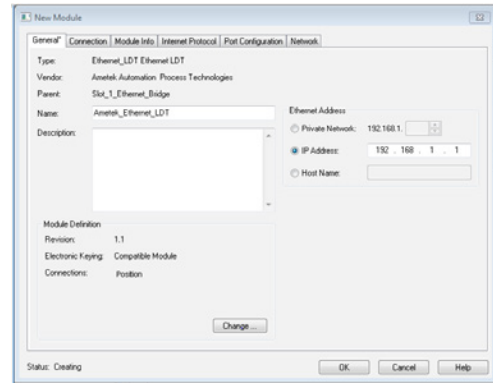


2. Under Catalog - Select Module Type: Ethernet LDT



3. General Tab – Assign name, description and IP address

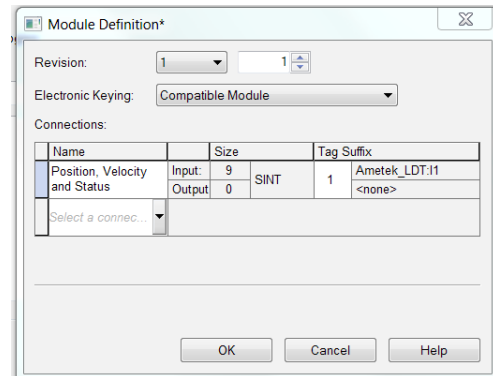
In the New Module window, enter the name in the Name field and select the IP address radio button and enter the IP address that is assigned to the sensor. Click on the Change button in the Module Definition field.



4. Module Definition

The following Dialog Box will appear:

In the Name field select the drop down menu and select the appropriate choice (Position, Velocity and Status). Click OK to close the New Dialog box.

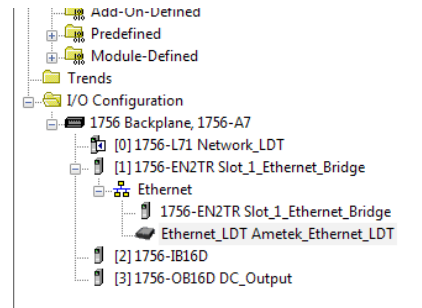


See pages 14 of this manual for optional size DINT.

5. I/O Configuration

Verify that the new sensors is listed in the I/O Configuration

The AMETEK Ethernet/IP™ LDT is now connected to the Network and ready to use

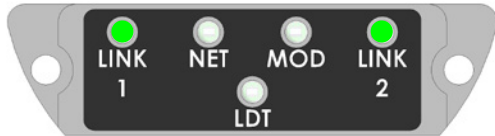


Chapter 8 LED Summary

The Networks Configuration Module is equipped with 4 Network Status LED's and a tri-color LED labeled LDT, to help while troubleshooting. The chart below explains the possible LED colors and the faults they represent.

These LEDs are labeled Link1, Net, Mod, Link 2 and LDT. The top row of LEDs will be used to display diagnostics and network status. The bottom row LDT LED will be used to display the health of the Linear Transducer.

Network LED Functionality



Network LED Number	Indicator	Status
LINK 1	Green Flashing	The module senses a link on connection 1. The LINK 1 LED flashes each time a packet is received or transmitted.
	Green Off	The module does not sense a link.
LINK 2	Green Flashing	The module senses a link on connection 2. The LINK 2 LED flashes each time a packet is received or transmitted.
	Green Off	The module does not sense a link.
NET- Network Status	Off	The module has no power or no IP address is assigned.
	Green On	The module has at least one established Ethernet IP connection.
	Green Flashing	There are no Ethernet/IP connections established to the module.
	Red Flashing	One or more of the connections in which this module is the target has timed out. This state is only left if all times out connections are re-established or if the module is reset.
	Red On	The module has detected that its IP address is already in use.
	Green/Red Flashing	The module is performing a power on self-test.
MOD- Module Status Indicator	Off	No power is applied to the module.
	Green On	The module is operating correctly.
	Green Flashing	Standby. The module has not been configured.
	Red Flashing	A minor recoverable fault has been detected.
	Red On	A major internal error has been detected.
	Green/Red Flashing	The module is performing a power on self-test.

LDT LED Status Indicator



LED Status	Summary	Description
Steady Off	No power	No power to LDT or internal power supply has failed. Verify that incoming M12-A power cable is connected and supplying a voltage between 7 to 30vdc.
Solid Green	Power is applied and magnet signal is detected	LDT is working and detecting a good magnet signal. Note: Network communications are not necessary to get a solid Green LDT.
Solid Red	No magnet signal detected	Magnet is not detected. Verify that magnet was on guide tube when power was applied. Remove power, verify magnet is on the guide tube, re-apply power.
Flashing Red	Major fault	Consult factory or network troubleshooting guide.
Slow Flashing Red/Green - 1 Sec Red/ .25 Sec Green	Max ACG Gain Set	ACG gain has been set to its maximum value, verify that magnet was on the guide tube when power was applied. Remove power, verify magnet is on the guide tube, re-apply power.
Flashing Green	Minor fault	Consult factory or network troubleshooting guide.

NOTE: If there is ever a loss of magnet, the LDT LED will turn red and the unit will transmit a fault message to the Network that the unit has lost its signal.

LED Indications for Diagnostic Modes

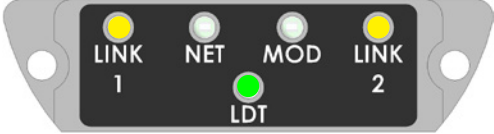
Overview

When any of the special diagnostic switch settings are recognized and the unit is performing the special diagnostic function, the LEDs will flash in a unique and special sequence to indicate both, the diagnostic feature being executed as well as the successful completion status.

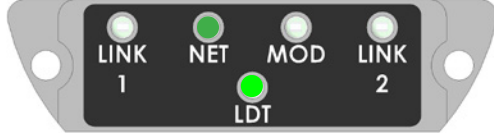
The general sequence will be to flash on all the green LEDs on the top four LEDs 3 times. After the 3rd flash the unit will turn on the LED(s) that indicate the code for the appropriate diagnostic function being performed. The LDT LED will turn green when the diagnostic was successfully completed or red if it failed to perform its function in some way.

Special Diagnostic Modes

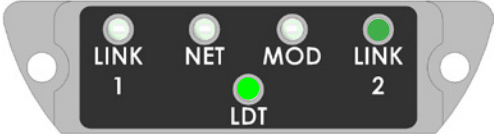
Reset Factory Defaults


888	Complete Restore to Factory Settings (i.e. initialized to "out of box" condition) IP Address: 192.168.1.1 Subnet Mask: 255.255.255.0 Gateway Address: 192.168.1.254
LEDS status	
	

Parameter Save & Restore

606	Backup All Parameters to USER I/O Module (Note: Also Saves IP Address Modes and Settings) IP Address: Saved Subnet Mask: Saved Gateway Address: Saved
LEDS status	
	

Reset Communication Settings

707	Restore Upper Static IP to: IP Address: 192.168.1.1 Subnet Mask: 255.255.255.0 Gateway Address: 192.168.1.254
LEDS status	
	

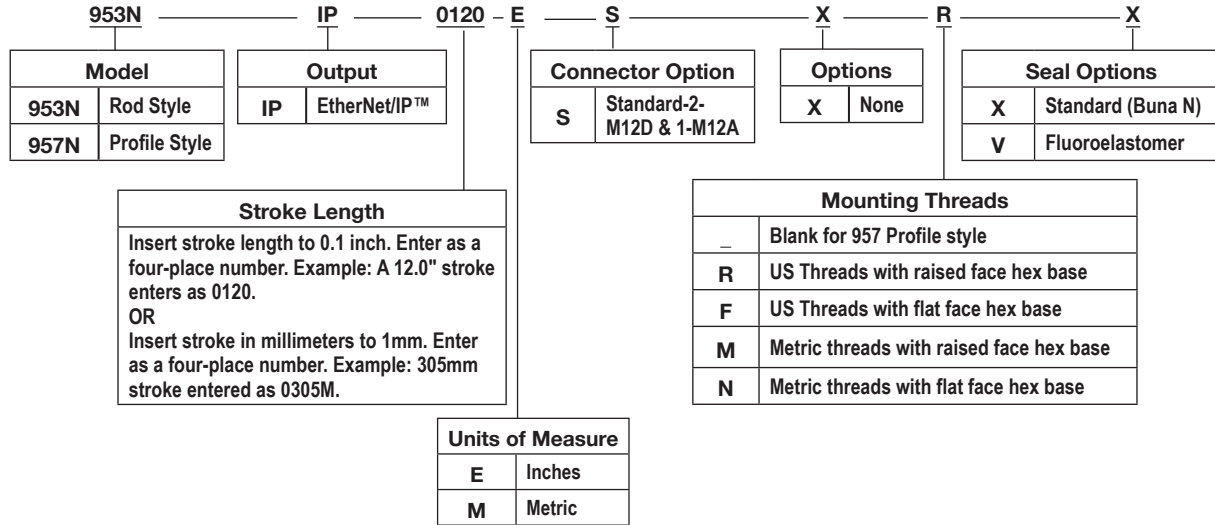
616	Restore All Parameters from USER I/O Module (Note: Also Restores IP Address Modes and Settings) IP Address: Restored Subnet Mask: Restored Gateway Address: Restored
LEDS status	
	



Chapter 9 - Part Numbering

The Ethernet/IP™ LDT is available in either our 953 Rod Style Package or the 957 Profile package. The numbering scheme listed below will break down the numbering system for our 953 Rod Style products. The LDT's are available with strokes from 1" to 300" in .1" increments. The "Unit of Measure" field will allow you to select either inches or millimeters (Note: This is only for the active stroke length of the Rod. The resolution, direction & counting format are all user defined during the Network set-up process). Since the Rod Style products are typically installed in hydraulic cylinders the "Mounting Threads Options" field will allow you to match the requested thread to that of the Cylinder.

The "Seal Option" has two choices – X = Standard Buna N or V = Fluoroelastomer. Depending on where these units will be mounted and what chemicals they may be exposed to, will help determine which option is best for your application.





Accessories

Item	Part Number
Magnets	
Standard 4 Hole Magnet	SD0400800
4 Hole Magnet Spacer	M0822400
Split Magnet Assembly	SD0403900
Split Magnet Spacer	M0750500
1" Cylinder Magnet	SD0410300
Slide Magnet - Top Mounted Swivel	SD0521800
Slide Magnet - Front Mounted Swivel	SD0521801
Large Floating Magnet Assembly	SD0551500
Mounting Foot	SD0522000
Rod Ends	04570252
Control Arm	955ARMXX (X=Inches)
Cables	
Communications Cable M12-D Straight to M12-D Straight – 1 Meter	949038L1M
Communications Cable M12-D Straight to M12-D Straight – 5 Meter	949038L5M
Communications Cable M12-D Straight to M12-D Right Angle – 1 Meter	949039L1M
Communications Cable M12-D Straight to M12-D Right Angle – 5 Meter	949039L5M
Communications Cable M12-D Right Angle to M12-D Right Angle – 1Meter	949040L1M
Communications Cable M12-D Right Angle to M12-D Right Angle – 5 Meter	949040L5M
Communications Cable M12-D Straight to RJ45 – 5 Meter	949041L5M
Communications Cable M12-D Right Angle to RJ45 – 5 Meter	949042L5M
Power Cable M12-A Straight to flying leads – 5 Meters	949043L5M
Power Cable M12-A Straight to flying leads – 10 Meters	949043L10M
Power Cable M12-A Straight to flying leads – 15 Meters	949043L15M
Power Cable M12-A Right Angle to flying leads – 5 Meters	949044L5M
Power Cable M12-A Right Angle to flying leads – 10 Meters	949044L10M
Power Cable M12-A Right Angle to flying leads – 15 Meters	949044L15M
Connector End Cap - Unused connectors should be covered by this End Cap	04-521619

953 VMAX LDT

- Shock resistant to 1000Gs
- Vibration resistant to 30Gs
- Analog outputs, 0-10 VDC, +/-10 VDC, 0-5 VDC, +/-5 VDC, 4-20mA
- Digital output Start/Stop, Control Pulse, and Variable Pulse (PWM)
- SSI (Synchronous Serial Interface) 24, 25, or 26 Bit, Binary or Gray Code, Synchronous or Asynchronous Mode
- Removable cartridge
- IP68 rating
- Stroke length to 300"
- Input power range is 7 to 30 VDC
- Programmable zero and span
- Diagnostic Tri-Color LED



955 BRIK Gen III & 955S Smart BRIK

- Low profile LDT
- Analog output 4-20mA, 0-10 VDC, +/-10 VDC, digital output
- Programmable zero and span
- Stroke length to 180"
- Wide input voltage range
- Optional floating magnet
- Diagnostic LED



Other Products



LINEAR DISPLACEMENT TRANSDUCERS

PLC INTERFACE PRODUCTS

ROTARY POSITION PRODUCTS

PROGRAMMABLE LIMIT SWITCHES

EXTREME DUTY CABLE REEL PRODUCTS

ROTARY LIMIT SWITCHES

RESOLVERS

MILL DUTY ENCLOSURES

ULTRA HIGH SPEED PLS

SAFETY PRODUCTS



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