GEMCO®

EtherNet/IP™

953N ReadyLink™ Network LDT with RapidRecall™

Mechanical Installation & Wiring Manual

EtherNet/IP™ conformance tested

ABSOLUTE PROCESS CONTROL
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AMETEK®
FACTORY AUTOMATION

Contents

The ReadyLink™ Network LDT manual will be divided into two separate manuals. The first one being the mechanical Installation manual and the second manual will be our Network configuration manual.

These instructions are designed to address the technical aspects of mounting and wiring 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 mounting and commissioning Ethernet based sensors into the host network.

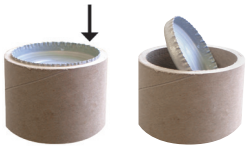
Turning on power - Note that the system may execute uncontrolled movement when power is first applied when the Network LDT is part of a closed loop system whose parameters have not yet been configured.

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 maintaining the LDT. Any errors or additional possibilities to the installation and maintenance of the LDT will be added in subsequent editions. Comments for the improvement of this manual are welcome.

Unpacking

Carefully remove the contents of the shipping carton and check each item on the packing slip before destroying the packing materials. Any damage must be reported to the shipping company. If you do not receive all of the parts, contact Ametek at 800-635-0289 (US and Canada) or 248-435-0700 (International).

Most probes are shipped in a Tube. To remove the metal end cap, use a large, flat blade screw driver or a metal rod and tap on the inner edge of the cap until it pivots. Grab the cap and pull it out. Use caution as the edge of the metal cap may be sharp.



If you have an RMA warranty claim, pack the probe in a shipping tube or with stiff reinforcement to prevent the probe from being bent in transit.

NOTE: The part number on the LDT is a record of the characteristics that make up your specific unit. For translation of the part number, see Appendix B.

Chapter 1: 953N ReadyLink™ Network LDT Overview

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™ Network 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 host controller via the ethernet network.

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

The 953N has three connectors. The incoming power is a 4-pin M12-A style connector. The Network communication will be two 4-pin M12-D coded connectors. The LDT supports Star, Line and Device Level Ring (DLR) topology. Our Network LDT supports DHCP (Dynamic Host Control Protocol) or the systems entire IP address can be assigned via a PC or the last 3 octets can be set manually via rotary DIP switches.

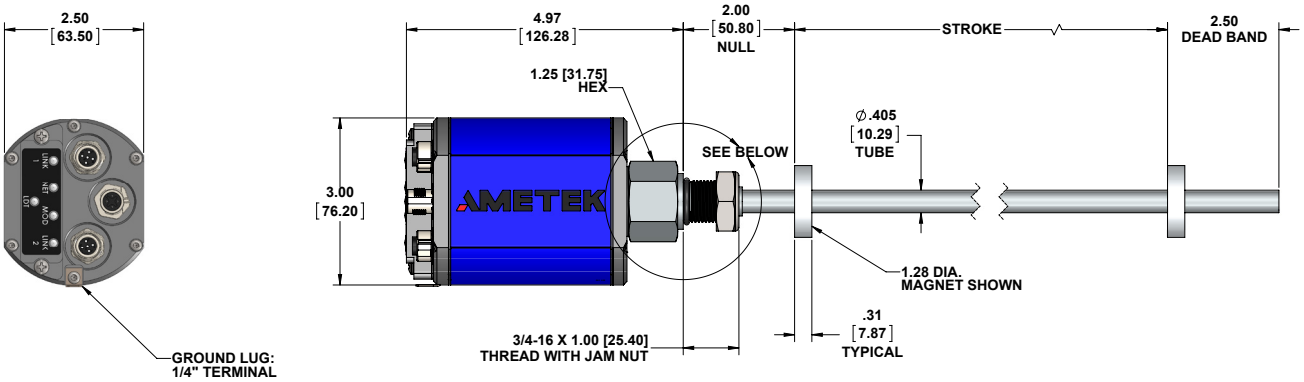
There are five diagnostic LEDs located on the cover next to the connectors that will indicate the health of the LDT and its network communication status.

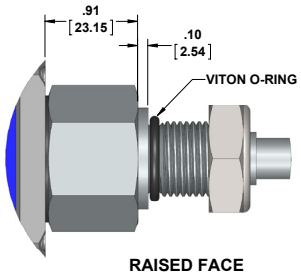
The ReadyLink™ Network LDT is totally configurable and can be set for your exact needs. Parameters such as counting direction, position and velocity format, resolution, and zero position are all programmable.

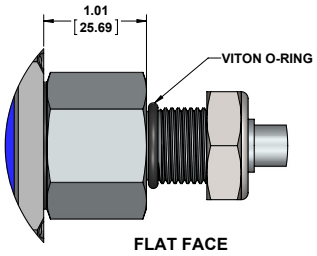
Chapter 2: 953N Rod Style Dimensions

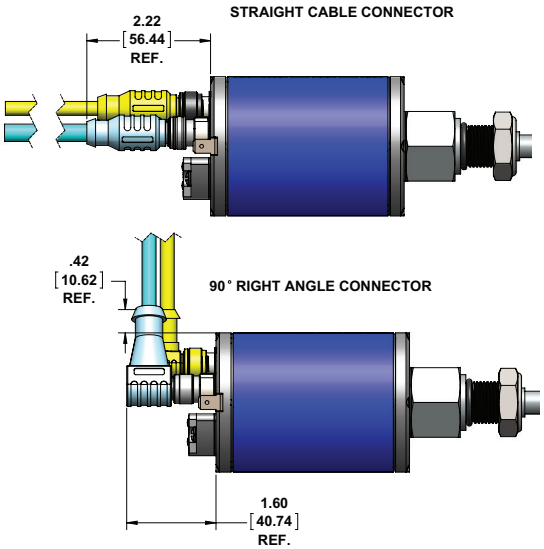
The 953N Rod style transducer is available in stroke lengths form 1" to 300". The transducer is available in English (Imperial) or metric stroke lengths as well as English ¾" x 16 or metric M18 x 1.5 mounting threads.

Magnets are always ordered as a separate line item. Depending on how and where the LDT will be mounted will help to determine which magnet option is best suited for your application.









Chapter 3: Installing the LDT

If a mounting bracket or other part is used that is made of ferromagnetic material (a material readily magnetized), it should be placed no closer than 0.25" from the LDT's rod end to minimize the effects of magnetic flux distortion. This can cause an inaccurate measurement of the magnet position.

Non-ferrous materials, such as brass, copper, aluminum, non-magnetic stainless steel, or plastics, can be in direct contact with the magnet assembly and rod end without producing any adverse results.

3.1: Installing the LDT to a Mounting Bracket

Parts discussed in this section can be found in Figure 3.1.

1. Unscrew the LDT's jam nut from the threads protruding from the hex mounting base.
2. Insert the LDT's rod end into the mounting bracket's hole. The mounting bracket may contain a 3/4-16 UNF-2B or metric M18 x 1.5 threaded hole. In this case, screw the LDT into this hole using the threads protruding from the hex mounting base.
3. Once the LDT is in place, screw the jam nut back onto the threads of the hex mounting base. Use the 1.25" hex mounting base on the rod assembly to tighten the LDT to the bracket.

WARNING: Do not use the blue aluminum cover of the head assembly to tighten the LDT within the bracket. This may damage the LDT and will void your warranty. To tighten the LDT within the bracket, use the 1.25" hex mounting base on the rod assembly.

If the length of the LDT's rod end is less than 30", skip to the sub-section: **Mounting the Magnet Assembly.**

Installing Support Brackets

It is recommended that a support bracket be used with LDTs having a rod 30"-71" in length. Supporting the end of the rod will minimize operational errors and protect against damage due to shock and vibration. If the length of the LDT's rod is 72" or longer, it is recommended that additional support brackets be used. These additional support brackets must be made of a non-ferrous material. Because these additional support brackets will interfere with the magnet's movement, a special split-type magnet assembly must be used. To order a split magnet (P/N SD0411200) and support brackets (P/N SD0411100), contact the factory at 800-635-0289.

To install a support bracket for a LDT having a rod 30"- 71" in length, perform step 4a. If the rod is longer than 71", perform step 4b.

4a. If the support bracket is made of a ferromagnetic material (material readily magnetized), install the support bracket no closer than 0.25" from where the LDT's dead band ends and the area of stroke begins. Continue to the sub-section: Mounting the Magnet Assembly.

To install two or more support brackets for a LDT having a rod 72" or longer in length, perform the following steps:

4b. Install support brackets at increments of 48" throughout the LDT's rod. Support brackets placed within the Null Zone and area of stroke or closer than 0.25" to the beginning of these areas must be made of a non-ferrous material.

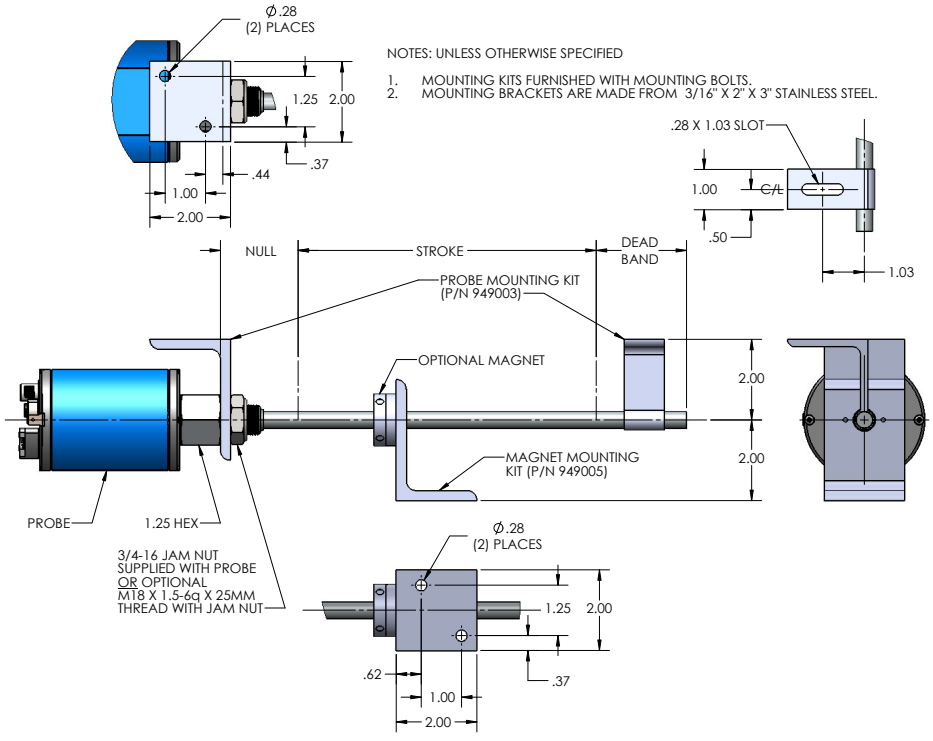


Figure 3.1

Mounting the Magnet Assembly

Before mounting the magnet assembly, the following should be considered:

- Ferromagnetic material should not be placed closer than 0.25” from the LDT’s magnet assembly or rod end. Failure to do so could cause erratic operations.
- Minimal clearance between the LDT’s rod and the magnet assembly through the full stroke is required. Stress between the magnet and the rod can cause flexing of the mounting brackets. This may result in non-linearity.
- LDTs using a split magnet assembly must keep the diameter of the magnet assembly around the rod throughout the complete stroke. The diameter of this magnet assembly should not be more than 0.2” away from the rod. Split magnet assemblies outside of this range will cause signal loss.

To install the magnet assembly, perform the following steps:

1. Slide the magnet assembly over the LDT rod.
2. Mount the magnet to the non-ferrous, movable portion of the device being controlled using non-ferrous screws.

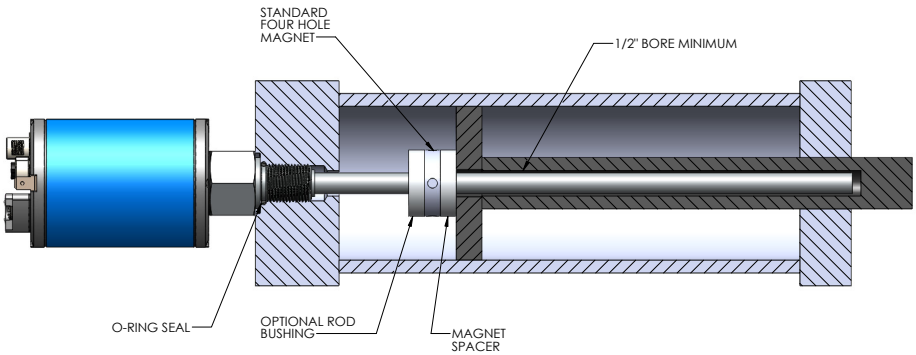
3.2: Installing the LDT in a Hydraulic Cylinder

Before installing an LDT in a hydraulic cylinder, note the following considerations. Items discussed in this section are found in Figures 3.2 and 3.3.

- A non-ferrous spacer must be used to separate the magnet assembly from the head of the piston rod. See Figure 3-1.
- The magnet should not be closer than 2.0” from the base of the LDT’s hex head when the piston rod is fully retracted. In instances where space restraints exist, it may be required to countersink the magnet into the piston rod. Two magnets are available for mounting to the piston: the standard 1.29" in diameter (P/N SD0400800) four-hole magnet and the 1.0" magnet (P/N SD0410300) designed exclusively for countersunk mounting applications. The 1.0" magnet must be secured with a snap ring.
- An O-ring is provided at the base of the LDT’s mounting hex for pressure sealing. The O-ring seal was designed to meet Mil-Std-MS33656. Refer to SAE J514 or SAE J1926/1 for machining of mating surfaces.
- A chamfered rod bushing in front of the magnet may be required. It is recommended that a chamfered rod bushing be used with LDTs having a rod 60.0” or longer. This bushing will prevent wear on the magnet assembly (wear occurs as the piston retracts from extended lengths). This rod bushing should be manufactured from a high wear polymer, such as Teflon®.
- It is recommended the bore for the cylinder piston rod have an inside diameter of at least 0.50”. The LDT rod has an outside diameter of 0.405”. Use standard practices for machining and mounting these components. Consult the cylinder manufacturer for details on applicable SAE or military specifications.

It may be necessary to perform machining and mounting operations on the hydraulic cylinder before installing the LDT. Consult the information and specifications provided by the cylinder manufacturer before beginning the following steps:

1. Unscrew the LDT’s jam nut from the threads protruding from the hex mounting base.
2. Position the non-ferrous spacer against the piston face, followed by the magnet, and then the chamfered rod bushing if the LDT’s rod is 60.0” or longer in length.
3. Insert non-ferrous screws through the chamfered rod bushing (if used), magnet, and non-ferrous spacer. Secure items by tightening screws.

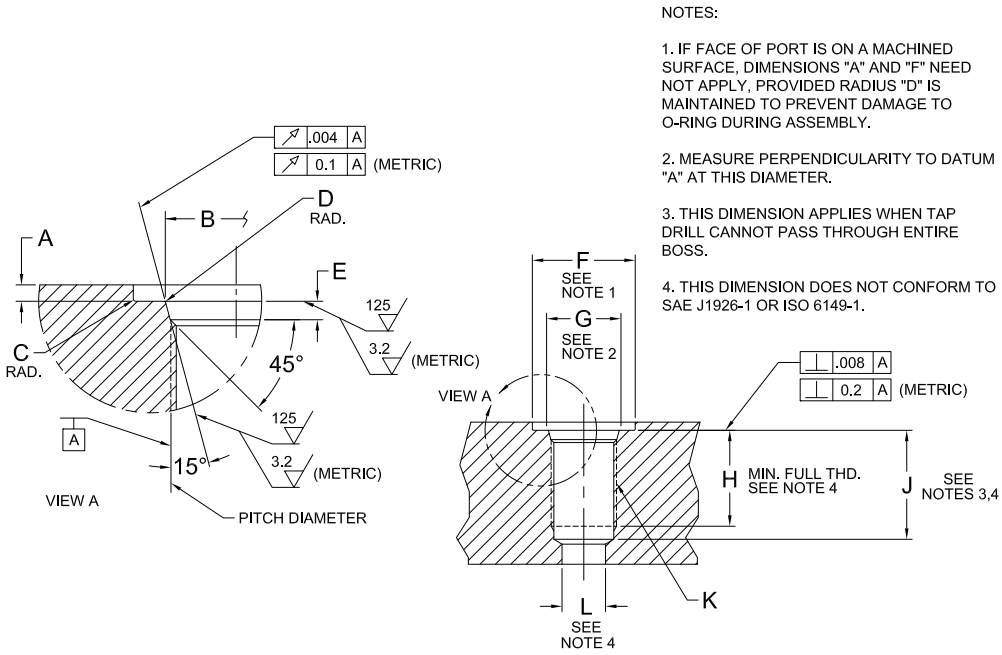


If the leading edge of the magnet will come closer than 2.0” from the base of the LDT’s hex head when the piston rod is fully retracted, it will be necessary to counter bore the magnet assembly into the piston rod. Both the standard 1.29” four-hole magnet assembly (P/N SD0400800) and the 1.0” magnet assembly (P/N SD0410300) are designed for counter bored mounting applications. If it has a 1.0” magnet assembly, a snap ring will be needed to hold it in place.

4. Insert the LDT’s rod into the hole of the hydraulic cylinders mounting bracket. The protective Plug may need to be removed from the hydraulic cylinder before inserting the LDT. The end cap should contain a 3/4-16 UNF-2B threaded hole (M18 x 1.5 for metric units). Screw the LDT into this hole using the threads protruding from the LDT’s hex mounting base.

WARNING: Do not use the blue aluminum cover of the head assembly to tighten the LDT within the bracket (see Figure 3.2). This may damage the LDT and will void your warranty. To tighten the LDT within the bracket, use the 1.25" hex mounting base on the rod assembly.

With the LDT properly installed inside the hydraulic cylinder, it may be necessary to assemble parts of the hydraulic cylinder. For assistance in this task, refer to the information provided by the cylinder manufacturer.



THREAD "K"	A (MAX.)	φB	C (MAX.)	D	E	φF (MIN.)	φG (MIN.)	H	J	φL
3/4-16 UNF-2B	.094	.813 ± .002	.015	.006 ± .002	.106 ± .008	1.18	.866	1.100	1.250	.500
M18 X 1.5	2MM	19.9/19.8MM	0.4MM	0.2/0.1MM	2.8/2.4MM	26MM	24.5MM	14.5MM	17MM	12.7MM

PORT DETAIL (SAE J1926-1)

Figure 3-2

Chapter 4: Wiring

The Ethernet Network LDT has three connectors. The incoming power is a 4-pin M12-A style connector. The Network communication will be 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.

MALE 4 PIN (M12-A) INPUT VOLTAGE

FEMALE 4 PIN (M12-D) BUS LINKS 1 AND 2

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-

4.1 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 953N 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 nut, the LDT's shield should NOT be tied to the earth ground at the power supply (See section 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 2.3 watts of power. The power supply must be rated at 275mA 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.

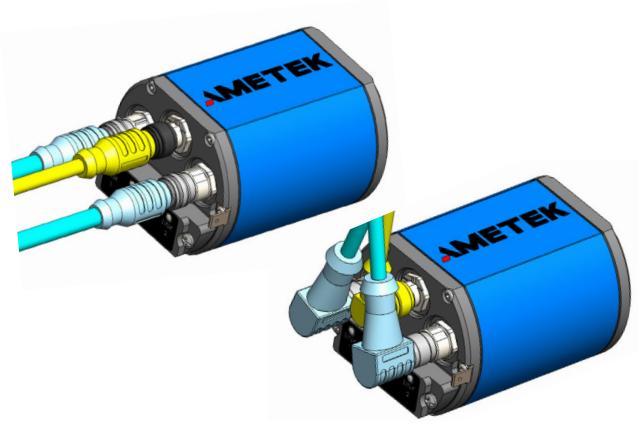
Network Connections

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

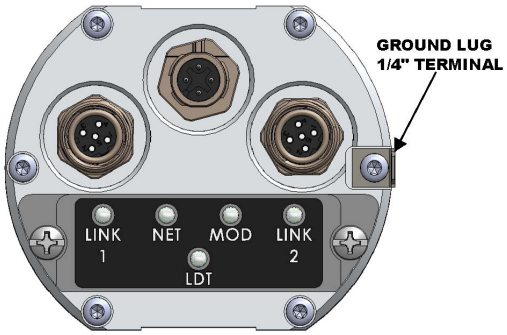
Per ODVA specifications, it is recommended that the maximum total cable run length be 100 meters or less. Typical cable lengths are 1 and 5 meters, cables greater than 10 meters are available; however, proper care must be taken during installation. It is recommended that one uninterrupted piece of cable 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.



4.2 Grounding Connections

There is a ¼" 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 from the ground provided by the Power Supply shields ground.

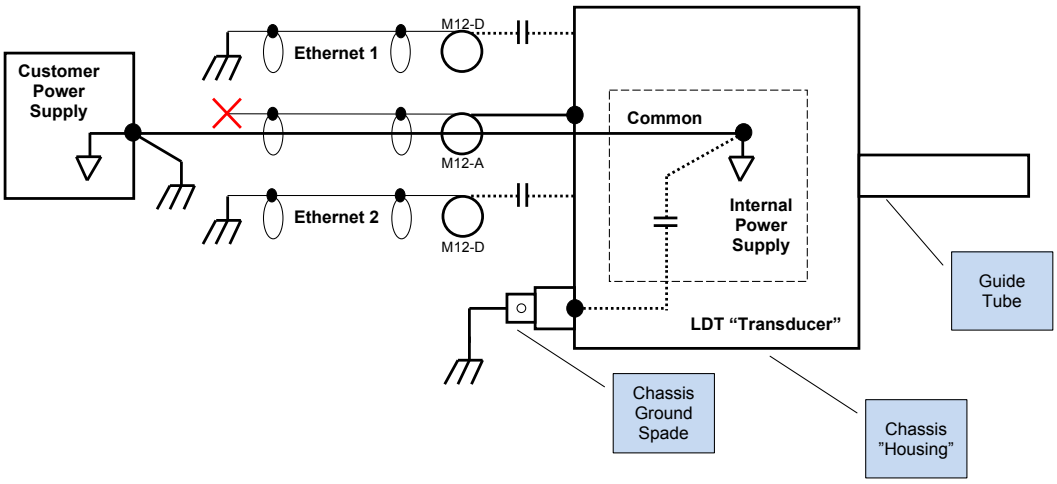
Always observe proper grounding techniques such as single point grounding and isolating high voltage (i.e. 120/240 VAC) from low voltage (7-30 VDC cables). Whenever possible, the cables should be run in conduit by themselves.



Startup

1. Verify connections. The 953N is reverse polarity protected; however, components can be damaged from improper connections or over voltage. Before applying power verify connections are correct.

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



Power Supply cable shield IS connected to connector coupling nut

Chapter 5: Features

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.

Position update frequencies are available up to 1,000 measurements per second (Length dependent).

Counting Direction and Resolution

The Network LDT can be configured increasing, decreasing, position, or velocity counts, along with the desired resolution. These parameters can 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.

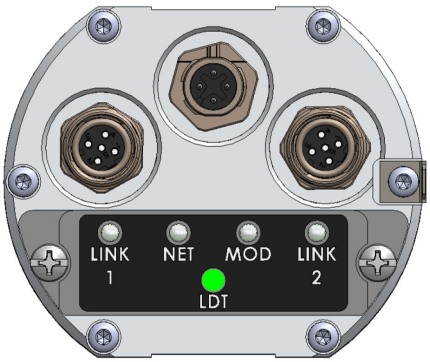
Network LDT Default Settings	
Position Measurement	Increasing from Head to Tip
Position Format	Inches
Position Measuring Increment	0.0001"
Preset	Zero position will be located closest to head. At 2" Null point, LDT will default to 2.0000"
Velocity	Increasing from Head to Tip
Velocity Format	Inches /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

Automatic Gain Control

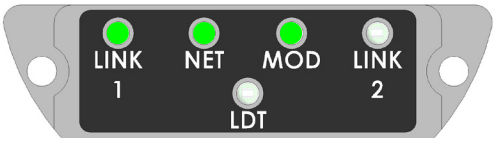
The Network LDT has an auto-tuning capability and will automatically compensate for non-standard magnet assemblies or adverse application conditions. The Automatic Gain Control (AGC) feature automatically searches and finds the magnet on power up (this is very useful when competitive style magnets are used with the AMETEK LDT). If power is applied without a magnet on the LDTs rod and within the active sensing range, the LED will turn RED indicating no magnet signal is detected. To correct this, turn the power off and place magnet within the active stroke area, then re-apply power to the LDT.

Diagnostics

To help aid in troubleshooting, the Network LDT is equipped with four network LEDs and a bi-color LDT status LED. These LEDs are labeled Link1, Net, Mod, Link 2, and LDT. The four top row LEDs will be used to display diagnostics and network status, the bottom row LDT LED is used to display the status of the Linear Transducer. If there is ever a loss of magnet, the LDT LED will turn red and the unit will transmit a position of zero or last valid position (user defined), as well as send a fault message to the Network that the unit has lost its signal. A green LDT LED indicates that the magnet is within the sensing range and the LDT is working properly.

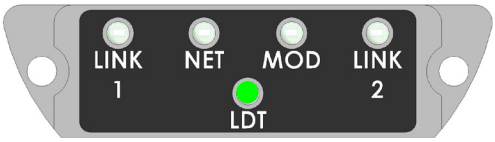


Network LED Functionality



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 1 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	AGC 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.

Appendix A: Troubleshooting

Troubleshooting describes common problems that may occur when installing the LDT and offers possible solutions to these problems. If, after reading this appendix, you are unable to resolve a problem, contact our technical support department at 800-635-0289.

General Checks

Make sure that the magnet is located within the LDT's active stroke area. Magnet assemblies should be positioned so that they can move freely over the entire area of the active stroke without binding or pushing on the rod. If power was applied to the LDT without the magnet, insert magnet into active region of the LDT and cycle power.

NOTE: Ferromagnetic material (material readily magnetized) should be located no closer than 0.25" from the sensing surface of the LDT. This includes mounting brackets, magnet spacers, magnet brackets, and mounting screws. Ferromagnetic material can distort the magnetic field, causing adverse operation or failure of the LDT.

Check all LDT wires for continuity and/or shorts. It is preferable that the cable between the LDT and the interface device 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 be carried through the splice and terminated at the interface device end.

Power Supply Check

This will help you to determine if your power supply is adequate for the LDT to operate properly or if the LDT's cable has a short or open.

In order for the 953N to operate properly, the external power supply must provide a voltage level between 7 to 30 VDC. A power supply providing voltage above this specified range may damage the LDT. A power supply providing power below this specified range will not be sufficient to power the LDT. When powering more than one network LDT on a single power supply, remember that each LDT typically requires 2.3 watts of power. The amount of current draw will vary based on the input voltage, as well as other operating parameters. To approximate the current draw for a particular LDT, divide the LDT wattage by the input voltage. For example, 2.3 watts divided by 24 VDC equals 96mA.

If your LDT is not operating properly, the LDT's cable may have an open or short, or the power supply is not supplying sufficient power. To verify this, perform the following steps:

1. Turn the power supply off.
2. Remove the mating connector from the LDT.
3. Turn the power supply on.
4. Using a digital voltmeter, check from the Power Supply Common to the Power Supply + on the mating end of the cable for a level between +7 and 30VDC

If reading is between 7 and 30 VDC, turn power supply off and go to step 7. If reading is below 7 VDC, either your power supply is not providing enough power or the LDT's cable possibly has a short/open. Readings of no voltage or minimal voltage (less than 5 volts) may be due to short/open in the cable. If reading is NOT between 7 and 30 VDC, go to step 5. If reading is above 30 VDC, adjust power supply or replace.

5. Turn the power supply off.
6. Check the continuity of the individual wires of the cable between the power supply and the LDT. Check for continuity from one end of the cable to the other. Also verify that no shorts exist between pins.
7. Reconnect the mating connector to the LDT.
8. Turn power supply on.
9. Using a digital voltmeter, check the power supply's "+" and "-" terminals for a voltage between 7 and 30 VDC.

Low voltage readings may indicate a power supply with a wattage (current) rating that is too low. (Each LDT requires approximately 2.3 watts). If the cabling checks out in step 6 and your voltage is below 7 VDC, check your power supply current rating. If voltage is between 7 to 30 VDC and the LDT is still inoperative, contact factory.

Appendix B: Part Numbering System

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 Rod Style LDTs 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 sensor. 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.

953N — IP — 0120 — E — S — X — R — X

Output	
IP	EtherNet/IP™

Connector Option	
S	Two-M12D and one M12A

Options	
X	None

Seal Options	
X	Standard (Buna N)
V	Fluoroelastomer

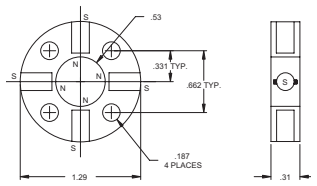
Stroke Length
Insert stroke length to 0.1 inch. Enter as a four-place number. Example: A 12.0" stroke enters as 0120. OR Insert stroke in millimeters to 1mm. Enter as a four-place number. Example: 305mm stroke entered as 0305M.

Mounting Threads	
R	US Threads with raised face hex base
F	US Threads with flat face hex base
M	Metric threads with raised face hex base
N	Metric threads with flat face hex base

Units of Measure	
E	Inches
M	Metric

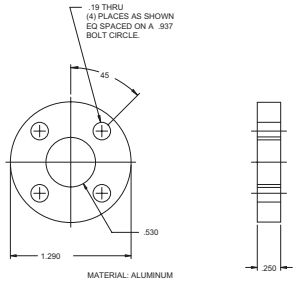
Magnet Assemblies

Standard 4 Hole Magnet



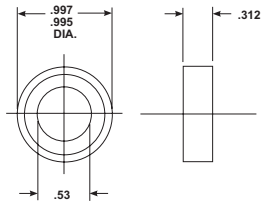
Standard P/N: SD0400800
Stainless Steel P/N: SD0480900

Non-Ferrous Spacer for 4 Hole Magnet



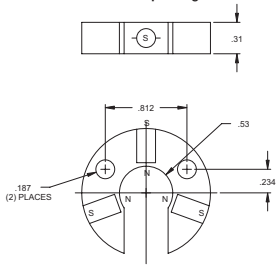
P/N: M0822400

Cylinder Magnet



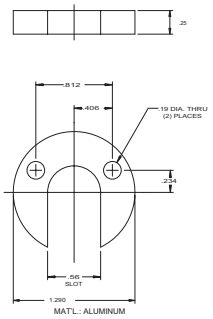
Standard P/N: SD0410300
Teflon Coated P/N: SD0410301

Aluminum Split Magnet

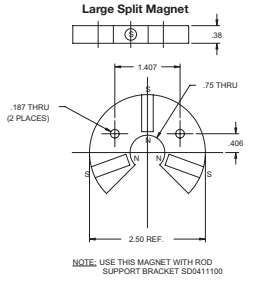


P/N: SD0403900

Non-Ferrous Spacer for Split Magnet



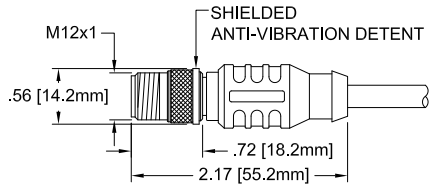
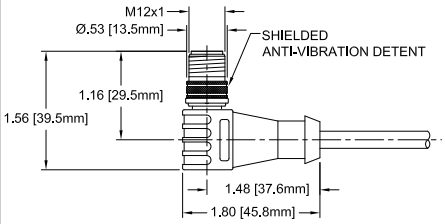
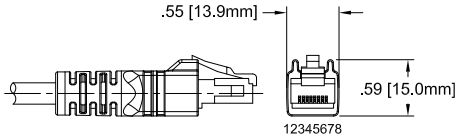
Large Split Magnet



Standard P/N: SD0411200
Stainless Steel P/N: SD0411201

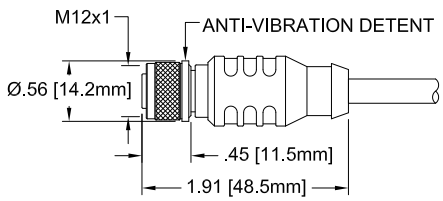
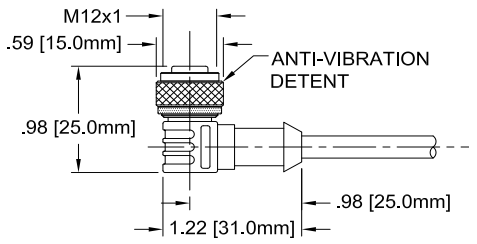
Accessories

Network Cable Assemblies

Straight Connector	Right Angle Connector	RJ45 Connector
		

Description	Part Number
Communications Cable M12-D Straight to M12-D Straight – CAT 5e, Shielded Cable - Available in 1 & 5 Meter lengths	949038L1M = 1 meter 949038L5M = 5 meter
Communications Cable M12-D Straight to M12-D Right Angle – CAT 5e, Shielded Cable - Available in 1 & 5 Meter lengths	949039L1M = 1 meter 949039L5M = 5 meter
Communications Cable M12-D Right Angle to M12-D Right Angle – CAT 5e, Shielded Cable - Available in 1 & 5 Meter lengths	949040L1M = 1 meter 949040L5M = 5 meter
Communications Cable M12-D Straight to RJ45 – CAT 5E, Shielded Cable- 5 Meter	949041L5M
Communications Cable M12-D Right Angle to RJ45 – CAT 5e Shielded Cable - 5 Meter	949042L5M
 Connector End Cap - Unused connectors should be covered by this End Cap	04521619

Power Cable Assemblies

Straight Connector	Right Angle Connector
	

Description	Part Number
Power Cable M12-A Straight to flying leads- Shielded – Available in 5, 10 & 15 Meter lengths	949043L5M = 5 meter 949043L10M = 10 meter 949043L15M = 15 meter
Power Cable M12-A Right Angle to flying leads - Shielded – Available in 5, 10 & 15 Meter lenghts	949044L5M = 5 meter 949044L10M = 10 meter 949044L15M = 15 meter

Consult factory for longer lengths or cables not listed above.

Cable Specifications

Cable Type	Gauge	Jacket	Shield	O.D.	Temp.	Bend Radius
Network Cables - ALL	4/24 AWG Stranded	PVC - Teal	Foil / Braid	7.2mm (.285")	-40° to 80°C	5 x O.D. Fixed Applications 10 x O.D. 1 million cycles 20 x O.D. 10 million cycles
Power Cable - Straight	4/22 AWG Stranded	PVC - Grey	Foil / Drain / Braid	7.3mm (.290")	-40° to 105°C	
Power Cable - Right Angle	4/22 AWG Stranded	PVC - Grey	Foil / Drain	5.2mm (.205")	-40° to 105°C	

Appendix C: Specifications

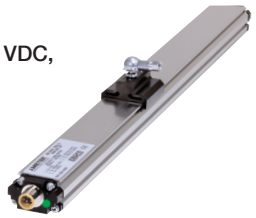
General Specifications	
Displacement	1" to 300" (25mm to 7620mm)
Rod End	316 Stainless Steel, 0.405" (10.29 mm) outer diameter
Mounting Hex	316 Stainless Steel, 1.25" (31.75 mm) across flats
Mounting Threads	3/4" x 16 UNF-3A or metric M18 x 1.5 with O-ring seal
Head Assembly	Thick wall aluminum cover, gasket seal at the base and connector exit
Dead Band	2.50" Rod Style
Null	2.00"
Internal Position Resolution	0.00003" (0.7 micron)
Non-linearity	Less than ± 0.01% of stroke (1) (± 0.003" typical)
Hysteresis	Less than 0.001"
Repeatability	Equal to output resolution
Position Temperature Drift	(6µm + 5ppm · Stroke)/°C
Connectors	
Power	M12-A Coded
EtherNet (2 Connectors)	M12-D Coded
Operating Temperature	
Head (Electronics)	-40°F to 185°F (-40°C to 85°C)
Guide Tube	-40°F to 221°F (-40°C to 105°C)
Storage Temperature	-40°F to 185°F (-40°C to 85°C)
Electrical Specifications	
Input Voltage	7 to 30 VDC
Power Consumption	2.3W maximum (at 30 VDC), 2.1W typical at 1ms interrogation time and 24V input voltage
Current Draw	275mA maximum (at 7VDC), 87.5mA @ 24VDC typical
Data Format	
Measured Variables	Single magnet displacement and velocity
Position Measurement Reference	Offset to preset value (User Configurable)
Measurement Direction	Forward or reverse (User Configurable)
Position Format (Units):	centimeter, millimeter, micron, inch, 0.01 inch, 0.001 inch, 0.0001 inch (User Configurable)
Position Measuring Increment	1 to 100 (User Configurable)
Velocity Format (Units):	centimeter/sec, inch/sec (User Configurable)
Velocity Resolution	1 to 65535 (User Configurable)
Measurement Mode	Asynchronous
Interface Specifications	
Interface Type	EtherNet/IP
Data Transmission Rate	100 Mb/s maximum
Other Specifications	
Enclosure Rating	IP-67 (IEC 60529)
Shock	100G (IEC 60068-2-27)
Vibration	15G (IEC 60068-2-6)
Guide Tube Pressure	5,000 PSI constant (10,000 PSI spike)
Approvals	CE (EMC) EN 61000-6-2 & EN 61000-6-4, ODVA Compliant

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



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