

Series 953



INSTALLATION MANUAL

LINEAR DISPLACEMENT TRANSDUCERS

953SSI VMAX™

Linear Displacement Transducer



**ABSOLUTE PROCESS CONTROL
KNOW WHERE YOU ARE... REGARDLESS**

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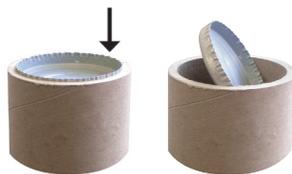
NOTE: Ametek has checked the accuracy of this manual at the time it was approved for printing. This manual may not provide all possible ways of installing and maintaining the LDT. Any errors or additional possibilities to the installation and maintenance of the LDT will be added in subsequent editions. Comments for the improvement of this manual are welcome.

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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.

Chapter 1: 953SSI Overview

The 953SSI VMAX is a magnetostrictive Linear Displacement Transducer (LDT) for highly accurate continuous machine positioning in a variety of industrial applications.

The 953SSI VMAX provides a Serial Synchronous Interface output signal that is proportional to the position of the magnet assembly along the length of the probe.

This sensor is built to withstand the most severe environmental conditions and is completely absolute. This means that power loss will not cause the unit to lose position information or require re-zeroing. The non-contact design allows this device to be used in highly repetitive applications without mechanical wear.

Features

The 953SSI has auto-tuning capability. This is the ability to sense a magnet other than the standard ring magnet and adjust its signal strength accordingly.

There is an indicator LED that is located at the connector end of the probe and provides visual status information regarding the operation of the probe. Green indicates proper or normal operation. Red indicates the loss of the magnetic signal or a probe failure. When the probe is in the normal mode of operation, the LED will remain illuminated green continuously.

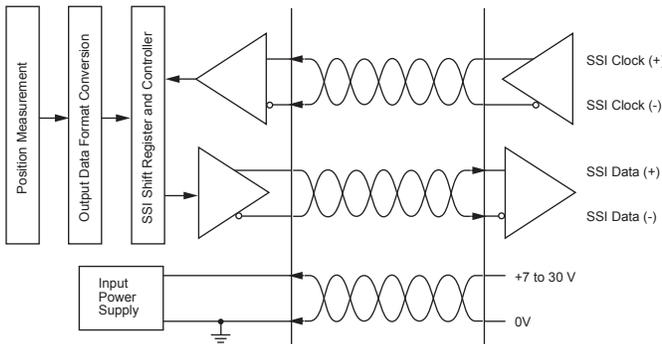
LED Colors*	
Green	Magnet is present and within the active range.
Red	Fault, the LDT has lost its signal from the magnet or the magnet has moved into the Null Zone or Dead Band.
*Refer to diagnostics on page 13 for a complete list of LED colors and functions.	

NOTE: The series number on your LDT is a record of all the specific characteristics that make up your unit. This includes what interface type it has, its output signal and range, the type of connector the unit uses, and stroke length. For a translation of the model number, see Section 3.5 Part Numbering System.

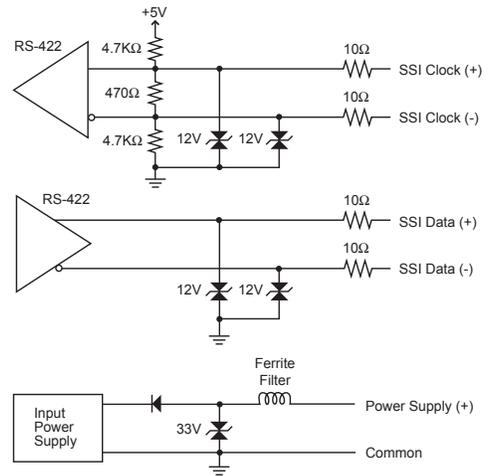
SSI (Serial Synchronous Interface)

The displacement value (position) is encoded into a 24, 25 or 26 Bit format and transmitted at high speeds. Synchronization in a closed loop system is made easy. A clock pulse train from a controller is used to shift out sensor data: one bit of position data is transmitted to the controller for one clock pulse received by the sensor. The absolute position data is continually updated by the sensor and converted by the shift register into serial information.

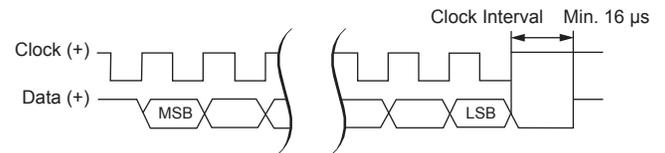
SSI Logic Diagram



SSI Sensor Input

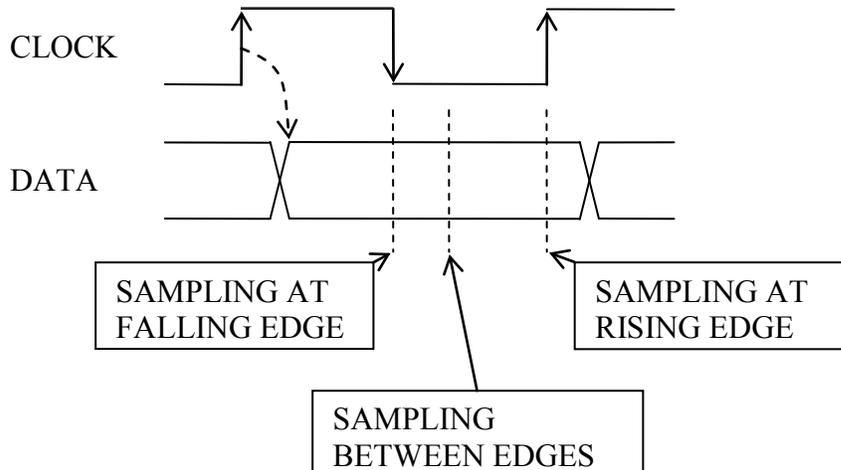


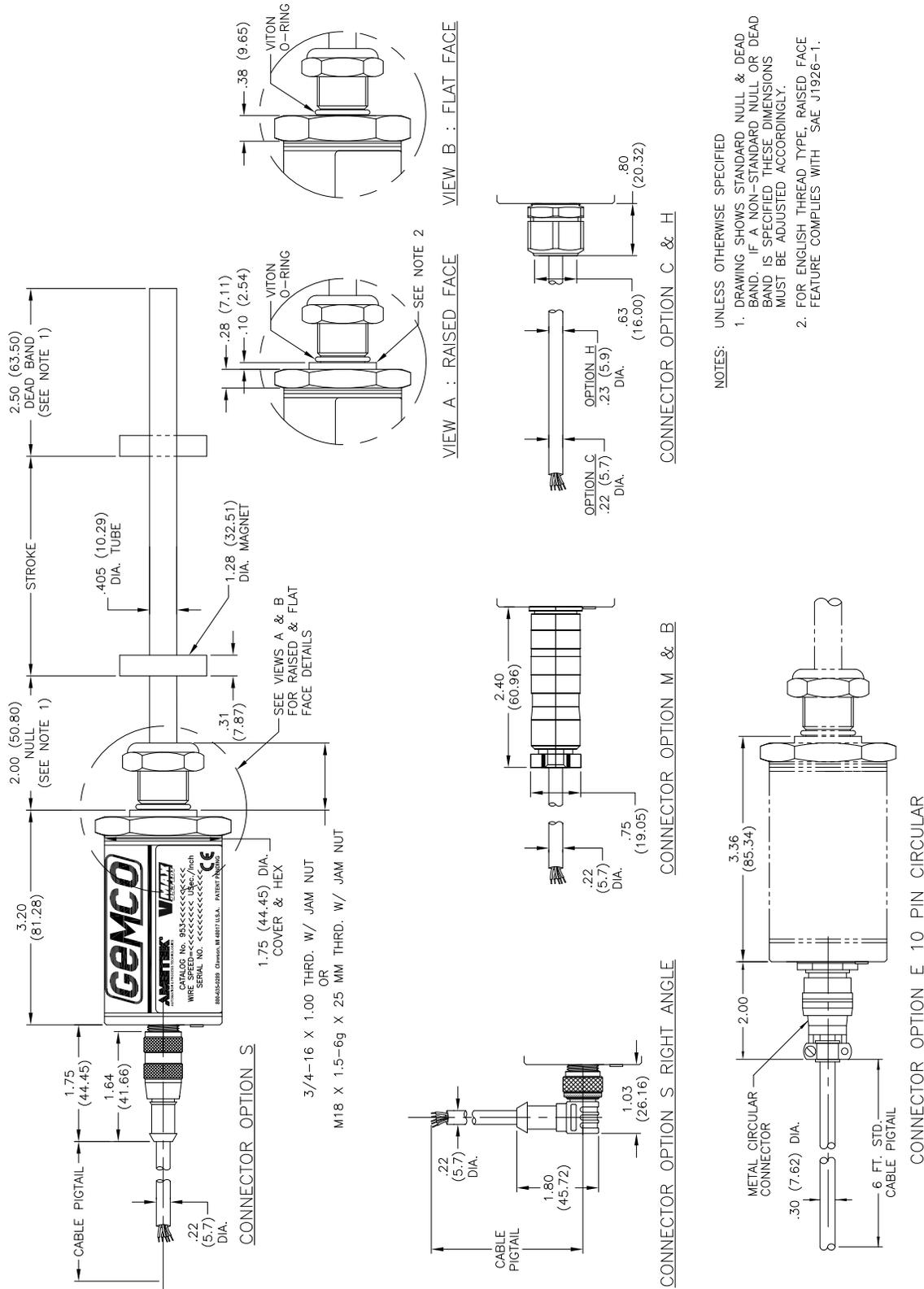
SSI Timing Diagram



Note: Based on Gemco cable P/N 01533149 (Turck P/N RF50610-30M).

New data is placed on the "data" signal 605nS after the rising edge of the "clock" signal. This time, plus the data caused by cable length, must be considered when determining the setup times (frequency) of the controller.





NOTES: UNLESS OTHERWISE SPECIFIED

1. DRAWING SHOWS STANDARD NULL & DEAD BAND. IF A NON-STANDARD NULL OR DEAD BAND IS SPECIFIED THESE DIMENSIONS MUST BE ADJUSTED ACCORDINGLY.
2. FOR ENGLISH THREAD TYPE, RAISED FACE FEATURE COMPLIES WITH SAE J1926-1.

Figure 1-1 953SSI Dimension Drawing



Chapter 2: 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.

2.1: Installing the LDT to a Mounting Bracket

Parts discussed in this section can be found in Figures 1-1 and 2-1.

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 1.75" hex mounting base on the head 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 (see Figure 2-1). This may damage the LDT and will void your warranty. To tighten the LDT within the bracket, use the 1.75" hex mounting base on the head 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.

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

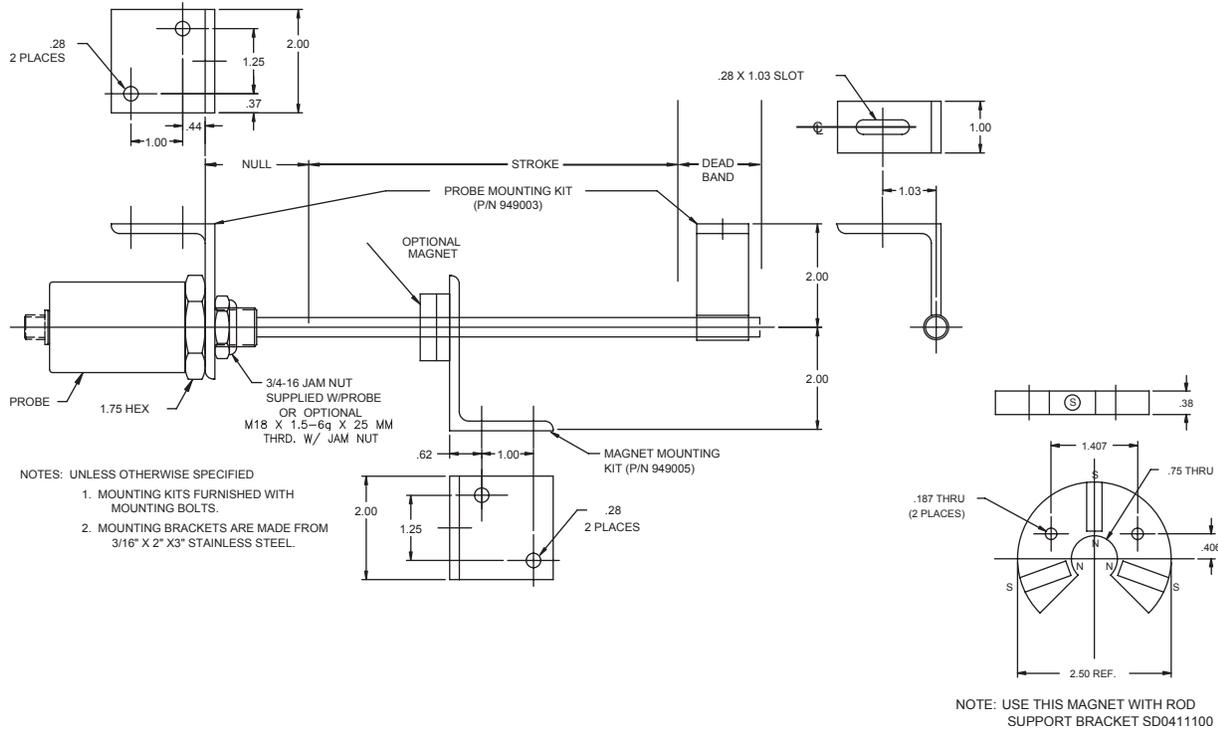


Figure 2-1: Mounting the LDT

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.

2.2: 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 1-1 and 2-1.

- A non-ferrous spacer must be used to separate the magnet assembly from the head of the piston rod. See Figure 2-2.
- 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 counterbore 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 counterbored 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 cylinder's 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.

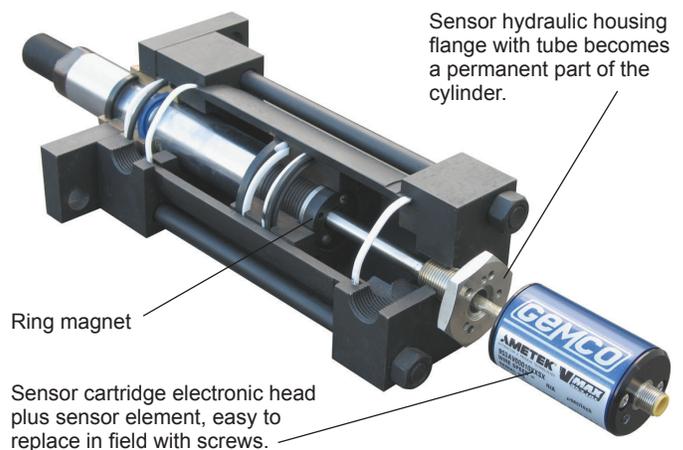


WARNING: Do not use the blue aluminum cover of the head assembly to tighten the LDT within the bracket (see Figure 2-1). This may damage the LDT and will void your warranty. To tighten the LDT within the bracket, use the 1.75" hex mounting base on the head assembly.

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.

Removable Cartridge

The sensor cartridge can be removed from the flange and rod housing while still installed in the cylinder. This procedure allows quick and easy sensor cartridge replacement, without the loss of hydraulic pressure.



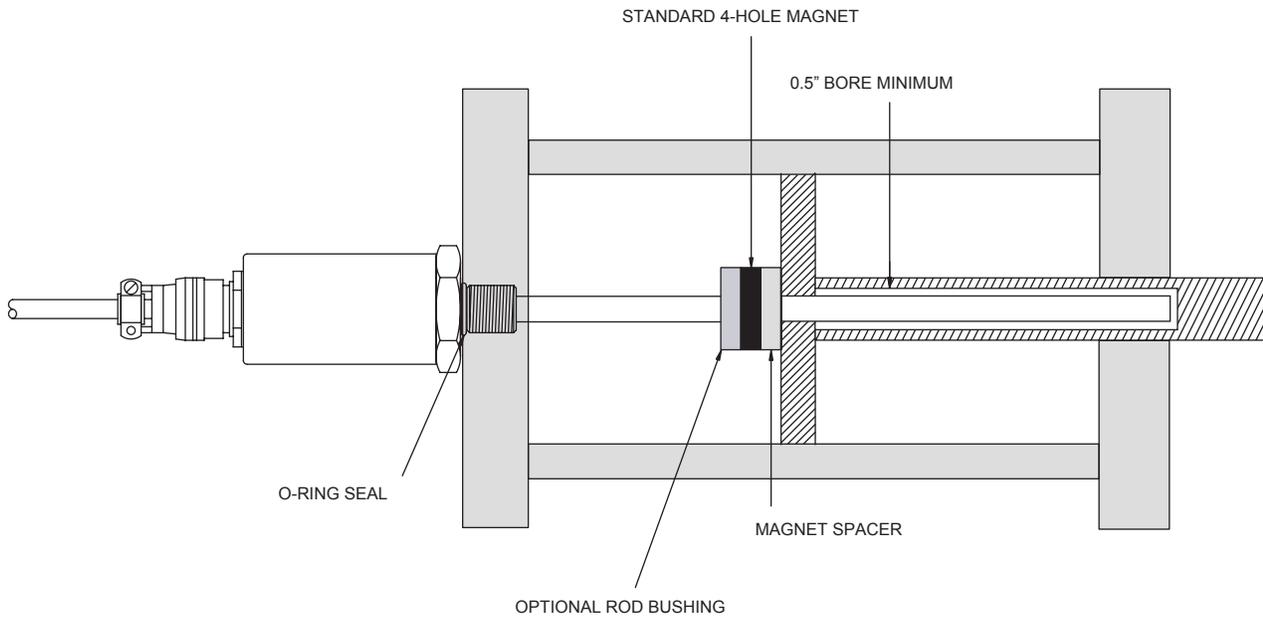
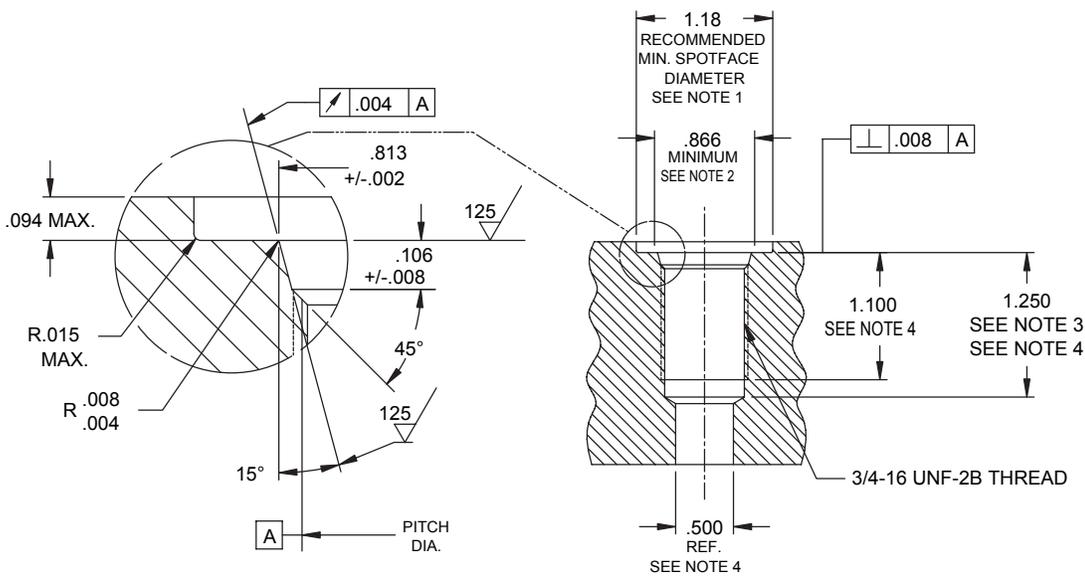


Figure 2-2: Mounting LDT in a Hydraulic Cylinder



NOTES:

1. IF FACE OF PORT IS ON A MACHINED SURFACE, DIMENSIONS 1.180 AND .094 NEED NOT APPLY AS LONG AS R.008/.0004 IS MAINTAINED TO AVOID DAMAGE TO THE O-RING DURING ASSEMBLY.
2. MEASURE PERPENDICULARITY TO A AT THIS DIAMETER.
3. THIS DIMENSION APPLIES WHEN TAP DRILL CANNOT PASS THROUGH ENTIRE BOSS.
4. THIS DIMENSION DOES NOT CONFORM TO SAE J1926-1.

Figure 2-3: Port Detail (SAE J1926/1)

Chapter 3: Wiring

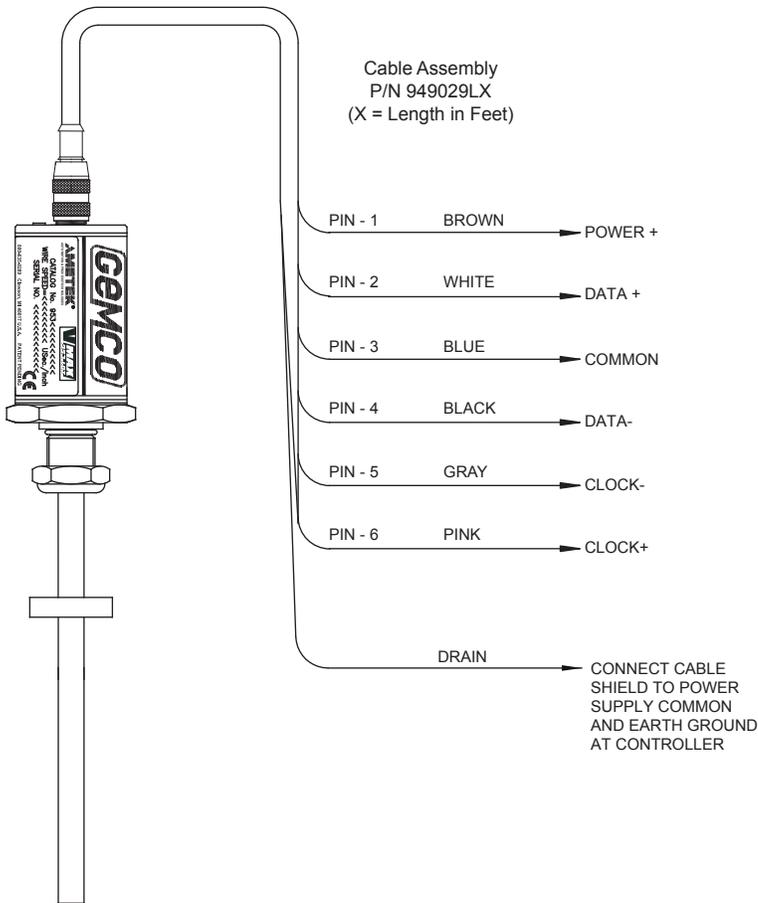


Figure 3-1: Wiring for Connector Option "S", 6 Pin 12 mm Micro

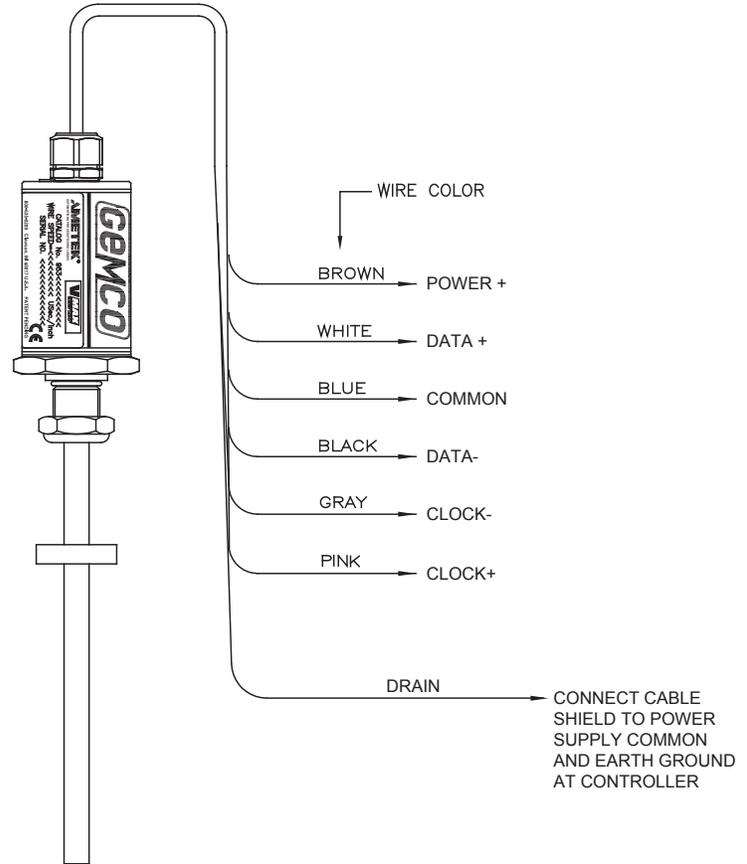


Figure 3-2: Wiring for Connector Option "C", Integral Cable Assembly

NOTE: XX= Length in feet

Cable # SD0439700LXX

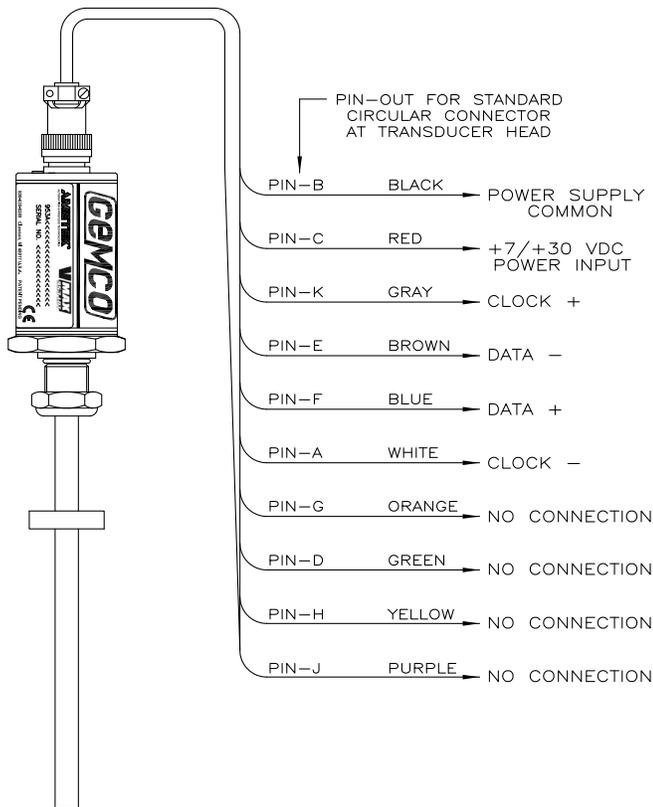


Figure 3-3: Wiring for Connector Option "E", 10 pin MS connector

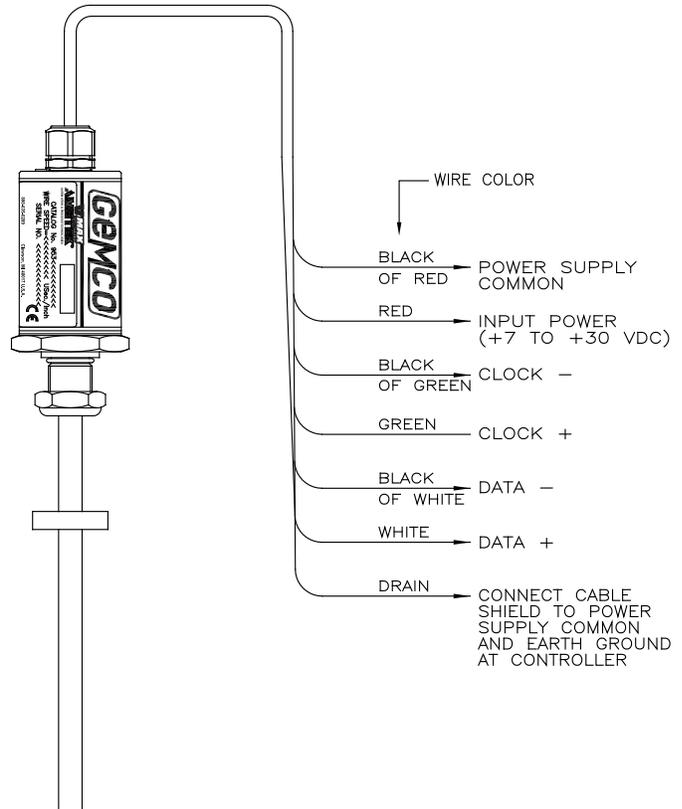


Figure 3.4 Wiring Diagram Option "H", High Temperature Integral Cable Assembly

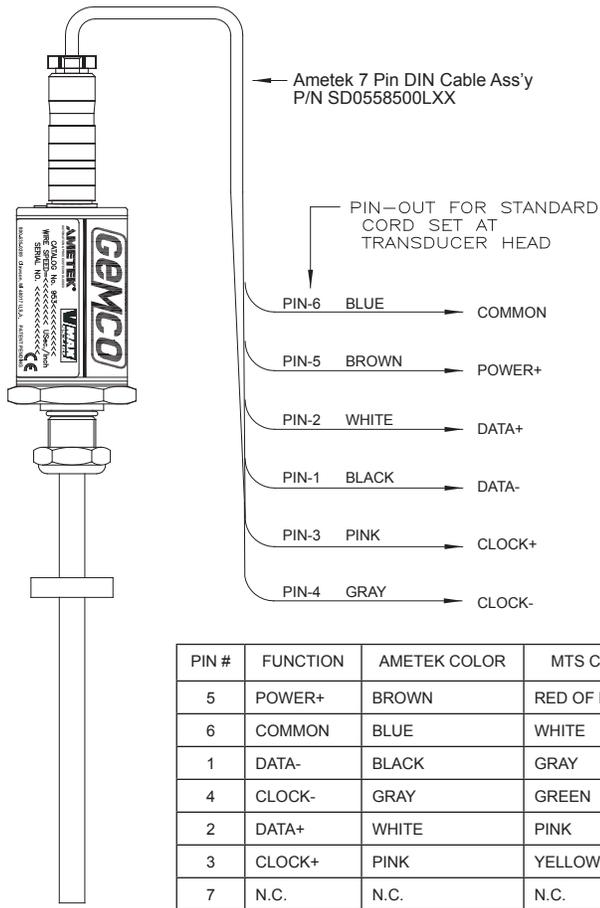


Figure 3-5: Wiring for Connector Option "M", 7 Pin DIN

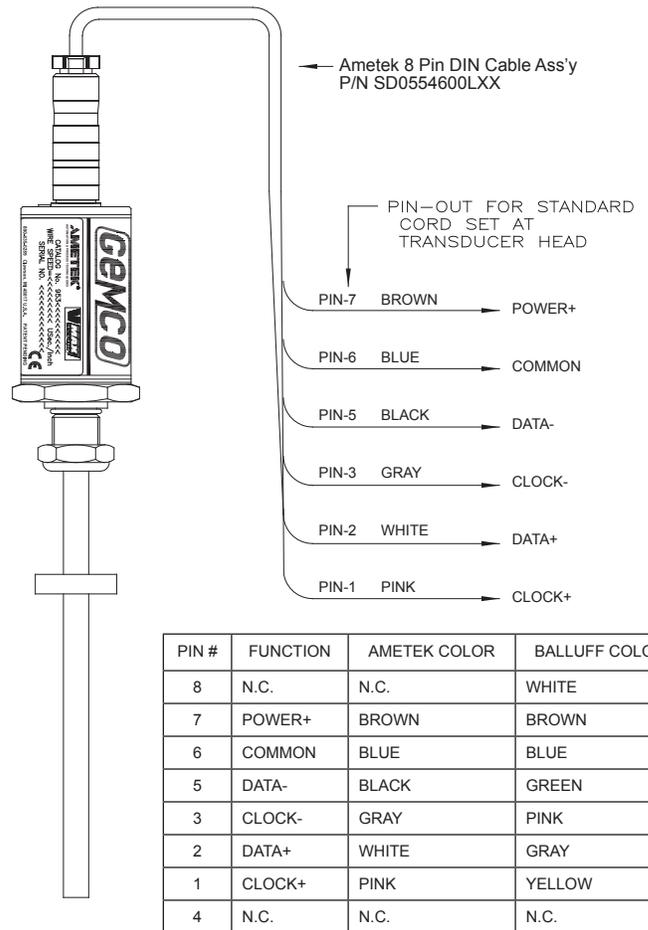


Figure 3-6: Wiring for Connector Option "B", 8 Pin DIN

PIN #	FUNCTION	AMETEK COLOR
5	POWER	RED
6	COMMON	BLACK OF RED
1	DATA -	BLACK OF WHITE
4	CLOCK -	BLACK OF GREEN
2	DATA +	WHITE
3	CLOCK +	GREEN
7	N.C.	N.C.

Figure 3-5A: Wiring for Connector Option "M", 7 Pin DIN with High Temperature Teflon Cable Assembly SD0558501LXX



3.1 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 Connections

Power Supply/Ground Connections

The 953SSI is available with many different connector/wiring options. Refer to part numbering on unit in question for proper wiring. See Chapter 3 for part numbering and figures 3.1 - 3.5 for wiring details.

The 953SSI standard cable is a 6 Pin, 12mm, Euro Style cordset. It has 6 conductors of 24ga, with an aluminum/polyester/aluminum foil with drain wire plus an overall braid of tinned copper shield. Cable O.D. is .270. To reduce electrical noise, the shield must be properly used. Connect the cable's shield to the controller system GND.

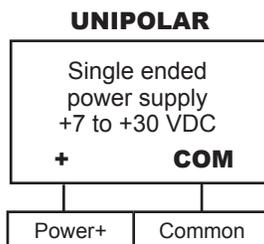
Always observe proper grounding techniques such as single point grounding and isolating high voltage (i.e. 120/240 VAC) from low voltage (7-30 VDC cables). Whenever possible, this cable should be run in conduit by itself. The power supply common, the cable shield and a good earth ground should be connected together at the location of the power supply common.



WARNING
Do not route the VMAX output cable near high voltage sources.

In order for the 953SSI to operate properly, the LDT's external power supply must provide a voltage between +7 to +30 VDC. The power supply must be rated at 150mA minimum. The power supply should provide

Figure 3.7 Power Supply Wiring



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.)

Cable lengths

Ametek recommends that the maximum cable length be 10 meters. Cables greater than 33 feet are available; however, proper care must be taken during installation.

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. 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. The LDT's shield should be tied to the earth ground at the power supply.

Cable length limitations are based on SSI clock frequencies . Apply good industry practices for long cable runs - keep cable away from high power AC lines and all motor drive cables.

Cable Length		Controller Data Sampling	
		Falling Edge	Rising Edge
6 ft	1.83 m	750 kHz	1500 kHz
30 ft	9.14 m	650 kHz	1300 kHz
100 ft	30.48 m	500 kHz	1000 kHz
150 ft	45.72 m	400 kHz	800 kHz
300 ft	91.44 m	270 kHz	540 kHz
600 ft	182.88 m	160 kHz	320 kHz
1200 ft	365.76 m	90 kHz	180 kHz

Note: Minimum SSI clock frequency rate is 70 kHz.



Startup

1. Verify connections
The 953S is reverse polarity protected; however, components can be damaged from improper connections or over voltage. Before applying power verify connections are correct.
2. Turning on power
Note that the system may execute uncontrolled movement when power is first applied when the 953S is part of a closed loop system whose parameters have not yet been configured.

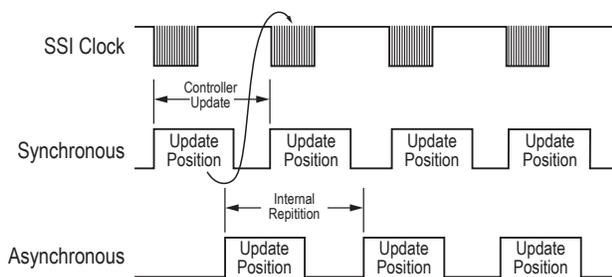
Position Update

The position of the magnet on the rod is precisely determined by a time of flight method. The 953S converts this position value to a 24, 25, or 26 bit Binary or Gray code data stream where it is transmitted to the host controller via SSI. All displacement outputs are absolute and do not lose their position after loss of power.

Position update frequencies are available up to 6500 measurements per second (Length dependant) in Asynchronous mode, and are controller dependant in the Synchronous mode. However, if the controller interrogates the 953LDT quicker than the LDT can provide data, the 953S VMAX LDT will automatically switch to the Asynchronous mode and supply the host controller with the most up to date positional information.

Synchronous Update Mode

A clock pulse train from the host controller is used to shift out sensor data, one bit of positional data is transmitted to the controller for each clock pulse received by the sensor. The first clock pulse edge



from the host controller signals the LDT to make a measurement. The positional data from this measurement will be used during the next controller update cycle.

NOTE: The data in this mode will always be one update cycle old.

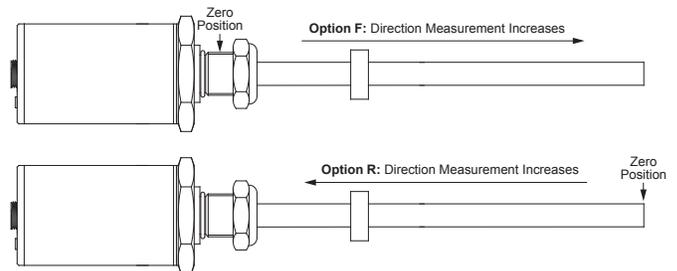
Asynchronous Update Mode

The 953S VMAX LDT takes measurements at its preset internal interrogation rate (length dependant) and provides information when requested from the host controller.

NOTE: If the controller or interface module does not specify Synchronous mode, we recommend using the LDT in the Asynchronous mode.

Direction

The 953 can be configured increasing, decreasing, position, or velocity. Option "F" (Measure Direction Forward) will increase counts as the magnet moves from the head of the LDT to the tip. Option "R" will be exactly opposite. The zero position will be located in the mounting threads. This is an area where it is physically impossible to detect a magnetic signal. If the 953S is in the "Measure Direction Reverse" option, the zero point will be at the far tip of the LDT, again a position that the magnet cannot be detected. If the velocity option is selected, the unit will output velocity and not displacement.



Resolution

The resolution of the positional output is selectable in the part number and can be ordered in English (Imperial) or metric units. Selections 1 thru B are valid options. Refer to section 3.5 Part Numbering for further details.



3.2 Features

Automatic Gain Control

The Automatic Gain Control feature will automatically search and find the magnet on power up. If power is applied without a magnet on the LDT, the LED will turn RED indicating no magnet signal is detected. Turn power off and place magnet within the active stroke area. Re-apply power.

Accessories	
P/N	Description
949029L6	6 Foot, 6 Pin, Straight, 12mm Euro Cable
949030L6	6 Foot, 6 Pin, Right Angle, 12mm Euro Cable
SD0400800	Standard 4 Hole Magnet
SD0558500L6	6 Foot, 7 Pin, Straight Cable for option M
Consult factory for complete accessory offerings.	

Diagnostics

The 953SSI is equipped with a tri-color LED next to the connector to help while troubleshooting. The chart below explains the possible LED colors and the faults they represent.

NOTE: If there is ever a loss of magnet, the LED will turn red and the unit will transmit a position of zero.

953 LED Output Summary	
Output	953SSI
Flashing Red	Flash memory corrupt
Flashing Red/Green	EE memory corrupt
Flashing Yellow	Communication/programming mode
Fast Flashing Yellow	Clock input held asserted at power up
Solid Red	No magnet signal detected
Green/Red Blip (1s to 0.12s)	Max Gain but signal detected and within range
Solid Green	Normal probe operation; magnet signal and SSI clock operational
Solid Yellow	No SSI clock pulses detected
Yellow/Red Blip (1s to 0.12s)	SSI clock pulses do not match LDT SSI data length
Green/Yellow Blip (1s to 0.12s)	LDT data not Synchronous with controller (if LDT is programmed for Synchronous mode)

Alarm Bit

The 953S can be configured to output a fault bit should there be a problem with the LDT. Consult Factory.

3.3 Troubleshooting for 953SSI

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.

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 953SSI 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 VMAX on a single power supply, remember that each VMAX typically requires 1 watt 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, 1 watt divided by 24 VDC equals 40mA.

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 +30 VDC.

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 1.3 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.

* See Section 3.4: Specifications for more information on power consumption.

3.4 Specifications

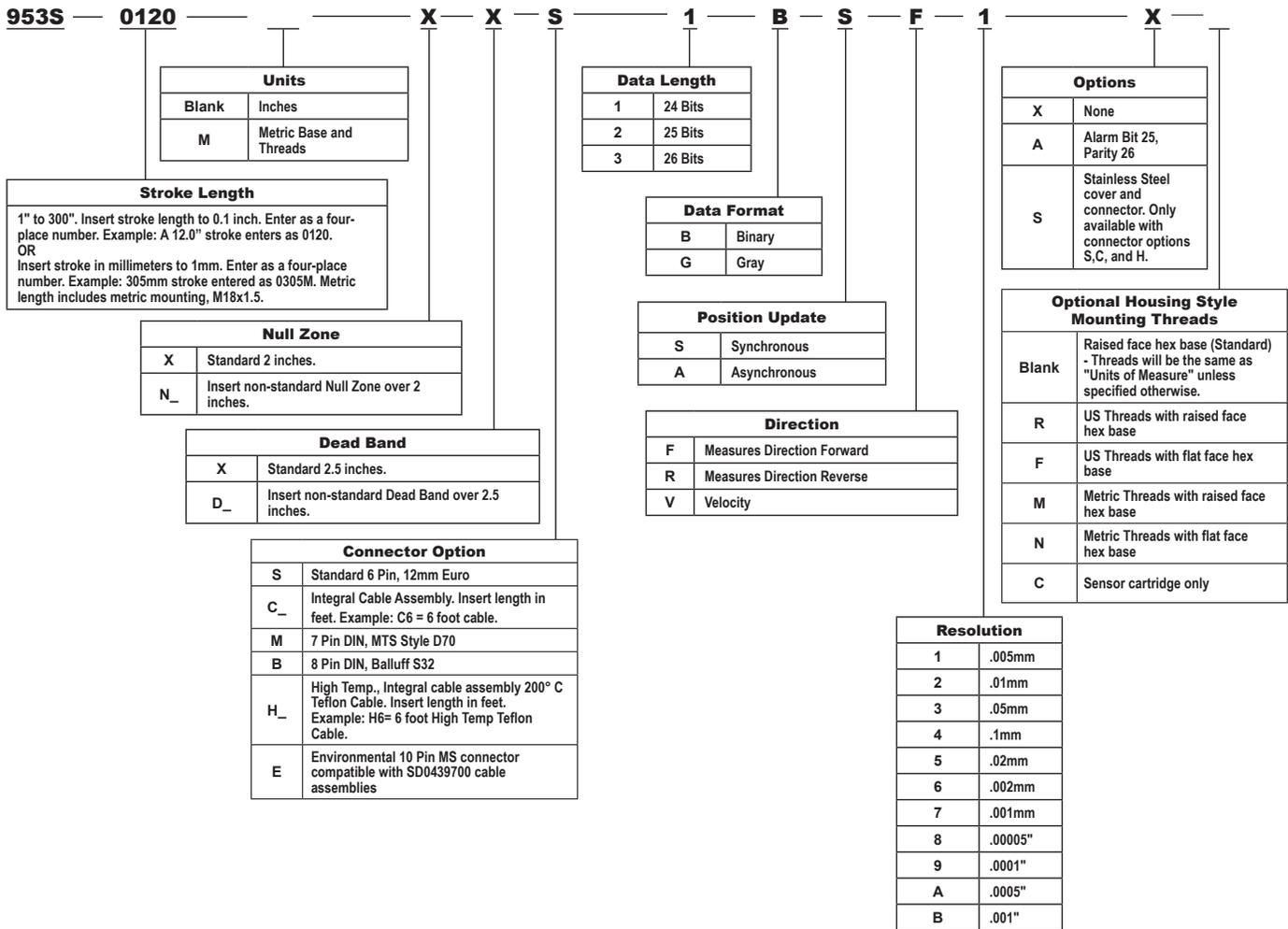
953SSI VMAX Specifications					
Connector Interface	6 Pin 12mm Euro micro, Integral cable ass'y, 7 Pin or 8 Pin DIN	Shock	1000 Gs (lab tested) IEC 60068-2-27	Output Type	24, 25 or 26 Bit, Binary or Gray Code (optional parity and error bit), Position Updates
		Vibration	30 Gs (lab tested) IEC 60068-2-6		
		Update Time	Measuring Length 300 750 1000 2000 5000mm Measurements/ 4.0k 2.4k 2.0k 1.1k 0.5k sec.		
Sensor Housing and Mounting Hex	Body length 3.2", hex base 1 3/4" dia., 3/4"x16x1" thread. Aluminum housing standard, stainless steel optional. M18 x 1.5 Metric Threads Optional.	Guide Tube Pressure	5,000 psi continuous (10,000 psi spike)	Resolution	English or Metric Units Metric: 1, 5, 10, 20 micron (5 micron standard) English: .00005", .0001", .0005", .001" Consult Factory for Others.
Displacement	1" to 300"	Approvals	CE (EMC)		
Dead Band	2.50" (63.5 mm) standard	Input Voltage	7 to 30 VDC		
Null Zone	2.00" (50.8 mm) standard	Current Draw	1.3 watts, (53mA at 24 VDC) typical*	Non-linearity	< 0.01% or +/- 0.005", whichever is greater, (+/- 0.002" Typical)
Enclosure Rating	IP68, IEC 600529	Storage Temperature	-40° to 221° F (-40° to 105° C)	Diagnostics	Tri-Color LED beside connector/cable exit, See "LED Output Summary Table" on page 13
Measured Variables	Single Magnet Displacement, Consult Factory for Velocity or Differential Operation	Repeatability	Equal to Output Resolution	Operating Temperature Head Guide Tube	-40° to 185° F (-40° to 85° C) -40° to 221° F (-40° to 105° C)
Interface Specifications Input SSI Clock	RS-422, 470 Ohm termination resistance				
Output Data Pulse resistance	RS-422, 2.0V min. @ 100 Ohm termination				
SSI Clock Frequency	Minimum 70 kHz Maximum 150 kHz See the table on page 11				

NOTE: Specifications subject to change and are based on a typical 48" stroke.
*1.3 watt typical at 1ms interrogation time. Faster interrogation times increase power consumption.

Cable Specifications

Cable Type	Gauge	Jacket	Temp	Bend Radius
Connector Options "S", "M", "B", "C"	22	PVC	-50 to 105° C	Moving Applications - 2.36" Fixed applications - 1.18"
High Temp Integral Cable "H" option	22	Teflon	-70 to 200° C	Moving Applications - 4.6" Fixed applications - 2.3"
Connector Option "E"	22	Polyurethane	-50 to 105 C	Moving Applications - 2.3" Fixed applications - 1.2"

3.5 Part Numbering System

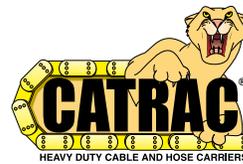
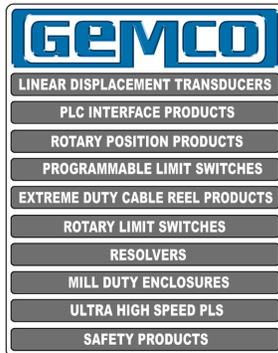


NOTE: Contact our Technical Support at 1-800-635-0289 for custom configurations.





Other Products



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