GEMCO®

Series 956 eBlok™

Linear Displacement Transducer

Installation Manual

956 eBlok™

Affordable Linear Position Solutions

Simplify Installation and Serviceability

AMETEK®
FACTORY AUTOMATION

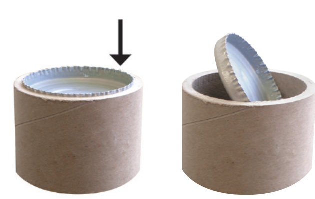
Contents

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 956 eBlok™ Linear Transducer. 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 linear transducers are shipped in a thick wall cardboard tube. To remove the metal end cap, use a large, flat blade screwdriver 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: 956 eBlok™ Linear Transducer Oveview

The 956 eBlok™ is a cost effective linear sensing solution. The streamlined anodized aluminum extrusion houses the sensing element, electronics, and sensing magnet in a Rod and Barrel style package. The LDT's magnet assembly is encapsulated inside the extrusion and is attached via a bearing assembly to the piston rod.

As the piston rod extends and retracts, the internal magnet moves over the sensing element that determines the position and converts it to an analog output. The transducer can be ordered with 0 to 10 VDC or 4 to 20 mA output. The transducer utilizes our field proven Magnetostrictive technology to give absolute position, repeatable to 0.001% of the programmable sensing distance.

The 956 eBlok™ is a self-contained unit and does not have a can or head assembly. All of the electronics and magnet assembly are incorporated into an exclusive two chamber industrial Rod & Barrel style housing. The electronics are isolated in a chamber that is sealed to IP67. The piston / magnet assembly are isolated in the second chamber and is designed to move effortlessly along the transducer. Units can be ordered in English or metric span lengths from 1" to 60" in 1" increments (25mm to 1525mm) and come standard with a 5-pin M12 style connector.

The 956 eBlok™ has a few truly unique features. As an option the unit can be ordered with field programmable Zero & Span positions. Programmable Zero and Span points allow the user to field program the analog output to match their exact requirements. The 956 eBlok LDT™ also offers a unique diagnostic capability. The normal analog output indicates the position of the magnet within the programmed Span. If the magnet moves .050" beyond the programmed Zero or Span points the output will indicate this with a voltage or current outside of the selected range. If the magnet signal is lost the unit will indicate this with a "Loss of Magnet" voltage or current.

See chart below for details on Fault Conditions. All units come 100% calibrated from the factory and do not need to be re-programmed unless desired.

Voltage Output **Specified at time of order (i.e. in Part Number)**

V0	Range	0 to +10VDC
	Resolution	16 bits
	Fault Condition	Loss of Magnet 10.2V, below or above programmed range -0.1V or 10.1V

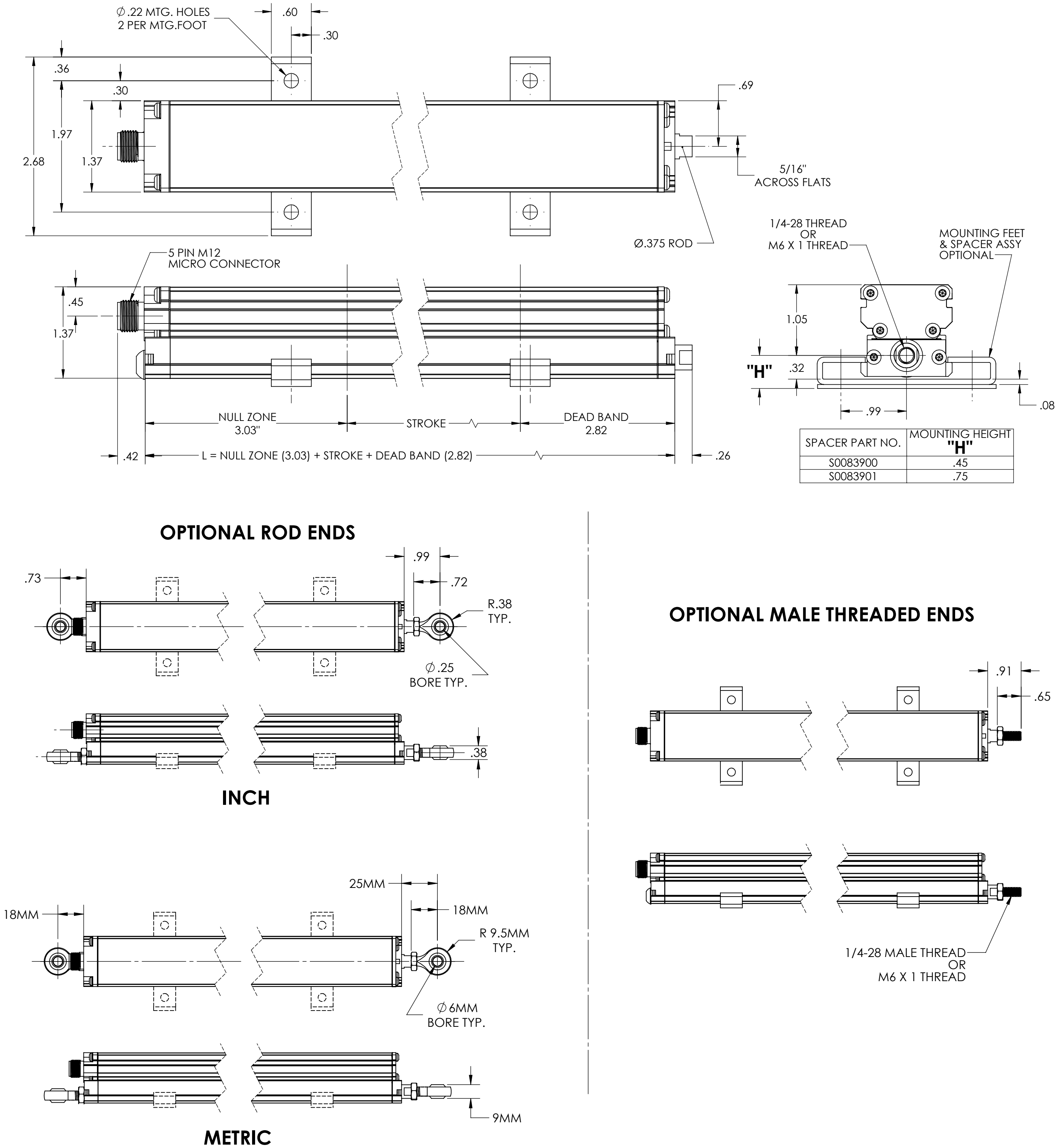
V1	Range	+10 to 0VDC
	Resolution	16 bits
	Fault Condition	Loss of Magnet 10.2V, below or above programmed range 10.1V or -0.1V

Current Output

C2	Range	20 to 4mA
	Resolution	16 bits
	Fault Condition	Loss of Magnet 3.8mA, below or above programmed range 20.1mA or 3.9mA

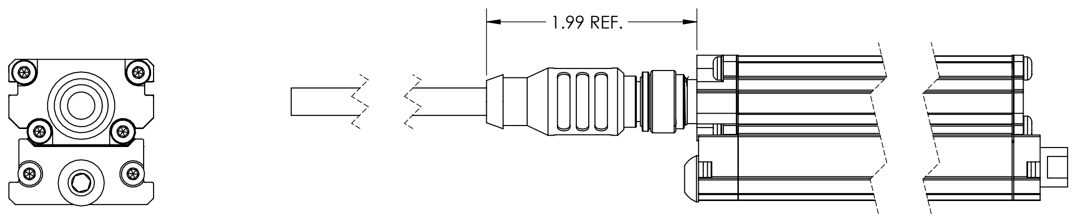
C4	Range	4 to 20mA
	Resolution	16 bits
	Fault Condition	Loss of Magnet 3.8mA, below or above programmed range 3.9mA or 20.1mA

1.1: Dimension Drawing 956 eBlok™

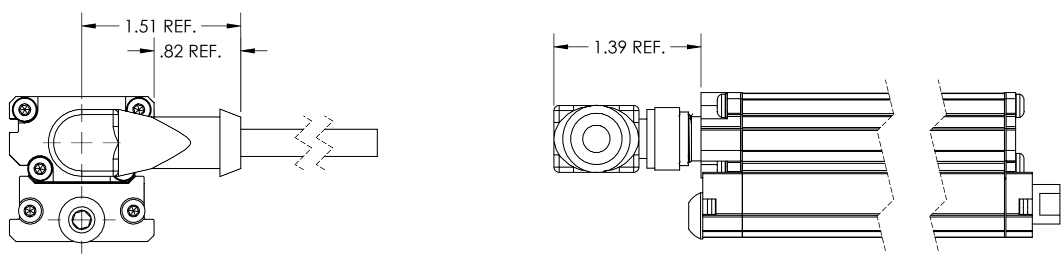


SPACER PART NO.	MOUNTING HEIGHT "H"
S0083900	.45
S0083901	.75

Figure 1-1: 956 eBlok™ – Dimension drawing (PD0129900)



STRAIGHT CABLE CONNECTOR



90° RIGHT ANGLE CONNECTOR

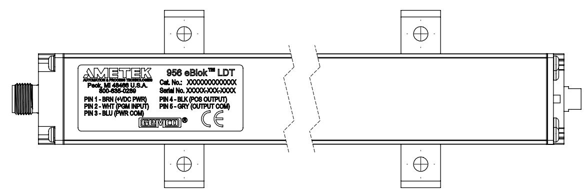
Figure 1-2: 956 eBlok™ – Cable Connector Dimensions

Chapter 2: Mounting

The Rod & Barrel package provides a compact and easy method of mounting for machine builders.

The following information is intended to aid the user in mounting the Series 956 eBlok™ LDT. The details shown here are only guidelines; because so many possible applications and configurations exist, it is up to the design engineer to determine the exact mounting.

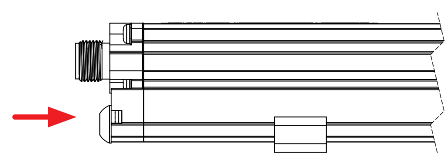
The transducer can be mounted vertically or horizontally using our SD0522000 mounting feet or optional rod ends. The mounting feet slide in the grooves on the lower part of the extrusion and clamp down when tightened. It is recommended to use one mounting bracket on each end and every three feet between. In unsupported horizontal mounting applications, it is recommended a maximum stroke length of 36” (925mm). Optional Mounting feet spacers can be ordered to change the height of the piston rod to match that of traditional linear potentiometers.



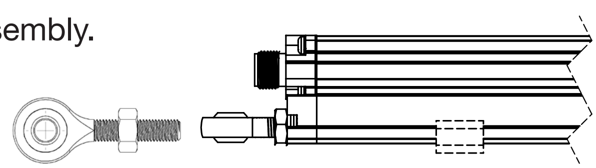
Front and Rear - Spherical Rod Ends

Rod ends are available for a fully articulated method of mounting. Rod ends are available in either ¼”-28 or M6 metric threads. The part numbering on page 11 will help to break down which thread options were ordered on the LDT. Rod ends are sold as accessories and are intended to be field installed.

At the connector end there is a button head screw plugging the threads where the rear rod option can be installed. If needed, simply remove the button head screw, and replace it with the appropriate rod end. *If the rear rod end option is **not needed.** Do not remove the button head screw!*



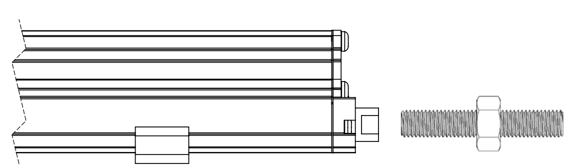
Front Rod ends will simply screw into the piston rod assembly. Use the 5/16” flats across the piston rod to tighten front rod end into place.



In unsupported horizontal mounting applications with Front and Rear rod ends it is recommended a maximum stroke length of 36” (925mm).

Front - Threaded Rod

The 956 Blok™ comes standard with a tapped female threaded piston rod (either ¼”-28 or M6 metric). As an accessory we offer a small piece of threaded rod that can be installed into the female thread to convert the piston from a female to male thread. Use the 5/16” flats across the piston rod to tighten the threaded rod into place.



Chapter 3: Connections and Wiring

Once the LDT has been installed, wiring connections can be made. The 956 eBlok™ uses an industry standard 5 pin 12mm Euro style cordset with a shield, tied to the coupling nut. To reduce electrical noise, the shield must be properly used. Connect the cable's shield to the controller system Ground. The cable shield is connected at the connector end. Always observe proper grounding techniques and isolate high voltage (i.e. 120/240VAC) from low voltage (24 VDC cables).

Warning: Do not use molded cordsets with LEDs!

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.

NOTE: When grounding the LDT, a single earth ground should be connected to the Power Supply Common (circuit ground). The LDT Power Supply Common should be connected to the Power Supply Common (-) terminal. The LDT power supply (+VDC) should be connected to the power supply positive terminal (+). The LDT cable shield should be tied to earth ground at the power supply. The LDT analog common should not be connected to earth ground and should be used for connection to interface devices only.

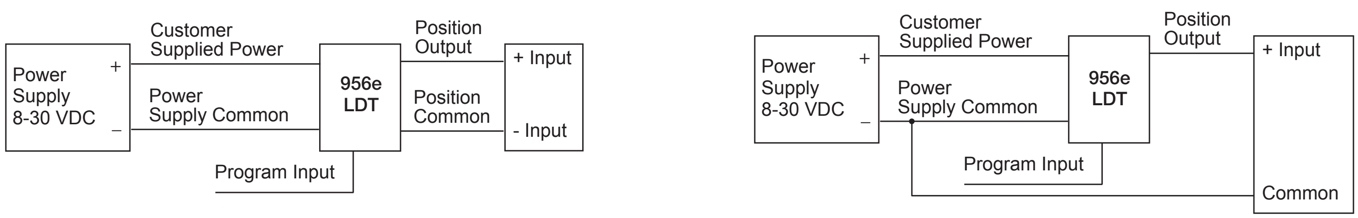
The power supply should be dedicated to the LDT to prevent noise and external loads from affecting it. When powering up more than one LDT on a single power supply, each unit will draw approximately 1.1 watts.

The LDT generates an analog output based on position. The 956 eBlok™ offers 16-Bits of resolution, and if the optional programming feature was ordered, is fully programmable over the entire active stroke length. Keep in mind that there is a 3.03" Null Zone at the connector end of the LDT and a 2.82" Dead Band at the piston end of the LDT. The housing is designed in such a way that the piston rod / magnet assembly will be allowed to stroke 0.050" into these restricted areas. The units come fully programmed from the factory and do not require re-programming unless desired. The analog output is referenced to the analog common terminal and should not be referenced to any of the other common terminals.

3.1: Wiring

Figure 3-1 shows two common methods for wiring the 956 eBlok™ to a customer supplied interface device, such as a PLC or motion controller. The two different methods are commonly referred to as Single Ended Input and Differential Input. Differential Input is the preferred wiring method.

With the Differential Input, the Analog Common wire is connected to the customer supplied input device and the Power Supply Common is wired separately to the customers supplied power source. When wired using the Differential method, the electrical noise and voltage offset errors produced by the currents running through the Power Supply Common are eliminated. The Power Supply Common and Analog Common are internally connected inside of the 956 eBlok LDT.



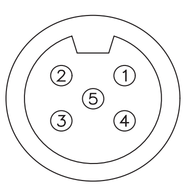
Differential Input
(Preferred Method)

Single Ended Input

Figure 3-1: Wiring – Single Ended vs. Differential

3.2: Pinouts and Wiring

All units come standard with a 5-Pin M12 (A-Code) connector.



LDT
Connector
View

PIN NUMBER	FUNCTION	COLOR
1	+VDC POWER SUPPLY	BROWN
2	PROGRAM	WHITE
3	POWER SUPPLY COMMON	BLUE
4	ANALOG OUT	BLACK
5	ANALOG COMMON	GRAY

Cable Specifications				
Cable Type	**Gauge**	**Jacket**	**Temp**	**Bend Radius**
5-Pin M12 Shielded	22	PVC	-40° to 105°C	Fixed Applications 1.3" Moving Applications 2.6"

3.3: Setting Zero & Span Positions

As an option the 956 eBlok™ can be ordered with Programmable Zero & Span positions. See page 11, Part Numbering to see if this option was selected. Note: If option "P" was not selected in part number configuration, the unit is non-programmable and cannot be rescaled.

All units come fully programmed from the factory and do not require re-programming unless desired. All units are 100% absolute and will not lose programmed parameters on power loss. The Zero and Span points can be programmed in any order and anywhere within the LDT's active sensor area.

NOTE 1: Zero or Span can be adjusted individually without setting the other.

NOTE 2: Zero = 0V on 0-10 VDC and 4mA on 4-20mA units.

There is a timing sequence that is used to unlock the probe for programming. This is to ensure that the Zero or Span positions cannot be accidentally re-programmed by someone in the field.

Before programming the Zero or Span, the program input must be connected to the Power Supply Common for a minimum of 2 seconds and no more than 6 seconds, then released for 1 second. The LTD programming sequence is now unlocked and will remain unlocked until either the Zero or Span is programmed or the 10 second programming sequence times out. During the unlock period either the Zero or Span can be programmed by momentarily connecting the Program Input to either the Power Supply Common or Power Supply +VDC.

NOTE: The LDT must be unlocked to program the Zero and unlocked again to program the Span. Once either the Zero or Span is programmed the LDT will go back into the locked mode.

WARNING: During normal operation, electrically insulate the Program wire to prevent accidental setting of Span.

Manual Setting of Zero & Span

To set the Zero and Span position, follow these steps:

1. Apply power to the LDT.
2. Place Piston Rod (magnet assembly) where Zero is to be located, but within the active region of the probe.
3. Short the Program Input pin to the Power Supply Common for 4 seconds. Remove the short for 1 second. Within 5 seconds, short the Programming Input pin to the Power Supply Common. This completes the Zero programming process.
4. Place Piston Rod (magnet assembly) where Span is to be located, but within the active region of the probe.
5. Short the Program Input pin to the Power Supply Common for 4 seconds. Remove the short for 1 second. Within 5 seconds, short the Programming Input pin to the Power Supply +VDC.

This completes the programming process.

NOTE: The LDT must be unlocked to program the Zero and unlocked again to program the Span. Once either the Zero or Span is programmed the LDT will go back into the locked mode.

WARNING: During normal operation, electrically insulate the Program wire to prevent accidental setting of Span.

Optional In-Line Programmer

The 955-1409 is a remote programmer that can help simplify the programming process. The programmer is a portable device that can be temporarily or permanently installed in series with the 956 eBlok LDT.

1. Remove the 5 pin cordset to the LDT.
2. Attach the existing cordset to the 955-1409 programmer.
3. Attach the other end to the LDT.
4. Apply power to the LDT.
5. Place the Piston Rod (magnet assembly) where Zero is to be located, but within the active region of the probe.
6. Push the Zero button for 4 seconds. Release the button for 1 second. Within 5 seconds, push the Zero button again.
7. Place the Piston Rod (magnet assembly) where Span is to be located, but within the active region of the probe.
8. Push the Zero button for 4 seconds. Release the Zero button for 1 second. Within 5 seconds, push the Span button.

This completes the programming process.

Optional Remote Tester & Programmer

To help simplify the programming process we offer a battery operated remote tester / programmer. It is available in either a voltage or current model. P/N SD0528810 is designed for voltage units while SD0528811 is for current units. These units are typically used to demonstrate the functionality of the LDT in the field; however, they can be used as a handy troubleshooting / programming device.

1. Attach the 5 pin Euro connector to the LDT.
2. Push the toggle switch to the ON position to power the LDT.
3. Place Piston Rod (magnet assembly) where Zero is to be located, but within the active region of the probe.
4. Push the black Zero button for 4 seconds, release for 1 second. Within 5 seconds, push the Zero button again. This completes the Zero programming process.
5. Place Piston Rod (magnet assembly) where Span is to be located, but within the active region of the probe.
6. Push the black Zero button for 4 seconds, release for 1 second. Within 5 seconds, push the Span button. NOTE: This time the Span button is pushed for the final programming step.

This completes the programming process.

Appendix A: Part Numbering

The 956 eBlok™ Series Linear Transducer is available with either voltage or current outputs. The numbering scheme below will break down all available options. The "Unit of Measure" field will allow you to select either inch or millimeter stroke lengths from 1" to 60" (25mm to 1525mm) in 1" or 25mm increments. The threads on the piston rod can be specified in either US or metric threads. The programmability option, if selected will allow the zero & span positions to be field programable.

956E — V0 — 0120 — E — U — X

Output	
V0	Voltage Output 0 - 10
V1	Voltage Output 10 - 0
C2	Current Output 20 - 4mA
C4	Current Output 4 - 20mA

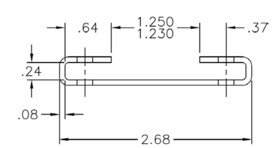
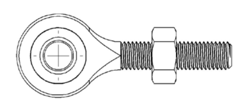
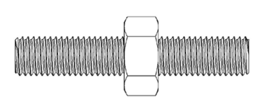
Stroke
Strokes from 1" to 60" in 1" or 25 mm increments Entered as a 4 digit number ie. 0120E is 12" stroke ie 0100M is 100mm stroke

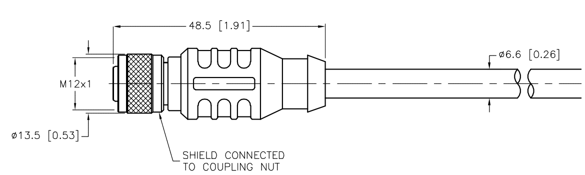
Unit of Measure	
E	English (inches)
M	Metric (millimeters)

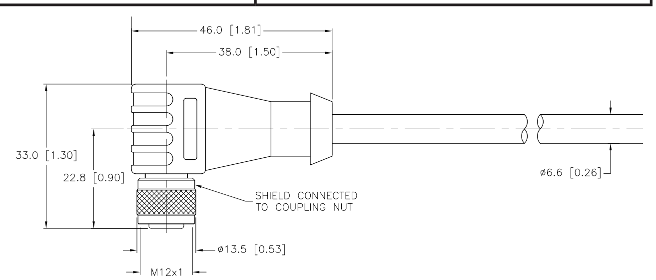
Rod & Barrell Threads	
U	Tapped Female Piston Rod - 1/4" - 28 Connector Endcap will have same threads as rod
M	Tapped Femalee Piston Rod - M6 Connector Endcap will have same threads as rod

Programmability	
X	Non-Programmable
P	Programmable Zero & Span

Accessories

Part #	Description	
SD0522000	Mounting Foot	
SD0545100	Mounting feet and spacers for .45" or .75" mounting - Includes two mounting feet and two of each spacer	
PSD0284700	Rod End & Nut Assembly - English - 1/4"-28 - Zinc Plated Steel	
PSD0284800	Rod End & Nut Assembly - Metric - M6 - Zinc Plated Steel	
PSD0284400	Threaded Rod & Nut - To be used when male threads are needed - ENGLISH 1/4"-28	
PSD0284500	Threaded Rod & Nut - To be used when male threads are needed - METRIC M6	





Straight Connector

Cable M12-A Straight to flying leads - Shielded	Part #
PVC Jacket - Nickel Plated Brass Coupling Nut - 6 ft long	949019L6
PVC Jacket - Nickel Plated Brass Coupling Nut - 12 ft long	949019L12
PVC Jacket - Stainless Steel Coupling Nut - 6 ft long	949047L6
PVC Jacket - Stainless Steel Coupling Nut - 12 ft long	949047L12

Right Angle Connector

Cable M12-A Right Angle to flying leads - Shielded	Part #
PVC Jacket - Nickel Plated Brass Coupling Nut - 6 ft long	949020L6
PVC Jacket - Nickel Plated Brass Coupling Nut - 12 ft long	949020L12
PVC Jacket - Stainless Steel Coupling Nut - 6 ft long	949048L6
PVC Jacket - Stainless Steel Coupling Nut - 12 ft long	949048L12

Appendix B: Specifications

General Specifications	
Displacement	1” (25mm) to 60” (1525mm) in 1” (25mm) increments *36” Stroke maximum for unsupported horizontal applications

Performance Specifications - Measurement	
Linearity	+/-0.03% of Stroke or +/-0.013", whichever is greater
Hysteresis	0.001" maximum
Repeatability	0.001%
Update Time	1ms

Null & Dead Bands	
Null	3.03"
Dead	2.82"

Mechanical Specifications - Housing	
Material - Housing & End Caps	Anodized Aluminum
Material - Piston	303 Stainless Steel

Temperature	
Operating	-40°C to + 85°C
Storage	-40°C to + 105°C

Shock & Vibration	
Shock	100G, single hit (per IEC 60068-2-27)
Vibration	15G, 10Hz - 2kHz (per IEC 60068-2-6)

Ingress Protection	
Protection level	IP67 (per EN 60529)

Electrical Specifications	
Power Consumption	1.1 Watt (44mA typical)
Input Voltage	24VDC +/-20%

Protection	
Polarity	Reverse polarity protected
Overvoltage	Transient overvoltage protection to +30VDC

Resolution	
Internal	.00006"
Output	16-bit

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Analog Output Specifications	
Voltage Output	0 to 10Vdc or 10 to 0Vdc
Output Current	4mA to 20mA or 20mA to 4mA

Output Loading	
Voltage	2kΩ minimum
Output Current	Guaranteed 5mA minimum for voltage units
Analog Ripple	1mV maximum
Current Output Maximum Load Resistance	500Ω maximum

Connection Options	
5 Pin - M12	5 pin -A-Code

Approvals	
CE (Electromagnetic Compatibility)	2014/30/EU

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

959CT LDT

- Compact Threaded Rod Style LDT
- All Stainless Steel Construction
- Wide variety of Analog Outputs
- Vibration Resistance to 20 Gs
- Shock Resistance to 100 Gs
- Stoke Lengths to 100”
- 16-bit Resolution
- Diagnostics
- IP68 Rating
- Programmable Zero and Span Points

Other Products

B/W Controls™
LIQUID LEVEL TECHNOLOGY

GEMCO®

GEMCO
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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