ABSOLUTE PROCESS CONTROL
KNOW WHERE YOU ARE... REGARDLESS
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The Need for automation is greater today than ever before.

Linear Displacement Transducers (LDT) play an important role in factory automation. They provide accurate, reliable, absolute position feedback to help automate today's sophisticated machinery. Sensors must deliver value, be easy to set up, and interface easily into the host controller.

We know the manufacturing challenges of today are extreme, so we designed and built a sensor to meet and exceed these demands, regardless of the application or environment. Innovation, proprietary technology and decades of experience were the key to the development of our 953 VMAX Linear Displacement Transducer.

The 953A VMAX is an accurate, programmable zero & span, auto-tuning, non-contact linear displacement transducer in a rod-style package. The transducer utilizes our field-proven Magnetostrictive technology to give absolute position, accurate to 0.01% of the programmable sensing distance. A variety of different outputs are available, including Analog (Voltage or Current), Digital (Start/Stop or PWM) and SSI (Serial Synchronous Interface). The 953 VMAX has a variety of truly unique features. The first one is the wide power range of 7 to 30 VDC @ 1 watt. The second is the LDT's auto-tuning capability, the ability to sense a magnet other than the standard ring magnet and adjust its signal strength accordingly. All units have a diagnostic LED to display the health of the unit and to help aid in troubleshooting. Our Analog units offer programmable Zero & Span points, the analog output is programmable over the entire active stroke length. Units can be ordered in span lengths from 25mm to 7.6M in 1mm increments.

Introducing the 953 VMAX LDT features:

- High Vibration Resistance to 30 Gs (lab tested)
- High Shock Resistance to 1000 Gs (lab tested)
- Wide Input Power Range of 7 to 30 VDC - (no need to specify different models for mobile applications)
- Very Low Power Consumption, 1 Watt Typical, Allows Direct Connection to Display and Control Interface Modules
- Applications Include All Mobile/Stationary Equipment, or both with the Same Sensor
- High Accuracy with High Resolution – Resolutions to 1 micron
- Sensor Lengths from 1” to 300” (25mm to 7.6M)
- Durability and Reliability Exceeds Competitive Offerings
- Tri-Color Diagnostic LED Indicator, Gives Quick Indication on the Status of the LDT
- Removable Cartridge for Hydraulic Applications
- SSI (Synchronous Serial Interface), 24, 25 or 26 Bit, Binary or Gray Code, Position Updates
- Analog Output, 0-10 VDC, +/-10 VDC, 0-5 VDC, +/-5 VDC, 4-20mA
- Digital Output, Start/Stop, Variable Pulse (PWM), Control Pulse
- Multi-Magnet Option (Digital Start/Stop only)
- Contaminant Resistant - IP68 Rated
- Optional Stainless Steel Cover and Connector
- Drop-in replacement for competitive model units – same Null, Dead bands, threads and connectors
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.

Our linear displacement transducer line utilizes advanced, proven Magnetostrictive technology to provide highly precise and absolute position feedback down to 1 micron resolution and repeatability. We package these sensors to survive in the most demanding and hostile environments. Our 950MD (mill-duty) housing offers an added layer of protection to rod-style LDT’s and can help simplify replacement with it’s two point mounting. The 950MD is constructed of 304 stainless steel, has been used in steel mills throughout the world for over 25 years with tens of thousands of units in service at this time. We offer air purging, vortex air cooling and water cooled head jackets for LDT protection.

No one in the industry understands the mechanical link between steel mill machines and sensors like AMETEK APT. The reason is our commitment to get down on the plant floor and solve real problems with an impressive line of standard and special products designed for steel mill applications. No one else in our business can live up to that claim.

- We know what to measure for improved automation and efficiency
- We know where to measure for greatest accuracy and repeatability
- We know when to protect sensors in our unique mill-duty housings for long, maintenance-free life
- We know how to mount and interface our sensor packages for easy, fast, “seamless” installation
- We package our sensors to survive harsh Environments

Typical Industries

- Steel Mills
- Hydraulic & Pneumatic Cylinders
- Tire & Rubber
- Hydro Power Generation
- Sawmill & Woodworking
- Hydraulic Presses
- Plastic Injection Molding
- Material Handling
- Packaging Machinery
- Pulp & Paper
- Factory Automation

Removable Cartridge

The removable cartridge feature allows for quick replacement of the electronics and sensing elements without disturbing the cylinders high pressure seal.
Connector Option

The 953 VMAX LDT is available with multiple connector options. Refer to pictures below or part Numbering pages for desired connector option.

S Connector
5 or 6 Pin
Micro, 12mm
Euro

M Connector
6 Pin DIN, Fits
MTS D60
7 Pin DIN, Fits
MTS D70 (for
SSI only)

B Connector
8 Pin DIN, Fits
Balluff S32

C Connector
Integral Cable
Assembly

E Connector
10 Pin MS Connector,
Fits Gemco 951 &
952 Wiring

Diagnostic LED

There is a diagnostic LED located at the connector end of the probe that will tell you the health of the unit and can help aid in troubleshooting.

<table>
<thead>
<tr>
<th>Output</th>
<th>953A</th>
<th>953D</th>
<th>953SSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing Red</td>
<td>Flash memory corrupt</td>
<td>Flash memory corrupt</td>
<td>Flash memory corrupt</td>
</tr>
<tr>
<td>Flashing Red/Green</td>
<td>EE memory corrupt</td>
<td>EE memory corrupt</td>
<td>EE memory corrupt</td>
</tr>
<tr>
<td>Flashing Green</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Flashing Yellow</td>
<td>Communication/programming mode</td>
<td>Communication/programming mode</td>
<td>Communication/programming mode</td>
</tr>
<tr>
<td>Fast Flashing Yellow</td>
<td>Programming input held asserted</td>
<td>Interrogation input held asserted</td>
<td>Clock input held asserted</td>
</tr>
<tr>
<td>Solid Red</td>
<td>No magnet signal detected</td>
<td>No magnet signal detected</td>
<td>No magnet signal detected</td>
</tr>
<tr>
<td>Green/Red Blip (1s to 0.12s)</td>
<td>N/A</td>
<td>Max Gain but signal detected and within range</td>
<td>Max Gain but signal detected and within range</td>
</tr>
<tr>
<td>Solid Green</td>
<td>Magnet signal detected and within the programmed range</td>
<td>Normal probe operation; magnet signal and interrogation pulse detected</td>
<td>Normal probe operation; magnet signal and SSI clock operational</td>
</tr>
<tr>
<td>Solid Yellow</td>
<td>Magnet signal detected outside of the programmed range</td>
<td>No external interrogation pulse detected</td>
<td>No SSI clock pulses detected</td>
</tr>
<tr>
<td>Yellow/Red Blip (1s to 0.12s)</td>
<td>N/A</td>
<td>N/A</td>
<td>SSI clock pulses do not match LDT SSI data length</td>
</tr>
<tr>
<td>Green/Yellow Blip (1s to 0.12s)</td>
<td>N/A</td>
<td>N/A</td>
<td>LDT data not synchronous with controller (if LDT is programmed for synchronous mode)</td>
</tr>
</tbody>
</table>
Specifications

Series 953 VMAX™ Linear Displacement Transducer

1080 North Crooks Road, Clawson, MI 48017  •  Phone: 248-435-0700

CONNECTOR OPTION S

3/4-16 X 1.00 THRD. W/ JAM NUT
OR
M18 X 1.5-6g X 25 MM THRD. W/ JAM NUT

CONNECTOR OPTION S RIGHT ANGLE

CONNECTOR OPTION M & B

CONNECTOR OPTION F 10 PIN CIRCULAR

NOTES: UNLESS OTHERWISE SPECIFIED
1. DREWING 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.
Product Specifications

953SSI Connector Interface
6 Pin 12mm Euro micro - Standard
Integral cable ass'y, 7 Pin or 8 Pin DIN - Optional

953D Connector Interface
6 Pin 12mm Euro micro - Standard
Integral cable ass'y, 6 Pin or 8 Pin DIN or 10 Pin MS - Optional

953A Connector Interface
5 Pin 12mm Euro micro - Standard
Integral cable ass'y, 6 Pin or 8 Pin DIN or 10 Pin MS - Optional

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.

Displacement
1" to 300"

Dead Band
2.50" (63.5 mm) standard, (2.25" Minimum)

Null Zone
2.00" (50.8 mm) standard, (1.5" Minimum)

Enclosure Rating
IP68, IEC 600529

953SSI Resolution
Metric: 1, 5, 10, 20 micron (5 micron standard)
English: .00005", .0001", .0005", .001"
Consult Factory for Others

953D Resolution
Controller Dependant

953A Resolution
Internal - 0.00006"
Output - 16-Bit

Shock
1000 Gs (lab tested)
IEC 60068-2-27

Vibration
30 Gs (lab tested)
IEC 60068-2-6

953SSI Update Time
Measuring Length 300 750 1000 2000 5000mm
Measurements/sec. 3.7k 3.0k 2.3k 1.2k 0.5k

953D Update Time
Controller Dependant

953A Update Time
< 2mS Typical

Guide Tube Pressure
5,000 psi continuous (10,000 psi spike)

Approvals
CE (EMC)

Input Voltage
7 to 30 VDC

Current Draw
1 watt typical", 40mA at 24 VDC typical

953A Zero & Span Adjustability
Factory set at Null & Dead Band locations
Field adjustable at any location within active stroke

953D Repeatability
Equal to Resolution of Controller

953A Repeatability
Equal to Resolution

953SSI Repeatability
Equal to Output Resolution

953SSI Measured Variables
Single Magnet Displacement, Consult Factory for Velocity or Differential Operation

953SSI Output
24, 25 or 26 Bit, Binary or Gray Code (optional parity and error bit), Position Update

953D Output
RS = RS422 Start/Stop Pulse
VP = RS422 Variable Pulse (PWM), Internal/External Interrogation
CP = RS422 Control Pulse
TP = TTL Start/Stop Pulse

953A Output
Voltage - 0-10 VDC, +/-10 VDC, 0-5 VDC, +/-5 VDC
Current - 4-20mA

953A Current Output
Max Load Resistance: 500 Ohms

953A Voltage Output
Minimum Load Resistance: 2K Ohm
Output Current: Guaranteed 5mA minimum
Analog Ripple: ≤ 1 mV maximum

Hysteresis
0.001"

Non-linearity
< 0.01% or +/- 0.005", whichever is greater, (+/- 0.002 Typical)

Storage Temperature
-40° to 221° F (-40° to 105° C)

Operating Temperature
Head -40° to 185° F (-40° to 85° C)
Guide Tube -40° to 221° F (-40° to 105° C)

Diagnostics
Tri-Color LED beside connector/cable exit,
See ‘LED Output Summary Table’

NOTE: Specifications subject to change and are based on a typical 48” stroke.
*One watt typical at 1ms interrogation time with no recirculations. Faster interrogation times and/or recirculations increase power consumption.

Toll Free: 800-635-0289 • Email: apt.orders@ametek.com • Web: www.ametekapt.com
Part Numbering - Analog

<table>
<thead>
<tr>
<th>Output</th>
<th>V0 0 to 10 VDC</th>
<th>V1 10 to 0 VDC</th>
<th>V2 -10 to 10 VDC</th>
<th>V3 10 to -10 VDC</th>
<th>V4 0 to 5 VDC</th>
<th>V5 5 to 0 VDC</th>
<th>V6 -5 to 5 VDC</th>
<th>V7 5 to -5 VDC</th>
<th>C4 4 to 20mA</th>
<th>C2 2 to 4mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null Zone</td>
<td>X Standard 2 inches.</td>
<td>N Insert non-standard Null Zone (1.5&quot; Minimum).</td>
<td>This value is called out in inches regardless of units of measure (i.e. 1.5&quot; Null Zone = N1.5).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector Option</td>
<td>S Standard 5 Pin, 12mm Euro</td>
<td>C_ Integral Cable Assembly. Insert length in feet. Example: C6 = 6 foot cable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M 6 Pin DIN, MTS Style D70</td>
<td>B 8 Pin DIN, Balluff S32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E Environmental 10 Pin MS Connector compatible with SDO439700 LXX cable assembly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>H_ High Temp., Integral cable assembly 200º C Teflon Cable. Insert length in feet. Example: H6+ = 6 foot High Temp Teflon Cable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Optional Housing Style - Mounting Threads

<table>
<thead>
<tr>
<th>Blank</th>
<th>Raised face hex base (standard) - Threads will be the same as &quot;Units of Measure&quot; unless specified otherwise.</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Threads with raised face hex base</td>
<td></td>
</tr>
<tr>
<td>F US Threads with flat face hex base</td>
<td></td>
</tr>
<tr>
<td>M Metric Threads with raised face hex base</td>
<td></td>
</tr>
<tr>
<td>N Metric Threads with flat face hex base</td>
<td></td>
</tr>
<tr>
<td>C Sensor cartridge only - No hex base</td>
<td></td>
</tr>
</tbody>
</table>

**Part Numbering - SSI**

<table>
<thead>
<tr>
<th>Units of Measure</th>
<th>Blank Inches Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stroke Length</strong></td>
<td>1&quot; to 300&quot;. Insert stroke length to 0.1 inch. Enter as a four-place number. Example: A 12.0&quot; stroke enters as 0120. OR Insert stroke in millimeters to 1mm. Enter as a four-place number. Example: 305mm stroke entered as 0305M. Metric length includes metric mounting, M18x1.5. Unless Specified Otherwise.</td>
</tr>
<tr>
<td><strong>Null Zone</strong></td>
<td>X Standard 2 inches. N Insert non-standard Null Zone (1.5&quot; Minimum). This value is called out in inches regardless of units of measure (i.e. 1.5&quot; Null Zone = N1.5).</td>
</tr>
<tr>
<td><strong>Dead Band</strong></td>
<td>X Standard 2.5 inches. D Insert non-standard Dead Band (2.25&quot; Minimum). This value is called out in inches regardless of units of measure (i.e. 2.25&quot; Dead Band = D2.25)</td>
</tr>
<tr>
<td>Connector Option</td>
<td>S Standard 6 Pin, 12mm Euro</td>
</tr>
<tr>
<td></td>
<td>C_ Integral Cable Assembly. Insert length in feet. Example: C6 = 6 foot cable.</td>
</tr>
<tr>
<td></td>
<td>M 7 Pin DIN, MTS Style D70</td>
</tr>
<tr>
<td></td>
<td>B 8 Pin DIN, Balluff S32</td>
</tr>
<tr>
<td></td>
<td>E Environmental 10 pin MS connector compatible with SDO439700 LXX cable assembly</td>
</tr>
<tr>
<td></td>
<td>H_ High Temp., Integral cable assembly 200º C Teflon Cable. Insert length in feet. Example: H6+ = 6 foot High Temp Teflon Cable.</td>
</tr>
</tbody>
</table>

**Optional Housing Style - Mounting Threads**

<table>
<thead>
<tr>
<th>Blank</th>
<th>Raised face hex base (standard) - Threads will be the same as &quot;Units of Measure&quot; unless specified otherwise.</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Threads with raised face hex base</td>
<td></td>
</tr>
<tr>
<td>F US Threads with flat face hex base</td>
<td></td>
</tr>
<tr>
<td>M Metric Threads with raised face hex base</td>
<td></td>
</tr>
<tr>
<td>N Metric Threads with flat face hex base</td>
<td></td>
</tr>
<tr>
<td>C Sensor cartridge only - No hex base</td>
<td></td>
</tr>
</tbody>
</table>

**Units of Measure**

- **Blank**
- **Inches**
- **Metric**

**Data Length**

<table>
<thead>
<tr>
<th>Options</th>
<th>1 25 Bits</th>
<th>2 25 Bits</th>
<th>3 26 Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>S Synchronous</td>
<td>A Asynchronous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Data Format**

- **B Binary**
- **G Gray**

**Position Update**

- **S Synchronous**
- **A Asynchronous**

**Direction**

- **F Measures Direction Forward**
- **R Measures Direction Reverse**
- **V Velocity**

**Resolution**

<table>
<thead>
<tr>
<th>Options</th>
<th>1 .005mm</th>
<th>2 .01mm</th>
<th>3 .05mm</th>
<th>4 .1mm</th>
<th>5 .02mm</th>
<th>6 .002mm</th>
<th>7 .001mm</th>
<th>8 .0005&quot;</th>
<th>9 .001&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>S None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C_ MTS Style D70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Balluff S32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E SDO439700 LXX cable assembly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H_ High Temp. Teflon Cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Optional Housing Style - Mounting Threads**

- **Blank**
- **Raised face hex base (standard) - Threads will be the same as "Units of Measure" unless specified otherwise.**
- **US Threads with raised face hex base**
- **US Threads with flat face hex base**
- **Metric Threads with raised face hex base**
- **Metric Threads with flat face hex base**
- **Sensor cartridge only - No hex base**

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Series 953 VMAX™ Linear Displacement Transducer

1080 North Crooks Road, Clawson, MI 48017 • Phone: 248-435-0700
### Part Numbering - Digital, CP and RS

#### 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. Metric length includes metric mounting, M18x1.5. Unless Specified Otherwise.

#### Output
- CP: Control Pulse
- RS: RS-422 Start/Stop Pulse
- TP: TTL Level Start/Stop

#### Dead Band
- X: Standard 2.5 inches.
- D: Insert non-standard Dead Band (2.25" Minimum). This value is called out in inches regardless of units of measure (i.e. 2.25" Dead Band = D2.25).

#### Options
- X: None
- S: Stainless Steel cover and connector. Only available with connector options S, C, and H.

#### Optional Housing Style - Mounting Threads
- None
- Blank: Raised face hex base (standard) - Threads will be the same as “Units of Measure” unless specified otherwise.
- 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
- C: Sensor cartridge only - No hex base

#### Null Zone
- S: Standard 6 Pin, 12mm Euro
- C: Integral Cable Assembly. Insert length in feet. Example: C6 = 6 foot cable.
- M: 6 Pin DIN, MTS Style D60
- B: 8 Pin DIN, Balluff S32
- E: Environmental 10 Pin MS Connector compatible w/951 & 952 LDTs w/connector option “E”.

### Part Numbering - Digital, VP (PWM)

#### 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. Metric length includes metric mounting, M18x1.5. Unless Specified Otherwise.

#### Output
- VP: Variable Pulse

#### Dead Band
- X: Standard 2.5 inches.
- D: Insert non-standard Dead Band (2.25" Minimum). This value is called out in inches regardless of units of measure (i.e. 2.25" Dead Band = D2.25).

#### Options
- X: None
- S: Stainless Steel cover and connector. Only available with connector options S, C, and H.

#### Optional Housing Style - Mounting Threads
- Blank: Raised face hex base (standard) - Threads will be the same as “Units of Measure” unless specified otherwise.
- 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
- C: Sensor cartridge only - No hex base

#### Null Zone
- X: Standard 2 inches.
- N: Insert non-standard Null Zone (1.5" Minimum). This value is called out in inches regardless of units of measure (i.e. 1.5" Null Zone = N1.5)

### Interrogation Mode
- I: Internal Interrogation
- E: External Interrogation

### Null Zone
- X: Standard 2 inches.
- N: Insert non-standard Null Zone (1.5" Minimum). This value is called out in inches regardless of units of measure (i.e. 1.5" Null Zone = N1.5)

### Units of Measure
- Blank
- Inches
- Metric

**NOTE:** Metric LDTs cannot be used with standard 950MD housings. Consult factory.
Accessories

### Magnets

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD0400800</td>
<td>Standard Four Hole Magnet</td>
</tr>
<tr>
<td>SD0480900</td>
<td>Standard Four Hole Magnet, Stainless Steel</td>
</tr>
<tr>
<td>SD0403900</td>
<td>Aluminum Split Magnet</td>
</tr>
<tr>
<td>SD0411201</td>
<td>Large Split Magnet, Stainless Steel</td>
</tr>
<tr>
<td>SD0411200</td>
<td>Large Split Magnet, Standard</td>
</tr>
<tr>
<td>SD0410300</td>
<td>Cylinder Magnet, Standard</td>
</tr>
<tr>
<td>SD0410301</td>
<td>Cylinder Magnet, Teflon Coated</td>
</tr>
<tr>
<td>M0750500</td>
<td>Non-Ferrous Spacer for Split Magnet</td>
</tr>
<tr>
<td>M0822400</td>
<td>Non-Ferrous Spacer for Four Hole Magnet</td>
</tr>
<tr>
<td>M0822401</td>
<td>Teflon-cylinder Bushing</td>
</tr>
</tbody>
</table>

### 953A Accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Use With Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>949011L6</td>
<td>6 Foot, 5 Pin, Straight, 12mm Euro Cable</td>
<td>S</td>
</tr>
<tr>
<td>949011L12</td>
<td>12 Foot, 5 Pin, Straight, 12mm Euro Cable</td>
<td>S</td>
</tr>
<tr>
<td>949012L6</td>
<td>6 Foot, 5 Pin, Right Angle, 12mm Euro Cable</td>
<td>S</td>
</tr>
<tr>
<td>949012L12</td>
<td>12 Foot, 5 Pin, Right Angle, 12mm Euro Cable</td>
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<tr>
<td>SD0553200LXX</td>
<td>6 Pin DIN</td>
<td>M</td>
</tr>
<tr>
<td>SD0553300LXX</td>
<td>8 Pin DIN Voltage</td>
<td>B</td>
</tr>
<tr>
<td>SD0553400LXX</td>
<td>8 Pin DIN Current</td>
<td>B</td>
</tr>
<tr>
<td>SD0400800</td>
<td>Standard 4 Hole Magnet</td>
<td>All</td>
</tr>
</tbody>
</table>

Consult factory for complete accessory offerings. XX = Length in Feet.

### 953D/953SSI Accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Use With Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>949029L6</td>
<td>6 Foot, 6 Pin, Straight, 12mm Euro Cable</td>
<td>S</td>
</tr>
<tr>
<td>949029L12</td>
<td>12 Foot, 6 Pin, Straight, 12mm Euro Cable</td>
<td>S</td>
</tr>
<tr>
<td>949030L6</td>
<td>6 Foot, 6 Pin, Right Angle, 12mm Euro Cable</td>
<td>S</td>
</tr>
<tr>
<td>949030L12</td>
<td>12 Foot, 6 Pin, Right Angle, 12mm Euro Cable</td>
<td>S</td>
</tr>
<tr>
<td>SD0554500LXX</td>
<td>6 Pin DIN (953D)</td>
<td>M</td>
</tr>
<tr>
<td>SD0558500LXX</td>
<td>7 Pin DIN (953SSI)</td>
<td>M</td>
</tr>
<tr>
<td>SD0554600LXX</td>
<td>8 Pin DIN</td>
<td>B</td>
</tr>
<tr>
<td>SD0400800</td>
<td>Standard 4 Hole Magnet</td>
<td>All</td>
</tr>
</tbody>
</table>

Consult factory for complete accessory offerings. XX = Length in Feet.

### SSI Cable Length Limits

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>Max. Cable Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MBd</td>
<td>10 ft.</td>
</tr>
<tr>
<td>400 kbd</td>
<td>160 ft.</td>
</tr>
<tr>
<td>300 kbd</td>
<td>320 ft.</td>
</tr>
<tr>
<td>200 kbd</td>
<td>650 ft.</td>
</tr>
<tr>
<td>100 kbd</td>
<td>1300 ft.</td>
</tr>
</tbody>
</table>

NOTE: The maximum cable length recommendation is 10 meters or 33 feet. Longer cables are available, but extra care must be taken while handling and installing.
Series 950MD Mill-Duty Housing

The series 950 Mill-Duty Housing (950MD) was designed for applications where mounting a stand-alone rod style linear displacement transducer (LDT) is prohibitive. Potential physical damage, environmental conditions or mounting limitations are all elements that are involved in specifying a linear position feedback system that will perform flawlessly for many years to come. The 950MD housing has been designed to eliminate all of the above problems by protecting the LDT from physical and environmental damage such as temperature, corrosives, shock & vibration, or dust and debris. Additionally, the 950MD offers a simple two point mounting scheme that can compensate for lateral and/or horizontal movement of the machine while in operation. Mounting bolts are provided for both the trunnion mount and rod ends in either standard steel or optional Stainless Steel when specified.

The 950MD housing is also perfect for retrofitting existing cylinders with an LDT providing a continuous position feedback signal. The 950MD allows for a convenient way to mount the 950MD and internal LDT parallel to the cylinder. This eliminates the need to tear down and gun drill the cylinder to accommodate an LDT simply for providing position feedback that had not previously been available.

The housing may also be of benefit in this same configuration when you have an existing cylinder in operation that does not allow for an easy removal of the LDT. Old machines and even some existing machines or newly designed machines did not take into consideration the need for continuous position feedback. Certain machines may require that the entire cylinder be removed in order to replace the LDT.

The actuator contains a 1/2" spherical rod end with approximately 1" of adjustment (length). This spherical rod end allows mechanical movement in a horizontal and/or vertical motion to compensate for any mechanical slop or misalignment between the housing and machine. A rear trunnion mount is provided for mounting either directly in front of the head assembly or on the rear of the head. An optional 3/4" spherical rod end can be supplied on the rear of the unit (see drawing for details). The back cap is supplied with threaded and plugged holes that allow for field installation of the 3/4" diameter trunnion mount bracket to the back cap. The trunnion mount bracket is positioned at the point where the head and barrel connect. A simple exchange of hardware is all that is necessary to move the trunnion mount bracket to the back cap and plug the no longer required bracket mounting holes. When ordering the 3/4" rear rod end option, the trunnion mount bracket is not supplied since it would not be required.

The actuator rod is supported by two bearings within the guide tube. The front piston bearing contains a wiper assembly to keep contaminants from entering the guide tube. The rear, or movable, bearing assembly is manufactured from Rulon®. This high-temperature polymer material provides low wear and smooth operation.

The transducer magnet is mounted within the rear bearing assembly. The magnet is a 1" O.D. cylinder magnet (SD0410300). The magnet is positioned 2" from the end of the transducer hex when the actuator is fully retracted and 5" from the end of the transducer guide tube when the actuator is fully extended.

The 950MD is designed to incorporate an LDT which has a minimum 2" Null Zone and 5" Dead Band.
950MD Mill-Duty Housing

Due to the fact that the standard Mill-Duty Housing has a mechanical stroke identical to the LDT active stroke, no physical over-stroke exists. If it is possible that the machine being coupled to can extend/retract beyond the stroke supplied, damage to the Mill-Duty Housing and possibly to the machine might occur. To compensate for this we call out fully retracted/fully extended over-stroke dimensions for the Mill-Duty Housing. These values are essentially the additional stroke length added to the Mill-Duty Housing. The reason they are called out separately is to alert the user that when entering these areas, they are out of the LDT active stroke area. If an extended over-stroke is specified, the LDT must be ordered with a Dead Band of 5” + X (extended stroke value). If a retracted over-stroke is specified, the LDT must be specified with a Null value of 2” + Y (retract over-stroke value).

The Mill-Duty Housing offers either a conduit entrance for hard wiring directly to the LDT within the head or an external connector and mate. The connector attaches to the LDT inside of the housing via a small pigtail connector within the head.

Detailed Product Description and Materials of Construction

The 950MD consists of a 304 Stainless Steel body, barrel, piston, head and trunnion mount bracket.

The standard 1/2” diameter rod end with mounting bolt, the 3/4” diameter trunnion mounting bolt, and some of the optional MS connectors on the head are the only items that are not Stainless Steel on the standard assembly. This is also true of the optional 3/4” diameter front and rear rod ends with their mounting bolts. These rod ends and all mounting bolts can be ordered in Stainless Steel as an option. The 12mm Euro connector options C3 and C4 come standard in Stainless Steel. Consult the factory for further details.

The 950MD head assembly is removable to allow installation of a rod style LDT that will screw into the standard 3/4” - 16 x 1.00 mounting thread. An optional Metric thread of M18 X 1.5 can also be supplied upon request. The head contains a 1/2” NPT conduit port for wiring to the LDT or optionally an MS connector can be installed for the external wiring. Use of the MS connector will require that the LDT also have a connector on it in lieu of a potted cable. This will allow for a quick connect at the LDT head internally and on the 950MD head externally. The 950MD head is sealed with O-rings and also contains two threaded air purge openings that are plugged but available for use to air cool the LDT head with filtered and regulated air. By removing the plugs and installing the proper size air fittings, you can cool the head electronics for high temperature applications. An optional Vortex air cooler may also be specified for the head and/or barrel or an optional water jacket for the LDT can be supplied. See the 950MD dimension drawings for further details.
950MD Mill-Duty Housing

Applications
The 950MD was originally designed for use in steel mill applications but has proven to be reliable in many applications where ruggedness, environmental protection and ease of mounting are required. Some of these applications include:

Steel Mills - Tundish car (Tundish height), turret height (Caster), hydraulic coil cars, torch cutoff machine (torchhead monitoring), furnace tilt, electrode positioning, side guide positioning, ladle slide gate positioning, louver or roof position, etc.

Foundries, Forging and Casting – Linear transducers with 950MD housings have been used on sand mold compactors, furnace or oven doors and material transfer systems.

Injection Molding and Die Casting – Proven effective in monitoring/controlling the position of the clamp and/or shot cylinder. The two point connection of the 950MD housing allows for a simple retrofit by replacing limit switches with an LDT for position feedback over the entire range movement. Linear potentiometers can also be replaced, thus eliminating their problems with drift, temperature, and short life span.

Hydraulic Servo Applications - Ideal for installing parallel to hydraulic cylinders including new applications and retrofits. The major advantage to using the 950MD housing versus gun drilling the cylinder for an LDT is that the cylinder fluid flow is not compromised. If an LDT fails within a cylinder it cannot be removed without having to deal with the hydraulic fluid lines, pressure etc. Some cylinders may be difficult to remove once installed, thus inhibiting the removal of the LDT. The 950MD housing is typically mounted parallel to the cylinder, the same as a slave cylinder would be, so removal is greatly simplified under these conditions.

Lock and Dam Sites - Miter gate and Tainter valve position feedback systems have both benefited from the 950MD and LDT combination.

Gate Position Feedback - For hydro-electric plants, water control structures, water and wastewater treatment and managing, wickett gate position feedback for Turbine speed control.

Optional Items
The standard Mill-Duty Housing includes the complete housing assembly with provisions to accept an LDT and all bolts, nuts and mounting hardware required for a complete installation. There are also several optional items available.

Vortex Air Cooler - The standard 950MD is equipped with air purge ports. In many cases, running clean shop air through the head is sufficient to cool the electronics. For severe temperature applications a Vortex Air Cooler may be desired. A Vortex Air Cooler accepts standard shop air (80 - 100 PSIG). The air is ejected through a generator in a Vortex spin chamber where the air stream revolves in a tube at up to 1,000,000 RPM. In simplest terms the inner stream gives off energy in the form of heat to the outer stream and the inner stream exits the opposite end as hot air. The Vortex Cooler is capable of generating air flows as cold as -40° F.

Protective Boots - To give added protection to the actuator rod, protective boots are available. These boots attach between the end of the Mill-Duty guide tube and the end of the actuator rod assembly. The boots are offered in neoprene coated nylon for most standard applications. They offer -60° F to 250° F operating range with resistance to water and oil. Also, silicone coated fiberglass offers high temperature resistance from -100° F to 550° F; Teflon-coated fiberglass offers -100° F to 500° F operating range with a high degree of corrosion resistance and optional stainless steel boots for rugged applications.

Water-Cooled Head Assemblies - In applications where extreme temperatures are present and air cooling is not appropriate, water-cooled head assemblies are available. Cooling jackets within the head assembly allow water to flow around the electronics.

Front and Rear Mount Spherical Rod Ends - In applications where two spherical rod ends are required, rear mount spherical rod ends are available. The 3/4” rear rod end attaches to a threaded bolt extending from the rear of the head. The 3/4” front rod end is threaded into the piston rod. An optional stainless steel version is available. Mounting bolts are supplied with both versions.

Delrin Liner - Used in longer horizontal applications, typically 60” or longer to prevent wear on the LDT’s guide tube as the 950MD housing is stroked. The Delrin liner is installed inside of the 950MD barrel and prevents sag of the LDT’s guide tube.
Series 953 VMAX™ Linear Displacement Transducer

Part Numbering - 950MD Mill-Duty Housing

<table>
<thead>
<tr>
<th>Active Stroke in Inches</th>
<th>Determine the &quot;active&quot; stroke to be measured followed by &quot;A&quot;.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0B</td>
<td>Fully Retracted Overstroke in Inches</td>
</tr>
<tr>
<td>0C</td>
<td>Insert length of retract overstroke in inches followed by &quot;B&quot;. If no retract overstroke is required, simply insert &quot;0B&quot;.</td>
</tr>
<tr>
<td>X</td>
<td>Connector Options</td>
</tr>
<tr>
<td>X</td>
<td>Standard 1/2 inch NPT conduit fitting (It is suggested to order a quick disconnect connector on the LDT)</td>
</tr>
<tr>
<td>C2</td>
<td>Environmental 10 pin MS connector and mate on side of housing (for use with 951, 952, and 953 LDT's with connector option E only)</td>
</tr>
<tr>
<td>C3</td>
<td>5 Pin, 12mm, Euro Connector on Side of Housing (for 952A/953A w/connector option S only)</td>
</tr>
<tr>
<td>C4</td>
<td>6 Pin, 12mm, Euro Connector on Side of Housing (for 953D and SSI w/connector option S only)</td>
</tr>
<tr>
<td>CS</td>
<td>10 Pin STD - to 953A 5 Pin Euro</td>
</tr>
<tr>
<td>CD</td>
<td>10 Pin STD - to 953D 6 Pin Euro</td>
</tr>
<tr>
<td>NC</td>
<td>No Head Cover on the 950MD Housing</td>
</tr>
<tr>
<td>W</td>
<td>Special Head cover for LDTs using a water cooled jacket. Allows entry and exit of water lines. NOTE: This option does not support connector option C, C2 or C3.</td>
</tr>
<tr>
<td>CGP</td>
<td>Cord grip PVDF for cable diameter .1&quot;-.3&quot;</td>
</tr>
<tr>
<td>CGA</td>
<td>Cord grip stainless steel for cable diameter .19&quot;-.25&quot;</td>
</tr>
<tr>
<td>CGB</td>
<td>Cord grip stainless steel for cable diameter .26&quot;-.31&quot;</td>
</tr>
<tr>
<td>CGC</td>
<td>Cord grip stainless steel for cable diameter .31&quot;-.38&quot;</td>
</tr>
</tbody>
</table>

Note 1: Guide tube support brackets are supplied as standard for strokes of 72" or greater.

Note 2: Special high temperature, abrasion resistant and oil resistant cables are available. Consult your Customer Service Representative.

<table>
<thead>
<tr>
<th>950MD Compatibility Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>940</td>
</tr>
<tr>
<td>950IIS</td>
</tr>
<tr>
<td>951</td>
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<td>952</td>
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<td>953</td>
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<td>955</td>
</tr>
<tr>
<td>7330</td>
</tr>
<tr>
<td>ReadyLink™</td>
</tr>
</tbody>
</table>

**Caution** Standard 950MD is designed for LDT’s with 3/4" x 16 US mounting thread. Consult factory for metric mounting options

<table>
<thead>
<tr>
<th>951, 952 and 953 LDT Cable Assemblies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
</tr>
<tr>
<td>Cable Assembly with Mate for Option &quot;C2&quot;, C5S, and C5D Connector Styles, 6 Feet</td>
</tr>
<tr>
<td>5 Pin, Straight, Stainless Steel Cable Assembly with Mate for Option &quot;C3&quot; Connector Style, 6 Feet</td>
</tr>
<tr>
<td>6 Pin, Straight, Stainless Steel Cable Assembly with Mate for Option &quot;C4&quot; Connector Style, 6 Feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
</tr>
<tr>
<td>Vortex Cooler</td>
</tr>
<tr>
<td>Muffler for Cooler</td>
</tr>
<tr>
<td>Replacement 1/2” Spherical Rod End</td>
</tr>
<tr>
<td>Guide Tube Support Bracket (See note 1)</td>
</tr>
<tr>
<td>Replacement (Male Connector) for Option “C2” Connector</td>
</tr>
<tr>
<td>Female Mating Connector for Option “C2” Connector</td>
</tr>
<tr>
<td>Replacement (Male Connector) for Option “C3” Connector</td>
</tr>
<tr>
<td>Replacement Piston &amp; Magnet Sub Assembly</td>
</tr>
<tr>
<td>Replacement Housing bushing &amp; Seal Sub Assembly</td>
</tr>
</tbody>
</table>

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1080 North Crooks Road, Clawson, MI 48017 • Phone: 248-435-0700
Standard 950MD Mill-Duty Housing

Mill-Duty with Rear Mount Spherical Rod End

A" = ELECTRICAL STROKE = _____ in.
B" = RETRACTED OVERSTROKE = _____ in.
C" = EXTENDED OVERSTROKE = _____ in.
D" = TOTAL MECHANICAL STROKE = SUMMATION OF A" + B" + C"

NOTE: TOLERANCES ON MECHANICAL STROKE AND ELECTRICAL STROKE ARE MAXIMUM AND MAY DIFFER FROM NOMINAL VALUES. THE ACTUAL MECHANICAL STROKE MAY BE LESS THAN THE NOMINAL VALUES DUE TO THE EFFECTS OF LOAD ON THE SHAFT AND THE GUIDING MECHANISM.
Conceptual Mounting of 950MD to Hydraulic Cylinders

**FOOT MOUNT CYLINDER (SIDE VIEW)**

**CLEVIS MOUNT CYLINDER (TOP VIEW)**

**OPTIONAL REAR SPHERICAL ROD END MOUNT**

**OPTIONAL MOUNTING SUPPORT PART NUMBER C0903400**
NOTES:
ReadyLink™ Network LDT

- EtherNet/IP™ - Linear Transducer
- Supports – Star, Line and DLR Topologies
- Available in Rod and Profile Style packages
- Resolution to 1 micron
- Stroke length to 300"
- Diagnostic Tri-Color LED’s
- IP67 rating

955 BRIK Gen III & 955S Smart BRIK

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

Other Products

- B/W Controls
- Gemco
- Catrac

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