



Industri<mark>al</mark> Au<mark>tomation</mark>



Linear Measurement Solutions



# **Selection Guide**

LDT Series / Molded Cordsets	Output	Page Numbers	
Profile Series	Analog High Resolution 0 to 10 VDC, 10 to 0 VDC 4 to 20 mA, 20 to 4 mA Analog 0 to 10 VDC, 10 to 0 VDC, 0 to 5 VDC, 4 to 20 mA, 20 to 4 mA, ±10 VDC, ±5 VDC Quadrature 10 kHz - 1 Mhz	6	
Rod Series	<b>Analog</b> 0 to 10 VDC, 10 to 0 VDC, 0 to 5 VDC, 4 to 20 mA, 20 to 4 mA <b>Differential</b> 0 to 10 VDC, 10 to 0 VDC, 4 to 20 mA, 20 to 4 mA	20	
Level Series	<b>Current Output</b> 4 to 20 mA, 20 to 4 mA	28	
WI Series	<b>Analog Output</b> 0 to 10 VDC, 4 to 20 mA	38	
Linear Encoder Series	Quadrature Output 20 microns 100 microns	46	
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#### **General Overview**

**TURCK's** line of linear displacement transducers (LDTs) called **EZ-track**, is the latest offering in **TURCK**'s continuous effort to change the shape of sensing. Based on magnetostrictive technology, the **EZ-track** line will reliably operate in the harsh conditions for which **TURCK** products are known. With its unique features, IP 67 or optional IP68 environmental rating, easy mounting and absolute positioning, the **EZ-track** line will be sure to fit into your tough linear sensing applications.



# **Features and Benefits**

#### Non-Contact Sensing Reduces Wear, Breakage, Downtime, and Ultimately, Cost

The *EZ-track* line from **TURCK** is a line of magnetostrictive linear displacement transducers. These non-contact devices detect the position of an external magnet along the active stroke of the sensor without causing any wear on the sensor parts. Because there are no parts to wear or break, the sensors can offer better performance over a longer life than competing technologies. They also offer an alternative when a continuous, absolute reading is necessary in the application.

The absolute reading allows the sensor to accurately determine the position at power on without the need to set up a home position. With this technology, repeatability of up to +/-0.001% of full stroke can be achieved. See specifications for detailed information on each product family.

#### **Fast Connections**

As a leading supplier of connection products, **TURCK** delivers the complete package. Standard, shielded 4 and 5-pin, M12, *eurofast* <sup>®</sup> cables are always available from **TURCK** for quick connection to *EZ-track*.

#### IP 67 / IP 68 (optional)

The *EZ-track* line will stand up in the harsh environments for which **TURCK** products are known, thus downtime situations due to environmental conditions can be reduced. Standard units have an environmental rating of IP 67, however IP 68 versions are also available - consult factory.



#### **General Overview**

#### **Programable Stroke**

#### Programmable Zero and Span Allow Standard Sensors to Have Customized Stroke Lengths, Eliminating the Need to Stock Numerous Models

The analog outputs of the *EZ-track*<sup>™</sup> line are not limited to the entire length of the sensor. The zero and span settings can be programmed anywhere along the active stroke. By utilizing this feature, the user can reduce stock of the various length LDTs used in the plant by replacing them with standard sizes and programming to the specific applications. The Q21 profile style transducers are available in stroke lengths up to 180 inches. The R10 Rod style transducer is available in stroke lengths from 2 to 168 inches. The R16 Liquid Level probe is available in stroke lengths from 7 to 288 inches depending on model.



Short pin 2 to pin 3 to obtain "Zero" setting and short pin 2 to pin 1 to obtain "Span" setting or use **TURCK**'s RP-Q21 Programmer.





#### **General Overview**

# **Reliable Accurate Technology**

The Q21 profile style probes use magnetostrictive technology by applying a mechanical strain pulse to a magnetostrictive waveguide that runs the length of the sensor. When the strain pulse encounters a magnetic field produced by the slide or floating magnet assembly, a current pulse is produced which is picked up by the electronic circuitry. A high speed timer measures the time difference between the applied strain pulse and the return of the induced current pulse. This time, proportional to position, is compared to the zero and span positions established during the calibration process to scale the output. Once the position has been scaled accordingly, it is converted to a signal in the form of an analog (voltage or current) output or a quadrature pulse output.

In the Q21R and rod style (R10) probes, the magnetostrictive effect is used in the opposite manner, in that a current pulse is induced and a strain pulse returns to the sensor electronics. Utilizing the magnetostrictive effect gives you highly accurate, non-contact absolute position sensing with no wear on the sensing element.



# Applications

- Hydraulic Cylinders
- Injection / Blow Molding
- Palletizers
- Foundries
- Packaging Machines
- Die Casting
- Medical Systems

- X-Y Axis Positioning
- Rolling Mills
- Stamping Presses
- Elevators
- Extruding Equipment
- Valve / Actuator Position
- Material Handling

- Laminating / Gluing Machines
- Saw Mills / Lumber Equipment
- Cutting / Slitting Machines
- Amusement Park Rides
- Flight Simulators
- Side Guides
- Leveling Machines

# **Profile Series**



### **Analog Profile Series**

#### Low Profile Extrusion Housing

# Low Profile Housings Reduce Mounting Restrictions and Eliminate Special Mounting Fixtures

The Q21 Series are housed in low profile, environmentally sealed, anodized aluminum housings. The electronics and the sensing element are incorporated into a housing that is less than 1 inch tall without the need for a can or head on the sensor to house the electronics (typical competitive devices are 2.5 times larger). By reducing the profile of the sensor, less thought has to be put into the mounting of the sensor. The Q21 Series will fit into applications where others are too bulky.



# **Diagnostic LED**

#### An LED Indicating the Status of the Sensor Simplifies Troubleshooting and Reduces Maintenance

The *EZ-track* Series utilizes a diagnostic LED that enables the operator to understand the state of the sensor dependent upon the position of the target magnet.



The LED is green when the power is on and the magnet is in an active programmed area.

The LED turns yellow when the magnet moves out of the programmed area, but is still within the active stroke.

The LED turns red when there is no magnet present or it is in the null or dead zones.

The LED flashes to indicate it is in AGC mode (Q21 and Q35 series).

This feature simplifies programming and troubleshooting, effectively reducing setup and maintenance time.



#### **Analog Profile Series**





Although sensors can be ordered with any of the above outputs, the units can easily be changed in the field to reverse the analog signal. Thus, one model can be used for two applications by programming the zero and span appropriately.

#### **Automatic Gain Control**

The Automatic Gain Control (AGC) feature allows the *EZ-track* to sense a magnet other than the standard slide magnet and adjust to the magnetic field strength accordingly. With the ability to sense a standard floating magnet up to 3/8 inch away, the user has greater mounting flexibility for various applications.



\* Q21 / Q35 versions only



**Enhanced Resolution** 

**Analog Output** 



#### Q21R / Q35R Profile Style

- Programmable Span
- High Resolution (16-Bit) Analog Output
- CE Certified

• LED's for Programming and Troubleshooting

CE

	Current Output	Voltage Output	
Туре	LTE-QR-LI.X3-H1151	LTE-QR-LU.X3-H1151	
Output	4 to 20 mA 20 to 4 mA	0 to 10 VDC 10 to 0 VDC	
Span	5 to 180 inches (Q35 style maximum length 36 inches)	5 to 180 inches (Q35 style maximum length 36 inches)	
Repeatability	+/-0.006% of full stroke or +/- 0.002 inches, whichever is greater	+/-0.006% of full stroke or +/- 0.002 inches, whichever is greater	
Resolution	0.001 inches internal / 16-bit analog output	0.001 inches internal / 16-bit analog output	
Operating Temperature	-20°C to +70°C (-4°F to +158°F)	-20°C to +70°C (-4°F to +158°F)	
Null Zone	3.00 inches	3.00 inches	
Dead Zone	2.00 inches	2.00 inches	
Operational Voltage	13.5 to 30 VDC	13.5 to 30 VDC	
Current Consumption	120 mA at 15 VDC 2.5 watts maximum	120 mA at 15 VDC 2.5 watts maximum	
Enclosure Rating	IP 67 (IP 68 optional)	IP 67 (IP 68 optional)	
Response Time ≤50 inches 50 to 100 inches 101 to 150 inches 151 to 180 inches	1 ms 2 ms 3 ms 4 ms	1 ms 2 ms 3 ms 4 ms	
Load Impedance	$\leq$ (voltage in - 4.5) $\div$ 0.02 $\Omega$ (example: 10 VDC $\leq$ 300 $\Omega$	≥2000 Ω	
Housing	Anodized Aluminum	Anodized Aluminum	
Connection	5-pin, M12 <b>eurofast</b> ®	5-pin, M12 <b>eurofast</b>	
LED	Green=Power is applied and magnet is present in the programmed rangeRed=Fault, magnet is in the Null Zone, Dead Zone or lostYellow=Magnet is out of the active programmed range, but still within the active stroke area		
Agency Approvals	CE Approved	CE Approved	
Mating Cordset	RKS 4.5T-*	RKS 4.5T-*	

\* Length in meters.





#### Q21 / Q35 Profile Style

• Programmable Span

- Non-Contact Sensing
- CE Certified

• LED's for Programming and Troubleshooting

CE

**Standard Resolution** 

**Analog Output** 

	Current Output	Voltage Output	
Туре	LTE-QLI.X3-H1141	LTE-QLU.X3-H1141	
Output	4 to 20 mA 20 to 4 mA	0 to 10 VDC       0 to 5 VDC         10 to 0 VDC       5 to 0 VDC         -10 to +10 VDC       -5 to 5 VDC         +10 to -10 VDC       5 to -5 VDC	
Span	4 to 180 inches (Q35 maximum length 36 inches)	4 to 180 inches (Q35 maximum length 36 inches)	
Repeatability	+/-0.01% of full stroke or +/- 0.014 inches, whichever is greater	+/-0.01% of full stroke or +/- 0.014 inches, whichever is greater	
Resolution	0.014 inches for stroke lengths less than 60 inches For lengths over 60 inches: 12 bits	0.014 inches for stroke lengths less than 60 inches For lengths over 60 inches: 12 bits	
Operating Temperature	-20°C to +70°C (-4°F to +158°F)	-20°C to +70°C (-4°F to +158°F)	
Null Zone	3.00 inches	3.00 inches	
Dead Zone	1.50 inches	1.50 inches	
Operational Voltage	10 to 30 VDC	10 to 30 VDC	
Current Consumption	90 mA at 10 VDC	80 mA at 10 VDC	
Enclosure Rating	IP 67 (IP 68 optional)	IP 67 (IP 68 optional)	
Response Time: 50 inches or less: 50 inches or greater:	1 ms updates with 5 ms settling time 2 ms updates with 4 ms settling time	1 ms updates with 5 ms settling time 2 ms updates with 4 ms settling time	
Load Impedance	≤(voltage in - 4) ÷ 0.02 Ω (example: 10 VDC ≤300 Ω)	≥1000 Ω	
Housing	Anodized Aluminum	Anodized Aluminum	
Connection	4-pin, M12 <b>eurofast</b> <sup>®</sup>	4-pin, M12 eurofast	
LED	Green=Power is applied and magnet is present in the programmed rangeRed=Fault, magnet is in the Null Zone, Dead Zone or lostYellow=Magnet is out of the active programmed range, but still within the active stroke area		
Agency Approvals	CE Approved	CE Approved	
Mating Cordset	RK 4.4T-*/S618	RK 4.4T-*/S618	
* Length in meters.	Wiri	ng Diagram +	





#### **Quadrature Profile Series**

#### **Direct Quadrature Output**

#### Reduce installation time, vendors, and cost by directly interfacing to the PLC input card

The quadrature output *EZ-track* offers an interface as common as analog with the speed and accuracy of pulsed type signaling. The Q21-LQ provides a quadrature output directly from the transducer to the controller. The Q21-LQ provides A and B channel quadrature output signals that are proportional to the position of the magnet assembly along the length of the probe. The quadrature output makes it possible to have a direct interface to virtually any incremental encoder input or counter card, eliminating costly absolute encoder converters and special PLC interface modules. An index channel (Z) is also provided and its position can be set by the user at any position along the active system. The A, B and Z channels are differential outputs. That is, the connection for each output consists of two signal wires. These are typically described as the "+" and "-" signals. Differential signals are much less prone to interference caused by electrical noise or ground loops more often found in single ended connections.

#### **Replace Incremental Output Devices**

The Q21-LQ can be used in certain applications to replace incremental rotary and linear encoders. The quadrature output can be used in applications requiring 0.001" resolution and repeatability.

#### **Velocity Feedback**

The quadrature *EZ-track* LDT produces pulses that are sent to the controller in packets at a fixed frequency. The period of the pulses do not change with magnet velocity. Therefore, velocity can not be determined from the pulse packets unless the controller can interpolate velocity from position over time. If your application requires a velocity feedback, please consider the Linear Encoder on pages 49-50 or consult factory.

#### Incremental Output, Absolute Functionality

#### No need to home the machine at start up or after power failure

The Q21-LQ allows you to use an incremental style of output while taking advantage of an absolute sensing technology. The Burst Input on the transducer triggers a data transfer of all incremental position data relative to the transducer's zero position. This can be used to achieve absolute position updates when power is restored to the system or anytime an update is needed to re-zero or home the machine.

#### **Programmable Zero Point**

The Zero Input allows you to set the probes reference position at any point along the active stroke. The probe will output an increasing or decreasing signal based on the direction the magnet is moving in relation to the established zero point. See Quadrature Part Number Key to select storage mode.

**Volatile Storage** - the zero point will be kept until a new zero pulse is sent or until the probe loses power. The zero point can be programmed an infinite number of times.

**Non-Volatile Storage** - the probe will store the zero position even in the event of a power failure. The zero point can be set 100,000 times.

# **Quadrature Profile Series**

### **Transducer Inputs**

The *Burst* and *Zero* Inputs are single ended connections. That is, the connection for each input consists of only one wire. The Q21-LQ is available with either +24 VDC level signal or TTL level thresholds. Additionally, the 24 VDC can be specified as either sinking or sourcing relative to the probe's input.

# **Quadrature Output Resolution and Speed**

The internal resolution of the Q21-LQ transducer is 0.001 inches. This would be represented to the encoder input device by specifying an output resolution of 1,000 cycles per inch (CPI).

# **Frequency or Pulse Rate**

For a typical incremental encoder output, the resolution of the encoder and the speed of travel govern the frequency and pulse width of the output pulses. The output pulse rate from the *EZ-track* transducer is fixed and controlled internally. This output frequency is user specified (10 kHz to 1MHz) so that it does not exceed the maximum input rate of the counter card. If the controller's maximum input frequency falls between two available frequencies, choose the lower frequency.

# **Output Drivers**

The Q21-LQ uses an OL7272 line driver and can be configured for either a TTL level output or a 10-30 VDC level output. Option R has a 5 VDC TTL level output regardless of input power. Option L has an output of 1 volt less than the probe's input voltage and should be used when driving input cards that are not TTL compatible.





I = 1.0 MHz

#### **Quadrature Profile Series Part Number Key**



#### Q21 / Q35 Profile Style

- Absolute Position with Incremental Output
- CE Certified
- LED's for Programming and Troubleshooting

• Programmable Zero

**Quadrature Output** 

CE

1000 pulses per inch (.001 inch • resolution)

Quadrature LT..E-Q21-LQ....X2-HR110 Type Quadrature, A,  $\overline{A}$ , B,  $\overline{B}$ , Z,  $\overline{Z}$ Output Span 4 to 180 inches (Q35 maximum length 36 inches) +/-0.001% of full stroke or +/- 0.001 inches, whichever is greater Repeatability Resolution 0.001 inches internal **Operating Temperature** -40°C to +70°C (-40°F to +158°F) Null Zone 3.00 inches Dead Zone 1.50 inches **Operational Voltage** 10 to 30 VDC **Current Consumption** 3 watts maximum (1 watt typical) **Enclosure Rating** IP 67 **Response Time** < 50 inches 1 ms 50 to 100 inches 2 ms 101 to 150 inches 3 ms 151 to 180 inches 4 ms Inputs Option N NPN (used with sourcing outputs) **Option P** PNP (used with sinking outputs) **Option T** TTL **Option R** 5 V differential **Option L** 10 to 30 VDC,  $V_{out} = V_{in}$ -1 Volt **Output Frequency** 10 kHz - 1 MHz Nonlinearity +/- 0.05% of full stroke Anodized Aluminum Housing Connection 10-pole HRS connector LED Green = Power is applied and magnet is present in the programmed range Red = Fault, magnet is in the Null Zone, Dead Zone or lost Agency Approvals CE Approved HRS 10-\*M

#### Mating Cordset

\* Length in meters.

HRS	1	2	3	4	5
Cable	BK	RD	GN	BN	BU
Output	Common	Power +	Z	Z	A
HRS	6	7	8	9	10
Cable	OG	YE	WH	VT	GY
Output	Ā	В	Burst input	Zero Input	B







# **Profile Style Drawings**

Profile Style - Q21 (Analog) - 4 or 5-pin



Profile Style - Q35 (Analog) - 4 or 5-pin



See specifications for Null/Dead Zone dimensions. All dimensions shown as: Inches [mm]

# **Profile Style Drawings (cont.)**

Profile Style - Q21 (Quadrature) - 10-pin



Profile Style - Q35 (Quadrature) - 10-pin



See specifications for Null/Dead Zone dimensions. All dimensions shown as: Inches [mm]





# Profile Style Accessories (cont.)

**Rocker Programmer** 







TB-LDT (voltage) TB-LDT-LI (current)

All dimensions shown as: Inches [mm]

# Rod Style Series



#### **Rod Style Series**

# Rugged Rod Style Housings Transducers Designed to Survive in Harsh Industrial Environments Reduce Downtime on the Plant Floor

The R10 housing, sensing rod, and components are designed and constructed to withstand heavy duty applications such as those seen in lumber mills, steel mills, and stamping plants. They have been lab tested and field proven to withstand 2000 G's of shock and 30 G's of random vibration without false signals or mechanical damage. In addition, the R10's electronics are enclosed in an aluminum housing with O-ring seals for an IP 67 environmental rating. The R10 is available in stroke lengths from 2 to 168 inches.

# Hydraulic Cylinder Applications

#### Accurate, Absolute, Continuous Feedback

When using the R10 series to monitor the position of hydraulic cylinders, the welded, stainless steel sensing rod can withstand up to 5,000 PSI continuously. The 0.4 inch diameter rod installs into a 1/2 inch gun-drilled piston rod assembly. The 3/4-16 UNF thread allows the R10 to be used in standard applications as a replacement or for new requirements.





#### **Rod Style Series**

#### Various Outputs Available in the R10 Style

Voltage	Current	Differential	
0 to 10 VDC	4 to 20 mA	0 to 10 VDC	
10 to 0 VDC	20 to 4 mA	4 to 20 mA	
0 to 5 VDC		10 to 0 VDC	
5 to 0 VDC		20 to 4 mA	

Although sensors can be ordered with any of the above outputs, the units can easily be changed in the field to reverse the output signal. Thus, one model can be used for two applications by programming the zero and span appropriately. The differential feature allows the gap distance between two magnets to be measured. The magnets must remain within the active stroke range at all times and cannot be any closer than 2.5 inches to each other.

#### **16-Bit Resolution**

Utilizing a 16-bit analog resolution, the R10 Series can achieve repeatability to 0.006% of full stroke. The output is programmable over the entire active stroke length.



**TURCK's EZ-track** transducers provide absolute positioning in high shock and vibration applications.

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# **Analog Rod Series Part Number Key**



LD = Differential





# R10 Rod Style

- High Resolution (16-bit) Analog Output
- CE Certified
- Highly Shock and Vibration Resistant
- Rated to 5000 PSI

Analog / Differential Output

• Optional Stainless Steel Can Available

CE

Туре	LTE-R10-LH1151		
Output	Voltage: 0 to 10 VDC, 10 to 0 VDC, 0 to 5 VDC, 5 to 0 VDC Current: 4 to 20 mA, 20 to 4 mA Differential: 0 to 10 VDC, 10 to 0 VDC, 4 to 20 mA, 20 to 4 mA		
Span	2 to 168 inches		
Repeatability	+/-0.006% of full stroke or +/- 0.002 inches, whichever is greater		
Resolution	0.001 inches / 16-bit		
Operating Temperature Head (Electronics) Guide Tube	-40°C to +70°C (-40°F to +158°F) -40°C to +105°C (-40°F to +220°F)		
Null Zone	2.00 inches (50.8 mm) standard		
Dead Zone	2.50 inches (63.5 mm) standard		
Operational Voltage	+13.5 to 26.4 VDC		
Current Consumption	3 watts maximum, 200 mA at 15 VDC		
Enclosure Rating	IP 67		
Response Time	1 ms (stroke length 1 to 50 inches)3 ms (stroke length 101 to 150 inches)2 ms (stroke length 51 to 100 inches)4 ms (stroke length 151 to 168 inches)		
Head Closure	3.00 inches (76.2 mm) high with 1.75 inches (44.5 mm) diameter; hex and cover are NEMA 4		
Nonlinearity	Less than 0.05% (±0.012 inches minimum)		
Hysteresis	0.02% of full stroke		
Storage Temperature	-40°C to +85°C (-40°F to +185°F)		
Operating Pressure	5000 PSI operating, 10,000 PSI spike		
Shock & Vibration	2000 G / 30 G		
Electromagnetic Compatibility	IEC 801-2, Level 3 (Electrostatic discharge requirements) IEC 801-4, Level 3 (Electrical fast transient/burst requirements)		
Minimum Load Resistance	2K Ohm minimum load for voltage output		
Output Current	Guaranteed 6 mA minimum for voltage output		
Maximum Load Resistance	Max. Load (Ohms) = (input voltage -2) /0.02		
Analog Ripple	<1 mV maximum (position output)		
Rod End / Mounting Hex	316 stainless steel, 0.405 inches (10.29 mm) outer diameter		
Head Assembly	Thick wall aluminum cover with viton o-ring standard gasket seal at the base and connector exit, NEMA 4 (Type 6 optional, consult factory) (316 stainless steel available)		
Connection	5-pin, M12 <b>eurofast</b> ®		
Mating Cordset	RKS 4.5T-*		

\* Length in meters.



# **Rod Style Drawing**

Rod Style - R10



**Rod Style Accessories** 



All dimensions shown as: Inches [mm]





**Notes:** 

# **Level Probe Series**



#### **Level Probe Series**

#### **Agency Approvals**

- FM approved for hazardous Locations: Groups IIA, IIB; Zone D, 1 or  $2 20^{\circ}C < = Tamb < = +70^{\circ}C$ , T4
- 3A registered 74-02
- Approvals pending for CSA & ATEX

The *EZ-track* <sup>TM</sup> R16 Series Liquid Level Sensor takes field proven sensing technology and incorporates intrinsic safety and a field programmable zero and span. Packaging is a patented low clearance design, making the R16 ideal for level monitoring in a variety of liquids and tank designs.

#### **Multiple Variations**

Sensors are available in rigid 316SS, flexible PVDF or sanitary designs. The stainless steel version has a choice of a mini-connector (7/8-16UN *minifast*<sup>®</sup>) or an optional housing which includes terminal connectors with zero and span adjustments. All offer totally welded construction.

The flexible (PVDF) version offers with a variety of mounting options and provides cost effective, high accuracy inventory monitoring in tanks up to 50 feet.

All of the sensor's electronics are integrated within the 5/8 inch diameter sensing tube. This breakthrough in package design eliminates the electronics enclosure at the top of the sensor, which reduces cost and offers greater options for insertion and mounting.

The R16 is a 2-wire loop powered intrinsically safe sensor with a configurable 4-20 mA span.

A variety of floats and mounting accessories are available to fit virtually any application, including a sanitary stainless steel version. Contact the factory to match your needs today.





C = 3 inch Dead Band  $^3$ 

#### Level Probe Part Number Key

1. Available on probe styles 3 or P only.

- 2. Available on probe styles S or F only.
- 3. Available on probe styles P only.
- 4. Available on probe styles S only.
- 5. Not available on probe style P.



# **R16 Level Probe**

- Easy InstallationHigh Accuracy
- Thgh Accuracy
- Minimal Maintenance
- Patented Low Clearance Design
- Optional 3A Sanitary Probe
- Intrinsically Safe



**Current Output** 

Stainless Steel

Туре	LTE-R16-3LIEX	LTE-R16-SLIEX-B1140	LTE-R16-FLIEX-B1140	
Output	4 to 20 mA 20 to 4 mA	4 to 20 mA 20 to 4 mA	4 to 20 mA 20 to 4 mA	
Span	10 to 288 inches	10 to 288 inches	10 to 288 inches	
Repeatability	0.015%	0.015%	0.015%	
Resolution	0.025% / 0.35 mm or 0.014 inches, whichever is greater	0.025% / 0.35 mm or 0.014 inches whichever is greater	0.025% / 0.35 mm or 0.014 inches whichever is greater	
Operating Temperature	-20°C to +70°C (-4F° to +158°F)	-20°C to +70°C (-4°F to +158°F)	-20°C to +70°C (-4°F to +158°F)	
Null Zone	8 inches	8 inches	8 inches	
Dead Zone	2 inches	2 inches	2 inches	
Operational Voltage	10 to 30 VDC	10 to 30 VDC	10-30 VDC	
Current Consumption	Loop Powered	Loop Powered	Loop Powered	
Enclosure Rating	IP 68	IP 68	IP 68	
Non-linearity	0.1%	0.1%	0.1%	
Reading Rate	40 ms	40 ms	40 ms	
Rod Diameter	0.625 inches (15.9 mm)	0.625 inches (15.9 mm)	0.625 inches (15.9 mm)	
Pressure	1015 PSI	1015 PSI	1015 PSI	
Electronics	Stainless Steel 316L	Stainless Steel 316L	Stainless Steel 316L	
Rod	Stainless Steel 316L	Stainless Steel 316L	Stainless Steel 316L	
Connection	4-pin <i>minifast</i> <sup>®</sup> connector, or 2 m cable	4-pin <i>minifast</i> connector	4-pin <i>minifast</i> connector	
Agency Approvals	FM; Pending: CSA, Atex	FM; Pending : CSA, Atex	FM; Pending : CSA : Atex Optional : 3A	
Ex-Approval	FM: Groups IIA, IIB Zones 0, 1, 2, ATEX: EEx ia IIB T4 (pending)	FM: Groups IIA, IIB Zones 0, 1, 2, ATEX: EEx ia IIB T4 (pending)	FM: Groups IIA, IIB Zones 0, 1, 2, ATEX: EEx ia IIB T4 (pending)	
Mating Cordset	RKM 46-*M	RKM 46-*M	RKM 46-*M	

\* Length in meters.

minifast	Coupling Nut	1	2	3	4
Cable	Shield/Drain	BK	WH	RD	GN
Output	Case Ground	Loop In (-)	Program In	Loop In (+)	Ground

#### minifast Wiring Diagram



#### TB-R16 Wiring Diagram





# R16 Level Probe Current Output • Easy Installation • Patented Flexible Probe • High Accuracy • Intrinsically Safe • Minimal Maintenance • Patented Low Clearance Design

Туре	LTE-R16PLIEX
Output	4 to 20 mA 20 to 4 mA
Span	7 to 288 inches
Repeatability	0.015%
Resolution	0.025% or 0.014 inches whichever is greater
Operating Temperature	-20°C to +70°C (-4F° to +158°F)
Null Zone	12 inches
Dead Zone	6 to 8 inches. See chart below.
Operational Voltage	10-30 VDC
Current Consumption	Loop Powered
Enclosure Rating	IP 68
Non-linearity	0.1%
Reading Rate	40 ms
Rod Diameter	0.625 inches
Pressure	145 PSI
Electronics	PVDF
Rod	PVDF
Connection	Cable, 2 m
Agency Approvals	FM
Ex-Approval	FM: Groups IIA, IIB Zones 0, 1, 2, ATEX: EEx ia IIB T4 (pending)

#### **Dead Zone Dimensions**

Span	Dead Band (in)	Clearance (in)
7 to 126	6.00	1.00
126 to 288	8.00	2.00

Cable	Shield/Drain	BK	WH	RD
Output	Case Ground	Loop In (-)	Program In	Loop In (+)



# Level Probe Style Drawings - Stainless Steel

LT\*\*E-R16-3LI\*-EX-B1140



LT\*\*E-R16-3LI\*-EX-D





#### Level Probe Style Drawings - Stainless Steel (cont)



LT\*\*E-R16-S\*\*LI\*-EX-B1140/3A





LT\*\*E-R16-3\*\*LI\*-EX-D



# **Flange Options**



All dimensions shown as: Inches [mm]

Flange 4 inch

# Level Probe Style Drawing PVDF

LT\*\*E-R16-PLI\*-EX-D



#### LT\*\*E-R16-P\*LI-EX-S



See table on page 32 for dead band dimensions.



All dimensions shown as: Inches [mm]





# **R16 Application Worksheet**

Liquid to be measured	Customer
Fluid Properties (check all that apply)	
Turbulent	
Foam	
Solids	Phone Number
Product Build-Up Yes No	
Temperature Range°F to°F	
Pressure Range to	Date
Viscosity Range to	
Specific Gravity	
4 mA Starting Point Top Bottom	Project
Approvals Required	
ULCSAFM3AFood Grade	
Tank Location Indoors Outdoors	Quantity
Tank Material	Quantity
Additional Comments	

\*Allow overhead clearance for installation and removal of sensor.



# **WI Series**



#### **WI Series**

The new WIM inductive magnetic sensors offer a true linear analog output. This is useful in applications where precise linear measurement is required, but space is limited. The compact housing is small enough to operate just about anywhere. The blind zones at each end of the sensor are very small, keeping the overall sensor length to a minimum. The WIM sensors can be used to determine the position of a pneumatic cylinder piston, evaluate the flow of a liquid, or monitor the level inside a tank. They can also be used on standard part position applications as well. The inductive magnetic technology lends itself to many applications where other technologies cannot. The WIM is able to detect a magnetic field through glass, plastic, even Stainless Steel. In fact, any non-ferrous metal can be present between the sensor and the magnetic target without effecting operation.



WIM sensor applied after market in a flow meter application.



**TURCK's** WIM sensors operate on a completely new inductive principle, which provides both current and voltage outputs. These outputs are located on separate output wires and are incorporated into every WIM sensor design. Both outputs are proportional to the distance of the magnetic target located along the sensing stroke. This electronic principle not only provides an accurate output, it also allows for slight lateral offsets of the magnetic target without affecting the output signal.

The output accuracy (linearity) specification is <3% of the final value, but the repeat accuracy is <0.5% of the overall measuring range. This equates to a reproducibility specification of 200  $\mu$ M (0.0079 inches) for the WIM 40 and 350  $\mu$ M (0.0138 inches) for the WIM 70. The overall range is adjustable via the potentiometer located on the end of the sensor opposite the connector. This allows for slight adjustment of the overall analog span. The S400 version offers two separate potentiometers allowing true Zero-To-Span adjustments to be made. The temperature drift of 0.9%/C is also very good. This compact housing combined with "first-class" repeatability ratings of these new WIM sensors closes the gap between pure digital positioning and highly precise measuring systems.





# WI Sensor Part Number Key



#### WIM / 23 mm - Embeddable

- No Contact Required with Target (Wear Free Operation)
- IP 67 Protection Rating
- Low Temperature Drift

• Range Adjustable via Potentiometer

**Quick Disconnect** 

**Analog Output** 

• Compact Housing for Short Stroke Applications

Туре	WIM40-STL68-LIU5X-V1141	WIM40-NTL68-LIU5X-V1141			
Linear Operating Distance	14 to 54 mm	14 to 54 mm			
Response Frequency	1000 Hz	1000 Hz			
Output	4-wire analog (Current and Voltage)	4-wire analog (Current and Voltage)			
Output Voltage	0 to 10 VDC	0 to 10 VDC			
Output Current	4 to 20 mA	4 to 20 mA			
Operating Temperature	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)			
Operational Voltage	15 to 30 VDC	15 to 30 VDC			
Protection	IP 67	IP 67			
Slew Rate	20 V/ms, 32 mA/ms	20 V/ms, 32 mA/ms			
Housing	РВТ	PBT			
Face	РВТ	PBT			
Connection	picofast ®	picofast <sup>®</sup>			
Mating Cordset	PKG 4M-*	PKG 4M-*			

\* Length in meters.





**Quick Disconnect** 



#### WIM / 20 mm Embeddable

- No Contact Required with Target (Wear Free Operation
- IP 67 Protection Rating
- Low Temperature Drift

- Analog Output
- Range Adjustable via Potentiometer
- Compact Housing for Short Stroke Applications

Туре	WIM40-Q20L60-LIU5-H1141	WIM40-Q20L60-LIU5-H1141/S400	WIM70-Q20L100-LIU5-H1141
Linear Operating Distance	10 to 50 mm	10 to 50 mm	15-85 mm
Response Frequency	1000 Hz	1000 Hz	1000 Hz
Output	4-wire analog (Current and Voltage)	4-wire analog (Current and Voltage)	4-wire analog (Current and Voltage)
Output Voltage	0 to 10 VDC	0 to 10 VDC	0 to 10 VDC
Output Current	4 to 20 mA	4 to 20 mA	4 to 20 mA
Operating Temperature	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)
Operational Voltage	15 to 30 VDC	15 to 30 VDC	15 to 30 VDC
Protection	IP 67	IP 67	IP 67
Slew Rate	20 V/ms, 32 mA/ms	20 V/ms, 32 mA/ms	20 V/ms, 32 mA/ms
Housing	PBT	РВТ	РВТ
Face	PBT	РВТ	РВТ
Connection	eurofast <sup>®</sup>	eurofast	eurofast
Mating Cordset	RK 4.4T-*	RK 4.4T-*	RK 4.4T-*

S400 indicates LEDs on back side.

\* Length in meters



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#### WI / 18 mm Potted-In Cable

- Current and Voltage Outputs in One Sensor
- IP 67
- Non-Contact Inductive Technology
- Target Material can be Copper, Aluminum, Steel, Brass, or Stainless Steel

Embeddable

**Analog Output** 

Туре	WI40-M18-LIU5	WI70-M18-LIU5
Linear Operating Distance	0-40 mm	0-70 mm
Response Frequency	200 Hz	200 Hz
Output	4-wire analog (Current and Voltage)	4-wire analog (Current and Voltage)
Voltage	0 to 10 VDC	0 to 10 VDC
Output Current	4 to 20 mA	4 to 20 mA
Operating Temperature	-10 C to +70°C (+14°F to +158°F)	-10 C to +70°C (+14°F to +158°F)
Operational Voltage	15-30 VDC	15-30 VDC
Protection	IP 67	IP 67
Slew Rate	4 V/ms, 6.4 mA/ms	4 V/ms, 6.4 mA/ms
Housing	Chrome Plated Brass	Chrome Plated Brass
Face	PA 12	PA 12
Cable Length/Material	2M/PVC	2M/PVC





# WI Style Drawings



All dimensions shown as: Inches [mm]

**Notes:** 

# **Linear Encoder Series**



### **Linear Encoder Series**

The magnetic linear measurement system is a high resolution linear encoder that allows measurement of linear position or speed without contact between the sensor head and scale.

The linear measurement system senses linear movement via a magnetic scale and a separate sensor head. The scale, which has equally spaced north and south magnetic poles, is adhered to a stainless steel band (*Figure 1*). The sensor head provides quadrature pulses, from which speed, position and direction of travel can be determined. This system allows a customer to specify a resolution of either 20 or 100 microns (0.00079" or 0.0039") for a given application (*Figure 2*).



Figure 1 - Principle of Operation



Figure 2 - Signal Output



The linear measurement system is rated to IP 67 and is completely immune to contaminants such as dust and liquids. The scale comes with a stainless steel covering that can be used for protection against metal shavings, filings, etc., and is available in lengths up to 90 meters. In addition, the linear encoder system is non-contact; this results in extended life over traditional mechanical systems.

This system is easy to install and can be used to retrofit current applications where speed and position values are sent to a display or used as an input to a controller. This technology provides a great economical alternative to optically based devices.



#### **Linear Encoder Series Part Number Key**

#### L1 Sensor: **T8.LX.** 1 X Χ. 2 2 1 1 .XXXX -XM E-RSS 8T Model M12 eurofast ® (optional) 1 = Standard resolution -E-RSS 8T 2 = High resolution Mold on Length Design Overall length in meters 1 = Standard0.2 m = 0.2 metersSupply Voltage Resolution 1 = 24 VDC 0025 = 0.025 mm (L1)2 = 5 VDC 0100 = 0.1 mm (L1)**Output Circuit** 0005 = 0.005 mm (L2)0020 = 0.02 mm (L2)1 = Push-Pull2 = Line driver (TTL 5 V)Type of Connection **Output Signal** 1 = Cable (PUR) 2 m, flying leads 2 = Inverted (A, $\overline{A}$ , B, $\overline{B}$ , Z, $\overline{Z}$ ) **Pulse Interval** $1 = 1 \, \mu s$ Reference 2 = Marker/index pulse

#### Magnetic Band (B1) for L1 Sensor:



010 = 0.1 mm



# L1 Sensor

#### **Magnetic Sensor**

- IP 67
- Unaffected by Dust, Shavings, Humidity
- Resolution of 0.025 mm (0.0009 in.)
- Quadrature Output with Index
- Speed up to 25 m/s

#### **Quadrature Output**

- Magnetic Scale
- Easy Mounting
- Humidity, Fluid and Oil Resistant

_	
Туре	T8.L1.1*.2211.*
Supply Voltage	24 VDC ±20% / 5 VDC ±5%
Cable/Connection	Flying leads 2 m PUR cable / molded M12 <b>eurofast</b> <sup>®</sup> 8-pin connection
Output Circuit	Push pull or line driver
Index Pulse	Every 2 mm (0.078 in.)
Reference Signal	Marker/index pulse
Output Current	0.1 mm (0.025 mm after edge count detection) (0.0039 in. or 0.0009 in. with edge detection)
Power Consumption	Max. 70 mA
Output Signals	A, $\overline{A}$ , B, $\overline{B}$ , Z, $\overline{Z}$
Sensing Distance	0.1 to 1.0 mm (0.004 in. to 0.039 in.)
Mounting Tolerance	Lateral offset: $\pm 1 \text{ mm} (\pm 0.039 \text{ in.})$ ; parallelism $\leq 3^{\circ}$ , yaw $< 3^{\circ}$ , pitch $< 1^{\circ}$
System Accuracy	±(0.1 + 0.03 x L) mm, L in M
Repeatability	±1 count (pulse)
Travel Speed	Max. 25 m/s (82 ft./sec.)
Noise Immunity	IEC 801 level 3
Humidity	100%, condensation permissible
Temperature Ranges	Operating temperature: $-10^{\circ}$ C to $+70^{\circ}$ C ( $+14^{\circ}$ F to $+158^{\circ}$ F) Storage temperature: $-30^{\circ}$ C to $+80^{\circ}$ C ( $-22^{\circ}$ F to $+158^{\circ}$ F)
Enclosure Rating	IP 67 according to DIN (sensor head)
Housing	Plastic (Acrylonitrile/Butadiene/Styrene)

M12 eurofast	Coupling Nut	1	2	3	4	5	6	7	8
Cable	Shield/Drain	ВК	BN	RD	YE	OG	GN	BU	VT
Output	Case Ground	Common	+V	A	Ā	В	B	Z	Z

#### **Pinouts**







#### L2 Sensor

#### **Magnetic Sensor**

- IP 67
- Unaffected by Dust, Shavings, Humidity
- Resolution of 0.005 mm (0.0002 in.)
- Index Pulse for Point of Reference
- Speed up to 14.5 m/s

#### **Quadrature Output**

#### Magnetic Scale

- Easy Mounting
- Humidity, Fluid and Oil Resistant

Туре	T8.L2.1*.22*1.*				
Supply Voltage	24 VDC ±20% / 5 VDC ±5%				
Cable/Connection	Flying leads 2 m PUR cable / molded M12 <b>eurofast</b> <sup>®</sup> 8-pin connection				
Output Circuit	Push pull or line driver				
Index Pulse	Every 5 mm (0.196 in.)				
Reference Signal	Marker/index pulse				
Output Current	0.020 mm (0.005 mm after edge count detection) (0.0007 in. or 0.0002 in. with edge detection)				
Power Consumption	Max. 70 mA				
Output Signals	A, $\overline{A}$ , B, $\overline{B}$ , Z, $\overline{Z}$				
Sensing Distance	0.1 to 2.0 mm (0.004 in. to 0.039 in)				
Mounting Tolerance	Lateral offset: $\pm 1 \text{ mm} (\pm 0.039)$ ; angle offset $\pm 3^{\circ}$ , parallelism $< 3^{\circ}$ , yaw $< 3^{\circ}$ ; pitch $< 1^{\circ}$				
System Accuracy	±(0.05 + 0.03 x L) mm, L in M				
Repeatability	±1 count (pulse)				
Travel Speed	See table below				
Noise Immunity	IEC 801 level 3				
Humidity	100%, condensation permissible				
Temperature Ranges	Operating temperature: -10°C to +70°C (+14°F to +158°F) Storage temperature: -30°C to +80°C (-22°F to +158°F)				
Enclosure Rating	IP 67 according to DIN (sensor head)				
Housing	Plastic (Acrylonitrile/Butadiene/Styrene)				
Cable	PUR				

M12 eurofast	Coupling Nut	1	2	3	4	5	6	7	8
Cable	Shield/Drain	ВК	BN	RD	YE	OG	GN	BU	VT
Output	Case Ground	Common	+V	A	Ā	В	B	Z	Z

#### **Pinouts**



# **Linear Encoder Style Drawings**



Linear Sensor with Potted Cable



#### Linear Sensor with M12 eurofast® connection



T8.L2.1\*.22\*1.\*

All dimensions shown as: Inches [mm]



# Linear Encoder Style Accessories



#### **B1 Linear Scale Specifications: Magnetic Band**

Pole Pitch	2 mm (.078 in.) from pole to pole
Width	10 mm (0.393 in.)
Thickness	1.7 mm (0.067 in.) with adhesive backing
Linear Expansion Rate	$(11\pm1) \times 10^{-6}/K$
Temperature Ranges	Operating temperature: $-10^{\circ}$ C to $+70^{\circ}$ C ( $-14^{\circ}$ F to $+158^{\circ}$ F) Storage temperature: $-30^{\circ}$ C to $+70^{\circ}$ C ( $-22^{\circ}$ F to $+158^{\circ}$ F)
Mounting	Adhesive backing
Adhesive Material	Acrylic





#### **B2 Linear Scale Specifications: Magnetic Band**

Pole Pitch	5 mm (0.196 in.) from pole to pole			
Width	10 mm (0.393 in.)			
Thickness	1.7 mm (0.067 in.) with adhesive backing			
<b>Linear Expansion Rate</b> $(11\pm1) \ge 10^{-6}$ /K				
Temperature Ranges	Operating temperature: $-10^{\circ}$ C to $+70^{\circ}$ C ( $-14^{\circ}$ F to $+158^{\circ}$ F) Storage temperature: $-30^{\circ}$ C to $+70^{\circ}$ C ( $-22^{\circ}$ F to $+158^{\circ}$ F)			
Mounting	Adhesive backing			
Adhesive Material	Acrylic			

All dimensions shown as: Inches [mm]

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Notes:

# **Molded Cordsets**



# TURCK Mating Cordsets



#### 4-pin, 250 VAC / 300 VDC, 4 A

Application	Cable Specs	Pinout	Straight
4-wire DC applications Foil shield and drain (drain <b>not</b> connected) UL Recognized CSA Certified	4/22 AWG 22 AWG drain, foil shield Grey PVC 105°C 5.2 mm OD	1. Bn 2. Wh 3. Bu 4. Bk	RK 4.4T-*/S618

Female

Female

#### 5-pin, 250 V, 4 A

Amplication	Cable Server	Discout	Sturicht	7
Application	Cable Specs	Pinout	Straight	/
5-wire DC applications Shield tied to coupling nut UL Recognized CSA Certified	5/22 AWG, 22 AWG drain, foil and braided shield Grey PVC 105°C 5.2 mm OD	1. Bn 2. Wh 3. Bu 4. Bk 5. Gy	RKS 4.5T-*	



#### **Specifications**

Connector:	Oil resistant polyurethane body material, Nylon or PUR contact carrier. Spacings to VDE 0110 Group C.
Contacts:	Gold plated brass.
Coupling Nuts:	Nickel plated brass. See options below**.
Cable:	See table.
Protection:	NEMA 1,3,4,6P and IEC IP 68.
Cable Length:	Standard cable lengths are nominal 2, 4 and 6 meters. Other lengths available by request - consult factory.

\*\* **Options**: To specify nylon coupling nut, add a "K" to part number. For example: RK .. to RKK .. (straight female) or WS .. to WSK .. (right angle male). To specify stainless steel coupling nut, add a "V" to part number. For example: RK .. to RKV .. (straight female) or WS .. to WSV .. (right angle male).

#### Dimensions

#### RK ..



#### **Female Connector**





**Female Connector** 

All dimensions shown as: Inches [mm]



# TURCK Mating Cordsets

		picofast® Sta	andard Duty Co	rdsets, Unshielded, PVC
		<ul><li>High Grade O</li><li>Unshielded</li></ul>	il & UV Resistant PV(	C
	<b>O</b>	NRTL/C		
				РКСМ
Threaded	4-pin			Female
	Application	Cable Specs	Pinout	Straight
Threaded, 4 PVC cable CSA	4-wire	125 VAC /VDC, 2.0 A 4/26 AWG, Yellow PVC 105°C 4.4 mm OD	1. Bn 2. Wh 3. Bu 4. Bk	PKG 4M-*

\* Length in meters



# Specifications

Connector:	Oil resistant polyurethane body material.
Contact Carrier:	Nylon or PUR.
Contacts:	Gold plated brass.
Coupling Nuts:	Nickel plated brass (threaded versions only).
Cable:	See table.
Protection:	NEMA 1, 3, 4, 6P and IEC IP 67.
Cable Length:	Standard cable lengths are nominal 2, 4 and 6 meters. Other lengths available by request - consult factory.

#### Dimensions





Female Connector, Threaded

All dimensions shown as: Inches [mm]

Pinouts Female

# TURCK Mating Cordsets

minifast <sup>®</sup> Heavy Duty Cordsets, I	PVC
<ul><li>High Grade Oil &amp; UV Resistant PVC</li><li>Standard Color Code</li></ul>	<ul><li> 16 AWG</li><li> Available in 4 Conductors</li></ul>
See table below	RKM

#### 4-pin, 16 AWG, Standard Color Code, 600 V, 9.0 A

Application	Cable Specs	Pinout	Straight
Heavy duty for 4-wire	4/16 AWG	1. Bk	RKM 46-*M
applications	Yellow PVC	2. Wh	
UL Recognized	105°C	3. Rd	
CSA Certified	4.0 mm OD	4. Gn	

Female



#### **Specifications**

Connector:	Oil resistant polyurethane body material, PUR contact carrier.
Contacts:	Gold plated brass.
Coupling Nuts:	Nickel plated brass. (see options below)**
Cable:	See table.
Protection:	NEMA 1, 3, 4, 6P and IEC IP67.
Cable Length:	Standard cable lengths are nominal 2, 4 and 6 meters. Other lengths available by request - consult factory.

\*\* **Options**: To specify nylon coupling nut, omit the "M" from the part number. For example: WKM .. to WK .. (right angle female) or RSM .. to RS .. (straight male). To specify stainless steel coupling nut, change the "M" to a "V" in the part number. For example: RKM .. to RKV .. (straight female) or WSM .. to WSV .. (right angle male).

#### Dimensions





All dimensions shown as: Inches [mm]

Pinouts Female

# TURCK Mating Cordsets



Application	Cable Specs	Pinout	Straight
10-wire DC applications UL listed CSA Certified	10/22 AWG 24 AWG Drain Grey PVC 80°C 5-8 mm OD	1. Bk 2. Rd 3. Gn 4. Bn 5. Bu 6. Og 7. Ye 8. Wh 9. Vt 10. Gy	HRS 10-*M



#### **Specifications**

Connector:Zinc alloy and brassContacts:Silver plated phosphor bronzeCoupling Nuts:Nickel plated brassCable:See tableProtection:Not ratedCable Length:Standard cable lengths are nominal 2, 4 and 8 meters. Other lengths available by request - consult factory.

#### Dimensions

#### HRS ..



**Female Connector** 

All dimensions shown as: Inches [mm]

**Pinouts** 





## **Glossary of Terms**

- Absolute Sensing Position is accurately known at power on without the need for a reference, or home, position.
- Accuracy The difference between the target point and the point actually indicated by the sensor with relation to a fixed reference.
- Active Stroke The area of the sensor between the Null and Dead Zones where the magnet assembly can be accurately sensed.
- **Dead Zone** An area at the end of the sensor opposite the connector where the magnet cannot be accurately sensed. For profile styles, the Dead Zone is the last 1.5 inches of the extrusion. For rod styles, the Dead Zone is the last 2.5 inches of the rod (See dimensional drawings).
- Hysteresis The difference of the measured value when approaching a defined point from opposite directions.
- **Incremental Sensing** A relative position feedback device whose signal is always referenced to the zero position. The LDT produces a digital, square wave pulse train that is fed into an up/down counter chip or clock to derive position.
- **Non-Contact Sensing** The moving fixture to be measured is not mechanically connected to the stationary sensor electronics. The coupling for the *EZ-track* line of linear displacement transducers is done with a magnetic field that causes no wear on the sensor parts.
- **Non-Linearity** The distance the indicated position of the magnet along the stroke varies from the actual physical position. The non-linearity of a sensor is caused by minute differences in physical properties of the waveguide and is measured as a percentage of full stroke length.
- Non-Volatile Position is held in memory and will not be lost on power down.
- **Null Zone** An area at the connector end of the sensor where the magnet cannot be accurately sensed. For profile styles, the Null Zone is the first 3 inches of the extrusion. For rod styles, the Null Zone is the first 2 inches of the rod (See dimensional drawings).
- Quadrature Cycle Output Frequency The fixed frequency at which the pulse rate is transmitted out of the probe.
- **Repeatability** The difference in the indicated position of a single point when that point is repeatedly approached from the same direction under the same ambient conditions.
- **Resolution** The smallest incremental change in position that can be detected and indicated as an output.
- **Span Point** The end point of the analog measuring distance at which the output signal equals the greatest value of the analog scale. The Span Point on the analog **TURCK** *EZ-track* sensors is adjustable.
- Volatile Position held in memory that is lost on power down.
- **Zero Point** The beginning point of the analog measuring distance at which the output signal equals the lowest value of the analog scale. The Zero Point is also used as the reference position for the incremental scale used in quadrature output probes. The Zero Point on the **TURCK** *EZ*-*track* sensors is adjustable.



**Notes:** 



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