

EZ-track®

TURCK's *EZ-track* line of linear displacement transducers (LDTs) 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 to withstand. With its unique features, IP 67 or optional IP 68 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

TURCK's *EZ-track* line is a family of magnetostrictive LDTs. 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. ***EZ-track*** LDTs 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 connectivity products, **TURCK** delivers the complete package. Standard, shielded 4 and 5-pin M12 **euromast**® cables are always available from **TURCK** for quick connection to ***EZ-track***.

IP 67 / IP 68 (optional)

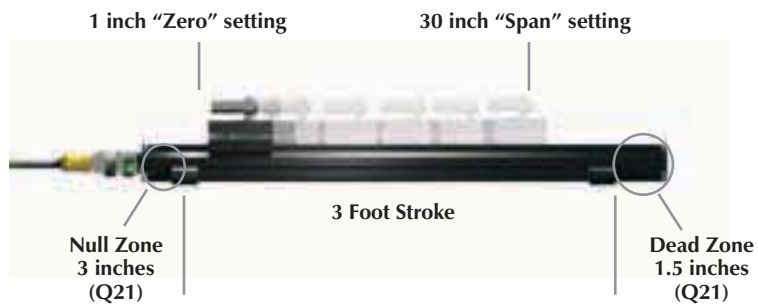
The ***EZ-track*** line will stand up in harsh environments, thus downtime situations due to environmental conditions can be reduced. Standard units have an environmental rating of IP 67, however IP 68 versions are also available. Consult factory for details.

EZ-track® General Overview

Programmable Stroke

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

EZ-track's analog outputs 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 levels for 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.



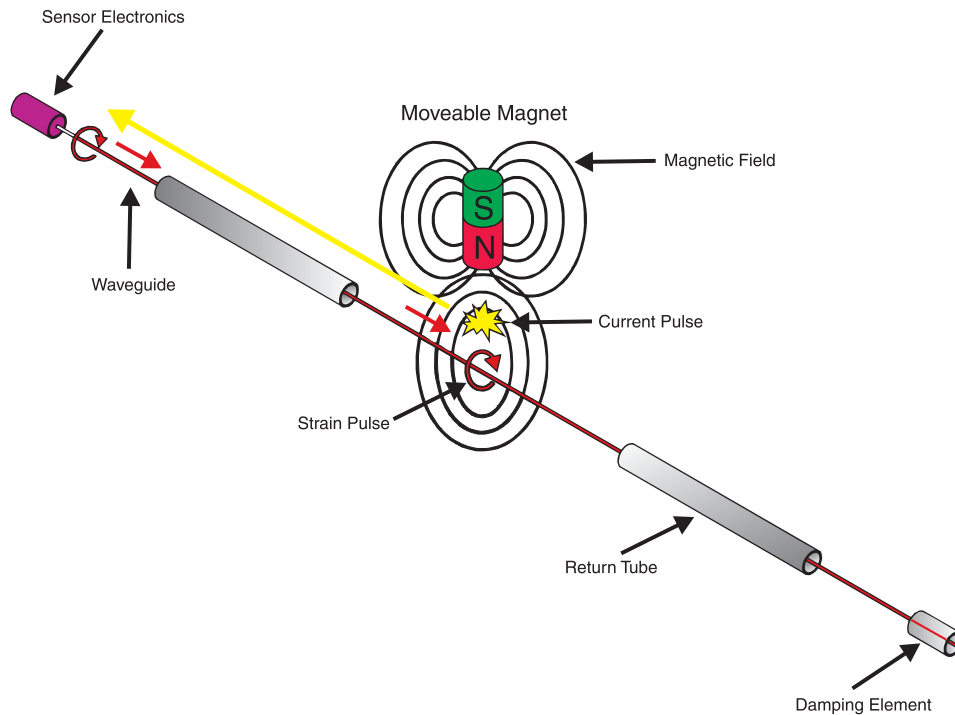
To Program the *EZ-track* Sensor:

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

Reliable Accurate Technology

EZ-track® LDTs 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 that 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, quadrature pulse output, or digital (PWM or start/stop) outputs.

In the **Q21R** 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
- 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

Analog Profile Series

Low Profile Extrusion Housing

Low Profile Housings Reduce Mounting Restrictions and Eliminate Special Mounting Fixtures

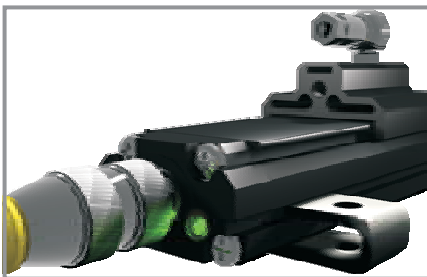
The **Q21** series is housed in low profile, environmentally sealed, anodized aluminum housings. The electronics and the sensing element are incorporated into a housing that is less than 1 inch tall without the need for a can or head on the sensor to house the electronics (typical competitive devices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



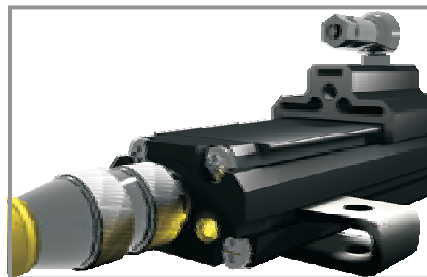
Diagnostic LED

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

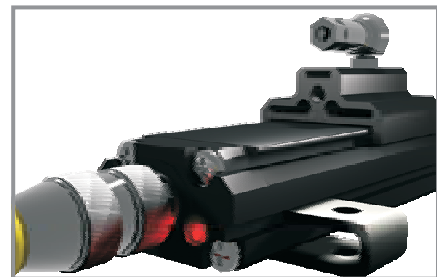
The **EZ-track**® Series utilizes a diagnostic LED that enables the operator to understand the state of the sensor dependent upon the position of the target magnet.



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**).

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

Various Analog Outputs Available Profile Style

The **Q21** series can be ordered in a variety of outputs.

<u>Voltage:</u>	<u>Current:</u>	<u>Quadrature:</u>
0-10 VDC	4-20 mA	10 kHz to 1 MHz
10-0 VDC	20-4 mA	
-10 to 10 VDC		
10 to -10 VDC		
0-5 VDC		
5-0 VDC		
-5 to 5 VDC		
5 to -5 VDC		



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.

FM Approved Installation (Class I, Division 2)

The **EZ-track Q21** unit can be ordered for use in a Class I, Division 2 environment. The unit will utilize a Euro-G Fast-Lock, as shown below. See page L37 for part number key and ordering information (S1690 unit rating option).

Quadrature Profile Series

Direct Quadrature Output

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

The **Q21-DQ** provides a quadrature output directly from the transducer to the controller. The **Q21-DQ** 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-DQ** can be used in certain applications to replace incremental rotary and linear encoders. The quadrature output can be used in applications requiring 0.001 inch resolution and repeatability.

Velocity Feedback

The **EZ-track** quadrature 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 M4-M5 or consult factory.

Incremental Output, Absolute Functionality

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

The **Q21-DQ** 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-DQ** 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-DQ** 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-DQ** 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.

Digital Profile Series

The **Q21D** is a non-contact LDT with a digital output. This transducer utilizes magnetostrictive technology to give absolute position that is repeatable to .006% of the active sensing distance. It also has the same auto-tuning capability that the other profile series transducers offer so that it can adjust its signal strength to various magnets. There is a diagnostic LED that is located at the connector end of the probe and provides visual status information regarding the operation of the **Q21D**. The indications are as follows:

Green: Magnet is present and within the active range, the LED will remain illuminated continuously during normal operation.

Red: Fault, the LDT has lost its signal from the magnet or the magnet has moved into the Null or Dead Zone.

Yellow: No external interrogation pulse is detected.

The **Q21D** digital transducer provides either a Start/Stop or a Variable Pulse signal interface that is proportional to the position of the slide magnet assembly along the length of the probe.

Start/Stop (RS)

The Start/Stop signal interface of the **Q21D** digital output series is a differential RS-422 output. To initiate a start pulse, an external device must be used, and should be a minimum of 1ms in duration. A stop pulse of 1 ms in duration will follow. The time delay from the leading edge of the start pulse to the leading edge of the stop pulse is proportional to the distance from the Null Zone to the Magnet.

Digital Profile Series

Variable Pulse (VP)

The Variable Pulse interface digital output is a pulse width modulated signal (RS-422). The **Q21D** LDT can be ordered with either external (**VPE**) or internal (**VPI**) interrogation.

External interrogation occurs when an external device connected to the **Q21D-VPE** generates a start pulse. This start pulse should be a minimum of 1 ms in duration. Within 50 nanoseconds after the leading edge of the start pulse has been received, the LDT will generate an output pulse. The duration of the output pulse is proportional to the distance from the Null Zone to the Magnet.

The **Q21D-VPI** generates an internal interrogation, and will continually output pulse width modulated signals. The duration of this output pulse is also proportional to the distance from the Null Zone to The Magnet.



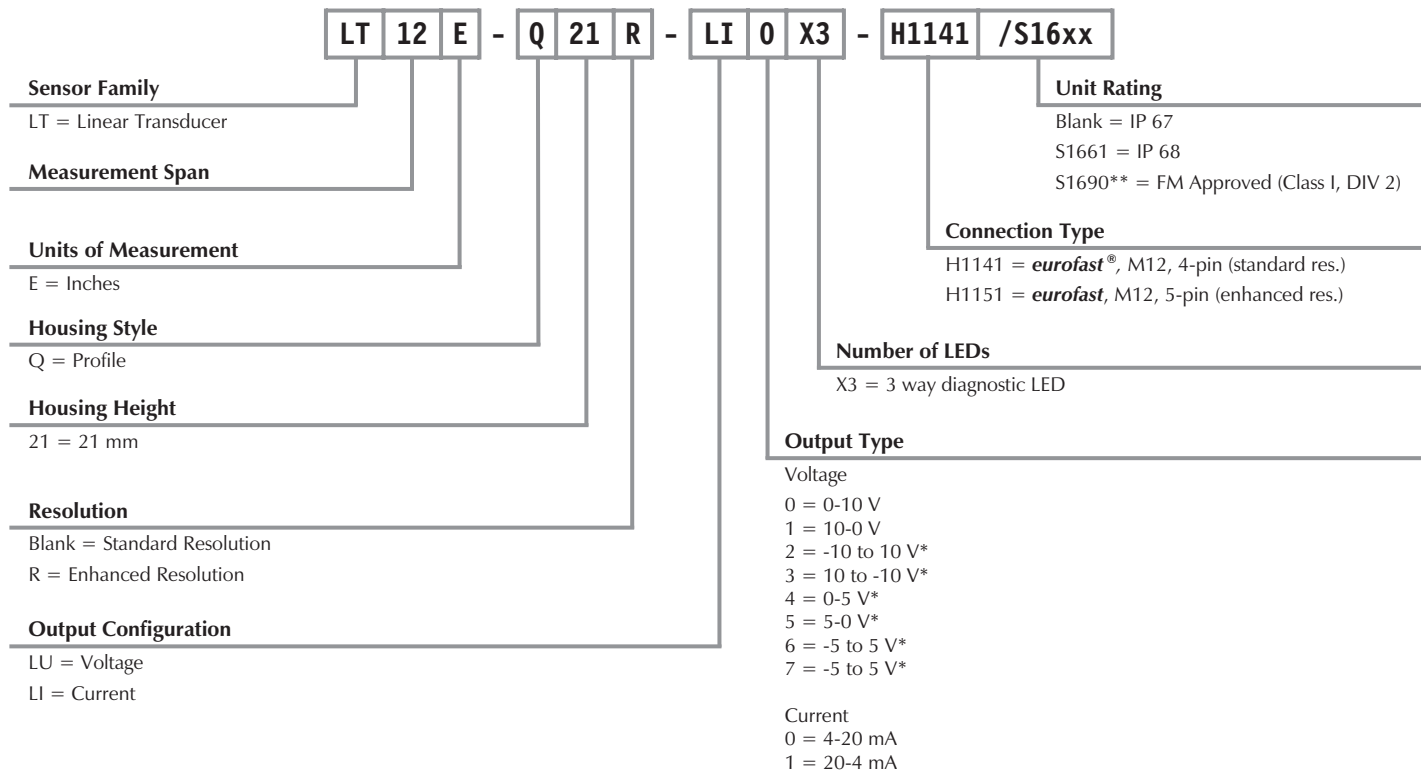
Notes:

TURCK

Process Automation – Sensors

Analog Profile Series Part Number Key

Part Number Keys are to assist in IDENTIFICATION ONLY. Consult factory for catalog items not identified.



* Q21 / Q35 versions only

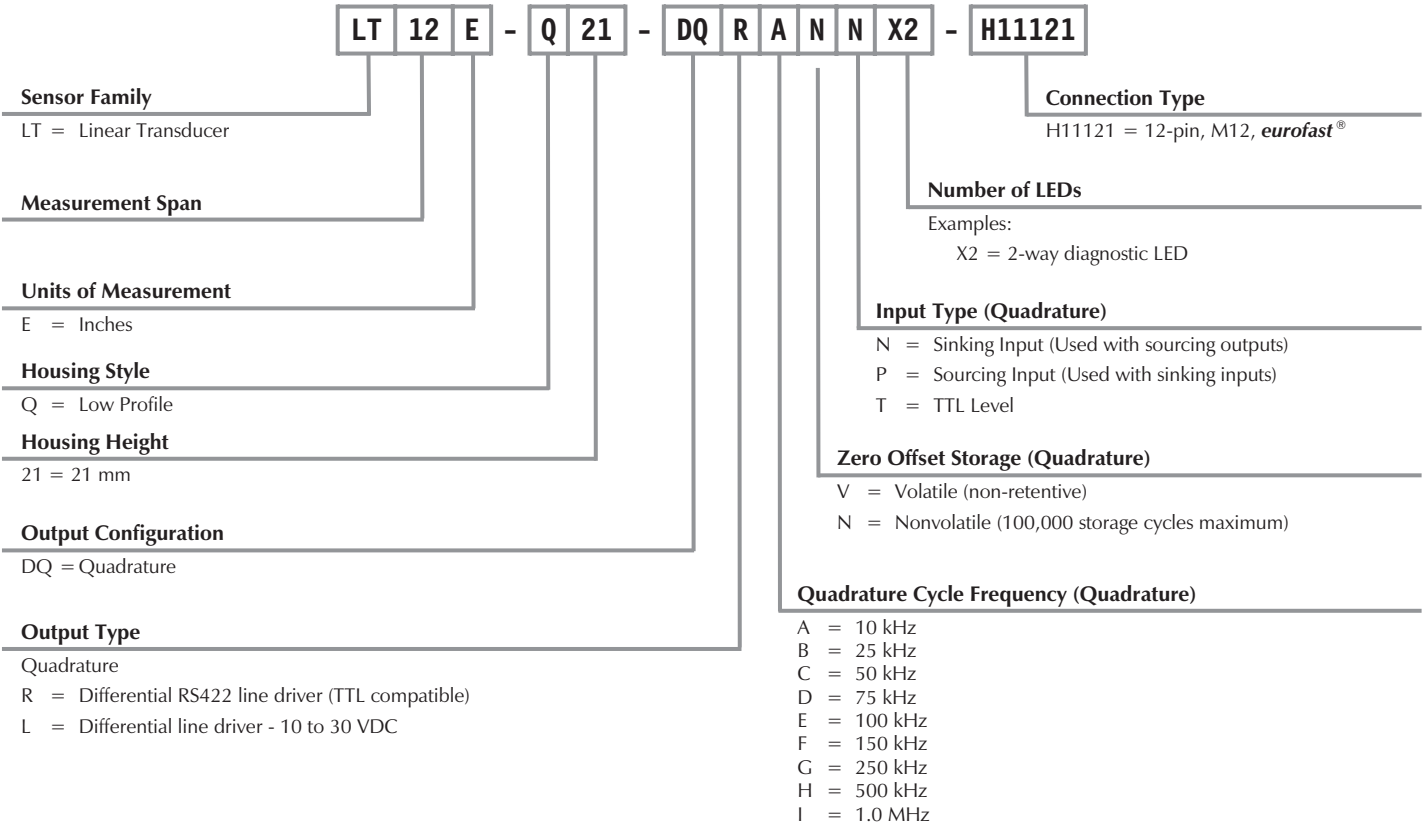
** FM approved units ship with Euro-G Fast Lock, which must be installed to maintain FM approval.

Note: In addition to the LDT, a typical system includes a magnet, mounting feet and cable (all sold separately).

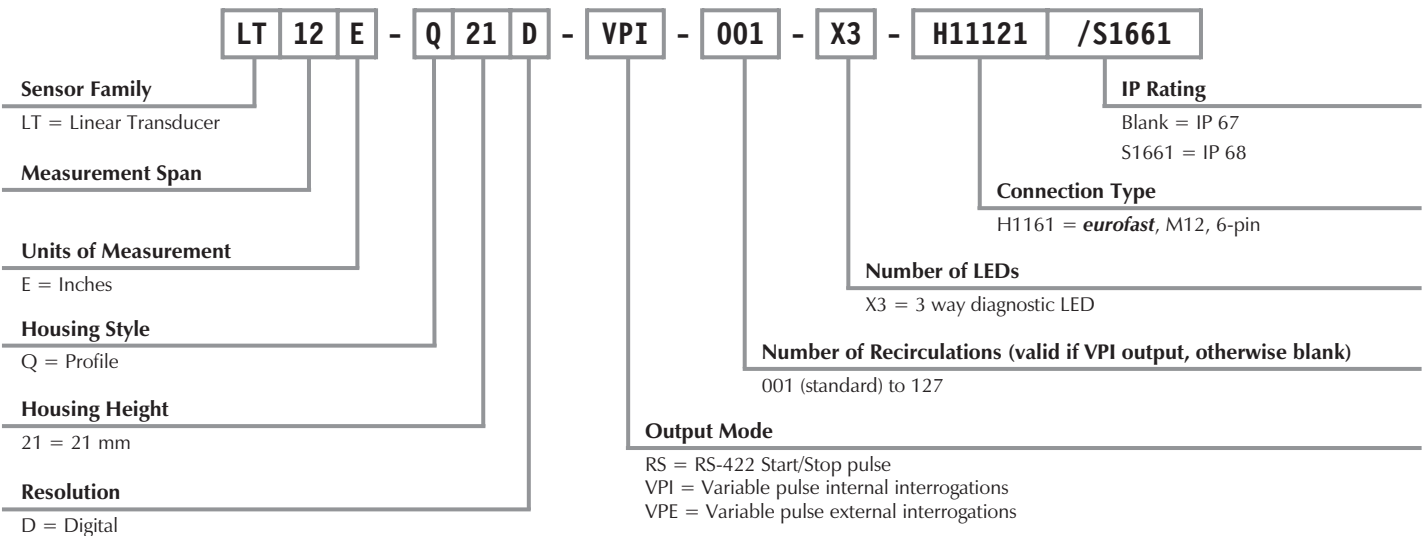


Quadrature Profile Series Part Number Key

Part Number Keys are to assist in IDENTIFICATION ONLY. Consult factory for catalog items not identified.



Digital Profile Series Part Number Key



Note: In addition to the LDT, a typical system includes a magnet, mounting feet and cable (sold separately).

Enhanced Resolution Analog Profile Style (Q21R) Specifications

Output	Current:	Voltage:
	4-20 mA	0-10 VDC
	20-4 mA	10-0 VDC
Load Impedance	$\leq(\text{voltage in} - 4) \div 0.02 \Omega$ $\geq 1000 \Omega$ (example: 10 VDC \leq 300 Ω)	
Span	5 to 180 in. (Q35 style maximum length 36 in.)	
Repeatability	+/-0.006% of full stroke or +/-0.002 in., whichever is greater	
Resolution	0.001 in. internal (For stroke lengths <65"); 16 bit (For lengths >65)	
Operating Temperature	-40° to +70°C (-40° to +158°F)	
Null Zone	3.00 in.	
Dead Zone	2.00 in.	
Operating Voltage	13.5-30 VDC	
Current Consumption	120 mA at 15 VDC, 2.5 watts maximum	
Response Time:		
≤50 in	1 ms	
50 to 100 in	2 ms	
101 to 150 in.	3 ms	
151 to 180 in.	4 ms	
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	

Standard Resolution Analog Profile Style (Q21) Specifications

Output	Current:	Voltage:
	4-20 mA	+5 to -5 VDC 0-10 VDC
	20-4 mA	-5 to +5 VDC 10-0 VDC
		0 to +5 VDC -10 to +10 VDC
		+5 to 0 VDC +10 to -10 VDC
Load Impedance	$\leq(\text{voltage in} - 4) \div 0.02 \Omega$ $\geq 1000 \Omega$ (example: 10 VDC \leq 300 Ω)	
Span	4 to 180 in. (Q35 style maximum length 36 in.)	
Repeatability	+/-0.01% of full stroke or +/-0.014 in., whichever is greater	
Resolution	0.014 in. for stroke lengths less than 60 in.; For lengths over 60 in.: 12 bits	
Operating Temperature	-40° to +70°C (-40° to +158°F)	
Null Zone	3.00 in.	
Dead Zone	1.50 in.	
Operating Voltage	10-30 VDC	
Current Consumption (max.)	100 mA	
Response Time:		
50 in. or Less:	1 ms updates with 5 ms settling time	
50 in. or Greater:	2 ms updates with 4 ms settling time	
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 Yellow = Magnet is out of the active programmed range, but still within the active	



Quadrature Profile Style (Q21-DQ) Specifications

Output	Quadrature, A, \bar{A} , B, \bar{B} , Z, \bar{Z}
Span	5 to 180 inches (Q35 maximum length 36 inches)
Repeatability	+/-0.001% of full stroke or +/- 0.001 inches, whichever is greater
Resolution	0.001 inches internal (1000 pulses per inch)
Operating Temperature	-20° to +70°C (-4° to +158°F)
Null Zone	3.00 in.
Dead Zone	2.00 in.
Operating Voltage	13.5-30 VDC
Current Consumption	3 watts maximum (1 watt typical)
Response Time:	
≤50 in	1 ms
50 to 100 in	2 ms
101 to 150 in	3 ms
151 to 180 in	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
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

Digital Profile Style (Q21D) Specifications

Output	Start/Stop Pulse: External interrogation; Variable Pulse: Internal or External interrogation
Number of Recirculations	Variable Pulse: 001 (standard) to 127
Span	5 to 180 in.
Repeatability	+/-0.006% of full stroke
Hysteresis	+/-0.02% of full stroke
Operating Temperature	-20° to +70°C (-4° to +158°F)
Null Zone	3.00 in.
Dead Zone	2.00 in.
Operating Voltage	13.5-30 VDC
Current Consumption	120 mA at 15 VDC, 2.5 watts maximum
Shock	Tested to 40G
Vibration	MIL-STD810E, 10G rms random, 20 Hz - 2 kHz
LED	Green = Power is applied and magnet is present Red = Fault, magnet is in the Dead Zone or lost Yellow = No interrogation signal detected



Housing Style	Part Number	Output
21 mm Anodized Aluminum, 5-pin euromast® Connection 	LT***E-Q21R-LI0X3-H1151	Analog Current 4-20 mA
	LT***E-Q21R-LI1X3-H1151	Analog Current 20-4 mA
	LT***E-Q21R-LU0X3-H1151	Analog Voltage 0-10 V
	LT***E-Q21R-LU1X3-H1151	Analog Voltage 10-0 V
21 mm Anodized Aluminum, 4-pin euromast Connection 	LT***E-Q21-LI0X3-H1141	Analog Current 4-20 mA
	LT***E-Q21-LI1X3-H1141	Analog Current 20-4 mA
	LT***E-Q21-LU0X3-H1141	Analog Voltage 0-10 V
	LT***E-Q21-LU1X3-H1141	Analog Voltage 10 -0 V
	LT***E-Q21-LU2X3-H1141	Analog Voltage -10 to 10 V
	LT***E-Q21-LU3X3-H1141	Analog Voltage 10 to -10 V
	LT***E-Q21-LU4X3-H1141	Analog Voltage 0-5 V
	LT***E-Q21-LU5X3-H1141	Analog Voltage 5-0 V
	LT***E-Q21-LU6X3-H1141	Analog Voltage -5 to 5 V
LT***E-Q21-LU7X3-H1141	Analog Voltage 5 to -5 V	

*** Span = measuring length in inches.

See page L45 for magnets and mounting accessories (not included).



TURCK LT...-Q21-...-H1141 and LT...-Q21-...-H1151 **EZ-track** sensors are FM approved for installation in Class I, Division 2 hazardous locations when installed per TURCK control drawing Ni-1.003 (www.turck.com/fmcd).



Voltage	Features	eurofast Connection	Enclosure Rating	Agency Approval	Mating Cordset	Wiring Diagram #	Wiring Diagrams
13.5-30 VDC	Analog Output Enhanced Resolution	5-pin	IP 67	CE	RKS 4.5T-*	1	<p>Diagram 1</p> <p>Diagram 2</p>
		5-pin	IP 67	CE	RKS 4.5T-*	1	
		5-pin	IP 67	CE	RKS 4.5T-*	1	
		5-pin	IP 67	CE	RKS 4.5T-*	1	
10-30 VDC	Analog Output Standard Resolution	4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	
		4-pin	IP 67	CE	RK 4.4T-*/S618	2	

* Length in meters.



Housing Style	Part Number	Output
<p>21 mm Anodized Aluminum, 6-pin <i>euromast</i>® Connection</p>	LT***E-Q21D-RS-X3-H1161	RS 422 Start/Stop pulse
	LT***E-Q21D-VPI***-X3-H1161	Variable pulse internal interrogations
	LT***E-Q21D-VPE-X3-H1161	Variable pulse external interrogations
<p>21 mm Anodized Aluminum, 12-pin <i>euromast</i> Connection</p>	LT***E-Q21-DQR*N*X2-H11121	Quadrature RS 422 Line Driver (TTL)
	LT***E-Q21-DQR*N*X2-H11121	Quadrature RS 422 Line Driver (TTL)
	LT***E-Q21-DQL*N*X2-H11121	Quadrature 10-30 VDC Line Driver
	LT***E-Q21-DQL*N*X2-H11121	Quadrature 10-30 VDC Line Driver
	LT***E-Q21-DQR*V*X2-H11121	Quadrature RS 422 Line Driver (TTL)
	LT***E-Q21-DQR*V*X2-H11121	Quadrature RS 422 Line Driver (TTL)
	LT***E-Q21-DQR*V*X2-H11121	Quadrature 10-30 VDC Line Driver
LT***E-Q21-DQR*V*X2-H11121	Quadrature 10-30 VDC Line Driver	

*** Span = measuring length in inches.

See page L45 for magnets and mounting accessories (not included).

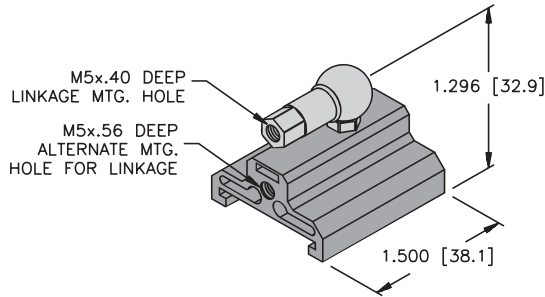


Voltage	Features	Eurofast Connection	Enclosure Rating	Agency Approval	Mating Cordset	Wiring Diagram #	Wiring Diagrams
13.5-30 VDC	Digital Output	6-pin	IP 67	CE	RKS 6T-*	1	<p>Diagram 1</p> <p>Diagram 2</p>
	Digital Output	6-pin	IP 67	CE	RKS 6T-*	1	
	Digital Output	6-pin	IP 67	CE	RKS 6T-*	1	
13.5-30 VDC	Nonvolatile Zero Offset Storage	12-pin	IP 67	CE	RKS 10T-*	2	
	Nonvolatile Zero Offset Storage	12-pin	IP 67	CE	RKS 10T-*	2	
	Nonvolatile Zero Offset Storage	12-pin	IP 67	CE	RKS 10T-*	2	
	Nonvolatile Zero Offset Storage	12-pin	IP 67	CE	RKS 10T-*	2	
	Volatile Zero Offset Storage	12-pin	IP 67	CE	RKS 10T-*	2	
	Volatile Zero Offset Storage	12-pin	IP 67	CE	RKS 10T-*	2	
	Volatile Zero Offset Storage	12-pin	IP 67	CE	RKS 10T-*	2	

* Length in meters.

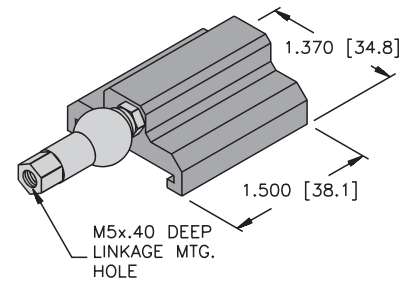
Profile Style Accessories

Slide Magnet



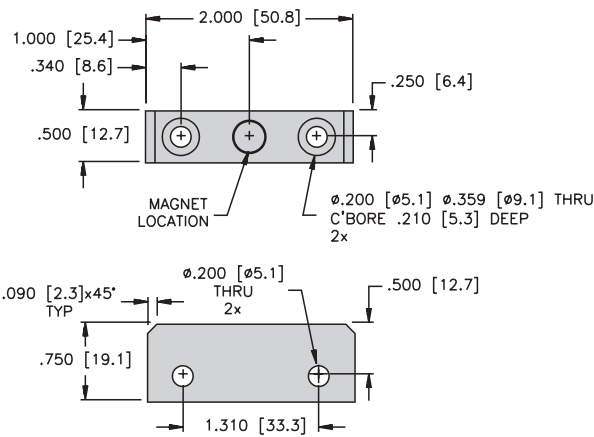
SM-Q21 (A5600)

Slide Magnet with Slide Adapter



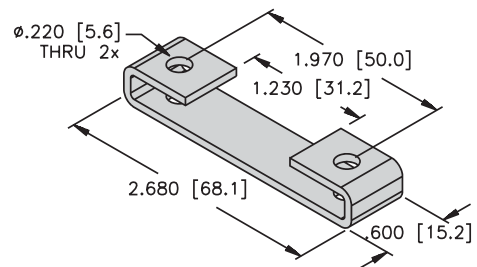
SA-Q21 (A0864)

Floating Magnet



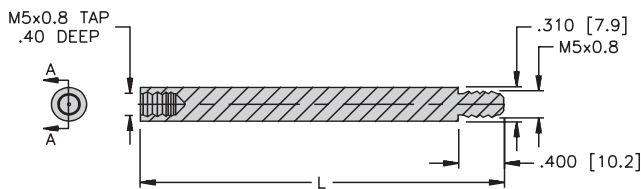
FM-Q21 (A5500)

Q21 Mounting Brackets



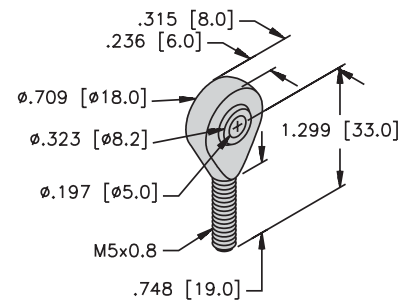
MB-Q21
 (* mount every 3 feet) (A5700)

Control Arms



CAE-Q21**

Rod Ends

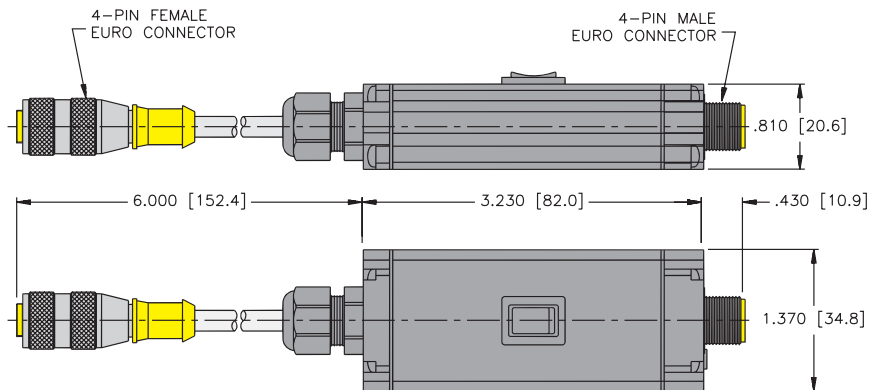


RE-Q21 (A0865)

** Length in inches.
 Stocked in 3", 6" and 9" lengths.

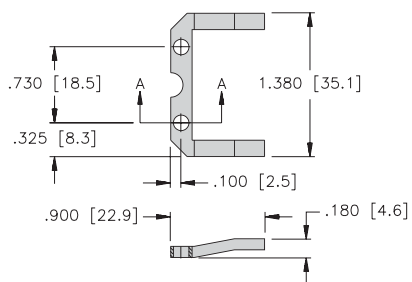
All dimensions shown as: Inches [mm]

Rocker Programmer



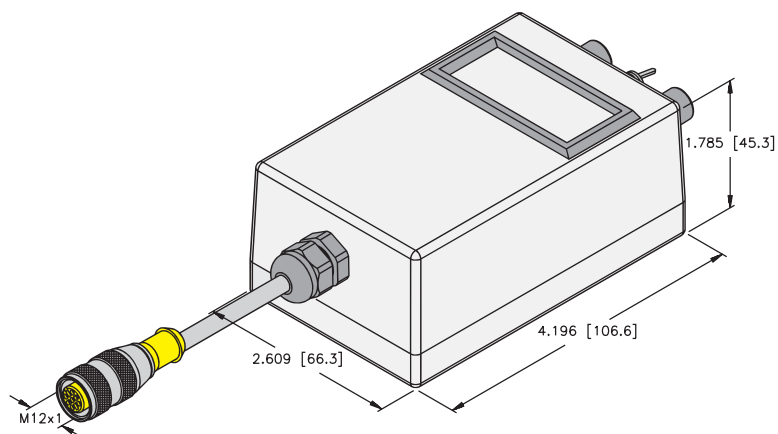
RP-Q21 (A0875)

Q21 Upside Down Brackets



UB-Q21 (2/bag)
(A0876)

Test and Programming Device



TB2-LDT (voltage) (A58001)
TB2-LDT-LI (current) (A58002)

All dimensions shown as: Inches [mm]