

**TURCK**  
*works*

***Q-track***<sup>™</sup>

**LINEAR  
POSITION  
SENSORS**



**....Sense It!....Connect It!....Bus It!....Solve It!**

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# TURCK

YOUR **AUTOMATION SOLUTIONS** PROVIDER



PROXIMITY SENSORS



CORDSETS



I/O SOLUTIONS



MEASUREMENT



RFID



INTERFACE MODULES



CUSTOM CONNECTIVITY



POSITION



NETWORK MEDIA



TURCK's global support network consists of over 2,500 employees in 25 countries and 60 exclusive agencies worldwide that strive to meet customer expectations. Our sales, support and manufacturing facilities are strategically located across the world allowing us to respond to local market conditions and deliver customer specific solutions on a timely basis.

We are a world leader in **automation technology** with a diverse and broad product portfolio that provides customer specific applications with high performance, reliable and cost effective solutions. The synergy in our product portfolio and customization flexibility are key components of our value proposition.

Our expertise spans across two major industry categories: **Industrial Automation** and **Process Automation**. Each weighs in with its own unique requirements and methods of conducting business. This market centric approach ensures that we develop application specific solutions across a variety of vertical market segments.



# ***Q-track*<sup>™</sup> LINEAR POSITION SENSORS**

|              |   |
|--------------|---|
| Introduction | 2 |
|--------------|---|

## ***Q-track* Linear Position Sensors**

|                                                                                                              |   |
|--------------------------------------------------------------------------------------------------------------|---|
| S-series with standard resolution, analog output (U/I)                                                       | 4 |
| E-series with enhanced resolution and SSI interface                                                          | 6 |
| E-series with enhanced resolution and with programmable analog/digital output (U/I, PNP), IO-Link compatible | 8 |

## **Accessories**

|                     |    |
|---------------------|----|
| Fieldbus connection | 10 |
| Connectivity        | 12 |
| Position elements   | 13 |
| Mounting hardware   | 14 |

***Q-track*<sup>™</sup>**





# ***Q-track*™ LINEAR POSITION SENSORS**

## **BREAKING NEW GROUND**

### **Principle of operation**

TURCK's new *Q-track* linear position sensor operation is based on the RLC (Resistance Inductive Capacitance) principle and incorporates an advanced microprocessor and precisely positioned emitter and receiver coils on a printed circuit board.

The emitter coils are excited with a high frequency AC field. The interaction between the moving position element and the receiver coils creates different voltages that are induced into the receiver coils which determines the position of the target.



### **Speed and accuracy**

To increase speed and accuracy, TURCK designed the linear position sensor with two different coil systems. The first coil system is for coarse measurements, while the second coil system is used to determine the fine position. An advanced microprocessor circuit analyzes the resulting signals producing a measuring system with very high linearity and repeatability.

The *Q-track* linear position sensor is available in 100 mm increments from 100 mm to 1,000 mm in length. Depending upon the series selected, the sensor is available with 12, 16 or 20 bit accuracy.



### **Short blind zones**

TURCK designed the microprocessor board and coil system to be compact. The sensor length is only 58 mm longer than the measuring span. The blind zones measure a mere 29 mm on each end of the sensor. The layout of the coils is designed in such a way to minimize the effect of vertical (up to 4 mm) or lateral misalignment.

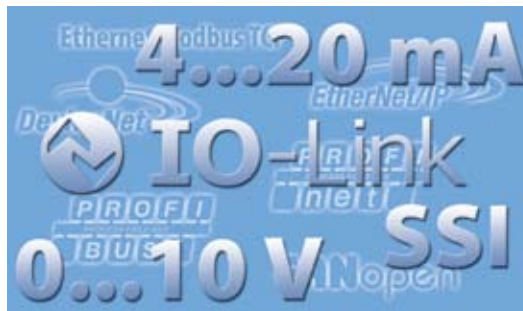


### **Analog or digital outputs**

The standard resolution versions feature 0-10 V and 4-20 mA analog signals with 12 bit resolution, plus the flexibility of scaling or reversing the direction of operation.

The enhanced resolution versions are available in either 20 bit SSI (Synchronous Serial Interface) or 16 bit I/O Link or with configurable switching points.

A dual multifunctional Green / Yellow LED facilitates simple set up and diagnostics.





### High noise immunity

The RLC circuit used in the *Q-track*™ linear position sensor is highly immune to noise interference. All products meet IEC 60529 and EN 60529 standards for noise immunity.

The *Q-track* linear position sensor is inherently weld field immune.

TURCK also offers a positioning element that is weld field immune for applications requiring weld field immunity.

### Robust housing

The linear position sensors have an anodized cast aluminum housing. Its electronics are mounted securely inside a polycarbonate sleeve that provides an IP67 rated housing with shock ratings up to 30g's (11 ms) and vibration resistance up to 55 Hz (1 mm displacement).

M12 *eurofast*® connectors provide an industry standard connection to the linear position sensor.

## ***Q-track* LINEAR POSITION SENSORS** PRECISE, VERSITILE AND RUGGED

The *Q-track* linear position sensor provides many advantages over existing linear measurement technologies, such as potentiometer and magnetostrictive devices. Potentiometer devices are larger in size relative to the measuring span and are subject to wear and contamination. Magnetostrictive transducers are also longer in length relative to the measuring span and require external magnets that are subject to environmental degradation.

TURCK's *Q-track* linear position sensor does not use magnets instead it uses a tuned coil positioning element. The *Q-track* RLC technology provides absolute position feedback and is noise immune. The 25 mm low profile housing is made from extruded materials and is IP67 rated for environmental protection. As a result, the linear position sensor may be used in a wide variety of industries and applications that require linear feedback.

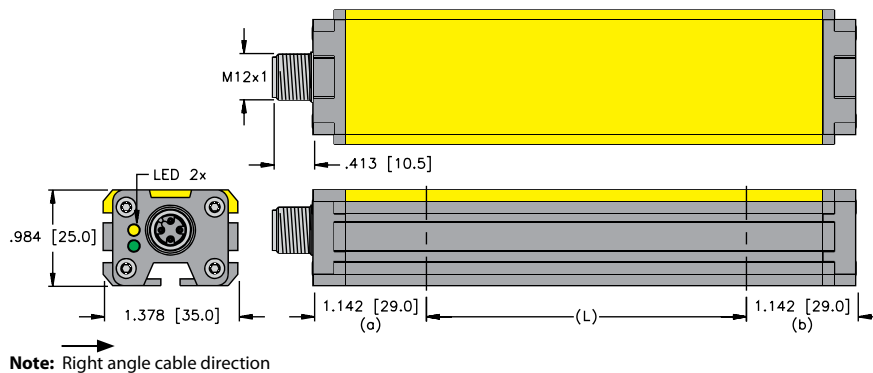
- Cylinder position
- Stamping
- Pinch roll height
- Ride control
- Level control
- Flight simulators
- Pitch control
- Casting machines
- Weld nut height
- Metal cutting machinery
- Wood cutting machinery
- Plastic molding machines



# S-series with standard resolution, analog output (U/I)

## Technical data

### Dimensions



### Measuring range specifications

|                      |                                                       |
|----------------------|-------------------------------------------------------|
| Measuring ranges (L) | 100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000 mm |
| Blind zone (a)       | 29 mm                                                 |
| Blind zone (b)       | 29 mm                                                 |

### System

|                        |                                       |
|------------------------|---------------------------------------|
| Resolution             | 12 bit (measuring range in mm / 4096) |
| Repeatability/accuracy | 0.025 % (0.025 mm per 100 mm)         |
| Linearity deviation    | ≤ 0.1 % of full scale                 |
| Temperature drift      | ≤ ± 0.002 %/K                         |
| Ambient temperature    | -25 to + 70 °C                        |
| Output update rate     | 2 ms                                  |
| Speed                  | 25 m/s                                |

### Electrical data

|                                             |                       |
|---------------------------------------------|-----------------------|
| Operating voltage                           | 15-30 VDC             |
| Residual ripple                             | ≤ 10 % $U_{pp}$       |
| No-load current                             | ≤ 8 mA                |
| Rated insulation voltage                    | ≤ 0.5 kV              |
| Short-circuit protection                    | yes                   |
| Wire breakage / reverse polarity protection | yes/yes               |
| Output function                             | 5-wire, analog output |
| Voltage output                              | 0-10 V                |
| Current output                              | 4-20 mA               |
| Load resistance of voltage output           | ≥ 4.7 kΩ              |
| Load resistance of current output           | ≤ 0.4 kΩ              |

### Housing style

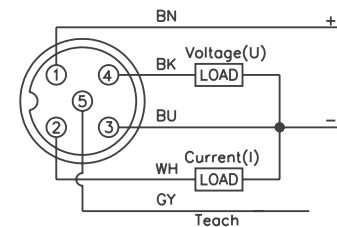
|                                       |                                                |
|---------------------------------------|------------------------------------------------|
| Housing style                         | rectangular, Q25L                              |
| Dimensions                            | profile 35 x 25 mm, L = measuring range + 58mm |
| Housing material                      | aluminum                                       |
| Material active face                  | plastic, PC-GF20                               |
| Connection                            | connector, M12 x 1                             |
| Vibration resistance                  | 55 Hz (1 mm)                                   |
| Shock resistance                      | 30 g (11 ms)                                   |
| Protection class (IEC 60529/EN 60529) | IP67                                           |

### LEDs

|                            |                                  |
|----------------------------|----------------------------------|
| Power indication           | green LED                        |
| Measuring range indication | green/yellow multifunctional LED |

### Wiring diagram

5-pin M12 **eurofast**® connection



Mating cordset: **RK 4.5T-\*/S618**

# Q-track™ linear position sensors

## E-series with enhanced resolution and SSI interface



### Product features

- Enhanced resolution, up to 20 bit, depending on sensor length
- Enhanced sample rate, 1 KHz
- Excellent temperature stability and linearity through direct digital signal transmission
- SSI interface
- M12 *eurofast*® connector (8-pin)
- 29 mm blind zones
- Robust extruded aluminum housing
- Watertight (IP67) polycarbonate insert
- Multifunction LED

### Measuring range indicated via LED

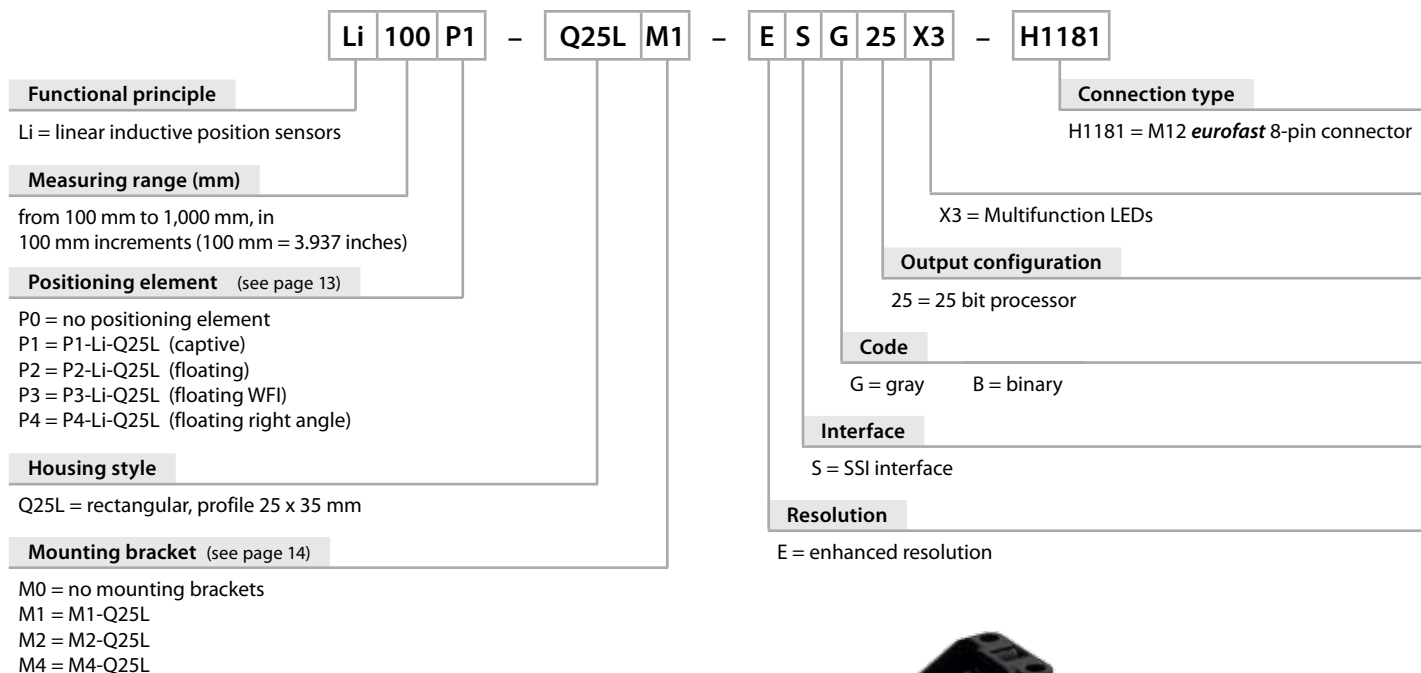
- **Green:** The positioning element is in the measuring range.
- **Green/yellow alternate flashing:** The positioning element is in the measuring range with a lower signal quality (i.e. distance too long).
- **Yellow flashing:** The positioning element is outside of the measuring range (max. range).
- **Off:** The positioning element is outside the programmed range but inside the total, non-programmed measuring length.

### High-precision digital SSI output

SSI (synchronous serial interface) is a 4 wire data communication standard commonly used in industry to transmit position data digitally. The conductors in the cable are shielded twisted pairs that enhance EMI/RFI protection. In addition to the clock and data wires, it also has separate power wiring.

Available for order second quarter 2010.

### Part number key



### Ordering information

The *Q-track* linear position sensors are available in different lengths from 100 to 1,000 mm, in increments of 100 mm. The sensors, mounting accessories and positioning elements are available individually or as a kit.



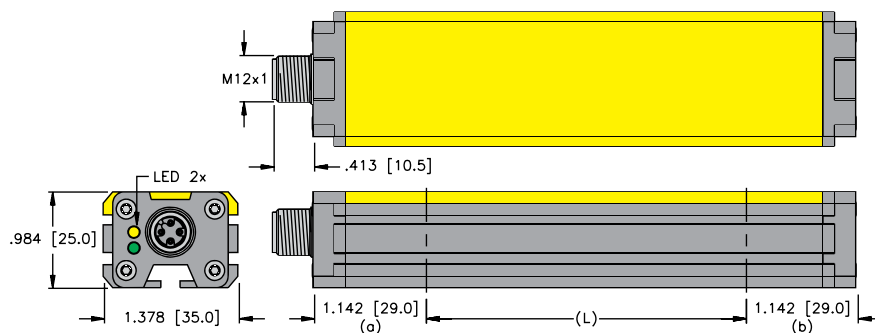
Assembly part number:  
Li100P2-Q25LM1-ESG25X3-H1181



# E-series with enhanced resolution and SSI interface

## Technical data

### Dimensions



Note: Right angle cable direction

### Measuring range specifications

|                      |                                                       |
|----------------------|-------------------------------------------------------|
| Measuring ranges (L) | 100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000 mm |
| Blind zone (a)       | 29 mm                                                 |
| Blind zone (b)       | 29 mm                                                 |

### System

|                        |                            |
|------------------------|----------------------------|
| Resolution             | 0.001 mm                   |
| Repeatability/accuracy | 10 $\mu$ m (0.01 mm)       |
| Linearity deviation    | $\leq 0.1$ % of full scale |
| Temperature drift      | $\leq \pm 0.0001$ %/K      |
| Ambient temperature    | -25 to + 70 °C             |
| Output update rate     | 1 ms                       |
| Speed                  | 50 m/s                     |

### Electrical data

|                                             |                               |
|---------------------------------------------|-------------------------------|
| Operating voltage                           | 15-30 VDC                     |
| Residual ripple                             | $\leq 10$ % $U_{pp}$          |
| Rated insulation voltage                    | $\leq 0.5$ kV                 |
| Short-circuit protection                    | yes                           |
| Wire breakage / reverse polarity protection | yes/yes (voltage supply)      |
| Output function                             | 8-wire, SSI, 25 bit Gray code |
| Current consumption                         | < 100 mA                      |

### Housing style

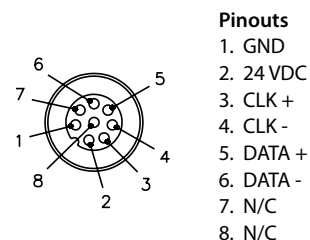
|                                       |                                               |
|---------------------------------------|-----------------------------------------------|
| Housing style                         | rectangular, Q25L                             |
| Dimensions                            | profile 35 x 25mm, L = measuring range + 58mm |
| Housing material                      | aluminum                                      |
| Material active face                  | plastic, PC-GF20                              |
| Connection                            | connector, M12 x 1                            |
| Vibration resistance                  | 55 Hz (1 mm)                                  |
| Shock resistance                      | 30 g (11 ms)                                  |
| Protection class (IEC 60529/EN 60529) | IP67                                          |

### LEDs

|                            |                                  |
|----------------------------|----------------------------------|
| Power indication           | green LED                        |
| Measuring range indication | green/yellow multifunctional LED |

### Wiring diagram

8-pin M12 *eurofast*® connection



Mating cordset: **E-RKC 8T-264-\***

# Q-track™ linear position sensors

## E-series with enhanced resolution, IO-Link compatible

**Q-track™**

### Product features

- Enhanced resolution of 16 bit
- Enhanced sample rate 1 kHz
- Improved linearity
- Two programmable outputs (analog output current or voltage, switching outputs, PWM) IO-Link compatible
- M12 *eurofast*® connector (5-pin)
- 29 mm blind zones
- Robust extruded aluminum housing
- Watertight (IP67) polycarbonate insert
- Multifunction LED

### Measuring range indicated via LED

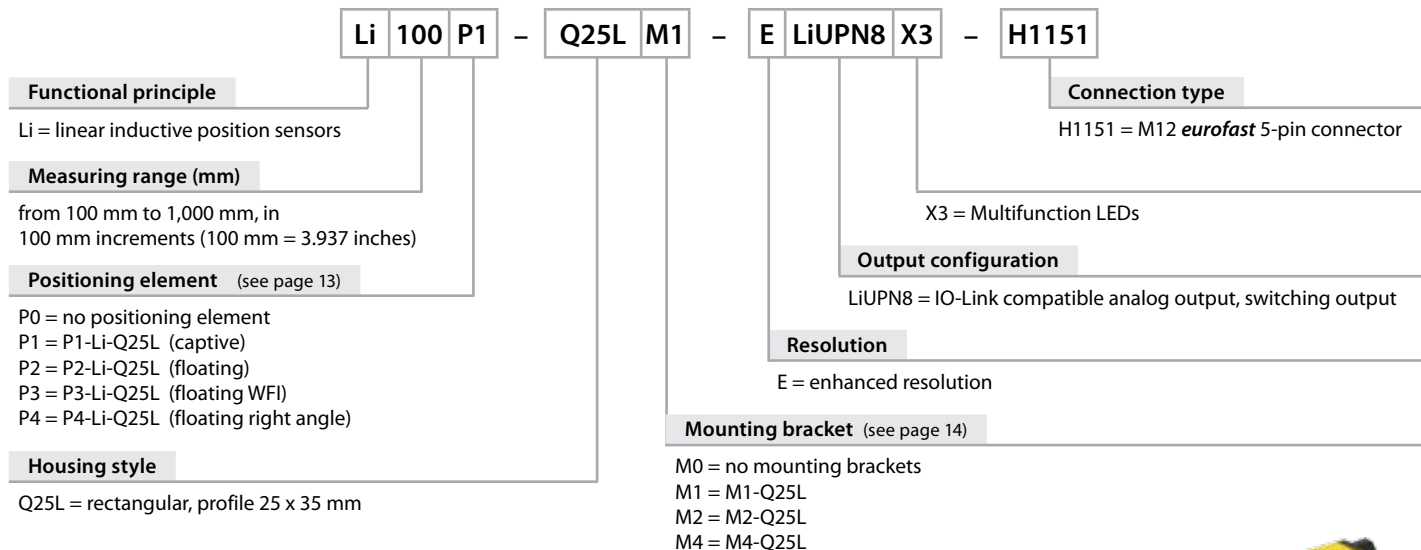
- **Green:** The positioning element is in the measuring range.
- **Green/yellow alternate flashing:** The positioning element is in the measuring range with a lower signal quality (i.e. distance too long).
- **Yellow flashing:** The positioning element is outside of the measuring range (max. range).
- **Off:** The positioning element is outside the programmed range but inside the total, non-programmed measuring length.

### Programming and IO-Link

Output functions, measuring ranges and alarm outputs are set via a teach adapter or programming line (pin 5). Alternatively, the sensor can also be operated in IO-Link mode. For this purpose, connect the sensor to an IO-Link compatible module. The established connection is indicated by a green flashing LED. For more information, please see the corresponding instruction manual.

Available for order second quarter 2010.

### Part number key



### Ordering information

The *Q-track* linear position sensors are available in different lengths from 100 to 1,000 mm, in increments of 100 mm. The sensors, mounting accessories and positioning elements are available individually or as a kit.

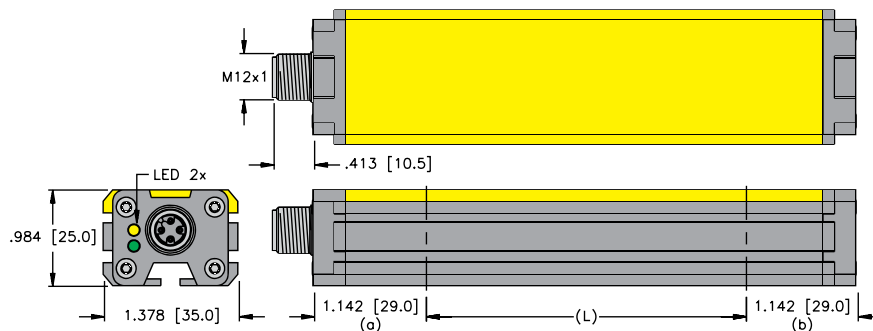


Assembly part number:  
Li300P1-Q25LM1-ELIUPN8X3-H1151

# E-series with enhanced resolution, IO-Link compatible

## Technical data

### Dimensions



Note: Right angle cable direction

### Measuring range specifications

|                      |                                                       |
|----------------------|-------------------------------------------------------|
| Measuring ranges (L) | 100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000 mm |
| Blind zone (a)       | 29 mm                                                 |
| Blind zone (b)       | 29 mm                                                 |

### System

|                        |                                                                       |
|------------------------|-----------------------------------------------------------------------|
| Resolution             | 16 bit (D/A converter and IO-Link)<br>(measuring range in mm / 65536) |
| Repeatability/accuracy | 0.0015 % (0.0015 mm per 100 mm)                                       |
| Linearity deviation    | ≤ 0.1 % of full scale                                                 |
| Temperature drift      | ≤ ± 0.001 % / K                                                       |
| Ambient temperature    | -25 to + 70 °C                                                        |
| Output update rate     | 1 ms                                                                  |
| Speed                  | 50 m/s                                                                |

### Electrical data

|                                             |                                                                                                             |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Operating voltage                           | 15-30 VDC                                                                                                   |
| Residual ripple                             | ≤ 10 % U <sub>pp</sub>                                                                                      |
| Rated insulation voltage                    | ≤ 0.5 kV                                                                                                    |
| Short-circuit protection                    | yes                                                                                                         |
| Wire breakage / reverse polarity protection | yes/yes (voltage supply)                                                                                    |
| Output function                             | two programmable outputs (analog output current or voltage, switching outputs, PWM, ...) IO-Link compatible |
| Current consumption                         | < 100 mA                                                                                                    |

### Housing style

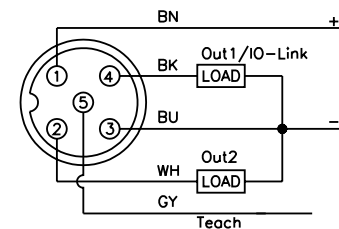
|                                       |                                                 |
|---------------------------------------|-------------------------------------------------|
| Housing style                         | rectangular, Q25L                               |
| Dimensions                            | profile 35 x 25 mm, L = measuring range + 58 mm |
| Housing material                      | aluminum                                        |
| Material active face                  | plastic, PC-GF20                                |
| Connection                            | connector, M12 x 1                              |
| Vibration resistance                  | 55 Hz (1 mm)                                    |
| Shock resistance                      | 30 g (11 ms)                                    |
| Protection class (IEC 60529/EN 60529) | IP67                                            |

### LEDs

|                            |                                  |
|----------------------------|----------------------------------|
| Power indication           | green LED                        |
| Measuring range indication | green/yellow multifunctional LED |

### Wiring diagram

5-pin M12 **eurofast**® connection



Mating cordset: **RK 4.5T-\*/S618**

### Sample configuration - I/O Link Master, *piconet*®

The following components are required to connect a linear position sensor through IO-Link to PROFIBUS®:

1 x I/O-Link Master, *piconet*®: **SDPX-10L4-0001**

1 x connection cable: **RK 4.5-2-RS 4.5T/S618**

# Accessories – Fieldbus connection

The *Q-track*™ linear position sensor with SSI interface is compatible with all fieldbus devices



| Part number                                       |                   | Description                                                                                                                                             |
|---------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BL20® – Distributed I/O, IP20 rated device</b> |                   |                                                                                                                                                         |
| Select one                                        | BL20-GW-EN-IP     | Gateway Ethernet/IP™                                                                                                                                    |
|                                                   | BL20-GW-DPV1      | Gateway PROFIBUS®-DP                                                                                                                                    |
|                                                   | BL20-GWBR-DNET    | Gateway DeviceNet™                                                                                                                                      |
|                                                   | BL20-GWBR-CANOPEN | Gateway CANopen                                                                                                                                         |
|                                                   | BL20-GW-EN        | Gateway Ethernet Modbus TCP                                                                                                                             |
|                                                   | BL20-PG-EN        | Gateway Ethernet Modbus TCP, programmable                                                                                                               |
|                                                   | BL20-GW-PG-EN     | Gateway Ethernet PROFINET® IO                                                                                                                           |
|                                                   | BL20-1SSI         | Communication module                                                                                                                                    |
|                                                   | BL20-S4T-SBBS     | Connection module, tension-spring connection                                                                                                            |
|                                                   | E-RKC-8T-264-2    | Connection cable M12, 8-pin, 2 m cable (end open) to connect <i>Q-track</i> ™ linear position sensors with SSI output to <i>BL20</i> fieldbus stations. |



|                                                   |                             |                                                                                                                                                                                                         |
|---------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BL67® – Distributed I/O, IP67 rated device</b> |                             |                                                                                                                                                                                                         |
| Select one                                        | BL67-GW-EN-IP               | Gateway Ethernet IP                                                                                                                                                                                     |
|                                                   | BL67-GW-DPV1                | Gateway PROFIBUS-DP                                                                                                                                                                                     |
|                                                   | BL67-PG-DP                  | Gateway PROFIBUS-DP, programmable                                                                                                                                                                       |
|                                                   | BL67-GW-DN                  | Gateway DeviceNet                                                                                                                                                                                       |
|                                                   | BL67-GW-CO                  | Gateway CANopen                                                                                                                                                                                         |
|                                                   | BL67-GW-EN                  | Gateway Ethernet Modbus TCP                                                                                                                                                                             |
|                                                   | BL67-PG-EN                  | Gateway Ethernet Modbus TCP, programmable                                                                                                                                                               |
|                                                   | BL67-GW-EN-PN               | Gateway Ethernet PROFINET IO                                                                                                                                                                            |
|                                                   | BL67-1SSI                   | Communication module                                                                                                                                                                                    |
|                                                   | BL67-B-1M12-8               | Connection module M12 <i>eurofast</i> ®, 8-pin                                                                                                                                                          |
|                                                   | BL67-B-1M23                 | Connection module M23 <i>multifast</i> ®, 12-pin                                                                                                                                                        |
|                                                   | E-RKC-8T-264-2-RSC-8T       | Connection cable M12 <i>eurofast</i> , 8-pin, 2 m to connect <i>Q-track</i> linear position sensors with SSI output to BL67 and <i>BL compact</i> fieldbus stations.                                    |
|                                                   | E-RKS-8T-264-1-CSWM12/S3085 | Connection cable M12 <i>eurofast</i> , 8-pin, on M23 <i>multifast</i> 12-pin, 1m to connect <i>Q-track</i> linear position sensors with SSI output to <i>BL67</i> and <i>piconet</i> fieldbus stations. |



|                                               |                       |                                                                                                                                                                             |
|-----------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BL compact – Robust, IP67 rated device</b> |                       |                                                                                                                                                                             |
|                                               | BLCEP-1M12MT-1SSI     | Ethernet IP, M12 <i>eurofast</i> , 8-pin                                                                                                                                    |
|                                               | E-RKC-8T-264-2-RSC-8T | Connection cable M12 <i>eurofast</i> , 8-pin, 2 m to connect <i>Q-track</i> linear position sensors with SSI output to <i>BL67</i> and <i>BL compact</i> fieldbus stations. |

## Sample configuration - BL67

The following components are required to connect a *Q-track* linear position sensor to a Ethernet IP system via a *BL67* station:

- 1 x Ethernet IP gateway: **BL67-PG-EN-IP**
- 1 x communication module: **BL67-1SSI**
- 1 x connection module: **BL67-B-1M12-8**
- 1 x connection cable: **E-RKC-8T-264-2-RSC 8T**



Ethernet Modbus TCP





## Part number

## Description

### Connection cable for standard series and E-series with analog output

RK 4.5T-2/S618

M12 *eurofast*®, 5-pin female, shielded, 2 meter cable with flying leads. Other lengths available upon request.

RK 4.5T-2-RS 4.5T  
(as shown)

M12 *eurofast*, 5-pin 2 meter extension cable with male and female connectors. To connect *Q-track*™ linear position sensors with analog output to **TB4**. Other lengths available upon request.

RKC 4.5T-2-RSS 4.5T

M12 *eurofast*, 5-pin 2 meter extension cable with male and female connectors. To connect *Q-track*™ linear position sensors with analog output to **TB4**. Other lengths available upon request. Shield connected to male coupling nut for use in high noise environments.



### Connection cable for E-series with SSI interface

E-RKC-8T-264-2

M12 *eurofast*, 8-pin female connector with 2 meter cable with flying leads. To connect *Q-track* linear position sensors with SSI output to **BL20**® fieldbus stations.

E-RKC-8T-264-2-RSC-8T

M12 *eurofast*, 8-pin female connector with 2 meter cable to M12 *eurofast*, 8-pin male connector. To connect *Q-track* linear position sensors with SSI output to **BL67**® and **BL compact** fieldbus stations.

E-RKS-8T-264-0.5-CSWM12/S3085  
(as shown)

M12 *eurofast*, 8-pin female connector with 0.5 meter cable to right angle M23 *multifast*®, 12-pin male connector. To connect *Q-track* linear position sensors with SSI output to **BL67** and fieldbus stations.



### Teach adapter

VB2-SP5

Teach adapter to program the measuring range of *Q-track* linear position sensors.



### Test box

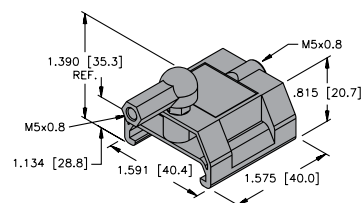
TB4

Test box for sensors with analog or switching output; batteries included. May also be used to program zero and span.

# Position elements



## Dimensions

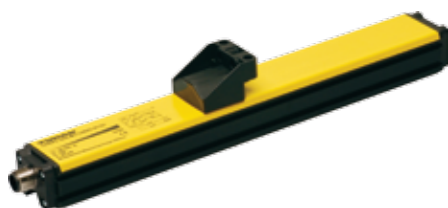


## Part number

P1-Li-Q25L

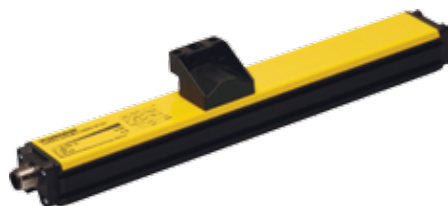
## Description

Captive positioning element; laterally inserted in sensor groove; incl. rod-end bearing to mount M5 threaded rods



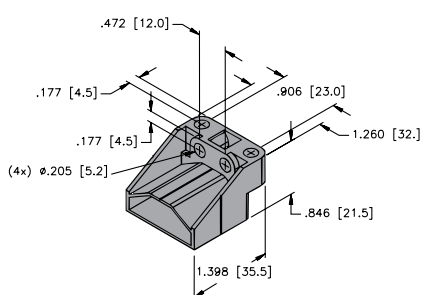
P5-Li-Q25L

Captive positioning element applied in extremely strong magnetic fields, such as welding areas; laterally inserted in sensor groove; incl. rod-end bearing to mount M5 threaded rods



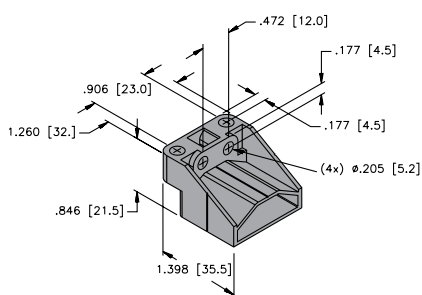
P2-Li-Q25L

Floating positioning element, operates at a distance of 0-4 mm to the sensor surface



P4-Li-Q25L

Floating positioning element, applied in extremely strong magnetic fields, such as welding areas; operates at a distance of 0-4 mm to the sensor surface



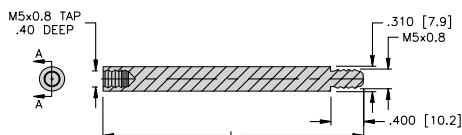
P3-Li-Q25L

Floating positioning element; right angle orientation; operates at a distance of 0-4 mm to the sensor surface



CA\*E-Q21

Control arm; Can be used with P1-Li-Q25L and RE-Q21 to connect the positioning element to an actuator.

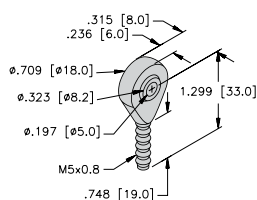


\* Length specified in inches. 3, 6 and 9 inches are standard lengths. Other lengths available, consult factory for part numbers and availability.



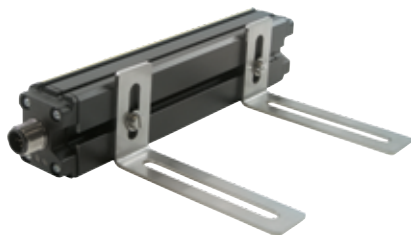
RE-Q21

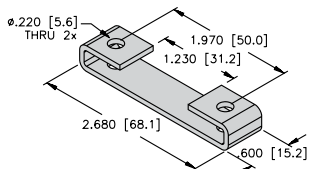
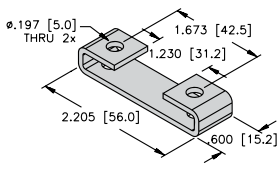
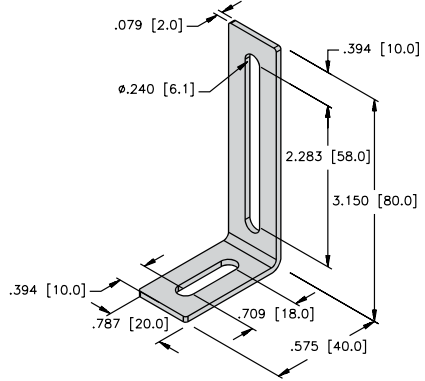
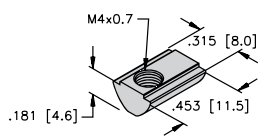
Rod End; Can be used with P1-Li-Q25L and CA\*E-Q21 to connect the positioning element to an actuator.



# Mounting accessories

A comprehensive range of accessories is available for mounting. Sliding blocks, the sensor groove and different brackets provide many mounting possibilities. Flexibility is guaranteed, as accessories are available for all borehole distances



| Dimensions                                                                           | Part number | Description                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | M1-Q25L     | Mounting foot for <i>Q-track</i> <sup>™</sup> linear position sensors;<br>Two mounting feet should be used for devices with a measuring range of up to 1,000 mm;<br>Material: stainless steel;<br>2 pcs. per bag.  |
|     | M2-Q25L     | Mounting foot for <i>Q-track</i> linear position sensors;<br>Two mounting feet should be used for devices with a measuring range of up to 1,000 mm;<br>Material: stainless steel;<br>2 pcs. per bag.               |
|  | M4-Q25L     | Mounting bracket for <i>Q-track</i> linear position sensors;<br>Two mounting feet should be used for devices with a measuring range of up to 1,000 mm;<br>Material: stainless steel;<br>2 pcs. per bag.            |
|   | MN-M4-Q25   | Sliding blocks with M4 thread for back side groove of <i>Q-track</i> linear position sensors;<br>Material: Brass;<br>10 pcs. per bag.<br><br>Only available separately, not as a kit with linear position sensors. |



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