

LINEAR POSITION TECHNOLOGY

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QR14 Miniature Series, Analog Output (U/I)



Measuring Range Specifications

Measuring span (A...B):	25 mm
Blind zone (a):	17 mm
Blind zone (b):	7.5 mm
Nominal distance:	1.5 mm

System

Resolution:	12 bit
Repeat accuracy:	≤ 0.025% of full scale
Linearity deviation:	≤ 1% of full scale
Temperature drift:	≤ ±0.01% / K
Ambient temperature:	-25 to +70 °C -40 to +70 °C (S97 version)

Electrical Data

Operating voltage:	15-30 VDC (LiU5) 8-30 VDC (LU4)
Residual ripple:	≤ 10% U _{pp}
No-load current:	≤ 50 mA
Isolation test voltage:	≤ 0.5 kV
Short-circuit protection:	yes
Wire breakage / reverse polarity protection:	yes/yes (supply voltage)
Output function:	analog output
Voltage output:	0-10 V (LiU5) 0.5-4.5 V (LU4)
Current output:	4-20 mA (LiU5)
Load resistance of voltage output:	≥ 4.7 kΩ
Load resistance of current output:	≤ 0.4 kΩ
Current consumption:	< 50 mA
Sampling rate:	700 Hz

Housing Style

Housing style:	rectangular, QR14
Dimensions:	53.5 x 49 x 14 mm
Housing material:	plastic, PBT-GF30-V0
Cable quality:	5.2 mm, LifYY, PVC (LiU5) 5.2 mm, Lif 32Y32Y, TPE (LU4)
Connection:	cable/cable with connector, M12 x 1
Vibration resistance:	55 Hz (1 mm)
Shock resistance:	30 g (11 ms)
Protection class (IEC 60529/EN 60529):	IP68/IP69K

LEDs

Power on indication:	green LED
Measuring range indication:	green/green flashing (multifunctional LEDs)

Miscellaneous

Included in delivery:	P1-Li-QR14/Q17L
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Product Features

- 12 bit resolution
- Current and voltage output in one device
- M12 Eurofast connector (4-pin)
- Cable, open end
- Extreme short blind zones
- Watertight (IP68/IP69K) fully potted polycarbonate housing

Measuring Range Indicated via LED

- **Green:** The positioning element is in the measuring range.
- **Green flashing:** The positioning element is in the measuring range with a lower signal quality (e.g., the distance between sensor and element is too large).
- **Off:** The positioning element is outside the programmed range.

QR14 Miniature Series, Analog Output (U/I)

Part Number Key: QR14 Series

A	B	C		D		E		F		G
LI	25	P1	-	QR14	-	LIU5X2	-	0.3-RS4	/	S97

A	Type
LI	Linear Inductive

B	Measuring Span
25	25 mm

C	Positioning Element, Floating
P1	P1-Li-QR14/Q17L*

*Operates at a distance of 0-4 mm from the sensor surface

D	Housing Style
QR14	Rectangular, 53.5 x 14 mm

E	Operating Voltage and Output Type
LU4X2	8-30 VDC, 0.5-4.5 V, 2 LEDs
LIU5X2	15-30 VDC, 4-20 mA, 0-10 V, 2 LEDs

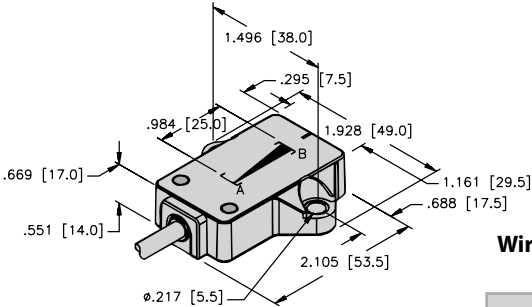
F	Type of Connection*
0.3-RS4 (Blank)	Cable (0.3 m PUR) w/ M12 Eurofast Connector Cable (2 m PUR)

*TPE cable for output type 'LU4X2'.

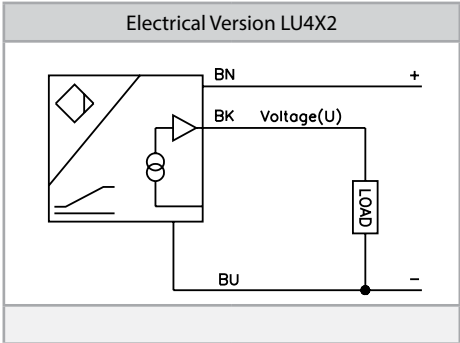
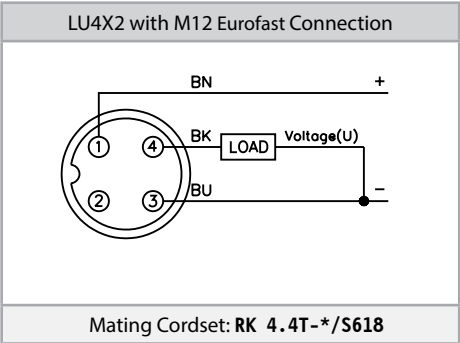
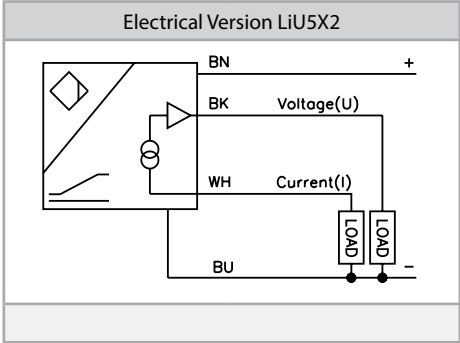
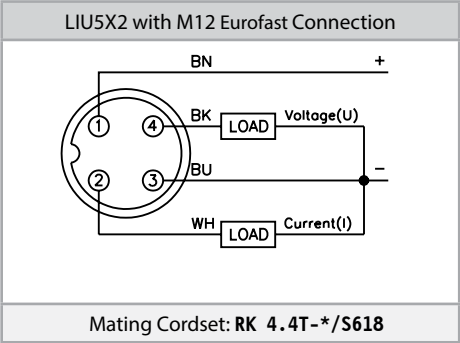
G	Specials (Optional)
S97	-40 to +70 °C Extended Temperature Range ¹⁾

¹⁾ Only available for output type 'LU4X2'.

Dimensions: QR14 Series



Wiring Diagram: QR14



See page H1, Connectivity, for cables and connectors.

We reserve the right to make technical alterations without prior notice.

Linear Position Technology



Q17L Compact Series, Analog Output (U/I)



Measuring Range Specifications

Max. measuring span:	50, 100, 150, 200, 300 mm
Blind zone (a):	22 mm
Blind zone (b):	9 mm (Li50 = 16 mm)
Nominal distance:	1.5 mm

System

Resolution:	12 bit
Repeat accuracy:	≤ 0.025% of full scale
Linearity deviation:	≤ 0.5% of full scale
Temperature drift:	≤ ±0.01 % / K
Ambient temperature:	-25 to +70 °C -40 to +70 °C (S97 version)

Electrical Data

Operating voltage:	15-30 VDC (LIU5) 8-30 VDC (LU4)
Residual ripple:	≤ 10% U _{pp}
No-load current:	≤ 50 mA
Isolation test voltage:	≤ 0.5 kV
Short-circuit protection:	yes
Wire breakage / reverse polarity protection:	yes/yes (supply voltage)
Output function:	4-wire, analog output
Voltage output:	0-10 V (LIU5) 0.5-4.5 V (LU4)
Current output:	4-20 mA (LIU5)
Load resistance of voltage output:	≥ 4.7 kΩ
Load resistance of current output:	≤ 0.4 kΩ
Current consumption:	< 50 mA
Sampling rate:	700 Hz

Housing Style

Housing style:	rectangular, Q17L
Dimensions:	20 x 16.5 mm, length L = measuring length + 32 mm, (Li50 + 38 mm)
Housing material:	plastic, PC-GF10
Cable quality:	5.2 mm, Li9YH-11YH, PUR (LIU5) 5.2 mm, Lif32Y32Y, TPE (LU4)
Connection:	cable/cable with connector, M12 x 1
Vibration resistance:	55 Hz (1 mm)
Shock resistance:	30 g (11 ms)
Protection class (IEC 60529/EN 60529):	IP67

Miscellaneous

Included in delivery:	P1-Li-QR14/Q17L (position element), M1.1-Q17L, M1.2-Q17L (mounting feet)
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Product Features

- 12 bit resolution
- Current and voltage output in one device
- M12 Eurofast connector (5-pin)
- Cable, open end
- Extreme short blind zones
- Programmable measuring range
- Watertight (IP67) fully potted polycarbonate housing

Measuring Range Indicated via LED

- **Green:** The positioning element is in the measuring range.
- **Green/flashing:** The positioning element is in the measuring range with a lower signal quality (e.g., the distance between sensor and element is too large).
- **Off:** The positioning element is outside the programmed range.

Setting the Measuring Range

The initial and final value of the measuring range is set at the push of a button, either via a teach adapter or programming line (pin 5). Furthermore, the output curve can be inverted.

- Factory setting (0 V/4 mA at the connector end): Jumper pin 5 and pin 1 for 10 sec.
- Factory setting inverted: Jumper pin 5 and pin 3 for 10 sec.
- Setting the initial value: Move positioning element to desired position and jumper pin 5 and pin 3 for 2 sec.
- Setting the final value: Move positioning element to desired position and jumper pin 5 and pin 1 for 2 sec.

Q17L Compact Series, Analog Output (U/I)

Part Number Key: Q17L Series

A	B	C		D	E		F		G		H
LI	50	P1	-	Q17L	M1	-	LU4X2	-	0.3M-RS5	/	S97

A	Type
LI	Linear Inductive

B	Measuring Span
50	50 mm
100	100 mm
150	150 mm
200	200 mm
300	300 mm

C	Positioning Element, Floating
P1	P1-Li-QR14/Q17L*
*Operates at a distance of 0-4 mm from the sensor surface	

D	Housing Style
Q17L	Rectangular, 16.5 x 20 mm

E	Mounting Bracket
M1	M1.1-Q17L and M1.2-Q17L

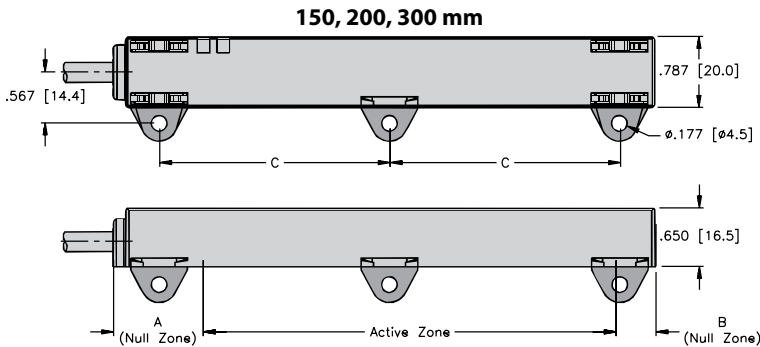
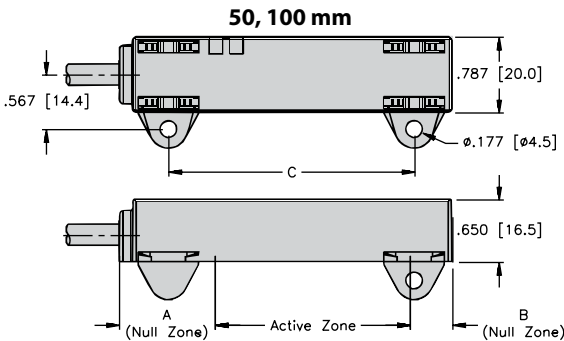
F	Operating Voltage and Output Type
LU4X2	8-30 VDC, 0.5-4.5 V, 2 LEDs
LIU5X2	15-30 VDC, 4-20 mA, 0-10 V, 2 LEDs

G	Type of Connection*
0.3M-RS5 (Blank)	Cable (0.3 m PUR) w/ M12 Eurofast Connector Cable (2 m PUR)

*TPE cable for output type 'LU4'.

H	Specials (Optional)
S97	-40 to +70 °C Extended Temperature Range ¹⁾
¹⁾ Only available for output type 'LU4'.	

Dimensions: Q17L Series



Wiring Diagram: Q17L

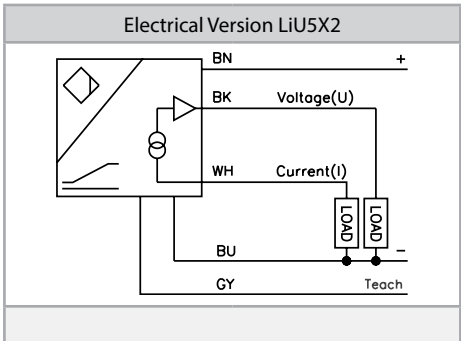
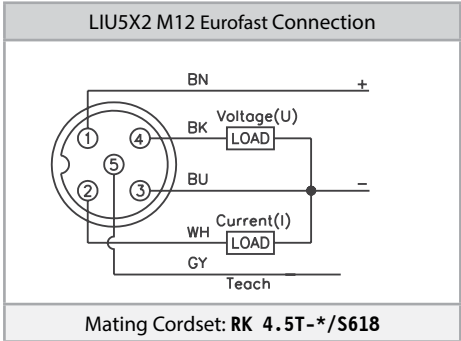


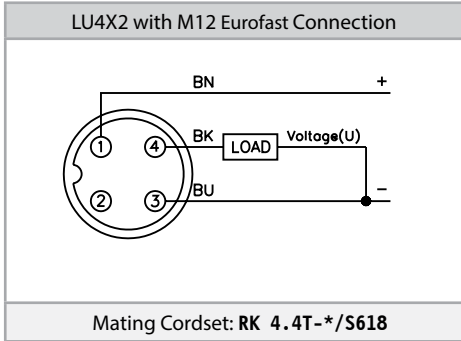
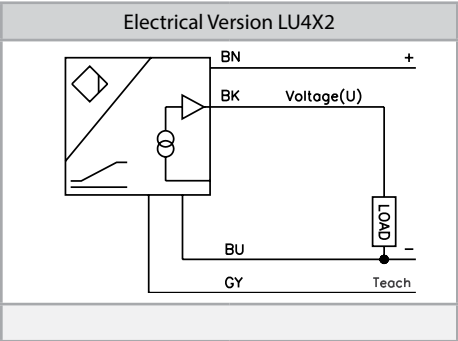
Table 1:

Measuring Range	Mounting Hole Dimensions (C)
50 mm	65 mm
100 mm	108 mm
150 mm	79 mm
200 mm	104 mm
300 mm	154 mm

See page H1, Connectivity, for cables and connectors.



* Length in meters.



E-Series with Enhanced Resolution, Analog Output (U/I)



Assembly part number:
Li200P1-Q25LM2-ELIU5X3-H1151

Measuring Range Specifications

Measuring span (L):	100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000 1250, 1500, 1750, 2000 mm
Blind zone (a):	29 mm
Blind zone (b):	29 mm
Nominal distance:	1.5 mm

System

Resolution:	16 bit (measuring range in mm/65536)
Repeatability:	≤ 0.02% of full scale
Linearity deviation:	≤ 0.1% of full scale (under the influence of shock and vibration)
Temperature drift:	≤ ±0.003 %/K
Ambient temperature:	-25 to +70 °C

Electrical Data

Operating voltage:	15-30 VDC
Residual ripple:	≤ 10% U _{pp}
No-load current:	≤ 50 mA
Isolation test voltage:	≤ 0.5 kV
Short-circuit protection:	yes
Wire breakage / reverse polarity protection:	yes/yes (supply voltage)
Output function:	5-wire, analog output
Voltage output:	0-10 V
Current output:	4-20 mA
Diagnostic:	output signal 24 mA or 11 V (positioning element not within detection range)
Load resistance of voltage output:	≥ 4.7 kΩ
Load resistance of current output:	≤ 0.4 kΩ
Current consumption:	< 100 mA
Sample rate:	5000 Hz

Housing Style

Housing style:	rectangular, Q25L
Dimensions:	profile 35 x 25 mm, L = measuring range + 58 mm
Housing material:	aluminum
Material active face:	plastic, PA6-GF30
Connection:	connector, M12 x 1
Vibration resistance (EN 60068-2-6):	20 g; 1.25 h/axis; 3 axis
Shock resistance (EN 60068-2-27):	200 g; 4 ms 1/2 sine
Protection class (IEC 60529/EN 60529):	IP67, IP66

LEDs

Power indication:	green LED
Measuring range indication:	green/yellow multifunctional LED

Product Features

- 16 bit resolution
- Current and voltage output in one device (5-wire, 15-30 VDC)
- M12 Eurofast connector (5-pin)
- 29 mm blind zones
- Programmable measuring range
- Captive and floating (0-4 mm from sensing face) position elements available
- Robust extruded aluminum housing
- Watertight (IP67) polycarbonate insert
- Multifunction LED

Measuring Range Indicated via LED

- **Green:** The positioning element is in the measuring range.
- **Yellow:** The positioning element is in the measuring range with a lower signal quality (e.g., the distance between sensor and element is too large).
- **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.

Setting the Measuring Range

The initial and final value of the measuring range is set at the push of a button, either via a teach adapter or programming line (pin 5). Furthermore, the output curve can be inverted.

- Factory setting (0 V/4 mA at the connector end): Jumper pin 5 and pin 1 for 10 sec.
- Factory setting inverted: Jumper pin 5 and pin 3 for 10 sec.
- Setting the initial value: Move positioning element to desired position and jumper pin 5 and pin 3 for 2 sec.
- Setting the final value: Move positioning element to desired position and jumper pin 5 and pin 1 for 2 sec.

Optional

- Teach lock/unlock: Jumper pin 5 and pin 1 for 30 sec. After 30 sec. the flashing changes to fast flashing. The teach lock is recommended in situations where it is necessary to prevent alterations of parameters.

E-Series with Enhanced Resolution, Analog Output (U/I)

Part Number Key: E-Series

A	B	C		D	E		F		G
LI	100	P0	-	Q25L	M0	-	ELIU5X3	-	H1151

A	Type
LI	Linear Inductive

B	Measuring Span
100	100 mm
200	200 mm
300	300 mm
400	400 mm
500	500 mm
600	600 mm
700	700 mm
800	800 mm
900	900 mm
1000	1000 mm
1250	1250 mm
1500	1500 mm
1750	1750 mm
2000	2000 mm

C	Positioning Element
P0	No Positioning Element
P1	P1-Li-Q25L (Captive)
P2	P2-Li-Q25L (Floating)*
P3	P3-Li-Q25L (Floating, Right Angle)*

*Operates at a distance of 0-4 mm from the sensor surface

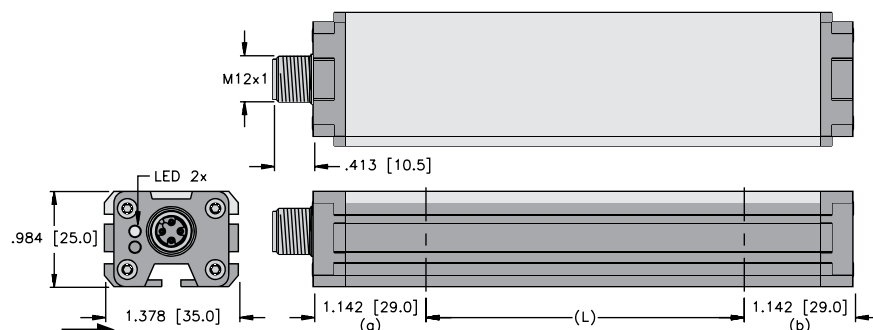
D	Housing Style
Q25L	Rectangle, 25 x 35 mm

E	Mounting Bracket
M0	No Mounting Brackets
M1	M1-Q25L
M2	M2-Q25L
M3	M3-Q25L

F	Operating Voltage and Output Type
ELIU5X3	15-30 VDC, 4-20 mA, 0-10 V, 3 LEDs

G	Type of Connection
H1151	5-pin M12 Eurofast Connector

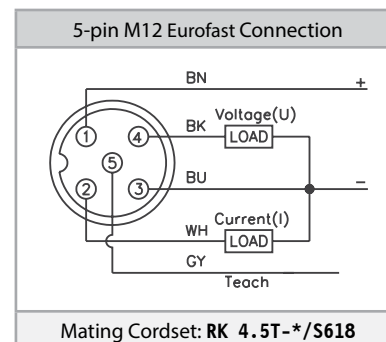
Dimensions: E-Series



Ordering Information

The Q-track linear position sensors are available in different lengths from 100 to 2,000 mm, in increments of 100 mm. The sensors, mounting accessories, and positioning elements are available individually or as a kit.

Wiring Diagram: E-Series



Mating Cordset: **RK 4.5T-*/S618**

* Length in meters.

See page H1, Connectivity, for cables and connectors.

HE-Series with Enhanced Resolution and SSI Interface



Assembly part number:

Li100P2-Q25LM1-HES625X3-H1181

Measuring Range Specifications

Measuring span (L):	100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000 mm
Blind zone (a):	29 mm
Blind zone (b):	29 mm
Nominal distance:	1.5 mm

System

Resolution:	0.001 mm
Repeatability:	10 µm (0.01 mm)
Linearity deviation:	≤ 0.1% of full scale
Temperature drift:	≤ ±0.0001 % / K
Ambient temperature:	-25 to +70 °C

Electrical Data

Operating voltage:	15-30 VDC
Residual ripple:	≤ 10% U _{pp}
Isolation test voltage:	≤ 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
Process data area:	bit 0.... bit 19
Diagnostic bits:	bit 21: Positioning element left the measuring range and is outside the detectable area bit 22: Positioning element is in the measuring range, lower signal quality (e.g., distance is too large) bit 23: Positioning element is outside the measuring range) bit 24: Synchronous operation active
Current consumption:	< 50 mA
Sample rate:	5 kHz

Housing Style

Housing style:	rectangular, Q25L
Dimensions:	profile 35 x 25 mm, L = measuring range + 58 mm
Housing material:	aluminum
Material active face:	plastic, PA6-GF30
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

Product Features

- Enhanced resolution (up to 20 bit) depending on sensor length
- Enhanced sample rate of 5 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.
- **Yellow:** The positioning element is in the measuring range with a lower signal quality (e.g., the distance between sensor and element is too large).
- **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.

HE-Series with Enhanced Resolution and SSI Interface

Part Number Key: HE-Series / SSI

A	B	C		D	E		G		H
LI	100	P0	-	Q25L	M0	-	HESG25X3	-	H1181

A	Type
LI	Linear Inductive

B	Measuring Span
100	100 mm
200	200 mm
300	300 mm
400	400 mm
500	500 mm
600	600 mm
700	700 mm
800	800 mm
900	900 mm
1000	1000 mm

C	Positioning Element
P0	No Positioning Element
P1	P1-Li-Q25L (Captive)
P2	P2-Li-Q25L (Floating)*
P3	P3-Li-Q25L (Floating, Right Angle)*

*Operates at a distance of 0-4 mm from the sensor surface

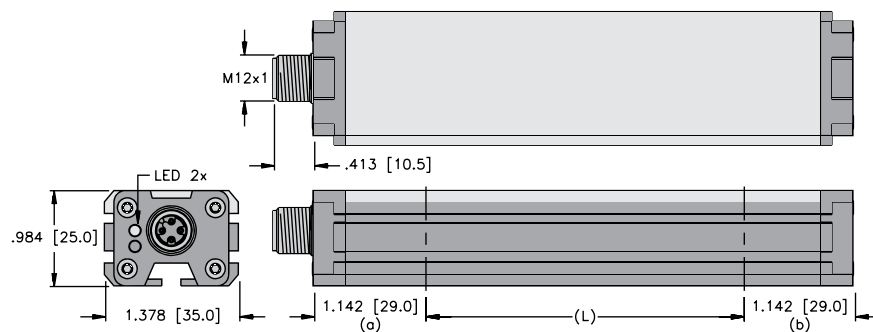
D	Housing Style
Q25L	Rectangular, 25 x 35 mm

E	Mounting Bracket
M0	No Mounting Brackets
M1	M1-Q25L
M2	M2-Q25L
M3	M3-Q25L

G	Operating Voltage and Output Type
HESG25X3	15-30 VDC, SSI, Gray Code, 25 bit, 3 LEDs

H	Type of Connection
H1181	8-pin M12 Eurofast Connector

Dimensions: HE-Series / SSI

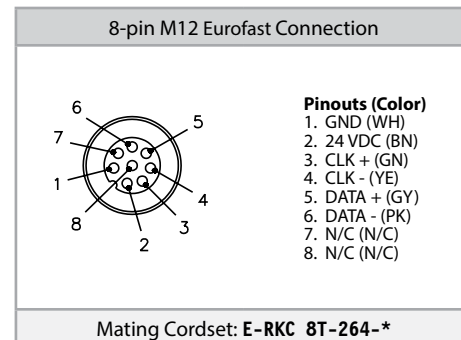


Note: Right angle cable direction

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.

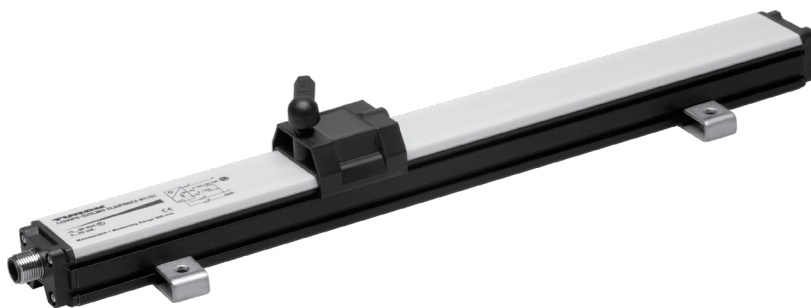
Wiring Diagram: E-Series / SSI



* Length in meters.

See page H1, Connectivity, for cables and connectors.

E-Series with Enhanced Resolution, IO-Link Compatible



Assembly part number:
Li300P1-Q25LM1-ELIUPN8X3-H1151

Measuring Range Specifications

Measuring span (L):	100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000 mm
Blind zone (a):	29 mm
Blind zone (b):	29 mm
Nominal distance:	1.5 mm

System

Resolution:	16 bit (D/A converter and IO-Link) measuring range in mm / 65536)
Repeatability:	0.0015% (0.0015 mm per 100 mm)
Linearity deviation:	≤ 0.035% of full scale
Temperature drift:	≤ ±0.003 % / K
Ambient temperature:	-25 to +70 °C

Electrical Data

Operating voltage:	15-30 VDC
Residual ripple:	≤ 10% U _{pp}
Isolation test 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 Factory setting: 0-10 V on pin 2, PNP switching output on pin 4. Changes to settings via IO-Link only.
Load resistance of voltage output:	≥ 4.7 kΩ
Load resistance of current output:	≤ 0.4 kΩ
Current consumption:	< 50 mA
Sample rate:	1000 Hz

Housing Style

Housing style:	rectangular, Q25L
Dimensions:	profile 35 x 25 mm, L = measuring range + 58 mm
Housing material:	aluminum
Material active face:	plastic, PA6-GF30
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

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.
- **Yellow:** The positioning element is in the measuring range with a lower signal quality (e.g., the distance between sensor and element is too large).
- **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.

E-Series with Enhanced Resolution, IO-Link Compatible

Part Number Key: E-Series / IO-Link

A	B	C		D	E		G		H
LI	100	P0	-	Q25L	M0	-	ELIUPN8X3	-	H1151

A	Type
LI	Linear Inductive

B	Measuring Span
100	100 mm
200	200 mm
300	300 mm
400	400 mm
500	500 mm
600	600 mm
700	700 mm
800	800 mm
900	900 mm
1000	1000 mm

C	Positioning Element
P0	No Positioning Element
P1	P1-Li-Q25L (Captive)
P2	P2-Li-Q25L (Floating)*
P3	P3-Li-Q25L (Floating, Right Angle)*

*Operates at a distance of 0-4 mm from the sensor surface

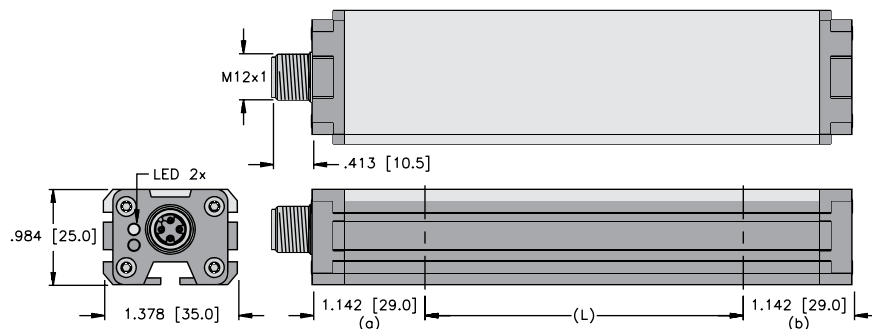
D	Housing Style
Q25L	Rectangular, 25 x 35 mm

E	Mounting Bracket
M0	No Mounting Brackets
M1	M1-Q25L
M2	M2-Q25L
M3	M3-Q25L

G	Operating Voltage and Output Type
ELIUPN8X3	15-30 VDC, IO-Link Configurable, 3 LEDs

H	Type of Connection
H1151	5-pin M12 Eurofast Connector

Dimensions: E-Series / IO-Link



Note: Right angle cable direction

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.

Sample Networked Communication: IO-Link Master

The following components can be used to connect a linear position sensor through IO-Link to any Turck supported network protocol:

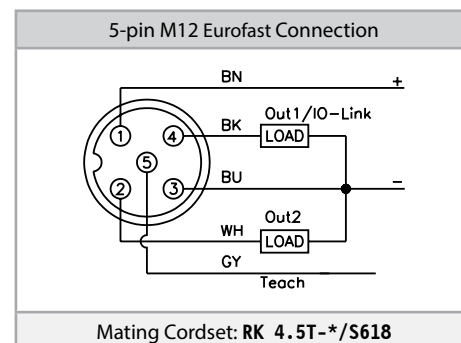
	BL20	BL67	TBEN	BLC
1 x IO-Link Master	BL20-E-4IOL	BL67-4IOL	TBEN-*.IOL	BLCEN-*.4IOL-*
1 x BL67 Base	N/A	BL67-B-4M12	N/A	N/A
1 x Connection Cable	RK 4.4T-*	RK 4.4T-*.RS 4.4T	RK 4.4T-*.RS 4.4T	RK 4.4T-*.RS 4.4T

Sample Configuration: IO-Link Master

The following components can be used for parameterization of a linear sensor through IO-Link:

1 x IO-Link Master	USB-2-IOL-0002
1 x Connection Cable	RK 4.5T-*.RS 4.5T

Wiring Diagram: E-Series / IO-Link



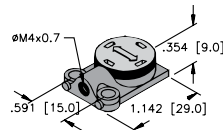
Mating Cordset: RK 4.5T-*/S618

* Length in meters.

See page H1, Connectivity, for cables and connectors.

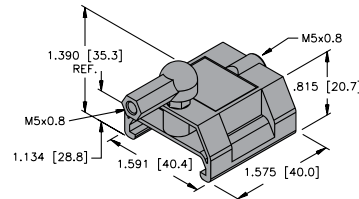


Q-track Accessories – Position Elements



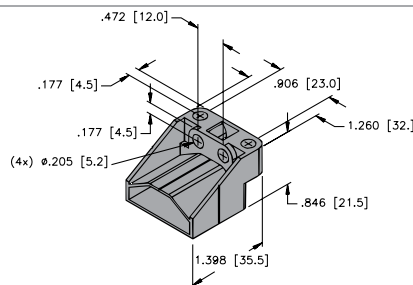
P1-Li-QR14/Q17L

Floating position element for LI-QR14 and LI-Q17L linear position sensors; transverse and longitudinal mounting possible; Nominal distance to the sensor is 1.5 mm; pairing with the linear sensor at a distance of up to 3 mm or misalignment tolerance of up to 3 mm.



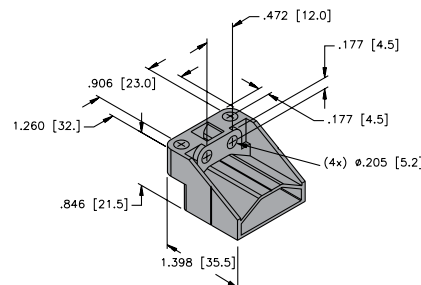
P1-Li-Q25L

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



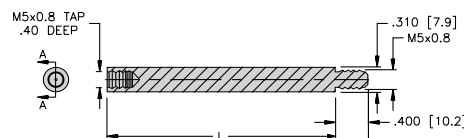
P2-Li-Q25L

Floating position element for LI-Q25L linear position sensors; Nominal distance to the sensor is 1.5 mm; pairing with the linear sensor at a distance of up to 5 mm or misalignment tolerance of up to 4 mm.



P3-Li-Q25L

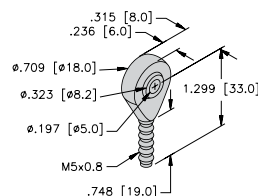
Floating position element for LI-Q25L linear position sensors; operational at an offset of 90°; Nominal distance to the sensor is 1.5 mm; pairing with the linear sensor at a distance of up to 5 mm or misalignment tolerance of up to 4 mm.



CA*E-Q21

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

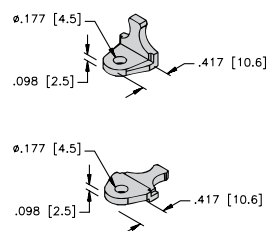
* Length specified in inches.
3, 6 and 9 inches are standard lengths.
Other lengths available, consult factory for part numbers and availability.



RE-Q21

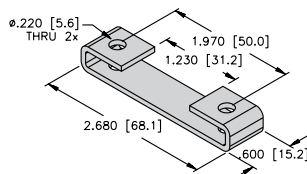
Rod End; Can be used with P1-Li-Q25L and CA*E-Q21 to connect the positioning element to an actuator.

Q-track Accessories – Mounting Accessories



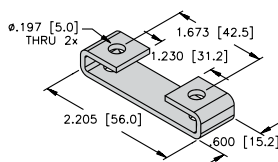
M1.1-Q17L (right angle) (3 pcs per bag)
M1.2-Q17L (straight) (3 pcs per bag)

Mounting feet for inductive linear position sensor Q17L. Each sensor is delivered with a sufficient quantity of M1.1-Q17L and M1.2-Q17L for mounting.



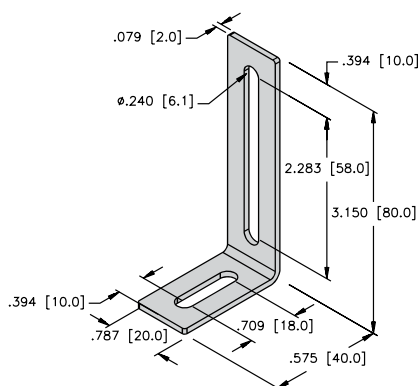
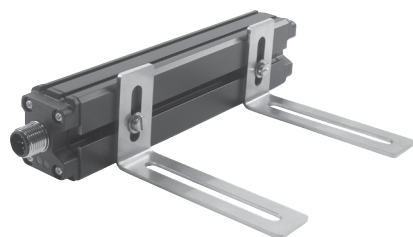
M1-Q25L

Mounting foot for LI-Q25L linear position sensors; Two mounting feet should be used for devices with a measuring range of up to 1,000 mm; Material: stainless steel; 2 pcs. per bag.



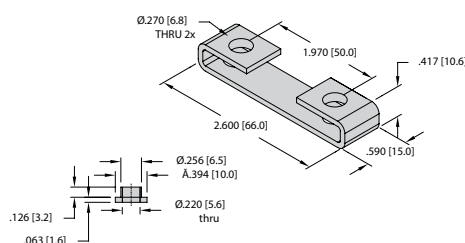
M2-Q25L

Mounting foot for LI-Q25L linear position sensors; Two mounting feet should be used for devices with a measuring range of up to 1,000 mm; Material: stainless steel; 2 pcs. per bag.



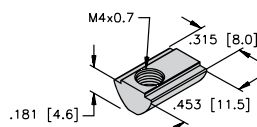
M4-Q25L

Mounting bracket for LI-Q25L linear position sensors; Two mounting feet should be used for devices with a measuring range of up to 1,000 mm; Material: stainless steel; 2 pcs. per bag.



M5-Q25L

Mounting foot for LI-Q25L linear position sensors; Two mounting feet should be used for devices with a measuring range of up to 1,000 mm; Includes isolation sleeves; Material: anodized aluminum, nylon; 2 sets per bag.

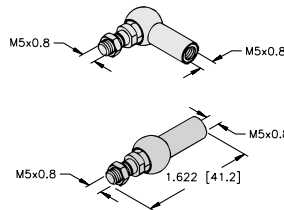


MN-M4-Q25

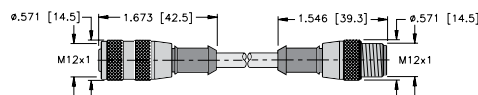
Sliding blocks with M4 thread for back side groove of LI-Q25L linear position sensors; Material: Brass; 10 pcs. per bag.

Only available separately, not as a kit with linear position sensors.

Q-track Accessories



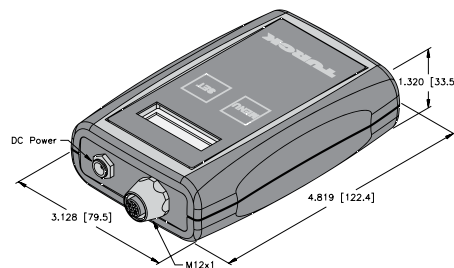
RBVA-M5
Angle joint for M5 thread, stainless steel



ABVA-M5
Axial joint for M5 thread, stainless steel

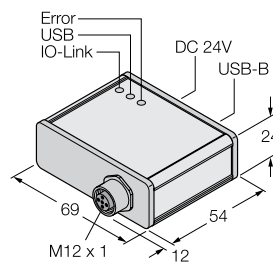
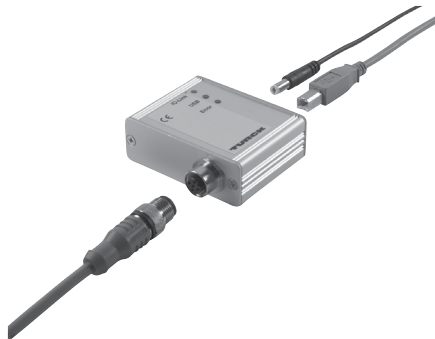
RK 4.5T-*-RS 4.4T/S3107 Cable
To convert existing wiring from EZ-track installation with current output to Q-track current output.

RK 4.5T-*-RS 4.4T/S3108 Cable
To convert existing wiring from EZ-track installation with voltage output to Q-track voltage output.



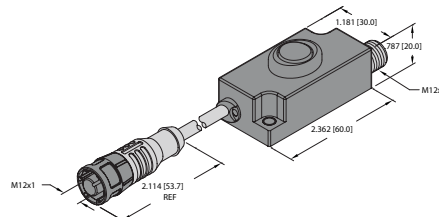
TB4 V.2
Analog test box for sensors with analog or switching outputs, incl. batteries.

USB-2-IOL-0002
IO-Link master with integrated USB interface for parameterization of IO-Link compliant linear position sensors via PC.



We reserve the right to make technical alterations without prior notice.

TX1-Q20L60
Teach adapter to program measuring range of inductive position sensors.



Analog Profile Series



EZ-track LDT's 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.

Enhanced Resolution Analog Profile Series (Q21R/Q35R) Specifications:

Output:	<u>Current:</u> 20 to 4 mA 4 to 20 mA	<u>Voltage:</u> 0 to 10 V 10 to 0 V	<u>Differential:</u> 0 to 10 V 4 to 20 mA
Load impedance:	$\leq (\text{voltage in } -4) \div 0.02 \text{ A}$ (example: $10 \text{ VDC} \leq 300 \Omega$)		
Q21R span:	4 to 180 in		
Q35R span:	5 to 36 in		
Repeatability:	+/-0.006% of full span or +/-0.002 in, whichever is greater		
Resolution:	0.001 in internal (For span lengths < 65 in); 16 bit (For lengths > 65 in)		
Non-linearity:	+/-0.05% of stroke		
Operating temperature:	-4 to +158 °F (-20 to +70 °C)		
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:	$\leq 50 \text{ in}$ 1 ms $51 \text{ to } 100 \text{ in}$ 2 ms $101 \text{ to } 150 \text{ in}$ 3 ms $151 \text{ to } 180 \text{ in}$ 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 Yellow = Magnet is out of the active programmed range, but still within the active stroke area		
Protection rating:	Electronics: IP67, IP68 optional Rod housing: IP65		
Agency approval:	CE		

Standard Resolution Analog Profile Series (Q21/Q35) Specifications:

Output:	<u>Current:</u> 20 to 4 mA 4 to 20 mA	<u>Voltage:</u> +5 to -5 V 0 to +10 V -5 to +5 V +10 to 0 V 0 to +5 V -10 to +10 V +5 to 0 V +10 to -10 V
Load impedance:	$\leq (\text{voltage in } -4) \div 0.02 \text{ A}$ (example: $10 \text{ VDC} \leq 300 \Omega$)	
Q21 span:	4 to 180 in	
Q35 span:	5 to 36 in	
Repeatability:	+/-0.01% of full span 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	
Non-linearity:	+/-0.05% of stroke or +/-0.028 whichever is greater	
Accuracy:	+/-0.1% of stroke or +/-0.050 whichever is greater	
Operating temperature:	-40 to +158 °F (-40 to +70 °C)	
Null zone:	3.00 in	
Dead zone:	1.50 in	
Operating voltage:	10-30 VDC	
Current consumption:	100 mA (maximum)	
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 stroke area	
Protection rating:	Electronics: IP67, IP68 optional Rod housing: IP65	
Agency approval:	CE, FM Class I, Div 2	

Low Profile Extrusion Housing:

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

Diagnostic LED:

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 flashes to indicate it is in AGC mode (Q21 and Q35 series). This feature simplifies programming and troubleshooting, effectively reducing setup and maintenance time.

Various Analog Outputs

Available Profile Style:

The Q21 and Q35 series may be ordered in a variety of outputs.

Although sensors may be ordered with any of the above outputs, the units may 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 utilizes a Lock-Euro-G.

Analog Profile Series

Part Number Key: Analog Profile Series

A	B	C		D	E		F	G	H		I		J
LT	40	E	-	Q21	R	-	LI	0	X3	-	H1151	/	S1661

A	Type
LT	Linear Transducer

B	Measuring Span
*	Length of Measuring Span

C	Housing
E	Inches

D	Housing Height
Q21	21 mm
Q35	35 mm

E	Resolution
(Blank)	Standard Resolution
R	Enhanced Resolution

F	Output Configuration
LI	Current
LU	Voltage
LD	Differential ¹⁾

G	Output Type		
	Current	Voltage	Differential
0	4-20 mA	0 to 10 V	0 to 10 V ³⁾
1	20-4 mA	10 to 0 V	4 - 20 mA ³⁾
2		-10 to 10 V ²⁾	
3		10 to -10 V ²⁾	
4		0 to 5 V ²⁾	
5		5 to 0 V ²⁾	
6		-5 to 5 V ²⁾	
7		5 to -5 V ²⁾	

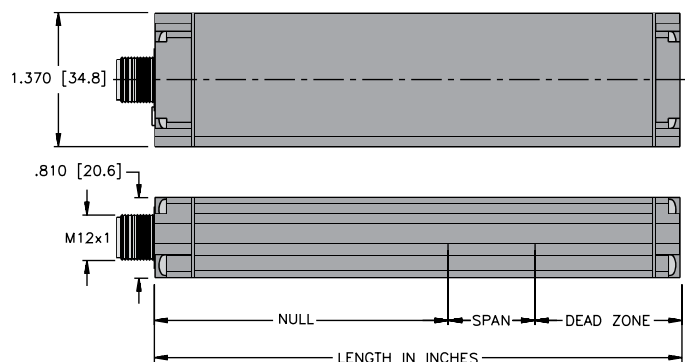
H	Number of LEDs
X3	3 Diagnostic LEDs

I	Type of Connection
H1141	4-pin M12 Eurofast Connector ²⁾
H1151	5-pin M12 Eurofast Connector ³⁾

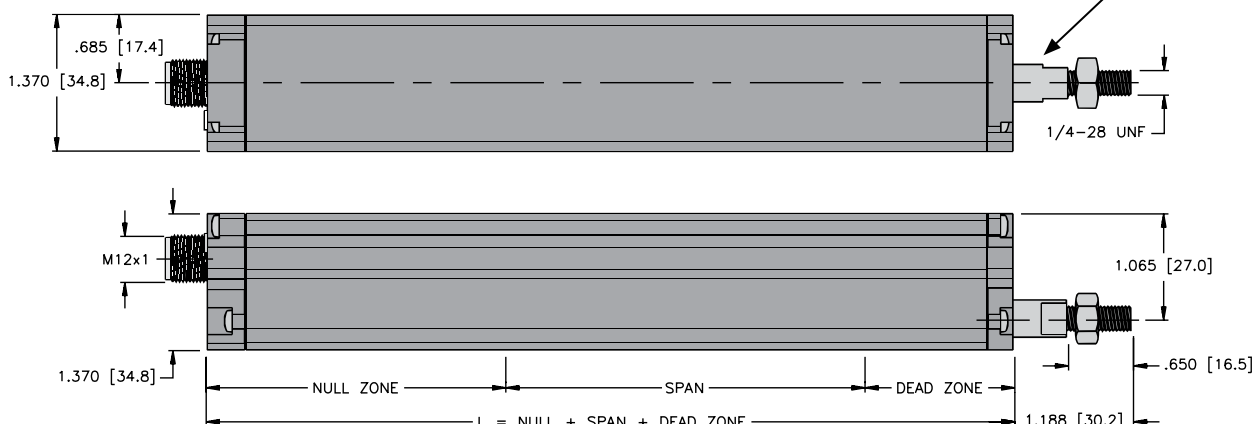
J	Specials
(Blank)	IP67
S1661	IP68

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

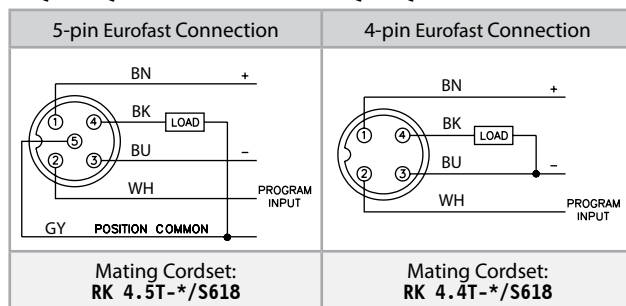
Dimensions: Q21 Analog Profile Series



Dimensions: Q35 Analog Profile Series



Wiring Diagrams: Q21R/Q35R



* Length in meters.

Note: Self contained piston with magnet permanently attached



Quadrature Profile Series



Direct Quadrature Output:

Directly interface to the PLC input card and reduce installation time, vendors and cost. 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, and output directly from the transducer to the controller. The quadrature output makes it possible to directly 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 may be set by the user at any position along the active system. The A, B and Z channels are differential outputs: 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 often found in single ended connections.

Quadrature Profile Series (Q21-DQ/Q35-DQ) Specifications:

Output:	Quadrature, A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$	
Span:	5 to 180 in (Q35 maximum span is 36 in)	
Repeatability:	+/-0.006% of full span	
Resolution:	0.001 in internal (1000 pulses per in)	
Operating temperature:	-4 to +158 °F (-20 to +70 °C)	
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:	≤ 40 in	1 ms
	≤ 41 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, Volt = Vin-1 Volt
Output frequency:	10 kHz - 1 MHz	
Nonlinearity:	+/-0.05% of full span	
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	
Protection rating:	Electronics: IP67, IP68 optional Rod housing: IP65	
Agency approval:	CE	

Incremental Output, Absolute Functionality:

The Q21-DQ allows you to use an incremental 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 span. 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.

Transducer Inputs:

The burst and zero inputs are single ended connections: 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 may 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).

Replace Incremental Output Devices:

The Q21-DQ may be used in certain applications to replace incremental rotary and linear encoders. The quadrature output may 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 does not change with magnet velocity. Therefore, velocity cannot 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 B32-B37 or consult factory.

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 1 MHz) 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 may 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.

Quadrature Profile Series

Part Number Key: Quadrature Profile Series

A	B	C		D		E	F	G	H	I	J		K
LT	40	E	-	Q21	-	DQ	R	A	N	N	X2	-	H11121

A	Type
LT	Linear Transducer

B	Measuring Span
*	Length of Measuring Span

C	Units of Measurement
E	Inches

D	Housing Height
Q21	21 mm
Q35	35 mm

E	Resolution
DQ	Quadrature

F	Output Configuration
L	10-30 VDC, Line Driver
R	13.5 - 30 VDC, RS422 Line Driver (TTL Compatible)

G	Quadrature Cycle Frequency
A	10 kHz
B	25 kHz
C	50 kHz
D	75 kHz
E	100 kHz
F	150 kHz
G	250 kHz
H	500 kHz
I	1000 kHz

H	Zero Offset Storage
N	Nonvolatile (100,000 storage cycles max)
V	Volatile

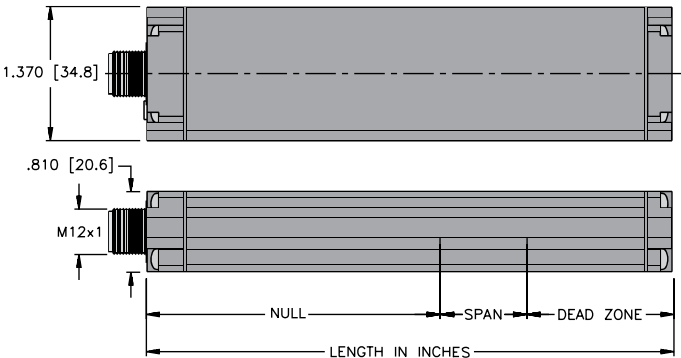
I	Input Type
N	Sinking (Typically used with Sourcing Outputs)
P	Sourcing (Typically used with Sinking Outputs)
T	TTL Level

J	Number of LED's
X2	2 Diagnostic LEDs

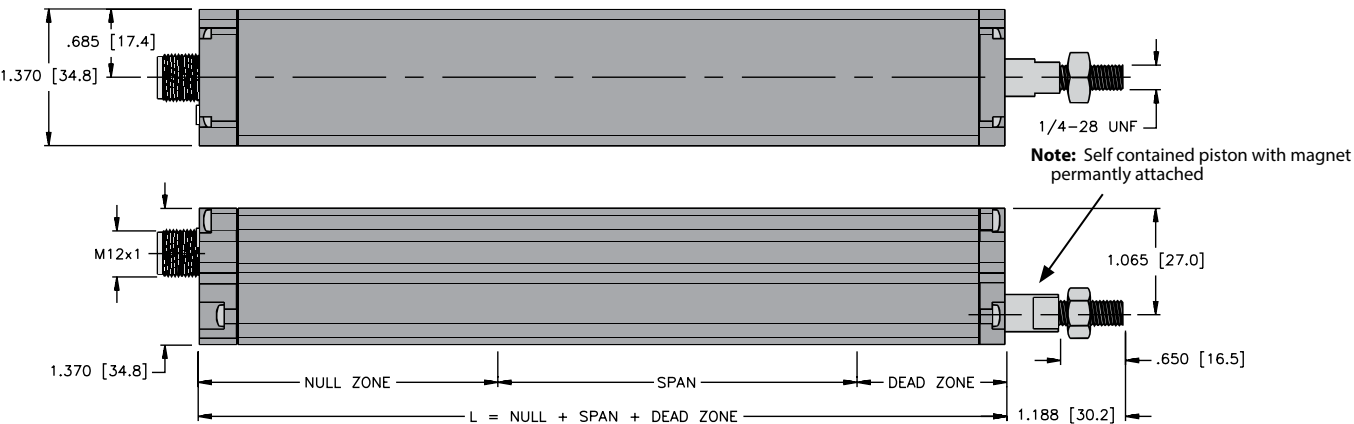
K	Type of Connection
H11121	12-pin M12 Eurofast Connector

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

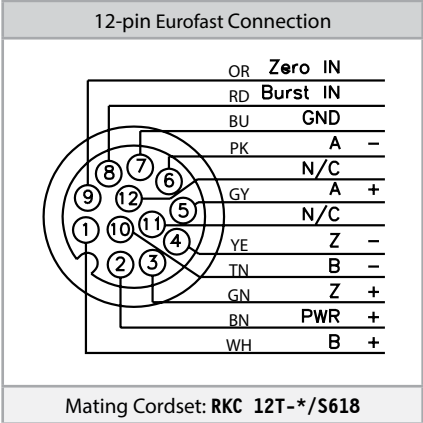
Dimensions: Q21-DQ Quadrature Profile Series



Dimensions: Q35-DQ Quadrature Profile Series



Wiring Diagram: Q21-DQ/ Q35-DQ



* Length in meters.



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 specified in the table below. 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.

Digital Profile Series (Q21D/Q35D) Specifications:

Output:	Start/Stop Pulse: External interrogation; Variable Pulse: Internal or External interrogation
Number of recirculation:	Variable Pulse: 001 (standard) to 127
Span:	5 to 180 in (Q35 maximum span is 36 in)
Repeatability:	+/-0.006% of full span
Hysteresis:	+/-0.02% of full span
Operating temperature:	-4 to +158 °F (-20 to +70 °C)
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 40 g
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 null zone, dead zone or lost Yellow = no interrogation signal detected
Protection rating:	Electronics: IP67, IP68 optional Rod housing: IP65
Agency approval:	CE

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 1 ms 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.

Variable Pulse (VP):

The Variable Pulse signal interface digital output is a pulse width modulated signal (RS-422). The Q21D LDT can be ordered with either an 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.

We reserve the right to make technical alterations without prior notice.

Linear Position Technology



Digital Profile Series

Part Number Key: Digital Profile Series

A	B	C		D		E		F		G		H		I
LT	40	E	-	Q21D	-	VPI	-	001	-	X3	-	H1161	/	S1661

A	Type
LT	Linear Transducer

B	Measuring Span
*	Length of Measuring Span

C	Units of Measurement
E	Inches

D	Housing Height
Q21D	21 mm
Q35D	35 mm

E	Output Mode
CP	RS422, Control Pulse
RS	RS422, Start/Stop Pulse
VPE	Variable Pulse External Interrogations
VPI	Variable Pulse Internal Interrogations

F	Number of Recirculations ¹⁾
*	001 (Standard) to 127
¹⁾ Only Available with Output Mode 'VPI' or 'VPE'. Otherwise (Blank)	

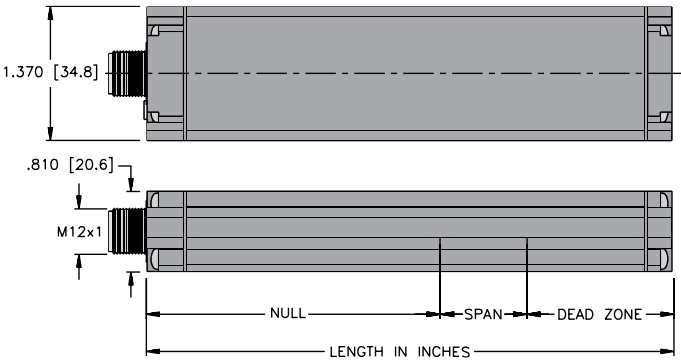
G	Number of LEDs
X3	3 Diagnostic LED's

H	Type of Connection
H1161	6-pin M12 Eurofast Connector

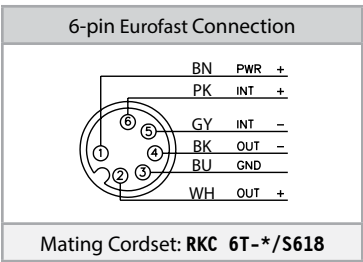
I	Specials
(Blank)	IP67
S1661	IP68

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

Dimensions: Q21D Digital Profile Series

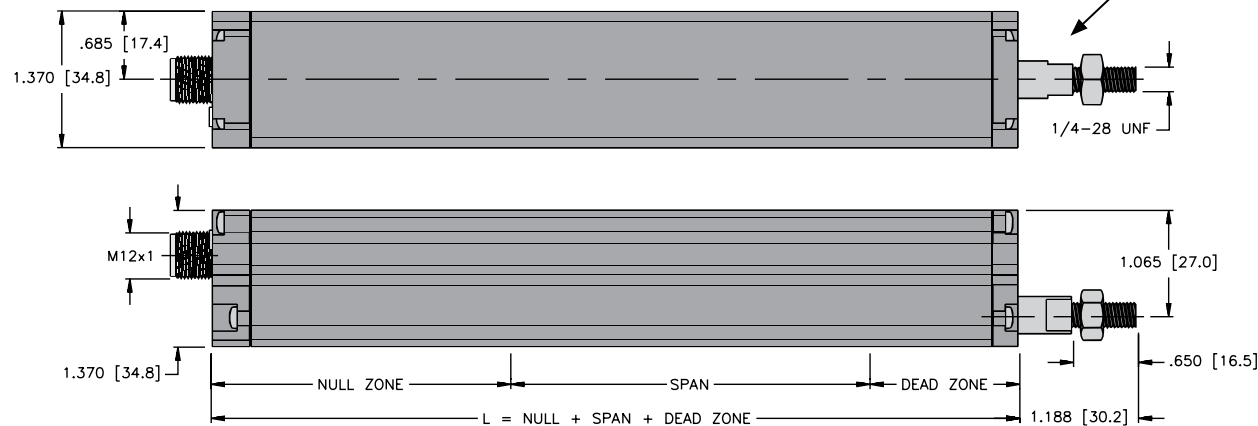


Wiring Diagram: Q21D/Q35D



* Length in meters.

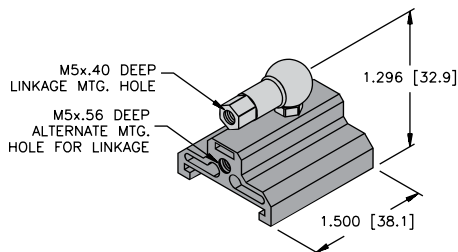
Dimensions: Q35D Digital Profile Series



Profile Series Accessories

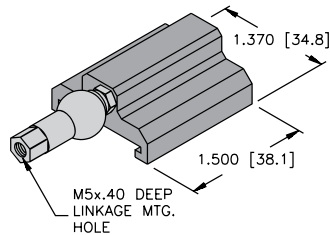
Slide Magnet

SM-Q21



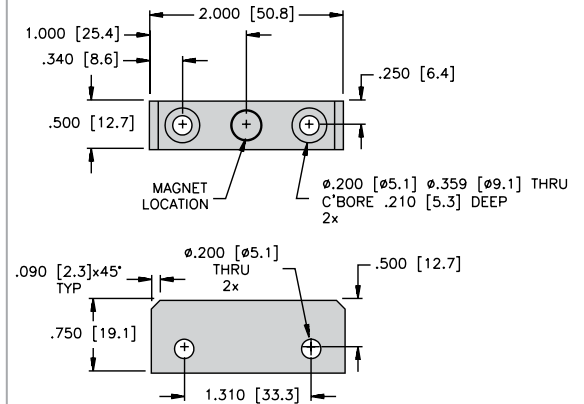
Slide Magnet with Side Adapter

SA-Q21



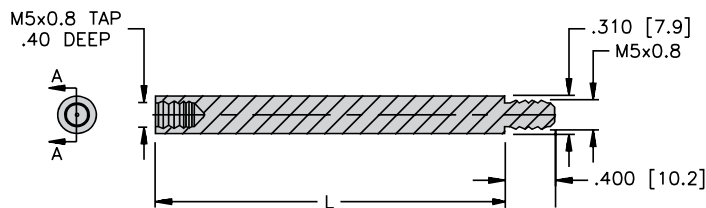
Floating Magnet

FM-Q21



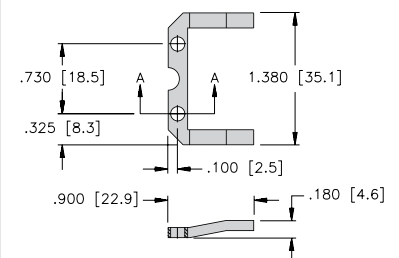
Control Arms

CA*E-Q21



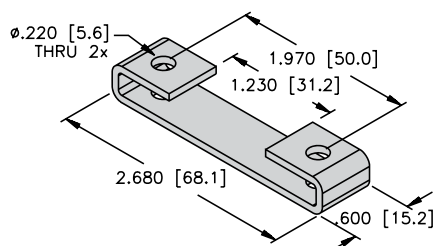
Q21 Upside Down Brackets

UB-Q21 (2/bag)



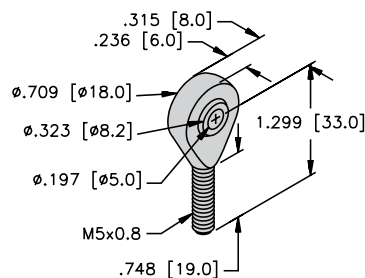
Q21 Mounting Brackets

MB-Q21



Rod Ends

RE-Q21



RBVA-M5

Angle Joint for M5 Thread, Stainless Steel



ABVA-M5

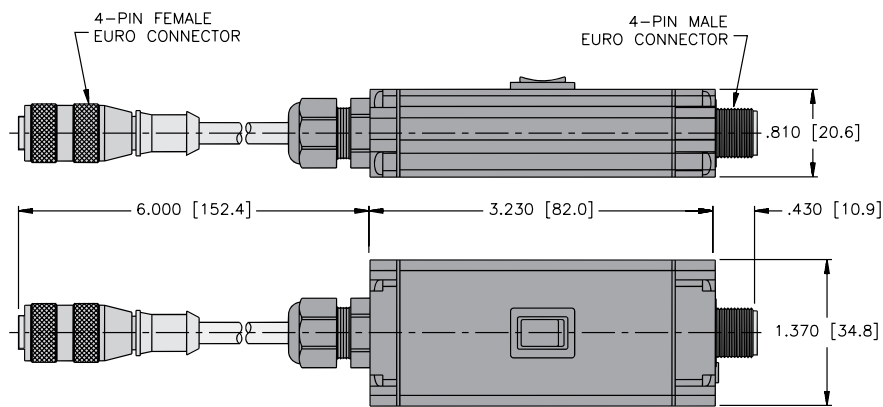
Angle Joint for M5 Thread, Stainless Steel



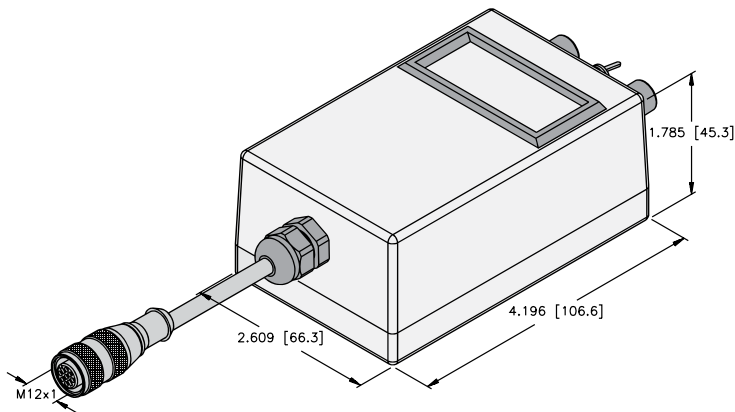
* Length in inches.

Profile Series Accessories

Rocker Programmer
RP-Q21



Test and Programming Device
TB2-LDT (voltage)
TB2-LDT-LI (current)

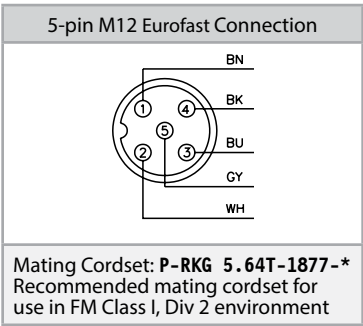


Lock-Euro-G

Required for use with a Q21 to maintain FM approval in a Class I, Div 2 environment



Wiring Diagram



Rod Style Series



Rugged Rod Style Housings:

Transducers designed to survive in harsh industrial environments to 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 found in lumber mills, steel mills and stamping plants. They have been lab tested and field proven to withstand 2000 g of shock and 30 g of random vibration without false signals or mechanical damage.

an aluminum housing with O-ring seals for an IP67 environmental rating.

Although R10 sensors can be ordered with any of the outputs below, 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 span at all times and cannot be any closer than 2.5 inches to each other.

In addition, the **R10's** electronics are enclosed in

Rod Style Series (R10) Specifications:

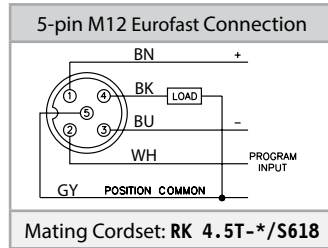
	LT Analog	LTX Analog	LTX Digital	LTX SSI
Output:	4-20 mA, 20-4 mA, 0-10 VDC, 10-0 VDC	0-10 VDC, 10-0 VDC, -10 to 10 VDC, 10 to -10 VDC, 0-5 VDC, 5-0 VDC, -5 to 5 VDC, 5 to -5 VDC, 4-20 mA, 20-4 mA	RS422 Start/Stop, Variable Pulse: Internal or External interrogation	24, 25 or 26 bit, Binary or Gray Code
Span ¹⁾ :	2-168 in	1-300 in	1-300 in	1-300 in
Repeatability:	+/-0.006% of full span or +/-0.002 in, whichever is greater	Equal to resolution	Equal to resolution of controller	Equal to output resolution
Resolution:	0.001 in / 16 bit	0.00006 in / 16 bit	Controller dependent	English: 0.00005 in, 0.0001 in, 0.0005 in, 0.001 in Metric: 1, 5, 10, 20 micron
Operating temperature:	Head (Electronics): -40 to +158 °F (-40 to +70 °C) Guide Tube: -40 to +221 °F (-40 to +105 °C)	Head (Electronics): -40 to +185 °F (-40 to +85 °C) Guide Tube: -40 to +221 °F (-40 to +105 °C)	Head (Electronics): -40 to +185 °F (-40 to +85 °C) Guide Tube: -40 to +221 °F (-40 to +105 °C)	Head (Electronics): -40 to +185 °F (-40 to +85 °C) Guide Tube: -40 to +221 °F (-40 to +105 °C)
Storage temp.	-40 to +185 °F (-40 to +85 °C)	-40 to +221 °F (-40 to +105 °C)	-40 to +221 °F (-40 to +105 °C)	-40 to +221 °F (-40 to +105 °C)
Null zone:	2.00 in	2.00 in	2.00 in	2.00 in
Dead zone:	2.50 in	2.50 in	2.50 in	2.50 in
Operating pressure:	5,000 PSI operating, 10,000 PSI spike	5,000 PSI operating, 10,000 PSI spike	5,000 PSI operating, 10,000 PSI spike	5,000 PSI operating, 10,000 PSI spike
Operating voltage:	13.5-30 VDC	7-30 VDC	7-30 VDC	7-30 VDC
Current consumption:	3 watts maximum, 200 mA at 15 VDC	1 watt at 1 ms interrogation time with no recirculations. Power consumption increases as interrogation times and recirculations increase. 40 mA at 24 VDC typical	1 watt at 1 ms interrogation time with no recirculations. Power consumption increases as interrogation times and recirculations increase. 40 mA at 24 VDC typical	1.3 watt at 1 ms interrogation time. Power consumption increases as interrogation times increase. 40 mA at 24 VDC typical
Response time:	1 ms (span length 1-50 in) 2 ms (span length 51-100 in) 3 ms (span length 101-150 in) 4 ms (span length 151-168 in)	0.5 mms (L ≤ 2") 1 ms (2" < L ≤ 12") 2 ms (12" < L ≤ 30") 3 ms (30" < L ≤ 50") 4 ms (50" < L ≤ 100") 5 ms (100" < L ≤ 150") 6 ms (150" < L ≤ 180") 7 ms (180" < L ≤ 250") 8 ms (250" < L ≤ 300")	Controller Dependent	4.0 K measurements/sec. (span length 1-12 in) 2.4 K measurements/sec. (span length 13-30 in) 2.0 K measurements/sec. (span length 31-40 in) 1.1 K measurements/sec. (span length 41-80 in) 0.5 K measurements/sec. (span length 81-197 in)
Shock:	2000 g	1000 g	1000 g	1000 g
Vibration:	30 g	30 g	30 g	30 g
Hysteresis:	+/-0.02% of full span	0.001 in	0.001 in	0.001 in
Non-linearity:	+/-0.05% of full span	< 0.01% or +/-0.005 in, whichever is greater	< 0.01% or +/-0.005 in, whichever is greater	< 0.01% or +/-0.005 in, whichever is greater
Rod end / Mounting hex:	316 stainless steel, 0.405 in (10.29 mm) outer dia.	316 stainless steel, 0.405 in (10.29 mm) outer dia.	316 stainless steel, 0.405 in (10.29 mm) outer dia.	316 stainless steel, 0.405 in (10.29 mm) outer dia.
LED:	N/A	Tri-color diagnostic	Tri-color diagnostic	Tri-color diagnostic
Protection rating:	IP67	IP68	IP68	IP68
Agency approval:	CE	CE	CE	CE

¹⁾ Span available in 0.1" increments

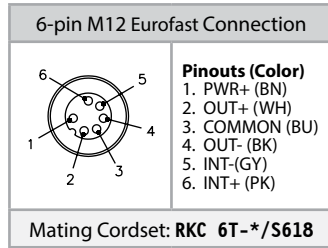
Rod Style Series

Wiring Diagrams:

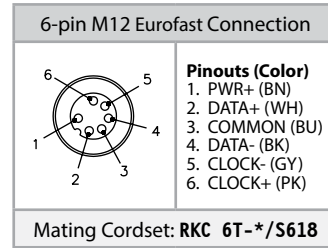
LT and LTX Analog



LTX Digital



LTX SSI



Part Number Key: Analog R10 Rod Style Series

A	B	C		D		E	F		G
LT	12	E	-	R10	-	LI	0	-	H1151

A	Type
LT	Linear Transducer

B	Measuring Span
*	Length of Measuring Span

C	Units of Measurement
E	Inches

D	Housing Size, Material
R10	10 mm Rod, Aluminum
ER10	10 mm Rod, Stainless Steel

E	Output Configuration
LI	Current
LU	Voltage
LD	Differential

F	Output Type		
	Current	Voltage	Differential
0	4-20 mA	0 to 10 V	0 to 10 V
1	20-4 mA	10 to 0 V	4-20 mA
4		0 to 5 V	
5		5 to 0 V	

G	Type of Connection
H1151	5-pin M12 Eurofast Connector

Part Number Key: LTX Analog R10 Rod Style Series

A	B	C		D		E	F	G		H
LTX	12	E	-	R10	-	LI	0	X3	-	H1151

A	Type
LTX	Linear Transducer

B	Measuring Span
*	Length of Measuring Span

C	Units of Measurement
E	Inches ¹⁾
M	Millimeters ¹⁾

¹⁾ This selection also determines thread type (see LTX drawing on page B26)

D	Housing Size, Material
R10	10 mm Rod, Aluminum
ER10	10 mm Rod, Stainless Steel

E	Output Configuration
LI	Current
LU	Voltage

F	Output Type	
	Current	Voltage
0	4-20 mA	0 to 10 V
1	20-4 mA	10 to 0 V
2		-10 to 10 V
3		10 to -10 V
4		0 to 5 V
5		5 to 0 V
6		-5 to 5 V
7		5 to -5 V

G	Number of LEDs
X3	3 Diagnostic LEDs

H	Type of Connection
H1151	5-pin M12 Eurofast Connector

Rod Style Series

Part Number Key: Digital R10 Rod Style Series

A	B	C		D		E		F		G		H
LTX	12	E	-	R10	-	VPI	-	001	-	X3	-	H1161

A	Type
LTX	Linear Transducer

B	Measuring Span
*	Length of Measuring Span

C	Units of Measurement
E	Inches ¹⁾
M	Millimeters ¹⁾

¹⁾ This selection also determines thread type (see LTX drawing on page B26)

D	Housing Size, Material
R10	10 mm Rod, Aluminum
ER10	10 mm Rod, Stainless Steel

E	Output Mode
RS	RS422, Start/Stop Pulse
VPE	Variable Pulse External Interrogations
VPI	Variable Pulse Internal Interrogations

F	Number of Recirculations ²⁾
*	001 (Standard) to 225

²⁾ Only Available with Output Mode 'VPI' or 'VPE'. Otherwise (Blank)

G	Number of LEDs
X3	3 Diagnostic LEDs

H	Type of Connection
H1161	6-pin M12 Eurofast Connector

Part Number Key: SSI R10 Rod Style Series

A	B	C		D		E		F		G	H	I	J		K		L		M
LTX	12	E	-	R10	-	SSI	-	1	-	B	S	F	B	-	X3	-	A	-	H1161

A	Type
LTX	Linear Transducer

B	Measuring Span
*	Length of Measuring Span

C	Units of Measurement
E	Inches ¹⁾
M	Millimeters ¹⁾

¹⁾ This selection also determines thread type (see LTX drawing on page B26)

D	Housing Size, Material
R10	10 mm Rod, Aluminum
ER10	10 mm Rod, Stainless Steel

E	Data Mode
SSI	Synchronous Serial Interface

F	Data Length
1	24 bit
2	25 bit
3	26 bit

G	Data Format
B	Binary Code
G	Gray Code

H	Data Type
A	Asynchronous
S	Synchronous

I	Direction
F	Forward
R	Reverse
V	Velocity

J	Resolution
1	0.005 mm
2	0.01 mm
3	0.05 mm
4	0.1 mm
5	0.02 mm
6	0.002 mm
7	0.001 mm
8	0.00005"
9	0.0001"
A	0.0005"
B	0.001"

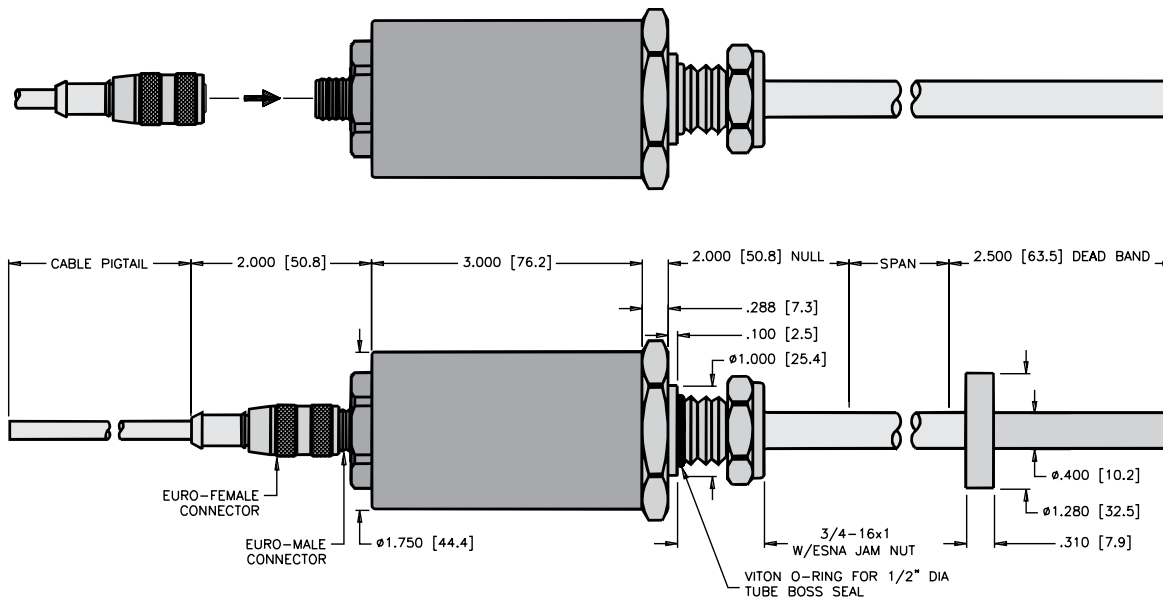
K	Number of LEDs
X3	3 Diagnostic LEDs

L	Option
(Blank)	None
A	Alarm

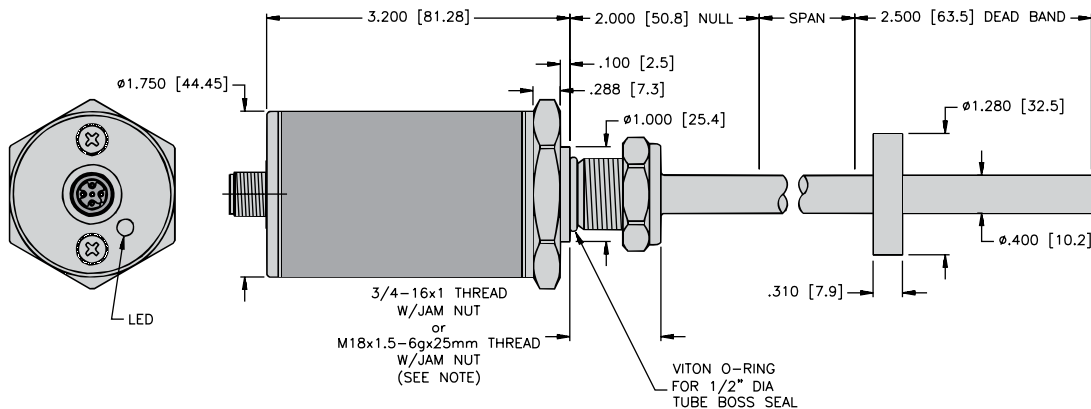
M	Type of Connection
H1161	6-pin M12 Eurofast Connector

Rod Style Series

Dimensions: Rod Style Series LT

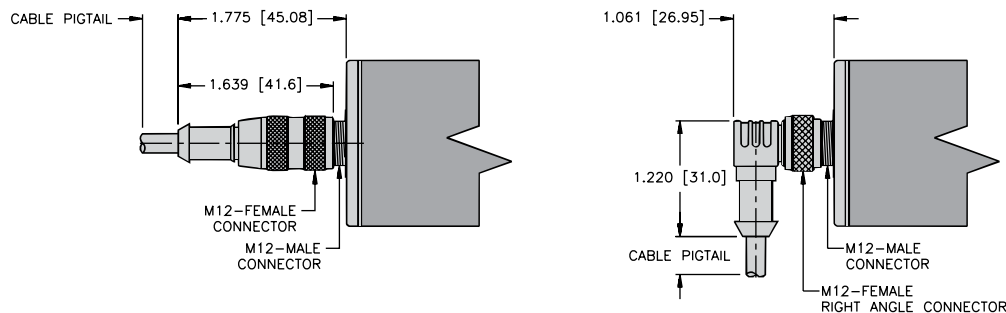


Dimensions: Rod Style Series LTX



NOTE: UNLESS OTHERWISE SPECIFIED

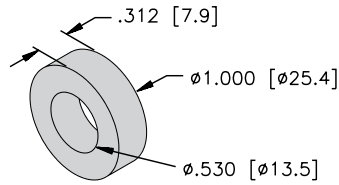
FOR ENGLISH THREAD TYPE, RAISED FACE FEATURE COMPLIES WITH SAE J1926-1.



Rod Style Series Accessories

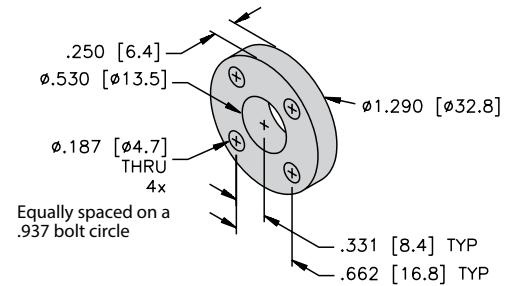
1" Diameter Cylinder Magnet

CM-R10



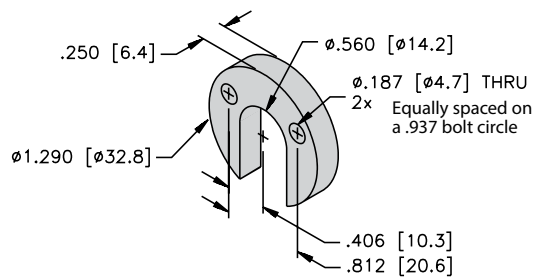
Standard Magnet Spacer

STS-R10



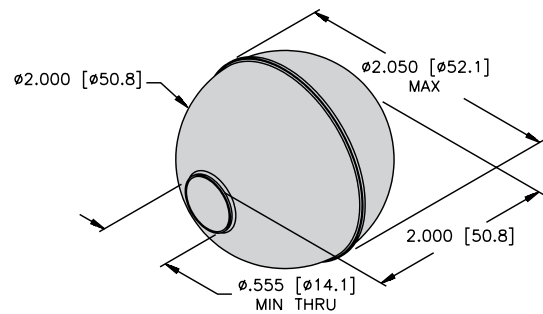
Split Magnet Spacer

SPS-R10



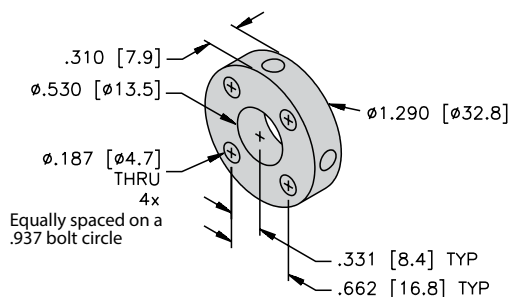
Egg Shape Float

EF-R10



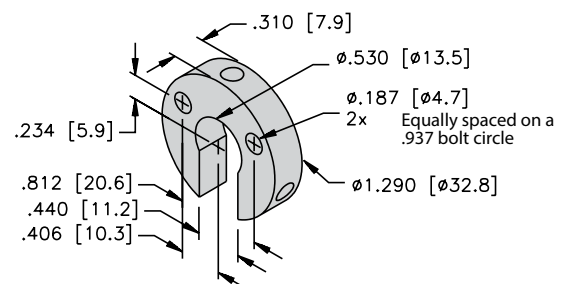
Standard 4-Hole Magnet

STM-AL-R10 (aluminum)
STM-SS-R10 (stainless steel)



Split Magnet

SPM-AL-R10



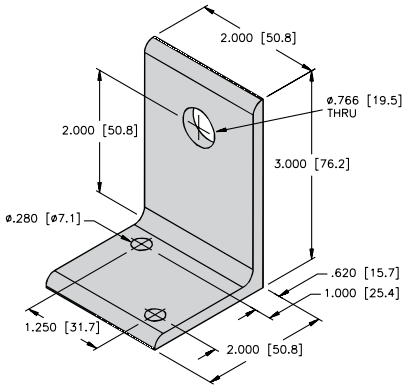
All dimensions shown as: inches [mm]

We reserve the right to make technical alterations without prior notice.

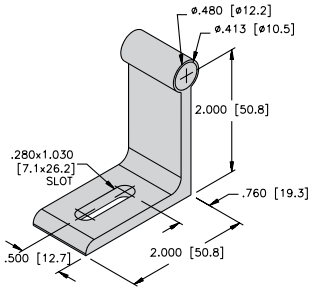
Linear Position Technology

Rod Style Series Accessories

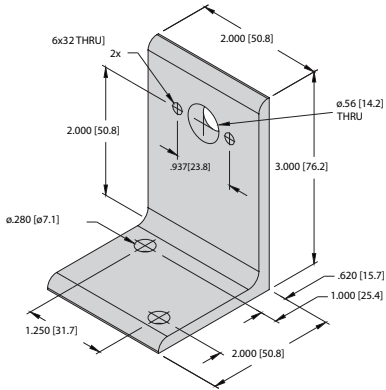
Mounting Bracket
LB-R10



Rod Support
RB-R10

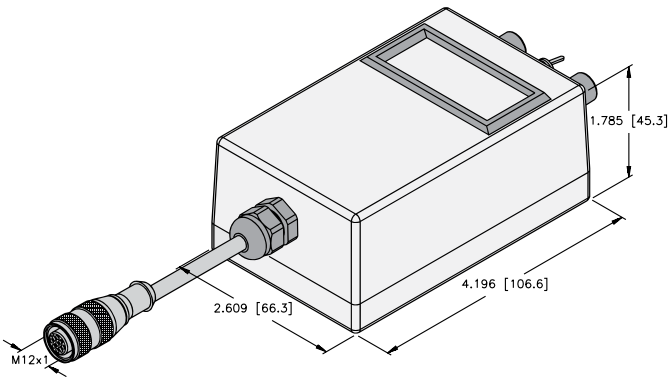


Magnet Mounting Bracket
MMB-R10

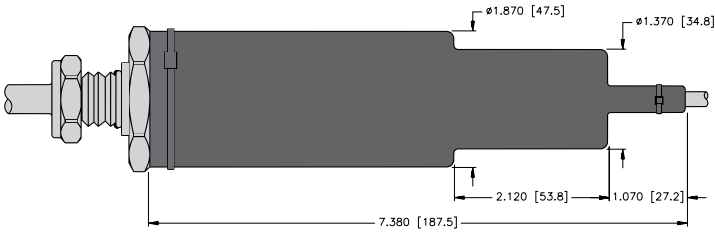


MB-R10: Part number includes mounting bracket LB-R10 and rod support bracket RB-R10.

Test and Programming Device
TB2-LDT
TB2-LDT-LI



Rubber Boot
BT-R10



All dimensions shown as: inches [mm]

We reserve the right to make technical alterations without prior notice.



Glossary of Terms: Linear Position Sensors

Absolute Sensing: Position is accurately known at power ON without the need for a reference or home position.

Magnetostrictive Technology: A linear sensor technology based on a magnetic principal of operation used in all EZ-track LDTs.

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.

Accuracy: The difference between the target point and the point actually indicated by the sensor with relation to a fixed reference.

Non-Linearity: The distance the indicated position of the positioning element along the span varies from the actual physical position.

Resolution: The smallest incremental change in position that can be detected and indicated as an output.

Blind Zone: Term used to describe the areas of the Q-track sensors where it no longer picks up the positioning element.

Non-Volatile: Position is held in memory and will not be lost on power down.

Span: The area of a linear sensor that reacts to the positioning element as it moves over it, producing an output signal.

Dead Zone: An area at the end of the EZ-track sensor that is opposite the connector where the magnet cannot be accurately sensed.

Null Zone: An area at the connector end of the sensor where the magnet cannot be accurately sensed.

Span Point: The end point of the analog measuring distance at which the output signal equals the greatest value of the analog scale.

Hysteresis: The difference of the measured value when approaching a defined point from opposite directions.

Quadrature Cycle Output Frequency: The fixed frequency at which the pulse rate is transmitted out of the probe.

SSI: Synchronous Serial Interface is a standard protocol for serial interface between sensors and controllers.

Incremental Sensing: A relative position feedback device whose signal is always referenced to the zero position. The sensor produces a digital square wave pulse train that is fed into an up/down counter chip or clock to derive position.

RLC: Stands for Resistance, Inductance and Capacitance. It is the principal of operation for all Turck Q-track sensors. The positioning element is a passive coil circuit that is excited by an emitter coil and the resulting inducted voltage is picked up by receiver coils.

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.

Linear Position Technology

Linear Magnetic Position System

Linear Magnetic Measurement System LM-2/LMT-2



High IP



Temperature



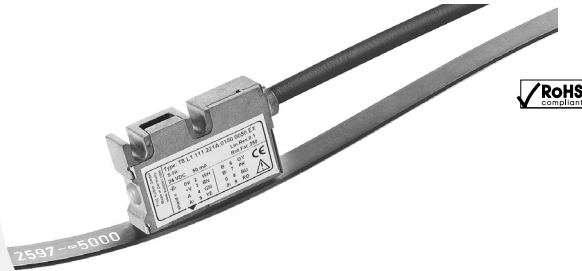
Shock/vibration
resistant



Reverse polarity
protection

Robust

- **Fully potted diecast metal housing.**
- **Increased ability to withstand vibrations and rough installation:** Eliminates machine downtime and repairs. Non-contact technology results in high shock and vibration resistance.
- **Stays sealed even when subjected to harsh everyday use.** Die cast metal housing with up to IP68/IP69K protection.



Compact

- **Installation depth only 10 mm, width of magnetic band 10 mm.**
- **Installation height only 28 mm.** May be used even where space is very tight.

Versatile

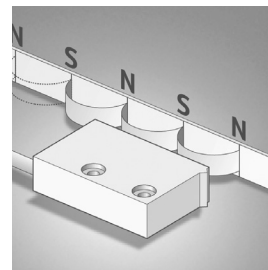
- **Fast start-up of the measuring system:** Easy attachment of the magnetic band and the sensor head.
- **Easy mounting with large tolerances possible:** Distance of sensor head to magnetic band from 0.1 to 1.0 mm; tolerates lateral misalignment + 1 mm; LED warning indicator when magnetic field is too weak.

Technical Data Magnetic Sensor LM-2:

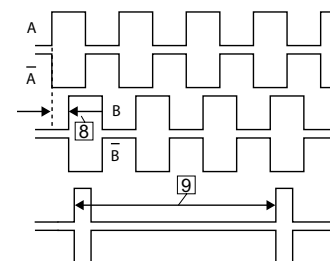
Output circuit [Key Code]:	Push-Pull [2R]	RS422 [4K]
Supply voltage:	4.8 to 30 VDC	4.8 to 26 VDC
Load/channel, max cable length:	±20 mA, max. 30 m	120 Ohm, RS422 standard
Current consumption (without load):	typ. 25 mA, max. 60 mA	
Short circuit protected:	yes	yes ¹⁾
Min. pulse interval:	1 µs (edge interval) corresponds to 4 µs/cycle (see signal figures below)	
Output signal:	A, $\bar{A}$, B, $\bar{B}$, I, $\bar{I}$	
Reference signal:	Index periodical	
System accuracy:	typ. 200 µm, max. ± (0.04 + 0.04 x L) mm, (L in [m], up to L = 50 m, at T = 20 °C)	
Repeat accuracy:	±1 increment	
Resolution and speed ²⁾ :	100 µm (post-quadrature), max. 25 m/s 25 µm (post-quadrature), max. 4 m/s 10 µm (post-quadrature), max. 6.5 m/s	
Permissible alignment tolerance:	see draft "Mounting tolerances"	
Gap sensor / magnetic band:	0.1-1.0 mm (0.4 mm recommended)	
Offset:	max. ±1 mm	
Tilting:	max. 3°	
Torsion:	max. 3°	
Working temperature:	-4 to +176 °F (-20 to +80 °C)	
Shock resistance:	500 g / 1 ms	
Vibration strength:	30 g / 10-2,000 Hz	
Protection class:	IP67 according to DIN 60529 (housing)	
Humidity:	100%, condensation possible	
Housing:	Zinc die-cast	
Cable:	2 m, PUR 8 x 0.14 mm ² , shielded, may be used in trailing cable installations	
Status-LED:	Green: Pulse-index; Red: Error Speed too high or magnetic fields too weak (for sensors LM-2*10-***020-*21 and LM-2-*10-***050-*)	

RoHS compliant acc. to EU guideline 2011/65/EU

Function Principle:



Signal Figures



- 9) Periodic index signal (every 2 mm)
The logical assignment A, B and I-Signal can change
8) Min. pulse interval: pay attention to the instructions in the technical data

¹⁾ A max. of one channel only may be short-circuited: (when +V = 5 V, a short circuit to another channel, 0 V, or +V is permissible.) (when +V = 5-30 V, a short circuit to another channel or to 0 V is permissible.)

²⁾ At the listed rotational speed the min. pulse interval is 1 µs, this corresponds to 250 kHz. For the max. rotational speed range a counter with a count input frequency of not less than 250 kHz should be provided.



Linear Magnetic Measurement System LM-2/LMT-2

Technical Data Magnetic Band LMT-2:	
Pole gap:	2 mm from pole to pole
Dimensions:	Width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient:	(11±1)×10 ⁻⁶ /K
Temperature ranges:	working temperature: -4 to +176 °F (-20 to +80 °C) storage temperature: -40 to +176 °F (-40 to +80 °C)
Mounting:	adhesive joint
Measuring:	0.1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius:	≥ 50 mm

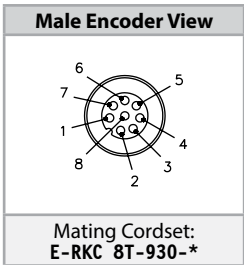


Standard Wiring:

Pin	Signal	Color
1	0 V	WH
2	+V	BN
3	A	GN
4	$\bar{A}$	YE
5	B	GY
6	$\bar{B}$	PK
7	Z	BU
8	$\bar{Z}$	RD

Shield is on the housing

Wiring Diagram:



* Length in meters.

Part Number Key: Magnetic Sensor LM-2

A		B		C	D		E
LM-2	-	P10	-	2R	005	-	C

A	Type
LM-2	Linear Magnetic

B	Housing
P10	10 mm, IP68/IP69K
Q10	10 mm, IP67

C	Voltage Supply and Output Type
2R	4.8-30 VDC, Push-Pull
4K	4.8-26 VDC, RS422

D	Resolution*
005	100 µm
020	25 µm
050	10 µm

* With quadruple evaluation

E	Type
C	Cable (2 m PUR)
C*-E-RSS8T	Cable w/ *m M12 Eurofast Connector

* Not available > 2 m

Part Number Key: Magnetic Band LMT-2

A		B
LMT-2	-	0010

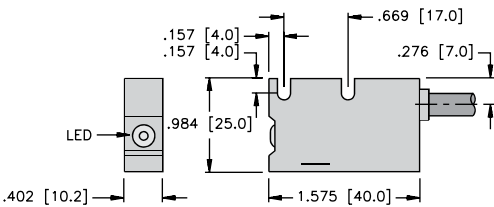
A	Type
LMT-2	10 mm, Linear Magnetic Tape, 2 mm Pole Gap

B	Length*
0010	1 m
0050	5 m
0100	10 m

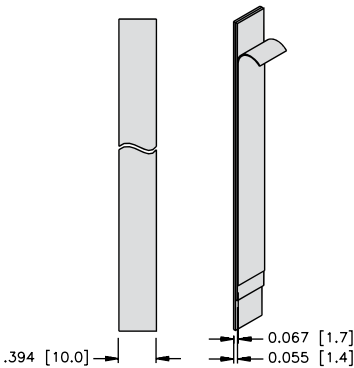
*Other lengths < 50 m available on request

Linear Magnetic Measurement System LM-2/LMT-2

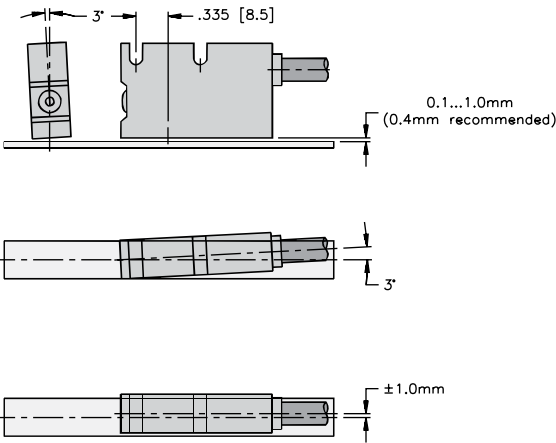
Dimensions: Magnetic Sensor LM-2-*10



Dimensions: Magnetic Band LMT-2



Permissible Mounting Tolerances:



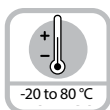
We reserve the right to make technical alterations without prior notice.



Linear Magnetic Measurement System LM-5/LMT-5



High IP



Temperature



Shock/vibration resistant



Reverse polarity protection

Robust

- **Fully potted diecast metal housing.**
- **Increased ability to withstand vibrations and rough installation:** Eliminates machine downtime and repairs. Non-contact technology results in high shock and vibration resistance.
- **Stays sealed even when subjected to harsh everyday use.** Die cast metal housing with up to IP68/IP69K protection.



Compact

- **Installation depth only 10 mm, width of magnetic band 10 mm.**
- **Installation height only 28 mm.** May be used even where space is very tight.

Simple Installation

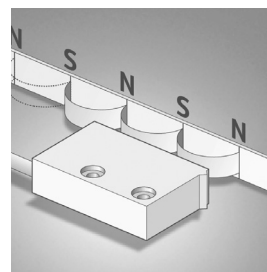
- **Fast start-up of the measuring system:** Easy attachment of the magnetic band and the sensor head.
- **Easy mounting with large tolerances possible:** Distance of sensor head to magnetic band from 0.1 to 2.0 mm; tolerates lateral misalignment +1 mm; LED warning indicator when magnetic field is too weak.

Technical Data Magnetic Sensor LM-5:

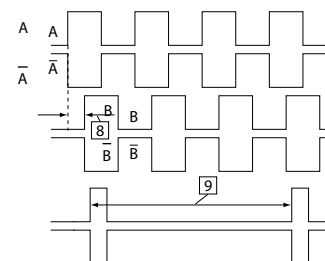
Output circuit [Key Code]:	Push-Pull [2R]	RS422 [4K]
Supply voltage:	4.8 to 30 VDC	4.8 to 26 VDC
Load/channel, max cable length:	±20 mA, max. 30 m	120 Ohm, RS422 standard
Current consumption (without load):	typ. 25 mA, max. 60 mA	
Short circuit protected:	yes	yes ¹⁾
Min. pulse interval:	1 µs (edge interval) corresponds to 4 µs/cycle (see signal figures below)	
Output signal:	A, $\bar{A}$, B, $\bar{B}$, I, $\bar{I}$	
Reference signal:	Index periodical	
System accuracy:	typ. 200 µm, max. $\pm (0.06 + 0.04 \times L)$ mm, (L in [m], up to L = 50 m, at T = 20 °C)	
Repeat accuracy:	±1 increment	
Resolution and speed ²⁾ :	25 µm (post-quadrature), max. 16.25 m/s 5 µm (post-quadrature), max. 3.25 m/s	
Permissible alignment tolerance:	see draft "Mounting tolerances"	
Gap sensor / magnetic band:	0.1-2.0 mm (1.0 mm recommended)	
Offset:	max. ±1 mm	
Tilting:	max. 3°	
Torsion:	max. 3°	
Working temperature:	-4 to +176 °F (-20 to +80 °C)	
Shock resistance:	500 g/1 ms	
Vibration strength:	30 g/10-2000 Hz	
Protection class:	IP67 according to DIN 60529 (housing) IP68/IP69K	
Humidity:	100%, condensation possible	
Housing:	Zinc die-cast	
Cable:	2 m, PUR 8 x 0.14 mm ² , shielded, may be used in trailing cable installations	
Status-LED:	Green: Pulse-index; Red: Error Speed too high or magnetic fields too weak (for sensors LM-5-*10-*050-* and LM-5-*10-*250-*)	

RoHS compliant acc. to EU guideline 2011/65/EU

Function Principle:



Signal Figures:



- 9) Periodic index signal (every 5 mm)
The logical assignment A, B and I-Signal can change
- 8) Min. pulse interval: pay attention to the instructions in the technical data

¹⁾ A max. of one channel only may be short-circuited: (when +V = 5 V, a short circuit to another channel, 0 V, or +V is permissible.) (when +V = 5-30 V, a short circuit to another channel or to 0 V is permissible.)

²⁾ At the listed rotational speed the min. pulse interval is 1 µs, this corresponds to 250 kHz. For the max. rotational speed range, a counter with a count input frequency of not less than 250 kHz should be provided.

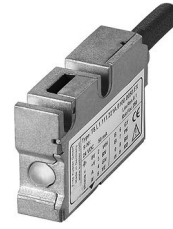
Linear Position Technology

Linear Magnetic Position System

Linear Magnetic Measurement System LM-5/LMT-5

Technical Data Magnetic Band LMT-5:

Pole gap:	5 mm from pole to pole
Dimensions:	Width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient:	$(11 \pm 1) \times 10^{-6} / K$
Temperature ranges:	working temperature: -4 to +176 °F (-20 to +80 °C) storage temperature: -40 to +176 °F (-40 to +80 °C)
Mounting:	adhesive joint
Measuring:	0.1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius:	≥ 50 mm

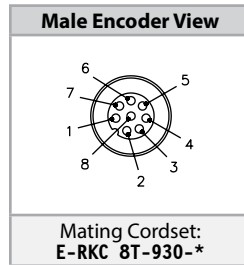


Standard Wiring:

Pin	Signal	Color
1	0 V	WH
2	+V	BN
3	A	GN
4	$\bar{A}$	YE
5	B	GY
6	$\bar{B}$	PK
7	Z	BU
8	$\bar{Z}$	RD

Shield is on the housing

Wiring Diagram:



* Length in meters.

Part Number Key: Magnetic Sensor LM-5

A		B		C	D		E
LM-5	-	P10	-	2R	050	-	C

A	Type
LM-5	Linear Magnetic

B	Housing
P10	10 mm, IP68/IP69K
Q10	10 mm, IP67

C	Voltage Supply and Output Type
2R	4.8-30 VDC, Push-Pull
4K	4.8-26 VDC, RS422

D	Resolution ¹⁾
050	25 μ m
250	5 μ m

¹⁾ with quadruple evaluation

E	Type of Connection
C	Cable (2 m PUR)
C*-E-RSS8T	Cable w/ *m M12 Eurofast Connector

* Not available > 2 m

Part Number Key: Magnetic Band LMT-5

A		B
LMT-5	-	0010

A	Type
LMT-5	10 mm, Linear Magnetic Tape, 5 mm Pole Gap

B	Length*
0010	1 m
0050	5 m
0100	10 m

*Other lengths < 50 m available on request

Accessories:

- See page H1, Connectivity, for cables and connectors

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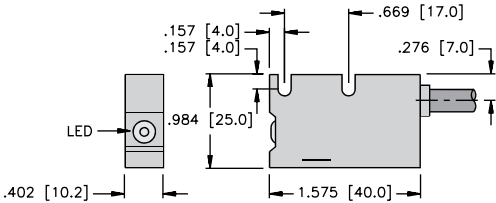


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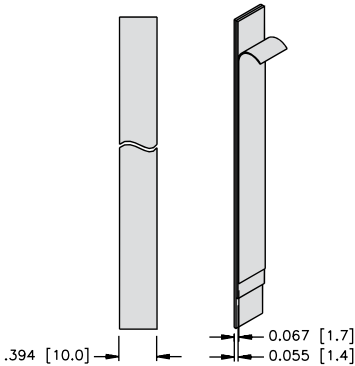
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Linear Magnetic Measurement System LM-5/LMT-5

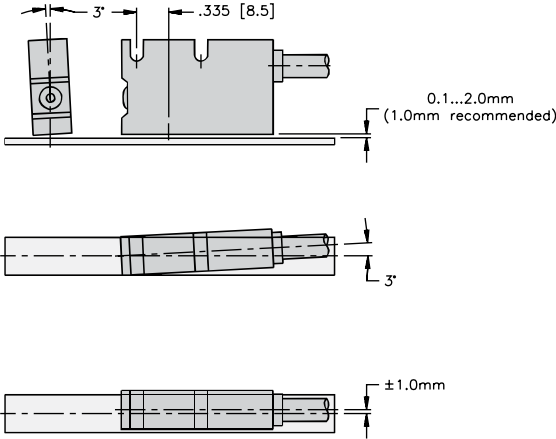
Dimensions: Magnetic Sensor LM-5-*10



Dimensions: Magnetic Band LMT-5



Permissible Mounting Tolerances:



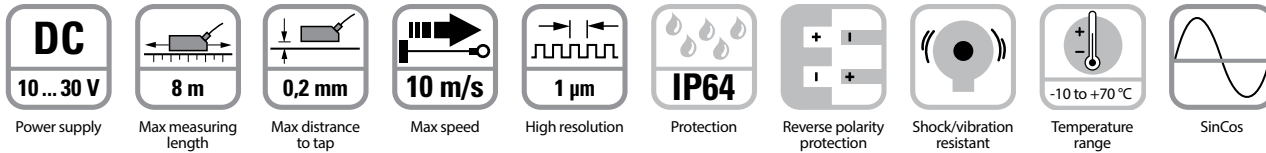
We reserve the right to make technical alterations without prior notice.

Linear Position Technology

Linear Position Technology

Linear Magnetic Position System

Absolute Linear Magnetic Measurement System LMA-1



Robust

- **Non-contact magnetic absolute measuring technology - therefore no wear - no referencing movement required.**
- **Sturdy housing with IP64 protection.**
- **For highly dynamic control.**
- **Stainless steel tape protecting the magnetic band.**



Simple Installation

- **Fast start-up of the measuring system:** Easy attachment of the magnetic band and the sensor head.
- **Easy mounting with large tolerances possible:** Distance of sensor head to magnetic band from 0.01 to 0.2 mm; tolerates lateral misalignment +1 mm; LED warning indicator when magnetic field is too weak.

Versatile

- **High resolution 1 µm / measuring length max. 8 m.**
- **Optional SinCos signal (1 Vpp) for dynamic movement control with 1 mm pole pitch**

Technical Data Magnetic Sensor LMA-1:

Mechanical characteristics

Weight:	approx. 0.22 lbs (0.1 kg)
Working temperature:	+14 to +157 °F (-10 to +70 °C) (non condensing)
Storage temperature:	-13 to +185 °F (-25 to +85 °C)
Protection acc. to EN 60529:	IP64
Housing:	aluminum
Max. speed:	SinCos reading 32.8 ft/s (10 m/s) permanent absolute positions reading 3.28 ft/s (1 m/s)
Shock resistance acc. to EN 60068-2-27:	500g (5000 m/s ²), 1 ms
Vibration resistance acc. to EN 60068-2-6:	30g (300 m/s ²), 10-2000 Hz
Distance sensor head / magnetic band:	0.01 - 0.2 mm incl. masking tape (recommended 0.2 mm)
Measuring length:	max. 8 m
Type of connection (standard):	M12 connector, 12 pin

Electrical characteristics:

Power supply:	10-30 VDC ±10%
Residual ripple:	< 10 %
Current consumption:	max. 150 mA
Reverse polarity protection:	yes
Short circuit protected:	yes
RoHS compliant acc. to EU guideline 2011/65/EU	

Accuracy:

Measuring principle:	absolute + incremental (option)
System accuracy at 68 °F [20 °C]:	max. ± (10 + 20 × L) µm L = measuring length in meters
Repeat accuracy:	±1 increment
Resolution:	0.001 mm
LED, red:	lights up when distance too large



Linear Magnetic Measurement System LMA-1

SSI interface:		
Output driver:		RS485 transceiver type
Permissible load / channel:		max. ±20 mA
Signal level:		
	HIGH	typ. 3.8 V
	LOW at ILoad = 20 mA	typ. 1.3 V
Clock rate:		25 bit (24 + 1 failurebit for distance)
Code:		Gray
SSI clock rate:		80 kHz - 0.4 MHz
Monoflop time:		≤ 40 µs
Data refresh rate:		≤ 250 µs
Option SinCos interface:		
Max. frequency -3dB:		400 kHz
Signal level:		1 Vpp (±10%)
Short circuit protected:		yes
Pulse rate:		1 SinCos per 1 mm pole
Magnetic band LMAT-1:		
Pole gap:		basic pole pitch1 mm
Dimensions:		
	width	10 mm
	thickness	1.97 mm incl. masking tape
Relative linear expansion:		$\Delta L = L \times \alpha \times \Delta \delta$ L = measuring length in meters $\alpha = 16 \times 10^{-6}$ 1/K temperature coefficient $\Delta \delta$ = relative temperature change based on +68 °F [20 °C] in °K
Working temperature:		-4 to +176 °F [-20 to +80 °C]
Mounting:		adhesive joint
Additional length:		100 mm in order to obtain an optimal measuring result, the magnetic band should be about 0.1 m longer than the required measuring length
Min. bending radius for storage:		≥ 150 mm
Material metal tape:		precision steel strip 1.4404 acc. to EN 10088-3

Accessories:
• See page H1, Connectivity, for cables and connectors



Linear Magnetic Measurement System LMA-1

Standard Wiring:

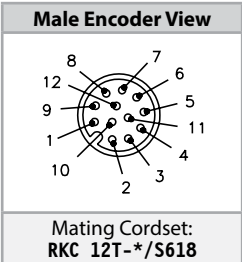
Output Circuit 3C (Gray code):

Connection Type	Common (0V)	+V	+Clock	-Clock	+Data	-Data	-	-	-	-	-	-
M12 Eurofast:	1	2	3	4	5	6						

Output Circuit 3G (Gray code + SinCos):

Connection Type	Common (0V)	+V	+Clock	-Clock	+Data	-Data	A	$\overline{A}$	B	$\overline{B}$	-	-
M12 Eurofast:	1	2	3	4	5	6	7	8	9	10		

Wiring Diagram:



* Length in meters.

We reserve the right to make technical alterations without prior notice.



Linear Magnetic Measurement System LMA-1

Part Number Key: Magnetic Sensor LMA-1

A		B		C		D
LMA-1	-	Q16	-	3C25B	-	H11121

A	Type
LMA-1	Linear Magnetic, Absolute

B	Housing
Q16	16 mm, IP64

C	Voltage Supply and Output Type
3C25B	10-30 VDC, SSI, 25-bit Gray Code
3G25B	10-30 VDC, SSI, 25-bit Gray Code Plus SinCos 1 Vpp

D	Type of Connection
H11121	12-pin M12 Eurofast Connector

Part Number Key: Magnetic Band LMAT-1

A		B
LMAT-1	-	0005

A	Type
LMAT-1	10 mm, Linear Magnetic Tape, 1 mm Pole Gap

B	Length*		
0005	0.5 m	0040	4.0 m
0010	1.0 m	0060	6.0 m
0020	2.0 m	0080	8.0 m
0030	3.0 m	-	-

*measuring range = Length - 0.1 m

Accessories:

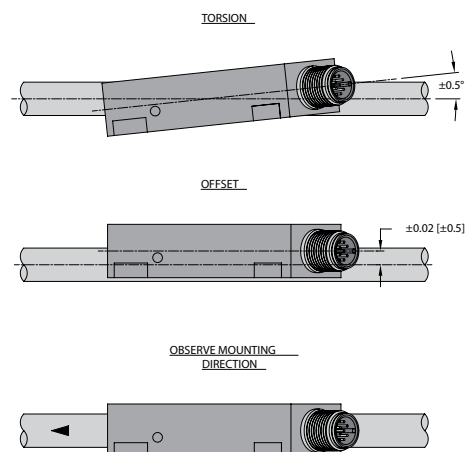
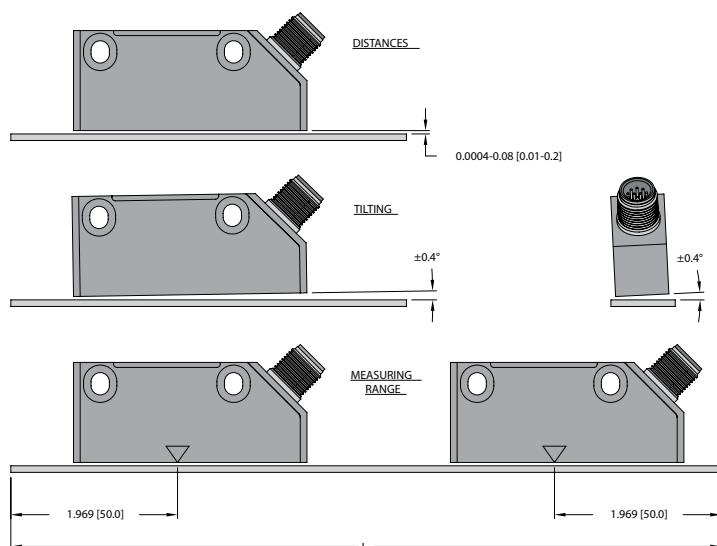
- See page H1, Connectivity, for cables and connectors

Linear Position Technology

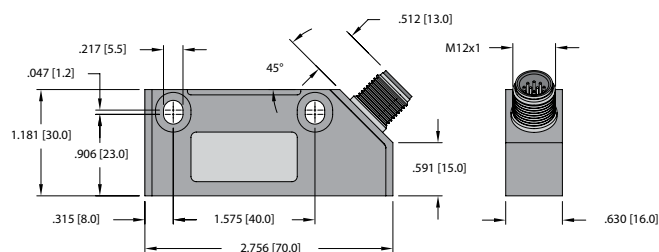
Linear Magnetic Position System

Linear Magnetic Measurement System LMA-1

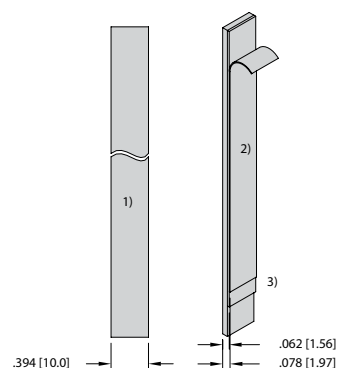
Permissible Mounting Tolerances:



Dimensions: LMA-1



Magnetic Band LMAT-1

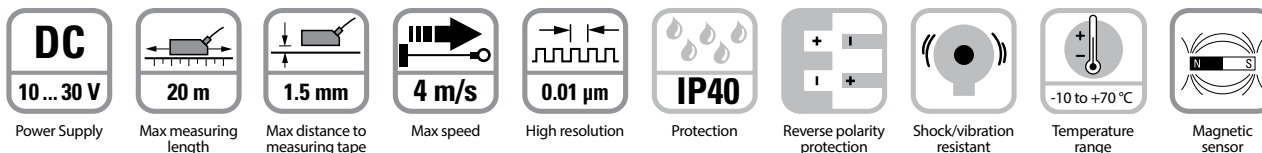


- 1) Length L, max 8 m
- 2) Masking tape
- 3) Magnetic band

We reserve the right to make technical alterations without prior notice.



Absolute Linear Magnetic Measurement System LMA-4



Robust

- Rugged die-cast zinc housing.
- Position changes are also detected when de-energized. No referencing movement required - no wear.
- Automatic distance detection in case of too large distance between the sensor and the magnetic band.
- Stainless Steel tape protecting the magnetic band.
- Interfaces: SSI



Versatile

- Resolution 0.01 mm / measuring length max. 20 m.
- Large mounting tolerances.

Simple Installation

- Simple glued assembly of the magnetic band.
- Requires very little installation space.
- LED warning signals in case of too weak magnetic field.

Technical Data Magnetic Sensor LMA-4:

Mechanical characteristics:

Weight:	approx. 0.41 lbs (0.19 kg)
Working temperature:	+14 to +158 °F (-10 to +70 °C) (non condensing)
Storage temperature:	-13 to +185 °F (-25 to +85 °C)
Protection acc. to EN 60529:	IP40
Housing:	zinc die-cast
Max. speed:	13.1 ft/s (4 m/s)
Shock resistance acc. to EN 60068-2-27:	500g (5000 m/s ²), 1 ms
Vibration resistance acc. to EN 60068-2-6:	30g (300 m/s ²), 10-2000 Hz
Distance sensor head / magnetic band:	0.1 - 1.5 mm incl. masking tape (recommended 0.5 mm)
Measuring length:	max. 20 m
Type of connection (standard):	cable, 1.5 m PUR

Electrical characteristics:

Power supply:	10-30 VDC ±10%
Residual ripple:	< 10 %
Current consumption:	max. 150 mA
Reverse polarity protection:	yes
Short circuit proof:	yes
RoHS compliant acc. to EU guideline 2011/65/EU	

Accuracy:

Measuring principle:	absolute
System accuracy at 68 °F [20 °C]:	max. ± (150 + 20 x L) μm L = measuring length in meters
Repeat accuracy:	±1 increment
Resolution:	0.01 mm
LED, red:	lights up when distance too large

Linear Position Technology

Linear Magnetic Position System

Linear Magnetic Measurement System LMA-4

SSI interface:

Output driver:	RS485 transceiver type	
Permissible load / channel:	max. ± 20 mA	
Signal level:	HIGH	typ. 3.8 V
	LOW at ILoad = 20 mA	typ. 1.3 V
Clock rate:	25 bit (24 + 1 failure bit for distance)	
Code:	binary/gray (default) switchable	
SSI clock rate:	80 kHz - 0.4 MHz	
Monoflop time:	$\leq 40 \mu\text{s}$	
Data refresh rate:	$\leq 250 \mu\text{s}$	

Magnetic Band LMAT-4:

Pole Gap:	Basic pole pitch 5 mm	
Dimensions:	width:	20 mm
	thickness:	1.8 mm incl. stainless steel tape
Relative linear expansion:	$\Delta L = L \times \alpha \times \Delta \theta$ L = measuring length in meters $\alpha = 16 \times 10^{-6} \text{ 1/K}$ temperature coefficient $\Delta \theta$ = relative temperature change based on +68 °F [20 °C] in °K	
Working temperature:	-4 to +158 °F (-20 to +70 °C)	
Storage temperature:	-4 to +176 °F (-20 to +80 °C)	
Mounting:	adhesive joint	
Additional length:	100 mm. In order to obtain an optimal measuring result, the magnetic band should be about 0.1 m longer than the required measuring length	
Min. bending radius for storage:	≥ 150 mm	
Material metal tape:	precision steel strip 1.4404 acc. to EN 10088-3	

We reserve the right to make technical alterations without prior notice.

Standard Wiring:

Output Circuit JC

Connection Type:	Common (0 V)	+V	+Clock	-Clock	+Data	-Data	-	-	PE
Cable:	WH	BN	YE	OR	GN	PK	GY	BK	shield ¹⁾

¹⁾Connect shielding only on machine side

Accessories:

- See page H1, Connectivity, for cables and connectors

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Linear Magnetic Measurement System LMA-4

Part Number Key: Magnetic Sensor LMA-4

A		B		C		D
LMA-4	-	Q24	-	JC25B	-	C1.5M

A	Type
LMA-4	Linear Magnetic, Absolute

C	Voltage Supply and Type
JC25B	10-30VDC, SSI, 25-bit Gray/Binary Code

B	Housing
Q24	24 mm, IP40

D	Type of Connection
C1.5M	Radial Cable (1.5 m PUR)

Part Number Key: Magnetic Band LMAT-4

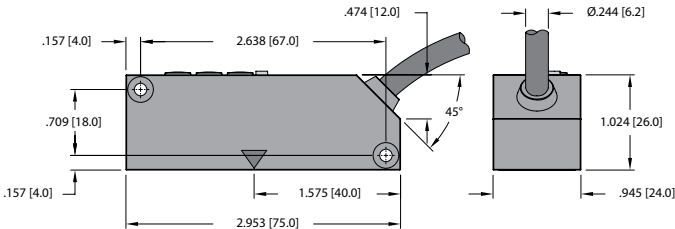
A		B
LMAT-4	-	0010

A	Type
LMAT-4	20 mm, Linear Magnetic Tape, 1 mm Pole Gap

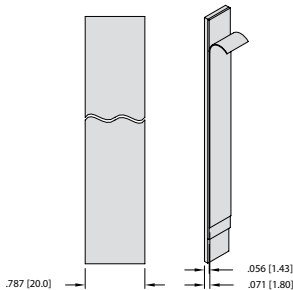
B	Length*	
0010	1.0 m	0060 6.0 m
0020	2.0 m	0100 10.0 m
0040	4.0 m	0200 20.0 m
0050	5.0 m	- -

*measuring range = Length - 0.1 m

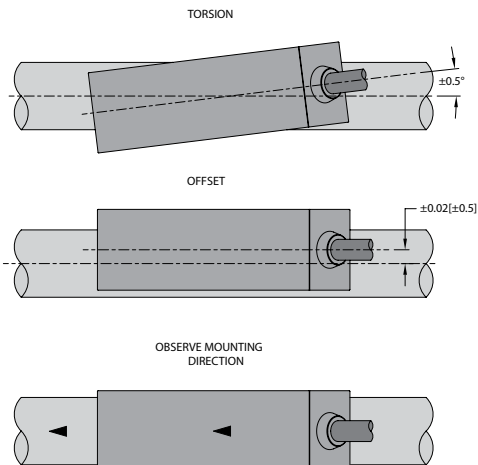
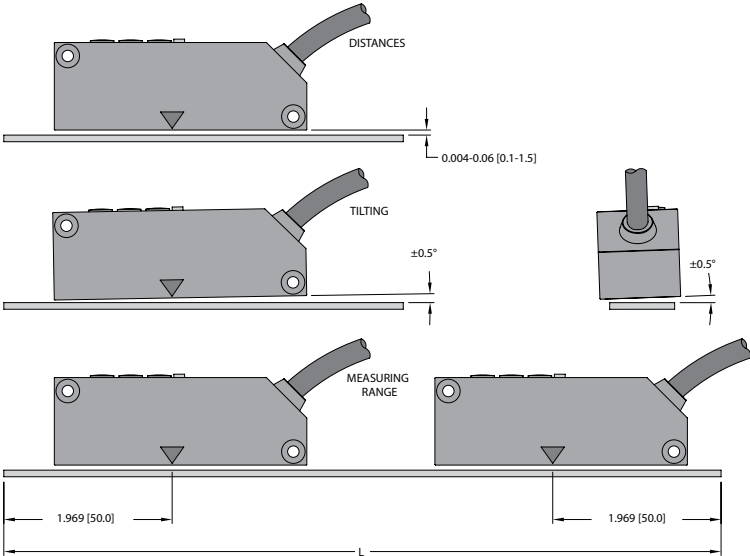
Dimensions: Magnetic Sensor LMA-4



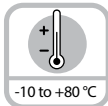
Dimensions: Magnetic Band LMAT-4



Permissible Mounting Tolerances:



Draw Wire Encoder DW33



Temperature
range



Maximum
speed



High protection
level

Miniaturized

- Measuring length up to 600 mm.
- Wide temperature range.



Simple

- For applications with low travel speeds.
- Easy to install.

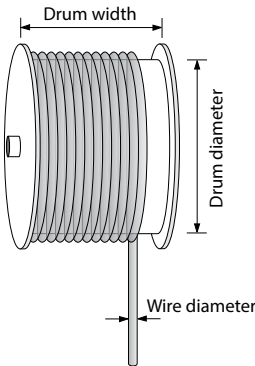
Versatile

- Available with potentiometer, voltage or current outputs.

Mechanical Characteristics (Draw Wire Mechanics):

Extension force:	Fmin	0.67 lbs (3.0 N)
Max. speed:		2.62 ft/s (0.8 m/s)
Linearity:		±0.35%
Repeat accuracy:		±0.15 mm
Working temperature:		+14 to +176 °F (-10 to +80 °C)
Weight:		approx. 0.13 lbs (60 g)
Materials:		housing: plastic wire: stainless steel Ø 0.4 mm, plastic coated
Protection (acc. to EN 60529):		IP50

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

We reserve the right to make technical alterations without prior notice.

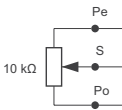
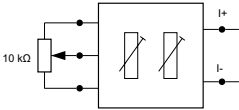
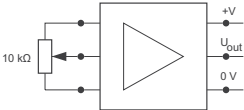


Draw Wire Encoder DW33

Electrical Characteristics (Analog Output):

Analog output [Key code]:	0-10 V [8D]	4-20 mA [7F]	Potentiometer [PB]
Supply voltage:	15-28 VDC	15-28 VDC	max. 48 VDC
Output:	0-10 V	4-20 mA	10 kOhm

Connection diagrams:



Recommended load current:	15 mA	-	-
Load:	-	max. 500Ω	-
Temperature range:	-14 to +176 °F (-10 to +80 °C)	-14 to +176 °F (-10 to +80 °C)	-14 to +176 °F (-10 to +80 °C)
ROHS compliant according to EU guideline 2011/65/EU			

Standard Wiring:

Color	BN	WH	GN
0-10 VDC	+24 VDC	0 V	U _{out}
4-20 mA	+I	-I	N/C
Potentiometer	Po	Pe	S

Accessories:

- See page H1, Connectivity, for cables and connectors



Draw Wire Encoder DW33

Part Number Key: DW33 with Analog Sensor

A	B		C		D		E
DW	300	-	33	-	7F	-	C0.5M

A	Type
DW	Draw Wire

B	Measuring Range
300	300 mm Steel Wire ¹⁾
600	600 mm Steel Wire

¹⁾Not suitable with output code 'PB'

C	Housing
33	33 mm

D	Voltage Supply and Output Type
7F	15-28 VDC, 4-20 mA
8D	15-28 VDC, 0-10 V
PB	48 VDC max, 10 kΩ Potentiometer

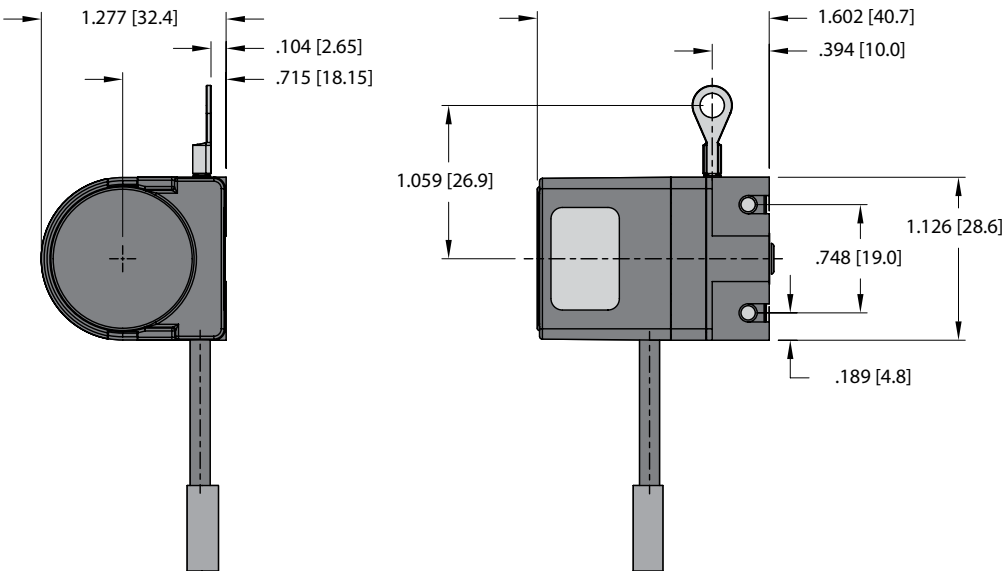
E	Type of Connection
C0.5M	Radial Cable (0.5 m PUR)

We reserve the right to make technical alterations without prior notice.



Draw Wire Encoder DW33

Dimensions: DW33



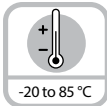
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Linear Position Technology

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Mini Draw Wire Encoder DW55



Temperature



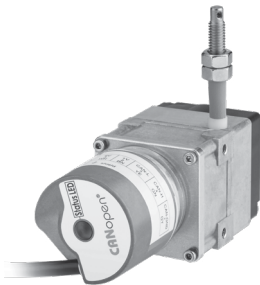
Short-circuit
protected



Reverse polarity
protection

Rugged

- Reinforced plastic housing (1 m wire).
- Stainless steel cable
- Zinc die cast housing (2 m wire).



Versatile

- Radial or axial cable exit.
- Analog outputs 4-20 mA, 0-10 V or resistance.
- Incremental push-pull output.
- Absolute encoder output options.

Compact

- Measuring length up to 2,000 mm.
- 40 x 40 x 58 mm housing (1 m wire).
- 40 x 40 x 72.3 mm housing (2 m wire).

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:	1,000 mm	2,000 mm
Max. speed:	2.62 ft/s (0.8 m/s)	3.28 ft/s (1.0 m/s)
Working temperature	+32 to +122 °F (0 to +50 °C)	+14 to +176 °F (-10 to +80 °C)
Protection acc. to EN60529:	IP50	IP65
Weight:	approx. 0.44 lbs (0.2 kg)	0.7 lbs (0.32 kg)
Required force:	0.45 lbs (2N)	0.45 lbs (2N)
Repeat accuracy:	±0.15 mm	±0.15 mm
Linearity:	±0.35%	±0.35%
Material:	Housing: plastic/zinc die cast Wiring: stainless steel Ø 0.45 mm, plastic coated	
Electrical Characteristics (Absolute Encoder):	The electrical characteristics of the draw wire encoder assembly may be found in the catalog pages of the encoder selected.	

We reserve the right to make technical alterations without prior notice.



Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Mini Draw Wire Encoder DW55

Mechanical Characteristics (Draw wire with incremental encoder):

Measuring range:	up to 2,000 mm
Absolute accuracy:	±0.1% for the whole measuring range
Repetition accuracy:	±0.15 mm per direction of travel
Resolution (incremental):	0.1 mm (0.025 mm post-quadrature) [standard encoder with 1,000 ppr.]
Traversing speed:	max. 2.62 ft/s (800 mm/s)
Required force:	approx. 2.25 lbs (10 N) (on wire)
Material:	Housing: reinforced plastic, Wire: stainless steel ø 0.45 mm, plastic coated
Weight:	approx. 0.463 lbs (0.210 kg)
Protection acc. to EN 60529:	IP54 from housing side
Working temperature:	-4 to +185 °F (-20 to +85 °C)
Shock resistance acc. to DIN-IEC 68-2-27:	100 g (1,000 m/s²), 6 ms
Vibration resistance acc. to DIN-IEC 68-2-27:	10 g (100 m/s²), 55-2,000 Hz
The electrical characteristics of the draw wire encoder assembly may be found in the catalog pages of the encoder selected.	

Electrical Characteristics (Absolute Encoder):

The electrical characteristics of the draw wire encoder assembly may be found in the catalog pages of the encoder selected.

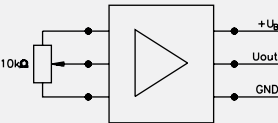
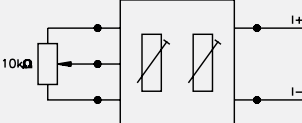
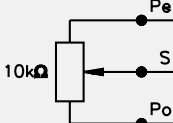
Electrical Characteristics (Incremental Output):

Output circuits [Key Code]:	Push-Pull [2D]	Push-Pull [2A]
Supply voltage:	5-24 VDC	8-30 VDC
Current consumption (without load):	max. 50 mA	max. 50 mA
Permitted load per channel:	max. ±50 mA	max. ±50 mA
Pulse rate:	max. 160 kHz	max. 160 kHz
Switching level high:	min. +V – 2.5 V	min. +V – 3 V
Switching level low:	max. 0.5 V	max. 2.5 V
Rise time tr:	max. 1 µs	max. 1 µs
Fall time tf:	max. 1 µs	max. 1 µs
Short-circuit protected:	yes	yes
Electrical Characteristics (Absolute Encoder):	The electrical characteristics of the draw wire encoder assembly may be found in the catalog pages of the encoder selected.	

Description of the Incremental Encoder
(Connected on Load Side)

- Compensation for temperature and aging
- Short-circuit protected outputs
- Reverse polarity protected power-supply input
- Push-pull output

Electrical Characteristics (Analog Output):

Analog output [Key Code]:	0-10 V [8C]	4-20 mA [7F]	Potentiometer 10 kΩ [PB]
Supply voltage:	15-28 VDC	15-28 VDC	Max. 48 VDC
Temperature range:	+32 to +122 °F (0 to +50 °C)	+32 to +122 °F (0 to +50 °C)	+32 to +122 °F (0 to +50 °C)
Load:	max 500 Ω	max 500 Ω	-
Connection diagrams:	  		

RoHS Compliant acc. to EU guideline 2011/65/EU

We reserve the right to make technical alterations without prior notice.

Linear Position Technology



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Mini Draw Wire Encoder DW55

Part Number Key: DW55 with Encoder

A	B		C		D		E		F
DW	2000	-	55	-	46	-	3C12S12M	-	CT1M

A	Type
DW	Draw Wire

B	Measuring Range
2000	2 m Steel Wire, IP65

C	Housing
55	40 mm

D	Encoder Type
46	RM-46, Absolute, SSI
47	RM-47, Absolute, CANopen
99	RM-99, Absolute, SSI
101	RM-101, Absolute, CANopen, SAE J1939

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Type of Connection
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

**Standard resolutions for draw wire with absolute encoder
RM-46/RM-99 (12-bit ST) or RM-47/RM-101 (12-bit ST, programmable via the bus)**

Drum circumference (mm)	1000
Pulses/revolution (ppr)	4096
Pulses/mm	41
Resolution (mm)	0.02

Recommended standard variants (with absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DW2000-55-99-3C12S12M-H1181	RM-99T6S-3C12S12M-H1181	SSI	10-30 VDC	Radial M12 connector	4096 ppr / SSI-Gray-Code	-
DW2000-55-101-9D38B-H1151	RM-101T6S-9D38B-H1151	CANopen	10-30 VDC	Radial M12 connector	CANopen encoder profile DS406 V4.0	-
DW2000-55-101-9F43B-H1151	RM-101T6S-9F43B-H1151	SAE J1939	10-30 VDC	Radial M12 connector	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B	-
DW2000-55-46-3C12S12M-CT1M	RM-46T6S-3C12S12M-CT1M	SSI	10-30 VDC	Tangential cable, 1 m	4096 ppr / SSI-Gray-Code	-
DW2000-55-47-9D32B-CT1M	RM-47T6S-9D32B-CT1M	CANopen	10-30 VDC	Tangential cable, 1 m	CANopen encoder profile DS406 V3.2	-

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Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

TURCK

Mini Draw Wire Encoder DW55

Part Number Key: DW55 with Encoder (analog, scalable with limit switch function)

A	B		C		D		E		F
DW	2000	-	55	-	97	-	7ASALWL	-	H1151

A	Type
DW	Draw Wire

B	Measuring Range
2000	2 m Steel Wire, IP65

C	Housing
55	40 mm

D	Encoder Type
97	RM-97, Absolute, Analog

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Type of Connection
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

Recommended standard variants (with analog encoder, scalable with limit switch function)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DW2000-55-97-7ASALWL-H1151	RM-97T6S-7ASALWL-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable with limit switch function ¹⁾
DW2000-55-97-8BSALWL-H1151	RM-97T6S-8BSALWL-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable with limit switch function ¹⁾
DW2000-55-97-7ASALNS-H1151	RM-97T6S-7ASALNS-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable without limit switch function ¹⁾
DW2000-55-97-8BSALNS-H1151	RM-97T6S-8BSALNS-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable without limit switch function ¹⁾

¹⁾Unscaled

Part Number Key: DW55 Incremental

A	B		C		D		E	F		G
DW	1000	-	55	-	01	-	2A	1000	-	CA

A	Type
DW	Draw Wire

B	Measuring Range
1000	1 m Steel Wire
2000	2 m Steel Wire

C	Housing
55	40 mm

D	Encoder Type
01	RI-01, Incremental

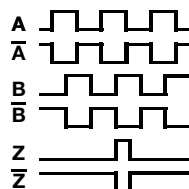
E	Voltage Supply and Output Type
2A	8-30 VDC, Push-Pull (w/ Inverted Signals)
2D	5-24 VDC, Push-Pull (w/ Inverted Signals)

F	Pulse Rate
	1000

G	Type of Connection
CA	Axial Cable (2 m PVC)

Standard Wiring:

Color:	Signal:
WH	Common
BN	+V
GN	A
YE	$\bar{A}$
GY	B
PK	$\bar{B}$
BU	Z
RD	$\bar{Z}$



* Index present every 100 mm every linear travel.



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Mini Draw Wire Encoder DW55

Part Number Key: DW55 Analog Sensor

A	B		C		D		E
DW	1000	-	55	-	7F	-	H1141

A	Type
DW	Draw Wire

B	Measuring Range
1000	1 m Steel Wire, IP50
2000	2 m Steel Wire, IP65

C	Housing
55	40 mm

D	Voltage Supply and Output Type
7F	15-28 VDC, 4-20 mA
8D	15-28 VDC, 0-10 V
PB	48 VDC max, 10 kΩ, Potentiometer

E	Type of Connection
H1141	Radial 4-pin M12 Eurofast Connector ¹⁾
C	Radial Cable (2 m PVC) ¹⁾
CA	Axial Cable (2 m PVC) ²⁾

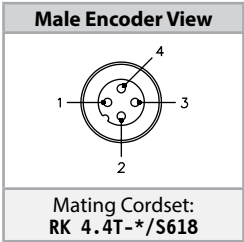
¹⁾ Only available with measuring range '2000'
²⁾ Only available with measuring range '1000'

Standard Wiring:

Color	WH	BN	GN
Pin M12	2	1	3/BU
4-20 mA	*-I	+I	N/C
0-10 VDC	GND	15-28 V	V _{out}
Pot. 10 kΩ	Pe, end position	Po, start position	Wiper contact

* Loop powered

Wiring Diagram:



* Length in meters.

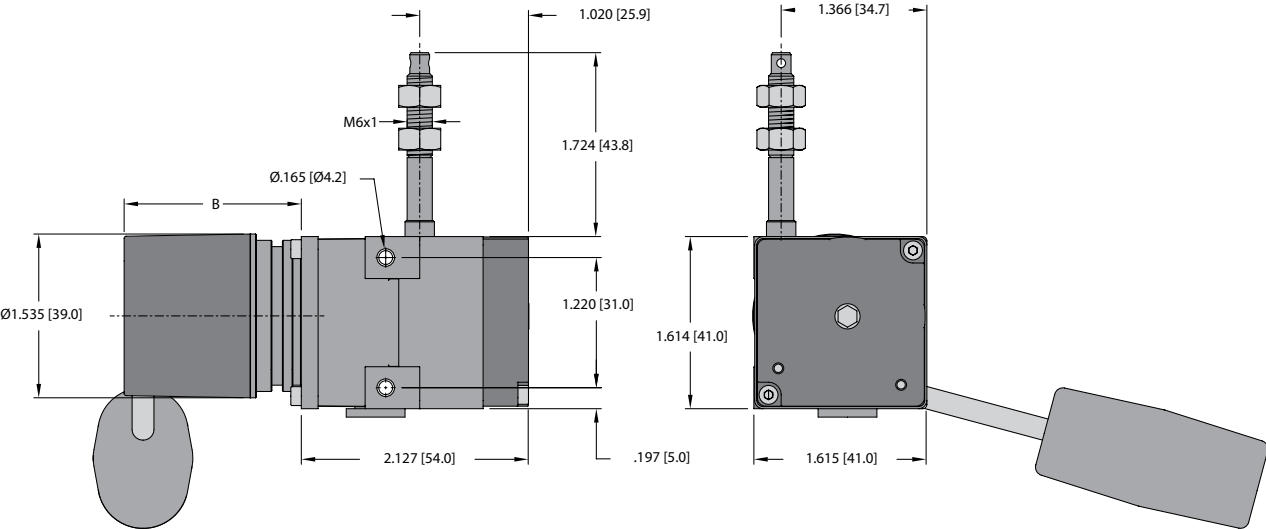
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Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Mini Draw Wire Encoder DW55

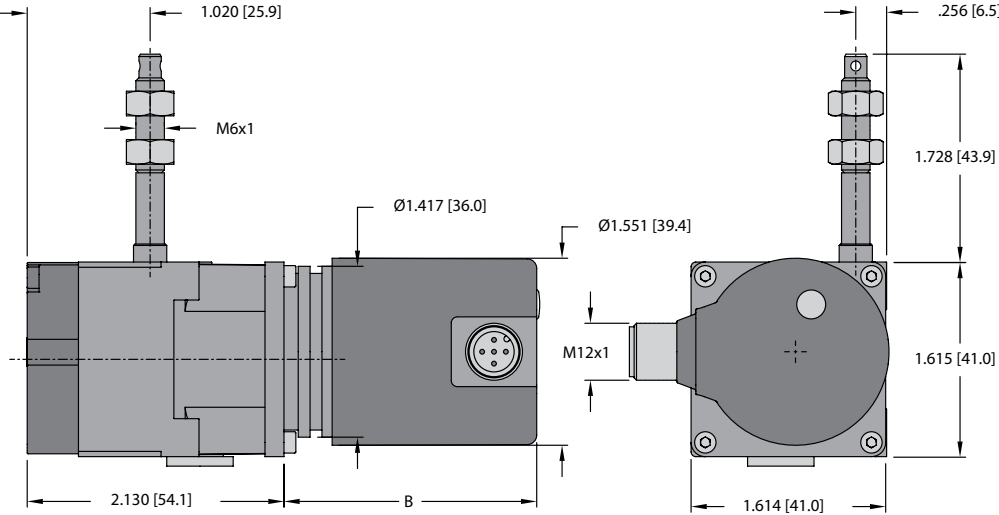
Dimensions: DW55 with RM-46/47 Encoder



Dimension B depends on the encoder used

Encoder	B in. [mm]
DW2000-55-46-*****_*****	1.56 [39.70]
DW2000-55-47-*****_*****	1.56 [39.70]

Dimensions: DW55 with RM-97/99/101 Encoder



Dimension B depends on the encoder used

Encoder	B in. [mm]
DW2000-55-97-*****_*****	2.10 [53.25]
DW2000-55-99-*****_*****	2.10 [53.25]
DW2000-55-101-*****_*****	2.10 [53.25]

Accessories:

- See page H1, Connectivity, for cables and connectors

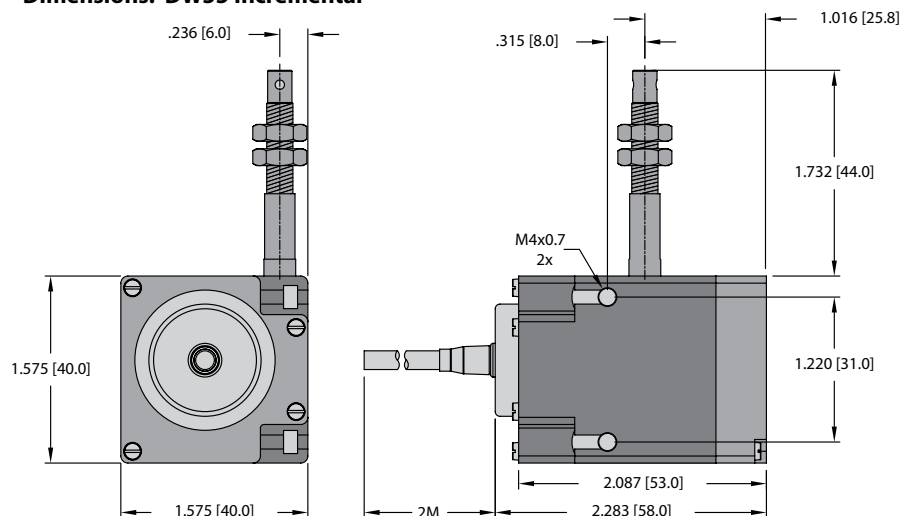


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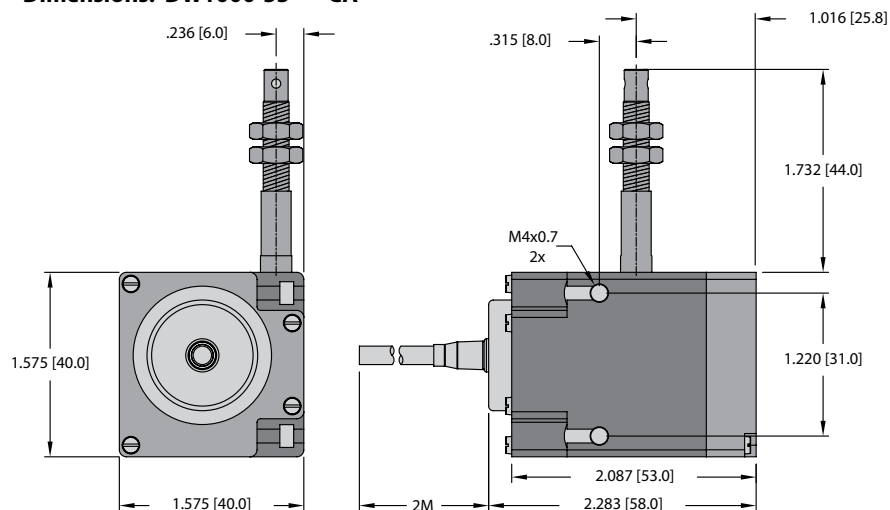
Draw Wire Mechanics with Encoder or Analog Sensor

Mini Draw Wire Encoder DW55

Dimensions: DW55 Incremental



Dimensions: DW1000-55-**-CA



Accessories:

- See page H1, Connectivity, for cables and connectors

B54 B1027

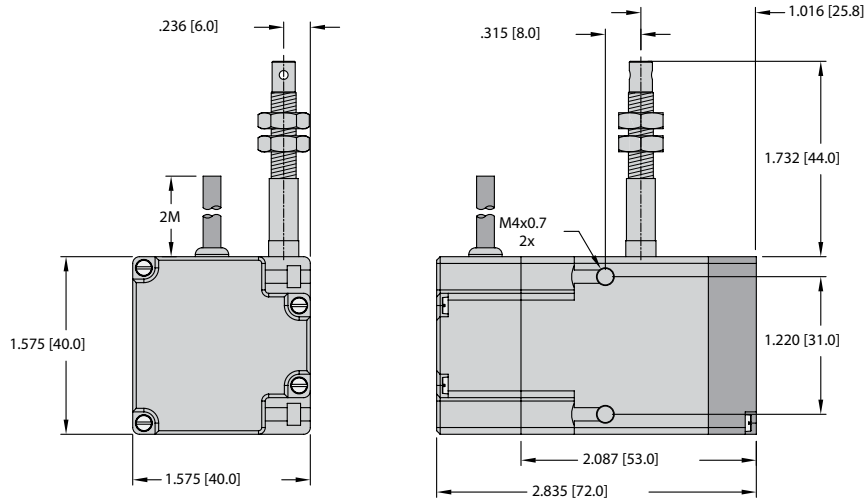


Turck Inc. | 3000 Campus Drive, Minneapolis, MN 55441 | T +1 800 544 7769 | F +1 763 553 0708 | www.turck.com

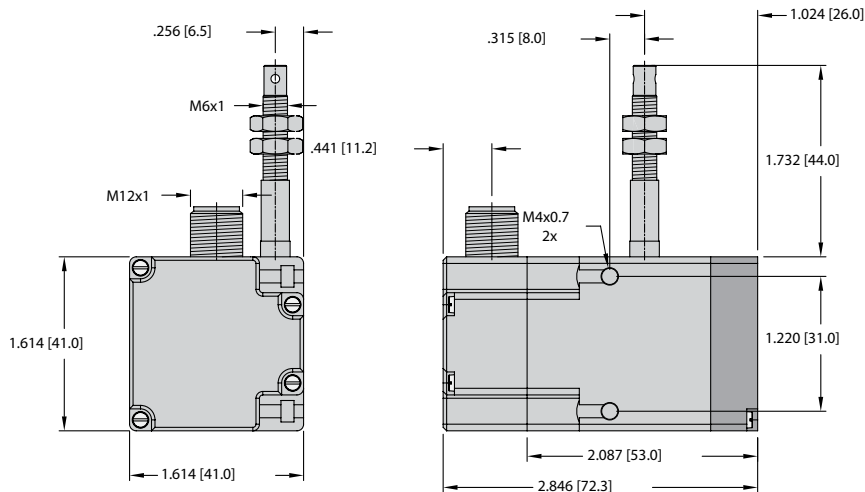
Courtesy of Steven Engineering, Inc - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com

Mini Draw Wire Encoder DW55

Dimensions: DW2000-55--C**



Dimensions: DW2000-55--H1141**

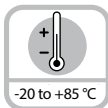


Accessories:

- See page H1, Connectivity, for cables and connectors

Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

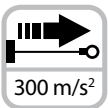
Draw Wire Encoder DW70



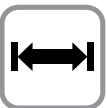
Wide temperature range
-20 to +85 °C



Reverse polarity protection



Maximum acceleration
300 m/s²



Long service life



High protection level
IP

Robust

- **Corrosion resistant:** Titanium-anodized aluminium housing.
- **High-strength stainless steel draw wire.**
- **Low friction design.** Diamond-polished ceramic guide.
- **Wide temperature range.**



Versatile

- **Suitable for various sensors/encoders:** Absolute encoders with fieldbus interfaces, incremental, and analog.
- **Quick mounting:** Fastening by means of two screws.
- **Flexible connection options:** Cable, M12 connector, radial, axial.
- **Linearity up to 0.02%.**

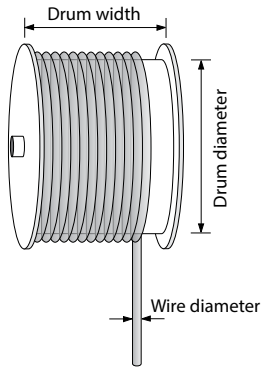
Fast

- **High traverse speed.**
- **High acceleration:** Dynamic spring traction by means of a constant force spring.

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:	250 mm	500 mm	1250 mm
Extension force:	Fmin 1.53 lbs (6.8 N) Fmax 1.78 lbs (7.9 N)	0.76 lbs (3.4 N) 0.90 lbs (4.0 N)	0.92 lbs (4.1 N) 1.21 lbs (5.4 N)
Max. speed:	26.2 ft/s (8 m/s)	26.2 ft/s (8 m/s)	32.8 ft/s (10 m/s)
Max. acceleration:	656.16 ft/s ² (200 m/s ²)	656.16 ft/s ² (200 m/s ²)	984.25 ft/s ² (300 m/s ²)
Linearity (of measuring range):			
analog sensor	±0.15%	±0.15%	±0.1%
encoder	±0.05%	±0.05%	±0.02%
Weight:	approx. 0.72 lbs(330 g) (depending on the sensor/encoder used)		
Materials:	housing: titanium-anodized aluminium wire: stainless steel Ø 0.5 mm		
Protection (encoder only):	IP65		

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

We reserve the right to make technical alterations without prior notice.



We reserve the right to make technical alterations without prior notice.

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

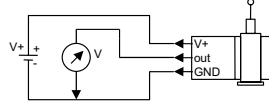
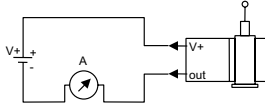
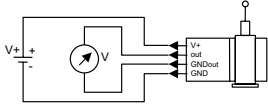


Draw Wire Encoder DW70

Electrical Characteristics (Analog Output):

Analog output [Key code]:	0-10 V [8C]	4-20 mA [7E]	Potentiometer [PA]
Output:	0-10 V galvanically isolated, 4 conductors	4-20 mA, 2 conductors	1 kOhm
Supply voltage:	12-30 VDC	12-30 VDC	max. 30 VDC
Recommended slider current:	-	-	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	-
Reverse polarity protection:	yes	yes	-
Operating temperature:	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)

Connection diagrams:



ROHS compliant according to EU guideline 2011/65/EU

Electrical Characteristics (Digital Output):

The electrical characteristics of the draw wire encoder assembly may be found in the catalog pages of the encoder selected.

Linear Position Technology

Accessories:

- See page H1, Connectivity, for cables and connectors



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW70

Part Number Key: DW70 with Encoder

A	B		C		D		E	F		G		H
DW	250	-	70	-	04	-	2H	1250	-	H1181	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
250	250 mm Steel Wire
500	500 mm Steel Wire
1250	1250 mm Steel Wire

C	Housing
70	50 mm

D	Encoder Type
04	RI-04, Incremental
46	RM-46, Absolute, SSI
47	RM-47, Absolute, CANopen
99	RM-99, Absolute, SSI
101	RM-101, Absolute, CANopen, SAE J1939

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Pulse Rate/Resolution
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

Standard resolutions for draw wire with incremental encoder RI-04

Drum circumference (mm)	125	125	125
Pulses/revolution (ppr)	125	1250	2500
Pulses/mm	1	10	20
Resolution (mm)	1	0.1	0.05

Standard resolutions for draw wire with absolute encoder RM-46, RM-47, RM-99 or RM-101, (12-bit ST, programable via bus)

Drum circumference (mm)	125
Pulses/revolution (ppr)	4096
Pulses/mm	32.8
Resolution (mm)	0.03

Recommended standard variants (with incremental, absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-70-04-2H1250-C	RI-04Q6S-2H1250-C	Push-pull with inverted signal	8-30 VDC	Radial cable 2 M	1250 ppr	-
DWxxxx-70-99-3C12S12M-H1181	RM-99T6S-3C12S12M-H1181	SSI	10-30 VDC	Radial M12 connector	4096 ppr / SSI-Gray-Code	-
DWxxxx-70-101-9D38B-H1151	RM-101T6S-9D38B-H1151	CANopen	10-30 VDC	Radial M12 connector	CANopen encoder profile DS406 V4.0	-
DWxxxx-70-101-9F43B-H1151	RM-101T6S-9F43B-H1151	SAE J1939	10-30 VDC	1 x radial M12 connector	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B	-

Other variants (with absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-70-46-3C12S12M-CT1M	RM-46T6S-3C12S12M-CT1M	SSI	10-30 VDC	Tangential cable 1 M	4096 ppr / SSI-Gray-Code	-
DWxxxx-70-47-9D32B-CT1M	RM-47T6S-9D32B-CT1M	CANopen	10-30 VDC	Tangential cable 1 M	CANopen encoder profile DS406 V3.2	-



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

TURCK

Draw Wire Encoder DW70

Part Number Key: DW70 with Encoder(analog, scalable with limit switch function)

A	B		C		D		E	F		G		H
DW	250	-	70	-	97	-	7A	SALNS	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
250	250 mm Steel Wire
500	500 mm Steel Wire
1250	1250 mm Steel Wire

C	Housing
70	50 mm

D	Encoder Type
97	RM-97, Absolute, Analog

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Measuring Range
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

Recommended standard variants (with analog encoder, scalable with limit switch function)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-70-97-7ASALNS-H1151	RM-97T6S-7ASALNS-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable without limit switch function ¹⁾
DWxxxx-70-97-8BSALNS-H1151	RM-97T6S-8BSALNS-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable without limit switch function ¹⁾
DWxxxx-70-97-7ASALWL-H1151	RM-97T6S-7ASALWL-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable with limit switch function ²⁾
DWxxxx-70-97-8BSALWL-H1151	RM-97T6S-8BSALWL-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable with limit switch function ²⁾

¹⁾Sealed to measuring range
²⁾Unsealed

Part Number Key: DW70 with Analog Sensor

A	B		C		D		E
DW	250	-	70	-	7E	-	H1441

A	Type
DW	Draw Wire

B	Measuring Range
250	250 mm Steel Wire
500	500 mm Steel Wire
1250	1250 mm Steel Wire

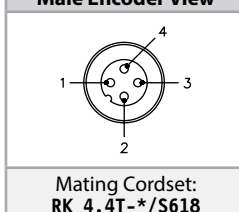
C	Housing
70	50 mm

D	Voltage Supply and Output Type
7E	12-30 VDC, 4-20 mA
8C	12-30 VDC, 0-10 V
PA	30 VDC max, 1 kΩ, Potentiometer

E	Type of Connection
H1441	Axial 4-pin M12 Eurofast Connector
CA	Axial Cable (2 m PVC)

Wiring Diagram (Analog Sensor):

Male Encoder View



* Length in meters.

Standard Wiring (Analog Sensor):

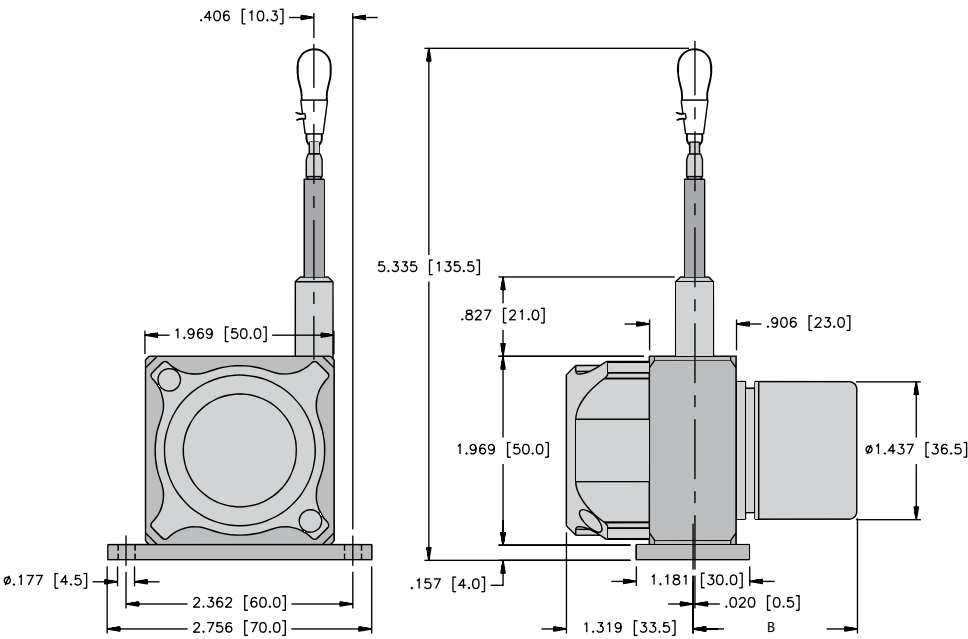
Pin	Color	0-10 V	4-20 mA	1 kΩm
1	BN	V+	V+	V+
2	WH	Signal	N/C	Slider
3	BU	GND	Signal	GND
4	BK	GND Sig.	N/C	N/C



Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW70

Dimensions: DW70 with Encoder



Dimension B depends on the encoder used

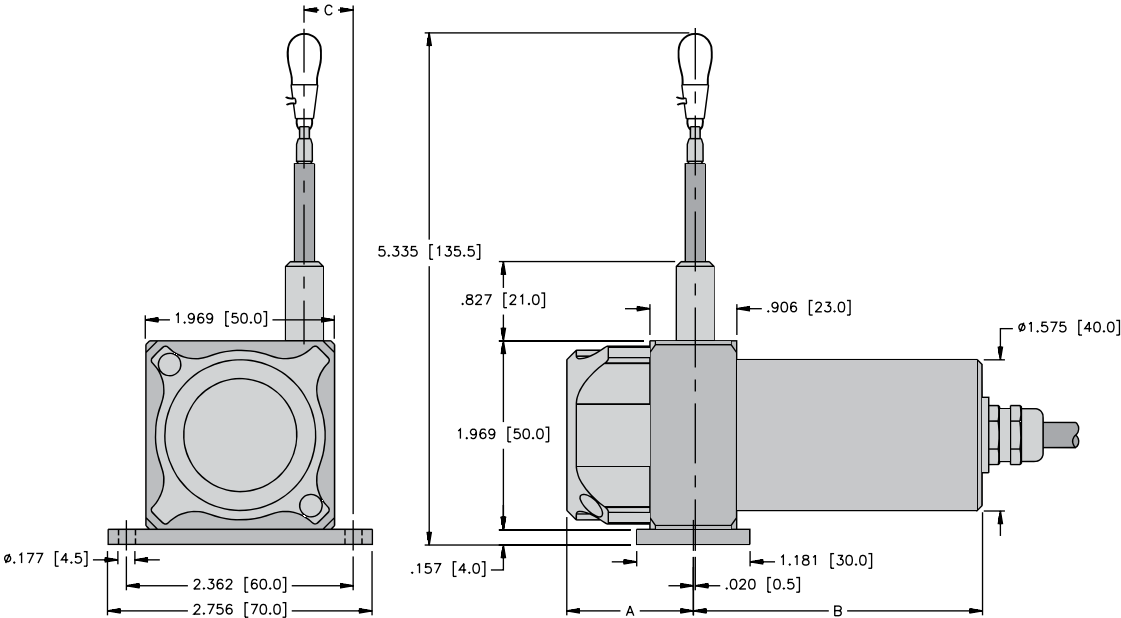
Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-04)	DW*****70-09-*****	1.69 [43.0]
Absolute (RM-97)	DW*****70-97-*****	2.46 [62.45]
Absolute (RM-99)	DW*****70-99-*****	2.46 [62.45]
Absolute (RM-101)	DW*****70-101-*****	2.46 [62.45]
Absolute (RM-46)	DW*****70-46-*****	2.02 [51.2]
Absolute (RM-47)	DW*****70-47-*****	2.02 [51.2]

We reserve the right to make technical alterations without prior notice.



Draw Wire Encoder DW70

Dimensions: DW70 with Analog Sensor



Sensor Type	Measuring Length	A in. [mm]	B in. [mm]	C in. [mm]
Potentiometer	250 mm	1.043 [26.5]	2.559 [65]	0.840 [21.3]
	500 mm	1.043 [26.5]	2.559 [65]	0.50 [12.75]
	1,250 mm	1.319 [33.5]	2.559 [65]	0.406 [10.3]
0-10 V 4-20 mA	250 mm	1.043 [26.5]	3.091 [78.5]	0.840 [21.3]
	500 mm	1.043 [26.5]	3.091 [78.5]	0.50 [12.75]
	1,250 mm	1.319 [33.5]	3.091 [78.5]	0.406 [10.3]

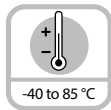
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Linear Position Technology

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW110



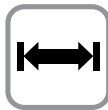
Wide temperature range
-40 to 85 °C



Reverse polarity protection



Max acceleration
140 m/s²



Long service life



High protection level
IP

Robust

- **Corrosion resistant:** Titanium-anodized aluminium housing.
- **High-strength stainless steel draw wire.**
- **Low friction design.** Diamond-polished ceramic guide.
- **Wide temperature range.**



EtherCAT
Conformance tested

Analog output

CANopen

SAE J1939

EtherNet/IP

Fast

- **High traverse speed.**
- **High acceleration:** Dynamic spring traction by means of a constant force spring.

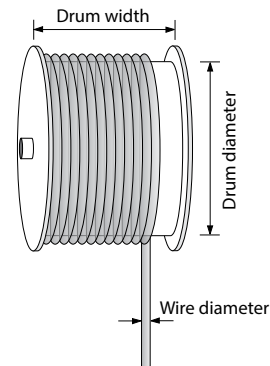
Versatile

- **Suitable for various sensors/encoders:** Absolute, fieldbus, incremental and analog.
- **Quick mounting:** Fastening by means of two screws.
- **Flexible connection options:** Cable, connector, radial, axial.
- **Linearity up to 0.05%.**

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:		1000 mm	2000 mm	3000 mm
Extension force:	Fmin	1.55 lbs (6.9 N)	1.44 lbs (6.4 N)	1.55 lbs (6.9 N)
	Fmax	1.87 lbs (8.3 N)	1.75 lbs (7.8 N)	2.20 lbs (9.8 N)
Max. speed:		32.8 ft/s (10 m/s)	32.8 ft/s (10 m/s)	32.8 ft/s (10 m/s)
Max. acceleration:		459.3 ft/s ² (140 m/s ²)	459.3 ft/s ² (140 m/s ²)	459.3 ft/s ² (140 m/s ²)
Linearity (of measuring range):				
	analog sensor	±0.15%	±0.1%	±0.1%
	encoder	±0.05%	±0.05%	±0.05%
Weight:		approx. 750 g (depending on the sensor/encoder used)		
Materials:		housing: titanium-anodized aluminium		
		wire: stainless steel Ø 0.5 mm		
Protection (encoder only):		IP65		

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



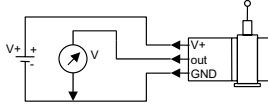
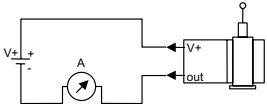
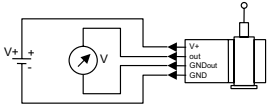
Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW110

Electrical Characteristics (Analog Output):

Analog output [Key Code]:	0-10 V [8C]	4-20 mA [7E]	Potentiometer [PA]
Output:	0-10 V galvanically isolated, 4 conductors	4-20 mA, 2 conductors	1 kOhm
Supply voltage:	12-30 VDC	12-30 VDC	max. 30 VDC
Recommended slider current:	-	-	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	-
Reverse polarity protection:	yes	yes	-
Operating temperature:	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)

Connection diagrams:



ROHS compliant according to EU guideline 2011/65/EU

Electrical Characteristics (Digital Output):

The electrical characteristics of the draw wire encoder assembly may be found in the catalog pages of the encoder selected.

Linear Position Technology

Part Number Key: DW110 with Encoder

A	B		C		D		E	F		G		H
DW	1000	-	110	-	10	-	2B	2000	-	H1181	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire

C	Housing
110	80 mm

D	Encoder Type
10	RI-10, Incremental
28	RM-28, Absolute, SSI
29	RM-29, Absolute, CANopen, EtherCAT, PROFIBUS-DP, PROFINET IO
103	RM-103, Absolute, SSI
105	RM-105, Absolute, CANopen, EtherNet/IP, Modbus
118	RM-118, Absolute, SSI
121	RM-121, Absolute, CANopen, SAE J1939

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Pulse Rate/Resolution
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

H	Specials
N85	Interchangeable Installation *
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below
*Optional

Accessories:

- See page H1, Connectivity, for cables and connectors



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW110

Standard resolutions for draw wire with incremental encoder RI-10, drum circumference 200 mm

Encoder PPR	200	2000	4000
Pulses/mm	1	10	20
Resolution (mm)	1	0.1	0.05

Standard resolutions for draw wire with absolute encoder RM-118 or RM-121, drum circumference 200 mm

Pulses/revolution	4096
Pulses/mm	20.5
Resolution (mm)	0.05

Recommended standard variants (with incremental, absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-110-10-2B2000-H1181	RI-10T10C-2B2000-H1181	Push-pull with inverted signal	10-30 VDC	Radial M12 connector	2000 ppr	-
DWxxxx-110-118-3C12S12M-H1181	RM-118T10C-3C12S12M-H1181	SSI	10-30 VDC	Radial M12 connector	4096 ppr / SSI-Gray-Code	-
DWxxxx-110-121-9D38B-H1151	RM-121T10C-9D38B-H1151	CANopen	10-30 VDC	Radial M12 connector	CANopen encoder profile DS406 V4.0	-

Other variants (with absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-110-103-3C12S12M-H1181	RM-103T10C-3C12S12M-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxxx-110-28-3C24B-H1181	RM-28T10C-3C24B-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxxx-110-105-9D38B-H1151/N46	RM-105T10C-9D38B-B1M12/N46	CANopen	10-30 VDC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxxx-110-29-9D28B-R2M12/N46	RM-29T10C-9D28B-R2M12/N46	CANopen	10-30 VDC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxxx-110-121-9F43B-H1151	RM-121T10C-9F43B-H1151	SAE J1939	10-30 VDC	1 x radial M12 connector	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B	-
DWxxxx-110-29-9A28B-R3M12/N46	RM-29T10C-9A28B-R3M12/N46	PROFIBUS	10-30 VDC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
DWxxxx-110-29-9C28B-R3M12	RM-29T10C-9C28B-R3M12	EtherCAT	10-30 VDC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
DWxxxx-110-29-9E28B-R3M12	RM-29T10C-9E28B-R3M12	PROFINET IO	10-30 VDC	3 x radial M12 connector	PROFINET encoder profile version 4.1	-
DWxxxx-110-105-9N32B-B3M12	RM-105T10C-9N32B-B3M12	EtherNet/IP	10-30 VDC	3 x axial M12 connector	EtherNet/IP	-

We reserve the right to make technical alterations without prior notice.



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

TURCK

Draw Wire Encoder DW110

Part Number Key: DW110 with Encoder (analog, scalable)

A	B		C		D		E	F		G		H
DW	1000	-	110	-	116	-	7A	AL	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire

C	Housing
110	80 mm

D	Encoder Type
116	RM-116, Absolute, Analog

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Measuring Range
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

H	Specials
N85	Interchangeable Installation *
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below
*Optional

Recommended standard variants (with analog encoder, scalable with limit switch function)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-110-116-7ASALNS-H1151	RM-116T10C-7ASALNS-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable without limit switch function
DWxxxx-110-116-8BSALNS-H1151	RM-116T10C-8BSALNS-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable without limit switch function
DWxxxx-110-116-7ASALWL-H1151	RM-116T10C-7ASALWL-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable with limit switch function
DWxxxx-110-116-8BSALWL-H1151	RM-116T10C-8BSALWL-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable with limit switch function

We reserve the right to make technical alterations without prior notice.

Linear Position Technology



Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW110

Part Number Key: DW110 with Analog Sensor

A	B		C		D		E
DW	1000	-	110	-	7E	-	H1441

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire

C	Housing
110	80 mm

D	Voltage Supply and Output Type
7E	12-30 VDC, 4-20 mA
8C	12-30 VDC, 0-10 V
PA	30 VDC max, 1 kΩ, Potentiometer

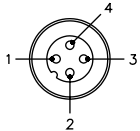
E	Type of Connection
H1441	Axial 4-pin M12 Eurofast Connector
CA	Axial Cable (2 m PVC)

Standard Wiring:

Pin	Color	0-10 V	4-20 mA	1 kOhm
1	BN	V+	V+	V+
2	WH	Signal	N/C	Slider
3	BU	GND	Signal	GND
4	BK	GND Sig.	N/C	N/C

Wiring Diagram:

Male Encoder View



Mating Cordset:
RK 4.4T-*/S618

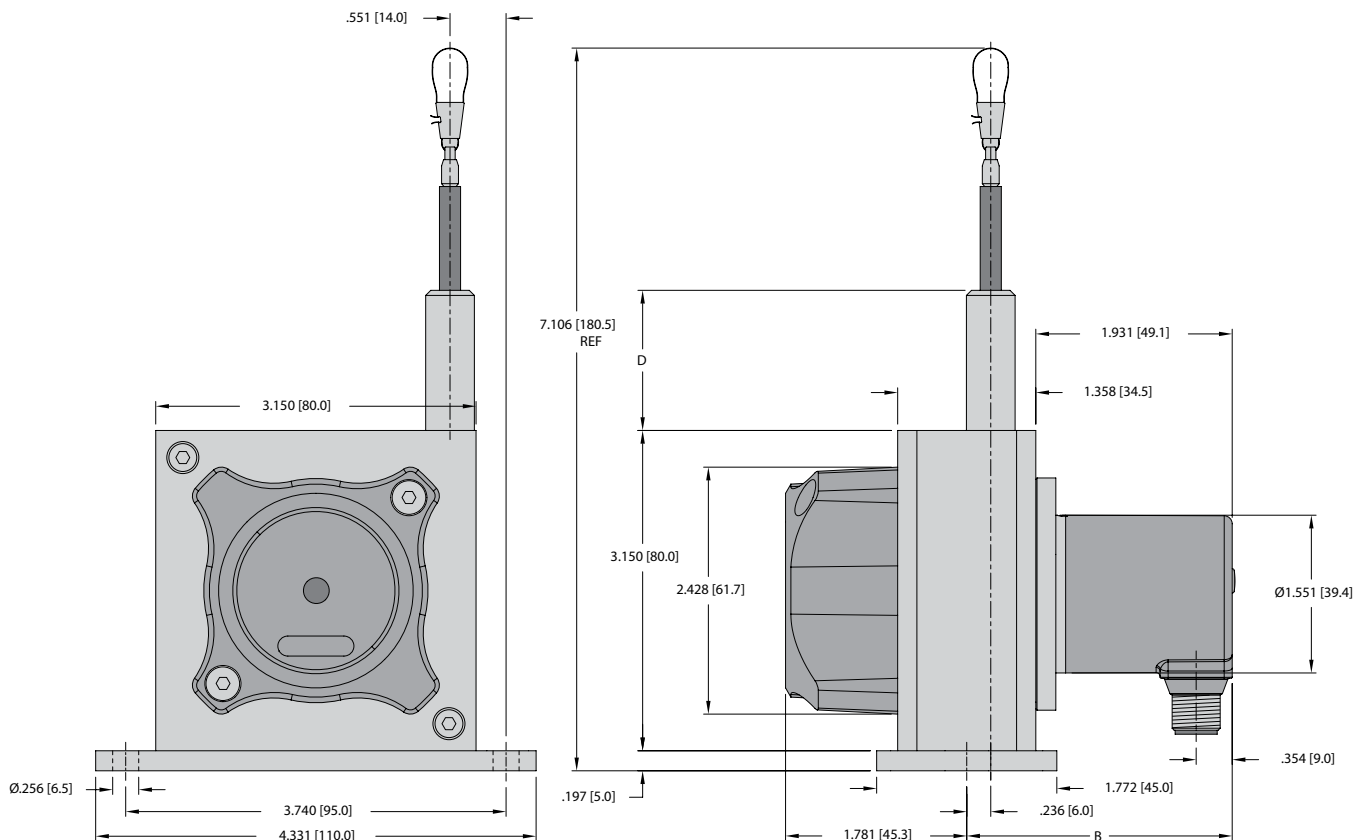
* Length in meters.

We reserve the right to make technical alterations without prior notice.



Draw Wire Encoder DW110

Dimensions: DW110 with Encoder (analog, scalable)



Dimension D depends on the measuring range of the draw wire

Measuring range	D in. [mm]
1000 mm	0.83 [21.0]
2000 mm	0.83 [21.0]
3000 mm	1.38 [35.0]

Dimension B depends on the encoder used

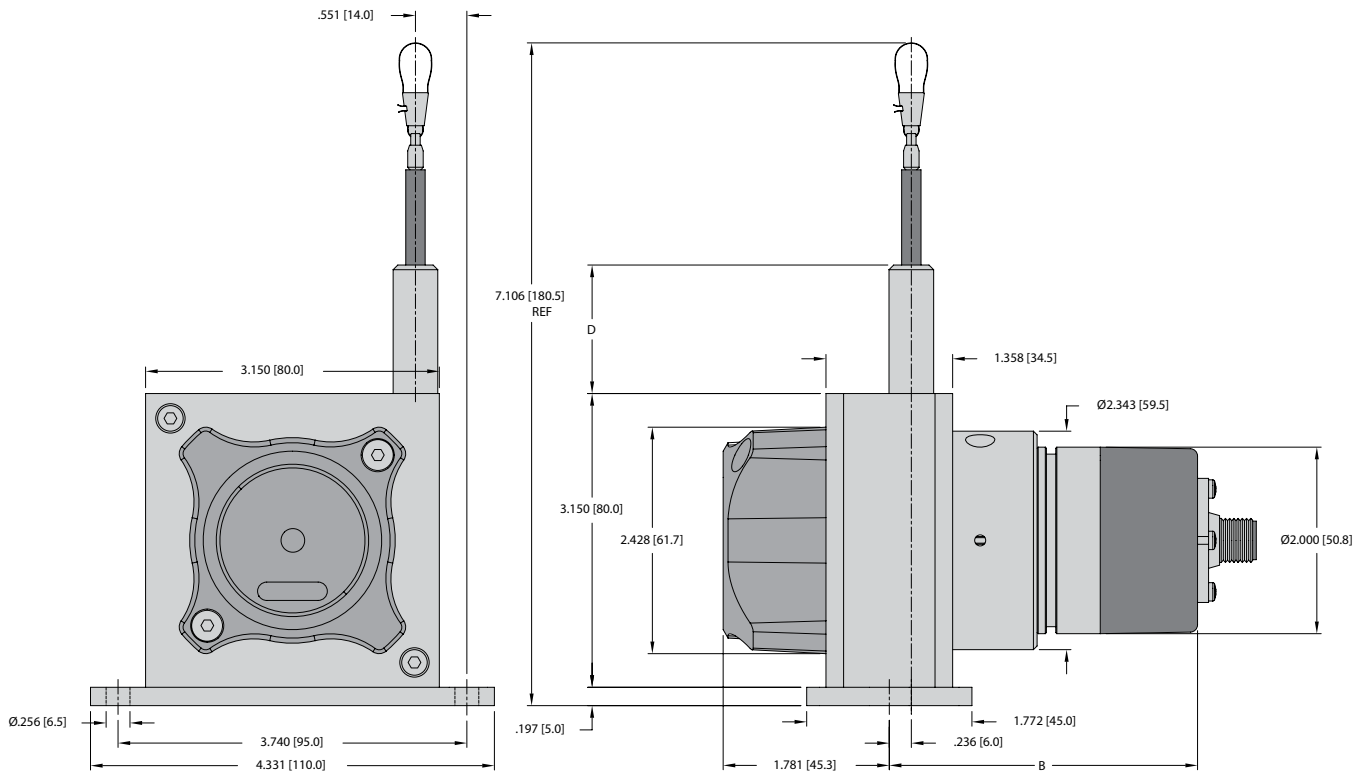
Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW****-110-10-*****-*****	2.19 [55.75]
Absolute (RM-28)	DW****-110-28-*****-*****	2.69 [68.25]
Absolute (RM-29)	DW****-110-29-*****-*****	3.75 [95.35]
Absolute (RM-103)	DW****-110-103-*****-*****	2.69 [68.25]
Absolute (RM-105) [EtherNet/IP]	DW****-135-105-*****-*****	3.02 [76.75]
Absolute (RM-105) [CANopen]	DW****-110-105-*****-*****	3.47 [88.25]
Absolute (RM-116)	DW****-110-116-*****-*****	2.69 [68.45]
Absolute (RM-118)	DW****-110-118-*****-*****	2.69 [68.45]
Absolute (RM-121)	DW****-110-121-*****-*****	2.69 [68.45]

Accessories:

- See page H1, Connectivity, for cables and connectors

Draw Wire Encoder DW110

Dimensions: DW110 with Interchangeable Installation



We reserve the right to make technical alterations without prior notice

Dimension D depends on the measuring range of the draw wire

Measuring range	D in. [mm]
1000 mm	0.83 [21.0]
2000 mm	0.83 [21.0]
3000 mm	1.38 [35.0]

Dimension B depends on the encoder used

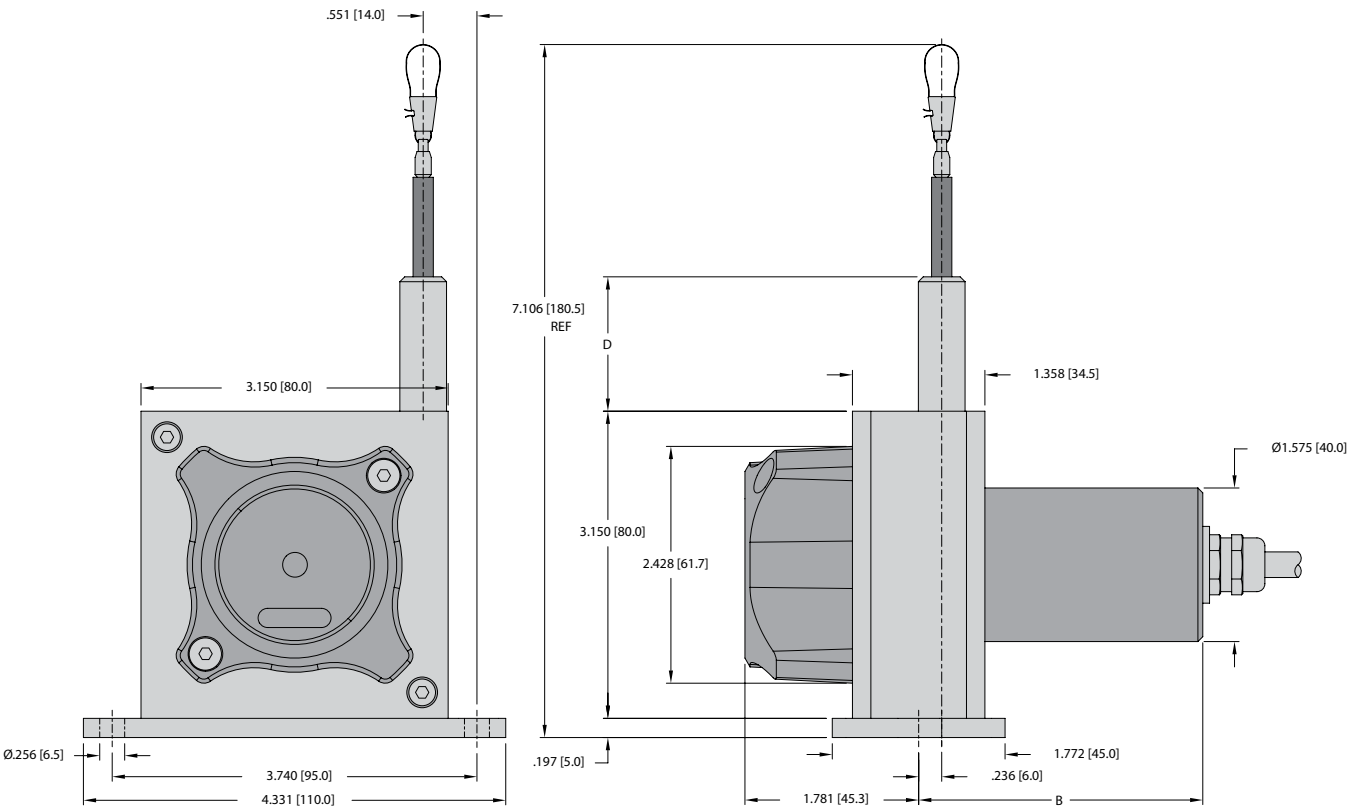
Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW****-110-10-*****-*****	3.10 [78.75]
Absolute (RM-28)	DW****-110-28-*****-*****	3.59 [91.25]
Absolute (RM-29)	DW****-110-29-*****-*****	4.66 [118.35]
Absolute (RM-103)	DW****-110-103-*****-*****	3.59 [91.25]
Absolute (RM-105) [EtherNet/IP]	DW****-135-105-*****-*****	3.93 [99.75]
Absolute (RM-105) [CANopen]	DW****-110-105-*****-*****	4.40 [111.25]
Absolute (RM-116)	DW****-110-116-*****-*****	3.60 [91.45]
Absolute (RM-118)	DW****-110-118-*****-*****	3.60 [91.45]
Absolute (RM-121)	DW****-110-121-*****-*****	3.60 [91.45]

Accessories:

- See page H1, Connectivity, for cables and connectors

Draw Wire Encoder DW110

Dimensions: DW110 with Analog Sensor



Sensor type	Measuring length	B	D
Potentiometer	1000 mm	2.91 [74.0]	0.83 [21.0]
	2000 mm	2.91 [74.0]	0.83 [21.0]
	3000 mm	4.04 [102.5]	2.56 [65.0]
4-20mA 0-10V	1000 mm	3.44 [87.5]	0.83 [21.0]
	2000 mm	3.44 [87.5]	0.83 [21.0]
	3000 mm	4.03 [102.3]	3.09 [78.5]

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW155



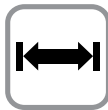
Wide temperature range



Reverse polarity protection



Max acceleration



Long service life



High protection level

Robust

- **Corrosion resistant:** Titanium-anodized aluminium housing.
- **High-strength stainless steel draw wire.**
- **Low friction design.** Diamond-polished ceramic guide.
- **Wide temperature range.**



EtherCAT
Conformance tested

Analog output

CANopen

SAE J1939
EtherNet/IP

Fast

- **High traverse speed.**
- **High acceleration:** Dynamic spring traction by means of a constant force spring.

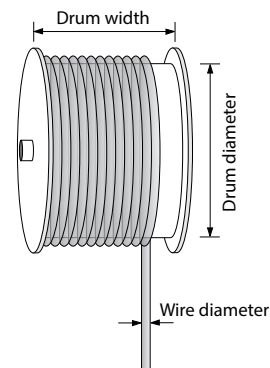
Versatile

- **Suitable for various sensors/encoders:** Absolute, fieldbus, incremental and analog.
- **Quick mounting:** Fastening by means of two screws.
- **Flexible connection options:** Cable, connector, radial, axial.

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:	6,000 mm (6 meter)
Extension force:	Fmin 1.98 (8.8 N) Fmax 2.77 lbs (12.3 N)
Max. speed:	32.8 ft/s (10 m/s)
Max. acceleration:	459.3 ft/s² (140 m/s²)
Linearity:	analog output: ±0.1% (of the measuring range) encoder: ±0.05% (of the measuring range)
Weight:	approx. 3.5 lbs (1,600 g) (depending on the sensor/encoder used)
Materials:	housing: titanium-anodized aluminium wire: stainless steel Ø 0.5 mm
Protection (encoder only):	IP65

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



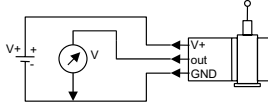
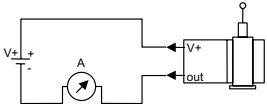
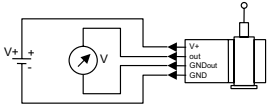
Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW155

Electrical Characteristics (Analog Sensor, Scaled to Measuring Range):

Analog output [Key Code]:	0-10 V [8C]	4-20 mA [7E]	Potentiometer [PA]
Output:	0-10 V galvanically isolated, 4 conductors	4-20 mA, 2 conductors	1 kOhm
Supply voltage:	12-30 VDC	12-30 VDC	max. 30 VDC
Recommended slider current:	-	-	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	-
Reverse polarity protection:	yes	yes	-
Operating temperature:	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)

Connection diagrams:



ROHS compliant according to EU guideline 2011/65/EU

Linear Position Technology

Part Number Key: DW155 with Encoder

A	B		C		D		E	F		G		H
DW	4000	-	155	-	10	-	2B	2000	-	H1181	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire
6000	6000 mm Steel Wire

C	Housing
155	120 mm

D	Encoder Type
10	RI-10, Incremental
28	RM-28, Absolute, SSI
29	RM-29, Absolute, CANopen, EtherCAT, PROFIBUS-DP, PROFINET IO
103	RM-103, Absolute, SSI
105	RM-105, Absolute, CANopen, Ethernet/IP, Modbus
118	RM-118, Absolute, SSI
121	RM-121, Absolute, CANopen, SAE J1939

E	Voltage Supply and Output Type
	Dependent on Encoder Selected*

F	Pulse Rate/Resolution
	Dependent on Encoder Selected*

G	Type of Connection
	Dependent on Encoder Selected*

H	Specials
N85	Interchangeable Installation ¹⁾
	Dependent on Encoder Selected*

¹⁾Optional
*Recommended encoders listed below

We reserve the right to make technical alterations without prior notice.



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW155

Standard resolutions for draw wire with incremental encoder RI-10, drum circumference 317.68 mm

Encoder PPR	1000	2000	3000
Pulses/mm	3.1	6.3	12.6
Resolution (mm)	0.32	0.16	0.08

Standard resolutions for draw wire with absolute encoder RM-118 or RM-121, drum circumference 317.68 mm

Pulses/revolution (ppr)	4096
Pulses/mm	12.9
Resolution (mm)	0.08

Recommended standard variants (with incremental, absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-155-10-2B2000-H1181	RI-10T10C-2B2000-H1181	Push-pull with inverted signal	10-30 VDC	Radial M12 connector	2000 ppr	-
DWxxxx-155-118-3C12S12M-H1181	RM-118T10C-3C12S12M-H1181	SSI	10-30 VDC	Radial M12 connector	4096 ppr / SSI-Gray-Code	-
DWxxxx-155-121-9D38B-H1151	RM-121T10C-9D38B-H1151	CANopen	10-30 VDC	Radial M12 connector	CANopen encoder profile DS406 V4.0	-

Other variants (with absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-155-103-3C12S12M-H1181	RM-103T10C-3C12S12M-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxxx-155-28-3C24B-H1181	RM-28T10C-3C24B-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxxx-155-105-9D38B-H1151/N46	RM-105T10C-9D38B-B1M12/N46	CANopen	10-30 VDC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxxx-155-29-9D28B-R2M12/N46	RM-29T10C-9D28B-R2M12/N46	CANopen	10-30 VDC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxxx-155-121-9F43B-H1151	RM-121T10C-9F43B-H1151	SAE J1939	10-30 VDC	1 x radial M12 connector	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B	-
DWxxxx-155-29-9A28B-R3M12/N46	RM-29T10C-9A28B-R3M12/N46	PROFIBUS	10-30 VDC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
DWxxxx-155-29-9C28B-R3M12	RM-29T10C-9C28B-R3M12	EtherCAT	10-30 VDC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
DWxxxx-155-29-9E28B-R3M12	RM-29T10C-9E28B-R3M12	PROFINET IO	10-30 VDC	3 x radial M12 connector	PROFINET encoder profile version 4.1	-
DWxxxx-155-105-9N32B-B3M12	RM-105T10C-9N32B-B3M12	EtherNet/IP	10-30 VDC	3 x axial M12 connector	EtherNet/IP	-

We reserve the right to make technical alterations without prior notice.



Draw Wire Encoder DW155

Part Number Key: DW155 with Encoder (analog, scalable)

A	B		C		D		E	F		G		H
DW	1000	-	155	-	116	-	7A	AL	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire

C	Housing
155	120 mm

D	Encoder Type
116	RM-116, Absolute, Analog

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Measuring Range
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

H	Specials
N85	Interchangeable Installation ¹⁾
	Dependent on Encoder Selected*

¹⁾Optional
*Recommended encoders listed below

Recommended standard variants (with analog encoder, scalable with limit switch function)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-155-116-7ASALNS-H1151	RM-116T10C-7ASALNS-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable without limit switch function
DWxxxx-155-116-8BSALNS-H1151	RM-116T10C-8BSALNS-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable without limit switch function
DWxxxx-155-116-7ASALWL-H1151	RM-116T10C-7ASALWL-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable with limit switch function
DWxxxx-155-116-8BSALWL-H1151	RM-116T10C-8BSALWL-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable with limit switch function

Accessories:

- See page H1, Connectivity, for cables and connectors

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW155

Part Number Key: DW155 with Analog Sensor

A	B		C		D		E
DW	4000	-	155	-	7E	-	H1441

A	Type
DW	Draw Wire

B	Measuring Range
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire
6000	6000 mm Steel Wire

C	Housing
155	120 mm

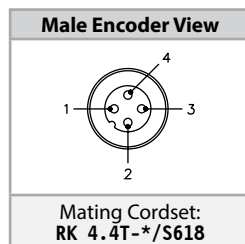
D	Voltage Supply and Output Type
7E	12-30 VDC, 4-20 mA
8C	12-30 VDC, 0-10 V
PA	30 VDC max, 1 kΩ, Potentiometer

E	Type of Connection
H1441	Axial 4-pin M12 Eurofast Connector
CA	Axial Cable (2 m PVC)

Standard Wiring:

Pin	Color	0-10 V	4-20 mA	1 kOhm
1	BN	V+	V+	V+
2	WH	Signal	N/C	Slider
3	BU	GND	Signal	GND
4	BK	GND Sig.	N/C	N/C

Wiring Diagram:



* Length in meters.

Accessories:

- See page H1, Connectivity, for cables and connectors

B74 B1027

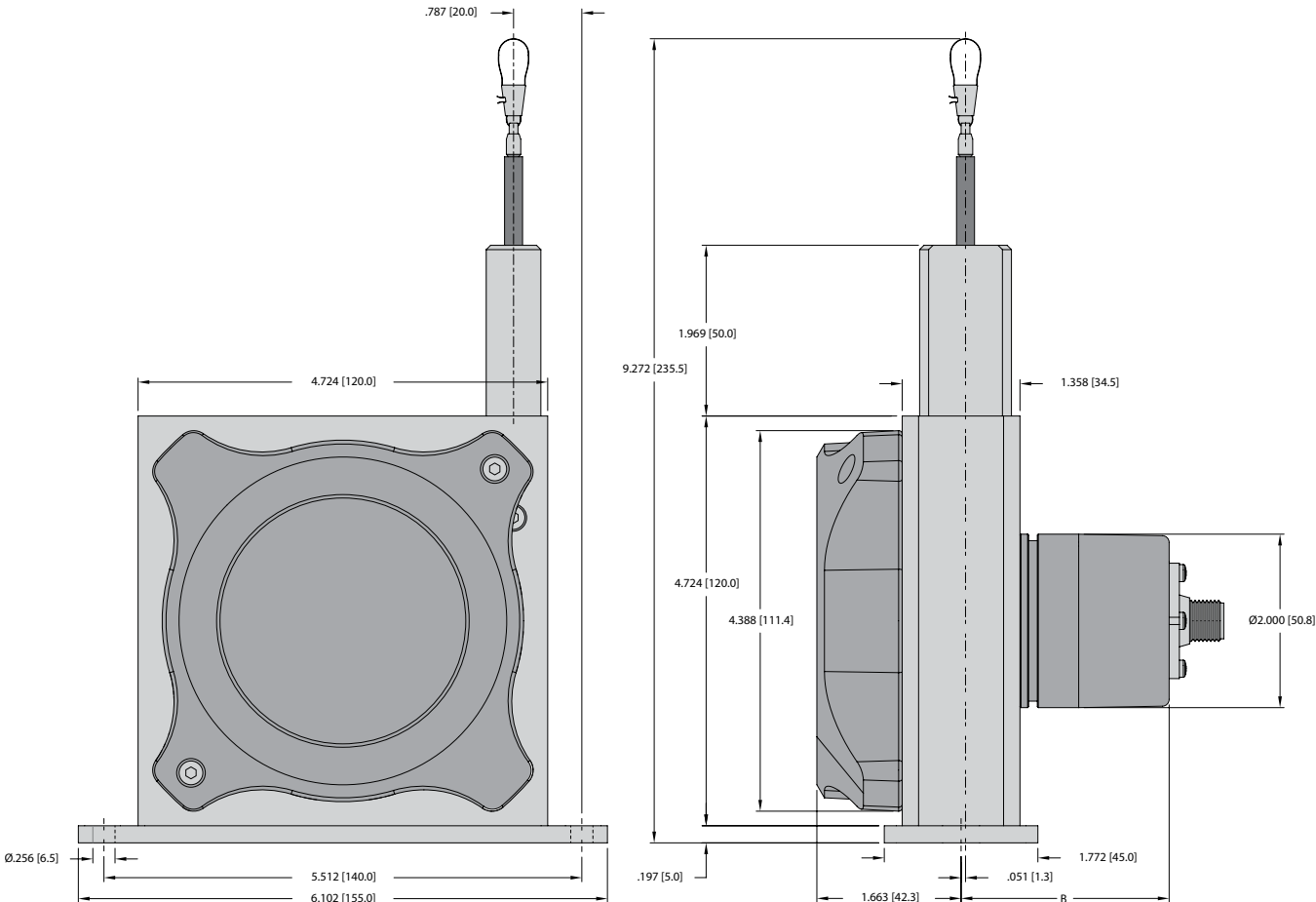


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Draw Wire Encoder DW155

Dimensions: DW155 with Encoder



Dimension B depends on the encoder used

Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW***-155-10-*****_*****	2.14 [54.25]
Absolute (RM-28)	DW***-155-28-*****_*****	2.63 [66.75]
Absolute (RM-29)	DW***-155-29-*****_*****	2.65 [67.35]
Absolute (RM-103)	DW***-155-103-*****_*****	2.63 [66.75]
Absolute (RM-105) [CANopen]	DW***-155-105-*****_*****	3.47 [88.25]
Absolute (RM-105) [Ethernet/IP]	DW***-155-105-*****_*****	3.02 [76.75]
Absolute (RM-116)	DW***-155-116-*****_*****	2.64 [67.05]
Absolute (RM-118)	DW***-155-118-*****_*****	2.64 [67.05]
Absolute (RM-121)	DW***-155-121-*****_*****	2.64 [67.05]

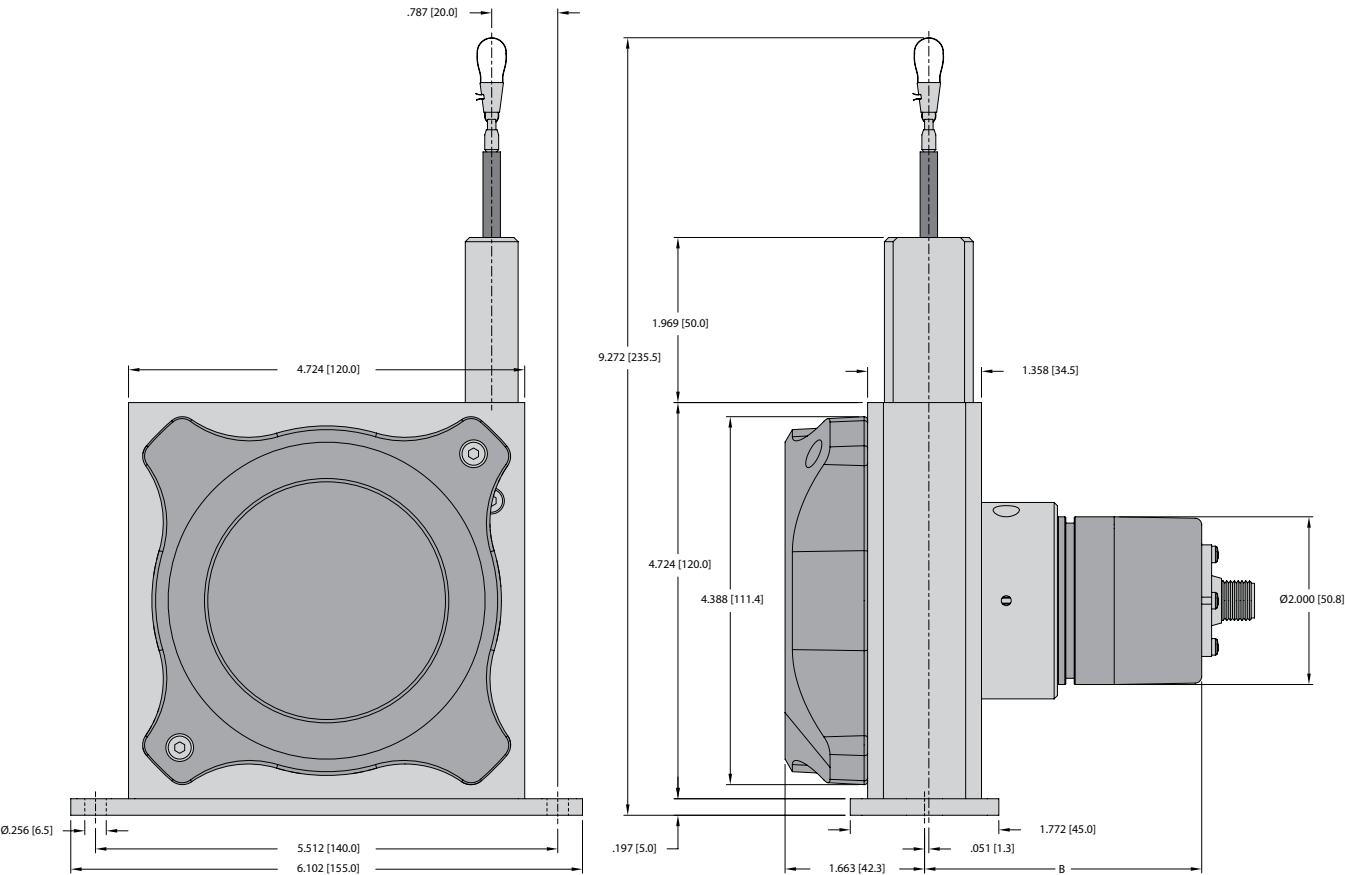
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Linear Position Technology

Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW155

Dimensions: DW155 with Encoder and Interchangeable Installation [N85]



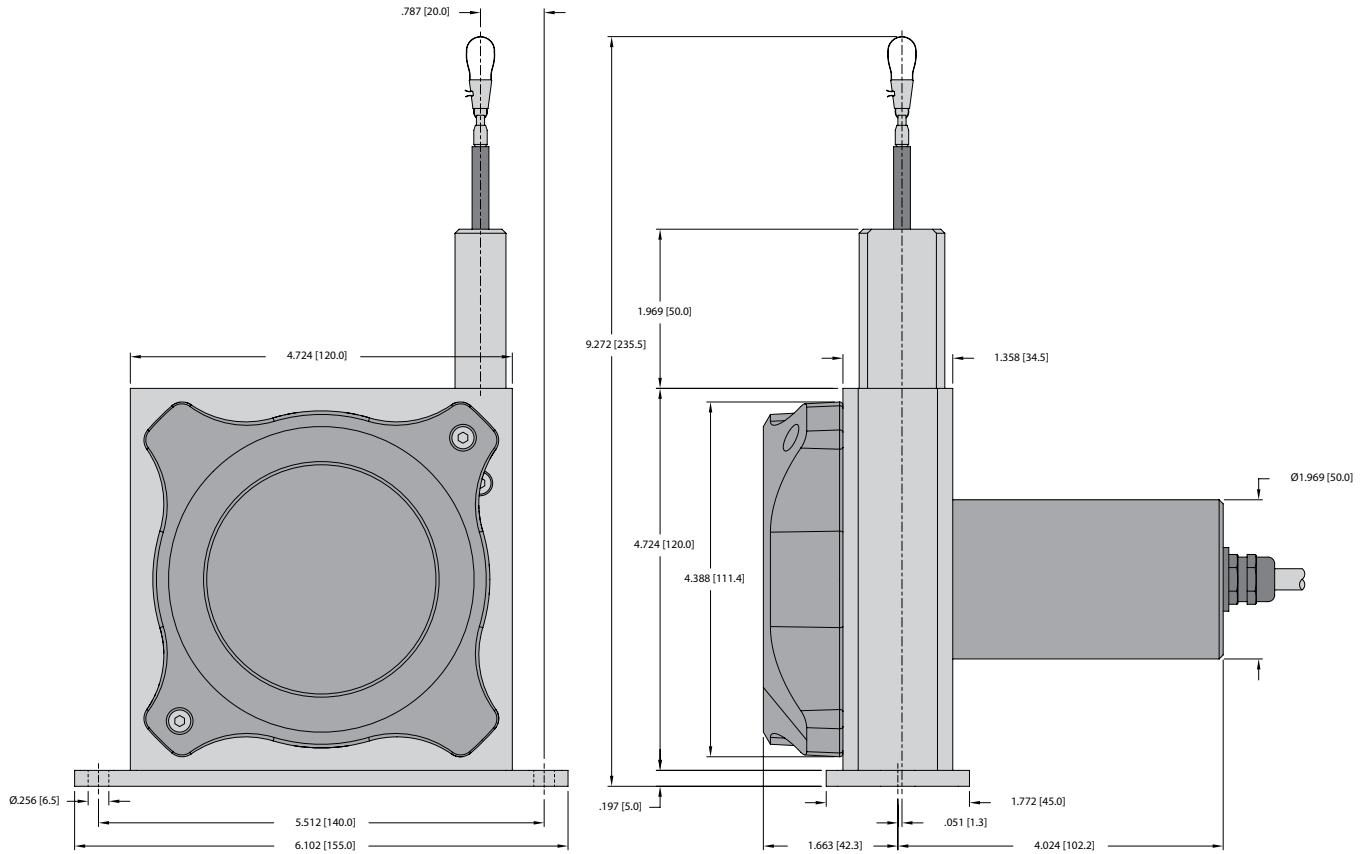
Dimension B depends on the encoder used

Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW****-155-10-*****/N85	3.04 [77.25]
Absolute (RM-28)	DW****-155-28-*****/N85	3.53 [89.75]
Absolute (RM-29)	DW****-155-29-*****/N85	3.55 [90.17]
Absolute (RM-103)	DW****-155-103-*****/N85	3.53 [89.75]
Absolute (RM-105) [CANopen]	DW****-155-105-*****/N85	4.38 [111.25]
Absolute (RM-105) [Ethernet/IP]	DW****-155-105-*****/N85	3.92 [99.56]
Absolute (RM-116)	DW****-155-116-*****/N85	3.54 [90.05]
Absolute (RM-118)	DW****-155-118-*****/N85	3.54 [90.05]
Absolute (RM-121)	DW****-155-121-*****/N85	3.54 [90.05]

We reserve the right to make technical alterations without prior notice.



Dimensions: DW155 with Analog Sensor



We reserve the right to make technical alterations without prior notice.

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Accessories:

- See page H1, Connectivity, for cables and connectors

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW135



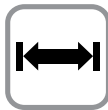
Wide temperature range



Reverse polarity protection



Max acceleration



Long service life



High protection level

Robust

- **Corrosion resistant:** Titanium-anodized aluminium housing.
- **High-strength stainless steel draw wire.**
- **Low friction design or wire exit free from wear:** Diamond-polished ceramic guide.
- **Wide temperature range.**



SAE J1939
EtherNet/IP

Versatile

- **Suitable for various sensors/encoders:** Absolute, fieldbus, incremental and analog.
- **Quick mounting:** Fastening by means of mounting feet.
- **Flexible connection options:** Cable, connector, radial, axial.
- **Linearity up to 0.05%.**

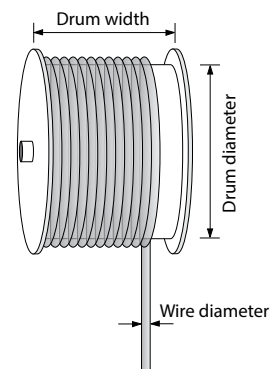
Dynamic

- **High traverse speed.**
- **High acceleration:** Dynamic spring traction by means of a constant force spring.

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:	8,000 mm	10,000-15,000 mm	20,000 mm	25,000-30,000 mm	35,000-42,500 mm
Extension force:	Fmin	1.62 lbs (7.2 N)	1.96 lbs (8.7 N)	1.57 lbs (7.0 N)	1.57 lbs (7.0 N)
	Fmax	3.60 lbs (16.0 N)	3.80 lbs (16.9 N)	2.79 lbs (12.4 N)	3.17 lbs (14.1 N)
Max. speed:		32.8 ft/s (10 m/s)	19.7 ft/s (6 m/s)	16.4 ft/s (5 m/s)	16.4 ft/s (5 m/s)
Max. acceleration:		459.3 ft/s² (140 m/s²)	262.5 ft/s² (80 m/s²)	196.8 ft/s² (60 m/s²)	196.8 ft/s² (60 m/s²)
Linearity:		analog output: ±0.1% (of the measuring range)			
		encoder: ±0.05% (of the measuring range)			
Weight:		approx. 1.65 lbs (750 g) (depending on the sensor/encoder used)			
Materials:		housing: titanium-anodized aluminium wire: stainless steel Ø 0.5 mm			
Protection (encoder only):		IP65			

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



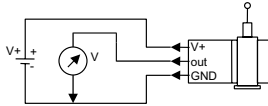
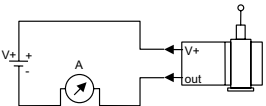
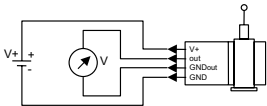
Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW135

Electrical Characteristics (Analog Output, Scaled to Measuring Range):

Analog output [Key Code]:	0-10 V [8C]	4-20 mA [7E]	Potentiometer [PA]
Output:	0-10 V galvanically isolated, 4 conductors	4-20 mA, 2 conductors	1 kOhm
Supply voltage:	12-30 VDC	12-30 VDC	max. 30 VDC
Recommended slider current:	-	-	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	-
Reverse polarity protection:	yes	yes	-
Operating temperature:	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)

Connection diagrams:



ROHS compliant according to EU guideline 2011/65/EU

Linear Position Technology

Part Number Key: DW135 with Encoder

A	B		C		D		E	F		G		H
DW	8000	-	135	-	10	-	2B	2000	-	H1181	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
8000	8000 mm Steel Wire
10000	10000 mm Steel Wire
12000	12000 mm Steel Wire
15000	15000 mm Steel Wire
20000	20000 mm Steel Wire
25000	25000 mm Steel Wire
30000	30000 mm Steel Wire
35000	35000 mm Steel Wire
40000	40000 mm Steel Wire
42500	42500 mm Steel Wire

C	Housing
135	135 mm

D	Encoder Type
10	RI-10, Incremental
28	RM-28, Absolute, SSI
29	RM-29, Absolute, CANopen, EtherCAT, PROFIBUS-DP, PROFINET IO
103	RM-103, Absolute, SSI
105	RM-105, Absolute, CANopen, Ethernet/IP, Modbus
118	RM-118, Absolute, SSI
121	RM-121, Absolute, CANopen, SAE J1939

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Pulse Rate/Resolution
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

H	Specials
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

We reserve the right to make technical alterations without prior notice.



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW135

Standard resolutions for draw wire with incremental encoder RI-10

Drum circumference (mm)	333.33	333.33	333.33
Encoder PPR	1000	2000	4000
Pulses/mm	3	6	12
Resolution (mm)	0.33	0.17	0.08

Standard resolutions for draw wire with absolute encoder RM-118 or RM-121 (12-bit ST, programmable via bus)

Drum circumference (mm)	333.33
Pulses/revolution (ppr)	4096
Pulses/mm	12.3
Resolution (mm)	0.08

Recommended standard variants (with incremental, absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxx-135-10-2B2000-H1181	RI-10T10C-2B2000-H1181	Push-pull with inverted signal	10-30 VDC	Radial M12 connector	2000 ppr	-
DWxxx-135-118-3C12S12M-H1181	RM-118T10C-3C12S12M-H1181	SSI	10-30 VDC	Radial M12 connector	4096 ppr / SSI-Gray-Code	-
DWxxx-135-121-9D38B-H1151	RM-121T10C-9D38B-H1151	CANopen	10-30 VDC	Radial M12 connector	CANopen encoder profile DS406 V4.0	-

Other variants (with absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxx-135-103-3C12S12M-H1181	RM-103T10C-3C12S12M-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxx-135-28-3C24B-H1181	RM-28T10C-3C24B-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxx-135-105-9D38B-H1151/N46	RM-105T10C-9D38B-B1M12/N46	CANopen	10-30 VDC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxx-135-29-9D28B-R2M12/N46	RM-29T10C-9D28B-R2M12/N46	CANopen	10-30 VDC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxx-135-121-9F43B-H1151	RM-121T10C-9F43B-H1151	SAE J1939	10-30 VDC	1 x radial M12 connector	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B	-
DWxxx-135-29-9A28B-R3M12/N46	RM-29T10C-9A28B-R3M12/N46	PROFIBUS	10-30 VDC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
DWxxx-135-29-9C28B-R3M12	RM-29T10C-9C28B-R3M12	EtherCAT	10-30 VDC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
DWxxx-135-29-9E28B-R3M12	RM-29T10C-9E28B-R3M12	PROFINET IO	10-30 VDC	3 x radial M12 connector	PROFINET encoder profile version 4.1	-
DWxxx-135-105-9N32B-B3M12	RM-105T10C-9N32B-B3M12	EtherNet/IP	10-30 VDC	3 x axial M12 connector	EtherNet/IP	-

We reserve the right to make technical alterations without prior notice.



Draw Wire Encoder DW135

Part Number Key: DW135 with Encoder (analog, scalable with limit switch function)

A	B		C		D		E	F		G		H
DW	8000	-	135	-	116	-	7A	SALNS	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
8000	8000 mm Steel Wire
10000	10000 mm Steel Wire
12000	12000 mm Steel Wire
15000	15000 mm Steel Wire
20000	20000 mm Steel Wire
25000	25000 mm Steel Wire
30000	30000 mm Steel Wire
35000	35000 mm Steel Wire
40000	40000 mm Steel Wire
42500	42500 mm Steel Wire

C	Housing
135	135 mm

D	Encoder Type
116	RM-116, Absolute

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Type of Connection
	Dependent on Encoder Selected ¹⁾

G	Pulse Rate/Resolution
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

Recommended standard variants (with analog encoder, scalable with limit switch function)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-135-116-7ASALNS-H1151	RM-116T10C-7ASALNS-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable without limit switch function
DWxxxx-135-116-8BSALNS-H1151	RM-116T10C-8BSALNS-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable without limit switch function
DWxxxx-135-116-7ASALWL-H1151	RM-116T10C-7ASALWL-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable with limit switch function
DWxxxx-135-116-8BSALWL-H1151	RM-116T10C-8BSALWL-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable with limit switch function

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW135

Part Number Key: DW135 with Analog Sensor (scaled to measuring range)

A	B		C		D		E
DW	8000	-	135	-	7E	-	H1441

A	Type
DW	Draw Wire

C	Housing
135	135 mm

B	Measuring Range
8000	8000 mm Steel Wire
10000	10000 mm Steel Wire
12000	12000 mm Steel Wire
15000	15000 mm Steel Wire
20000	20000 mm Steel Wire
25000	25000 mm Steel Wire
30000	30000 mm Steel Wire
35000	35000 mm Steel Wire
40000	40000 mm Steel Wire
42500	42500 mm Steel Wire

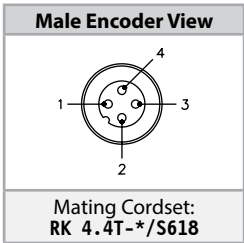
D	Voltage Supply and Output Type
7E	12-30 VDC, 4-20 mA
8C	12-30 VDC, 0-10 V
PA	30 VDC max, 1 kΩ, Potentiometer

E	Type of Connection
H1441	Axial 4-pin M12 Eurofast Connector
CA	Axial Cable (2m PVC)

Standard Wiring (analog sensor):

Pin	Color	0-10 V	4-20 mA	1 kOhm
1	BN	V+	V+	V+
2	WH	Signal	N/C	Slider
3	BU	GND	Signal	GND
4	BK	GND Sig.	N/C	N/C

Wiring Diagram:



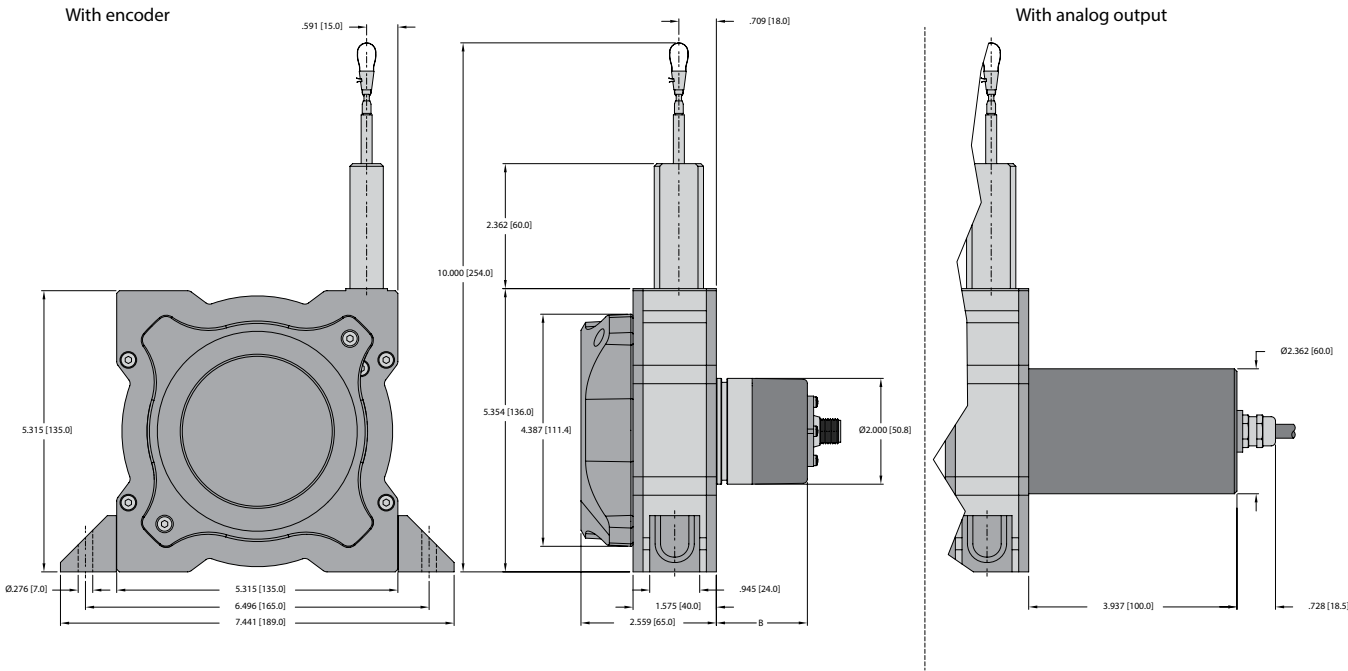
* Length in meters.

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Draw Wire Encoder DW135

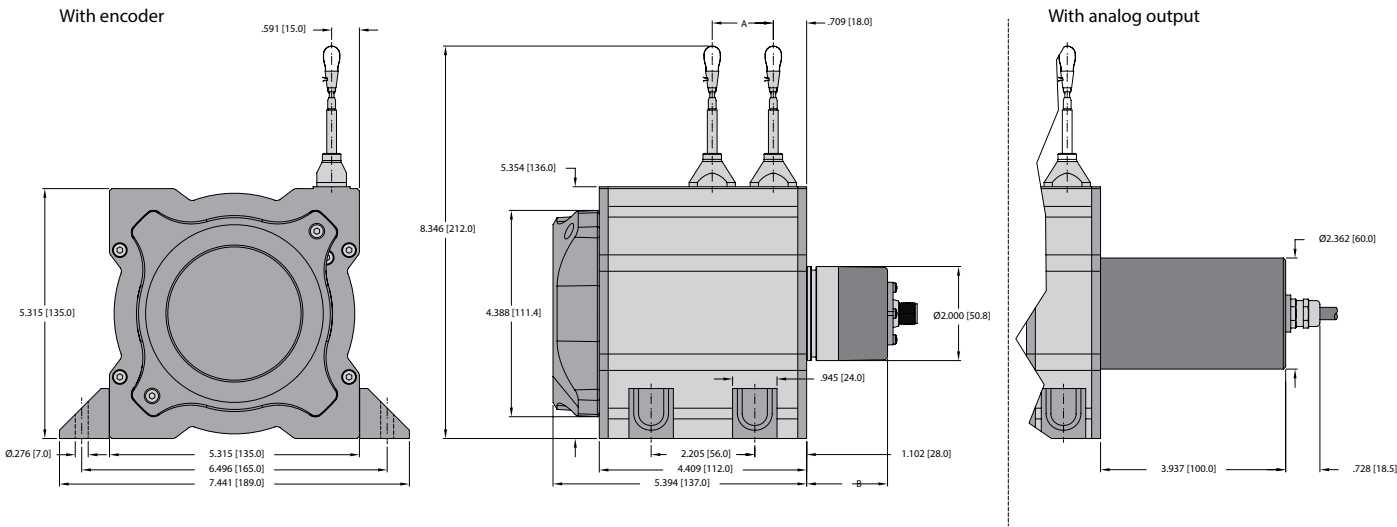
Dimensions: D135 with Encoder, Measuring Range 8,000 mm



Dimension B depends on the encoder used

Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW****-135-10-*****_****	1.46 [37.0]
Absolute (RM-28)	DW****-135-28-*****_****	1.95 [49.5]
Absolute (RM-29)	DW****-135-29-*****_****	3.04 [77.2]
Absolute (RM-103)	DW****-135-103-*****_****	1.95 [49.5]
Absolute (RM-105) [CANopen]	DW****-135-105-*****_****	2.76 [70.0]
Absolute (RM-105) [EtherNet/IP]	DW****-135-105-*****_****	2.34 [59.5]
Absolute (RM-116)	DW****-135-116-*****_****	1.96 [49.8]
Absolute (RM-118)	DW****-135-118-*****_****	1.96 [49.8]
Absolute (RM-121)	DW****-135-121-*****_****	1.96 [49.8]

Dimensions: DW135 with Encoder, Measuring Range 10,000 - 12,000 mm



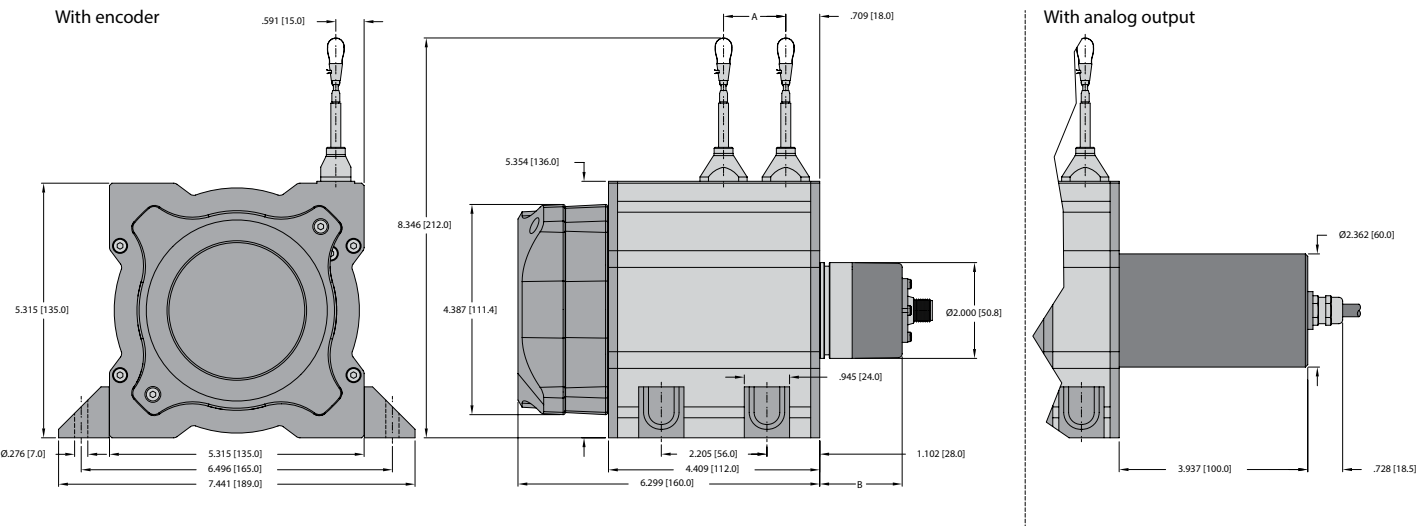
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Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW135

Dimensions: DW135 with Encoder, Measuring Range 15,000 - 20,000 mm

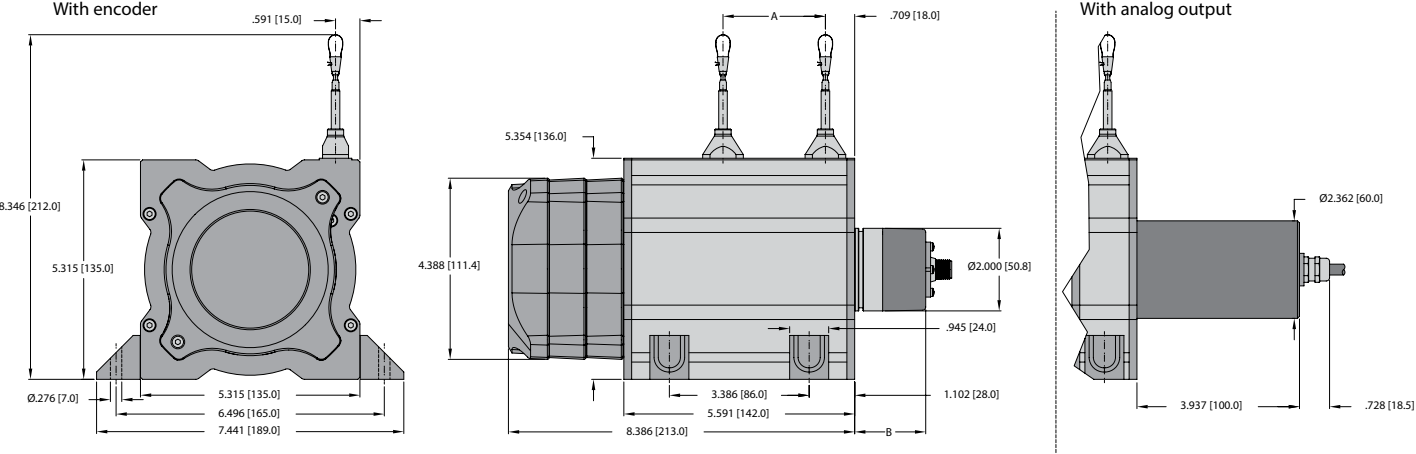


Measuring range	A - Wire rolled up	Wire pulled out
10000 mm	1.30 [33]	0.71 [18]
12000 mm	1.42 [36]	0.71 [18]
15000 mm	1.61 [41]	0.71 [18]
20000 mm	1.89 [48]	0.71 [18]

Dimension B depends on the encoder used

Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW*****135-10-*****_*****	2.36 [60.0]
Absolute (RM-28)	DW*****135-28-*****_*****	2.85 [72.5]
Absolute (RM-29)	DW*****135-29-*****_*****	2.85 [72.5]
Absolute (RM-103)	DW*****135-103-*****_*****	3.94 [100.2]
Absolute (RM-105) [CANopen]	DW*****135-105-*****_*****	3.66 [93.0]
Absolute (RM-105) [EtherNet/IP]	DW*****135-105-*****_*****	3.25 [82.5]
Absolute (RM-116)	DW*****135-116-*****_*****	2.87 [72.8]
Absolute (RM-118)	DW*****135-118-*****_*****	2.87 [72.8]
Absolute (RM-121)	DW*****135-121-*****_*****	2.87 [72.8]

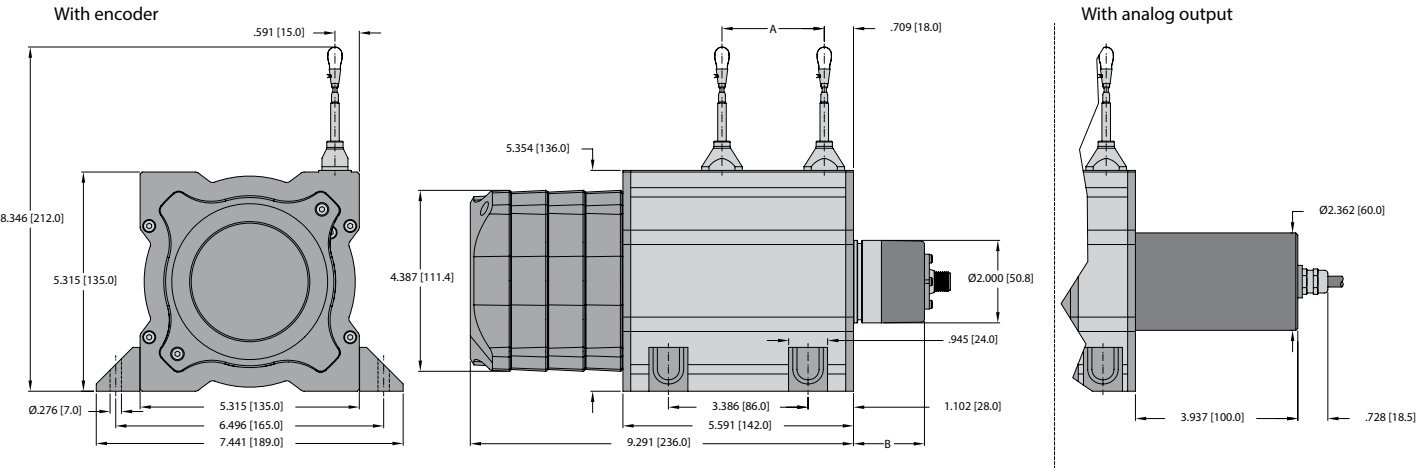
Dimensions: DW135 with Encoder, Measuring Range 25,000 - 30,000 mm



Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW135

Dimensions: DW135 with Encoder, Measuring Range 35,000 - 42,500 mm



Measuring range	A - Wire rolled up	Wire pulled out
25000 mm	2.02 [56]	0.71 [18]
30000 mm	2.48 [63]	0.71 [18]
35000 mm	2.80 [71]	0.71 [18]
40000 mm	3.07 [78]	0.71 [18]
42500 mm	3.23 [82]	0.71 [18]

Dimension B depends on the encoder used

Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW*****135-10-*****_*****	2.36 [60.0]
Absolute (RM-28)	DW*****135-28-*****_*****	2.85 [72.5]
Absolute (RM-29)	DW*****135-29-*****_*****	2.85 [72.5]
Absolute (RM-103)	DW*****135-103-*****_*****	3.94 [100.2]
Absolute (RM-105) [CANopen]	DW*****135-105-*****_*****	3.66 [93.0]
Absolute (RM-105) [EtherNet/IP]	DW*****135-105-*****_*****	3.25 [82.5]
Absolute (RM-116)	DW*****135-116-*****_*****	2.87 [72.8]
Absolute (RM-118)	DW*****135-118-*****_*****	2.87 [72.8]
Absolute (RM-121)	DW*****135-121-*****_*****	2.87 [72.8]

Accessories:

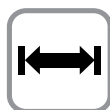
- See page H1, Connectivity, for cables and connectors



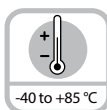
Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW60



Long service life



Wide temperature range
-40 to +85 °C



High protection level
IP69K



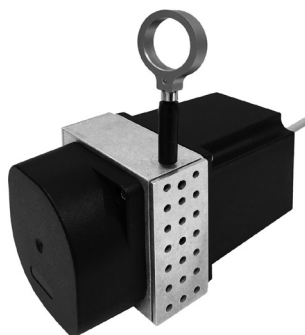
Redundancy



V4A

Robust

- Protection level up to IP69K and wide temperature range from -40 to +85 °C.
- The titanium-anodized aluminum housing and the stainless steel wires allow using the mechanics even in harsh conditions.
- Wire diameter (stainless steel, V4A) up to Ø1 mm - ideal for outdoor applications.



Analog output
CANopen

Versatile

- Measuring length up to 4 m.
- The right measuring wire and the right wire fastening for every application.
- Various constructions: open, closed housing or housing with perforated sheet steel cover.

Advantage

- Redundant outputs (mA, V, R, CANopen).
- Linearity up to $\pm 0.1\%$ of the measuring range.

Technical Data (Draw Wire Mechanics):

Linearity:	$\pm 0.5\%$, $\pm 1\%$ (See Linearity Table below)
Improved linearity:	$\pm 0.25\%$ or $\pm 0.1\%$
Resolution:	see electrical characteristics
Sensor element:	potentiometer
Output signal:	4 - 20 mA, 0 - 10 V, potentiometer, CANopen
Redundant output signal:	optional for: 4 - 20 mA, 0 - 10 V, potentiometer, CANopen
Connection:	axial M12 connector or axial cable outlet (TPE cable), standard length 2 m
Protection:	IP67, optional IP69K (only with cable outlet)
Humidity:	max. 90 % relative, no condensing
Max. speed:	9.84 ft/s [3.0 m/s]
Acceleration:	164.04 ft/s ² [50.0 m/s ²]
Weight:	up to approx. 0.92 lbs [420 g] depending on the measuring range
Housing:	aluminum, spring housing PA6
Spring force:	0.89 - 1.34 lbs [4 - 6 N] depending on the measuring range

Measuring Wire Characteristics:

V4A, Ø0.5 mm:

no.	1.4401
Breaking force	29.23 lbs (130 N)
TK	$16 \times 10^{-6} \text{ K}^{-1}$

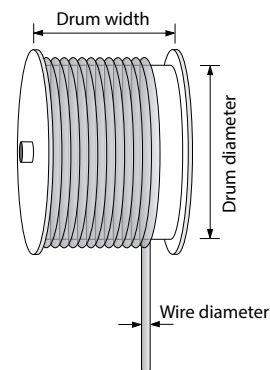
V4A, Ø0.7 mm:

no.	1.4401
Breaking force	48.56 lbs (216 N)
TK	$16 \times 10^{-6} \text{ K}^{-1}$

V4A, Ø1.0 mm:

no.	1.4401
Breaking force	107.5 lbs (478 N)
TK	$16 \times 10^{-6} \text{ K}^{-1}$

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

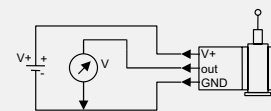
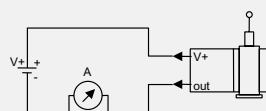
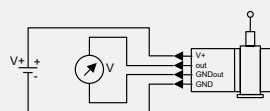


Draw Wire Encoder DW60

Electrical Characteristics (Analog Output):

Output circuit [Key Code]:	4-20 mA [7A/27A]	0-10 V [8C/28C]	1 k Ω , potentiometer [PA/2PA]
Output current:	max. 50 mA in case of a failure	max. 10 mA, min. load 10 k Ω	–
Max. current consumption:	–	22.5 mA (non load)	–
Power supply:	12 - 30 VDC	12 - 30 VDC	max. 30 VDC
Response time:	< 1 ms from 0 ... 100% and 100 ... 0%	< 3 ms from 0 ... 100% and 100 ... 0%	–
Resolution:	limited by the noise	limited by the noise	theoretically unlimited
Noise:	0.03 mA _{pp} = 6 mV _{pp} at 200 Ω	typ. 3 mV _{pp} , max. 37 mV _{pp}	depending on the supply voltage
Recommended slider current:	–	–	< 1 μ A
Reverse polarity protection:	yes	yes	–
Working temperature:	standard -4 to +185 °F (-20 to +85 °C) special option -40 to +185 °F (-40 to +85 °C)	-4 to +185 °F (-20 to +85 °C) -40 to +185 °F (-40 to +85 °C)	-4 to +185 °F (-20 to +85 °C) -40 to +185 °F (-40 to +85 °C)
Short circuit protection:	–	yes, sustained short-circuit protected	–
Temperature coefficient:	0.0079 %/K	0.0037 %/K	$\pm$ 0.0025 %/K

Connection diagrams:



Electromagnetic compatibility acc. to EN 61326-1:2013

ROHS compliant acc. to EU guideline 2011/65/EU

Interface Characteristics CANopen:

CAN specification:	Full CAN 2.0B (ISO11898)
Communication profile:	CANopen CiA 301 V4.2.0, Slave
Device profile:	Encoder, absolute linear, CiA 406 V3.2.0
Error monitoring:	Producer Heartbeat, Emergency Message, Node Guarding
Node ID:	Default: 7, adjustable via SDO
PDO:	1x TPDO, static mapping
PDO functions:	Event-triggered, time-triggered, Sync-cyclic, Sync-acyclic
Transmission rate:	Default: 250 kbit/s, 1Mbps, 800, 500, 250, 125, 50, 20 kbps adjustable via SDO
Bus connection:	M12 connection, 5-pin
Integrated bus terminating resistor:	120 ohms ready-to-activate via SDO
Bus, galvanic isolation:	no
Power supply:	8-30 VDC
Working temperature:	-4 to +185 °F (-20 to +85 °C) optional: -40 to +185 °F (-40 to +85 °C)
Current consumption:	typ. 10 mA at 24 V, 20 mA at 12 V
Measuring rate:	1 kHz with 16 bit resolution
Repeat accuracy:	$\pm$ 0.5%, $\pm$ 0.25% or $\pm$ 0.1% (according to the selected linearity)
Resolution:	0.002% of the measuring range
Reverse polarity protection:	yes
Electromagnetic compatibility:	acc. to EN 61326-1:2013
RoHS compliant acc. to EU guideline 2011/65/EU	

Standard Linearity:

Measuring Length	[m] Key Code	1.0 1000			1.5 1500			2.0 2000			2.5 2500			3.0 3000			3.5 3500			4.0 4000		
Wire Type	$\varnothing$ [mm] Key Code	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Standard Linearity	Key Code A	$\pm$ 0.5%			$\pm$ 0.5%			$\pm$ 0.5%			$\pm$ 1.0%			$\pm$ 0.5%			$\pm$ 1.0%			$\pm$ 0.5%		
Improved Linearity $\pm$ 0.25%	Key Code B	Y	Y	Y	Y	Y	Y	Y	Y	Y	–	Y	–	Y	–	–	–	–	–	–	–	–
Improved Linearity $\pm$ 0.1%	Key Code C	Y	Y	Y	Y	Y	Y	Y	Y	Y	–	Y	–	Y	–	–	–	–	–	–	–	–

Y = Feasible

– = not feasible

Accessories:

- See page H1, Connectivity, for cables and connectors

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW60

Standard Wiring (Analog Output):

Signal Type	H1441 Pin:	1	2	3	4	PH
4-20mA [7A]	Connection Type	+V	N/C	Signal	N/C	⊥
0-10V [8C]	Connection Type	+V	Signal	Common (0V)	Signal 0V	⊥
1kΩ pot.[PA]	Connection Type	+V	Slider	Common (0V)	N/C	⊥

Standard Wiring (CANopen Output):

Signal Type	H1451 Pin:	3	2	1	4	5
CANopen	Connection Type	Common (0V)	+V	CAN GND	CAN High	CAN Low

Standard Wiring (2x Analog Output):

Signal Type	H1481 Pin:	1	2	3	4	5	6	7	8	PH
2x 4-20mA [27A]	Connection Type	+V1	N/C	Signal1	N/C	+V2	N/C	Signal2	N/C	⊥
2x 0-10V [28C]	Connection Type	+V1	Signal1	Common1 (0V)	Signal 0V1	+V2	Signal2	Common2 (0V)	Signal 0V2	⊥
2x 1kΩ pot.[2PA]	Connection Type	+V1	Slider1	Common1 (0V)	N/C	+V2	Slider2	Common2 (0V)	N/C	⊥

Standard Wiring (Analog Output):

Signal Type	Cable Color:	BN	WH	BU	BK	Shield
4-20mA [7A]	Connection Type	+V	N/C	Signal	N/C	⊥
0-10V [8C]	Connection Type	+V	Signal	Common (0V)	Signal 0V	⊥
1kΩ pot.[PA]	Connection Type	+V	Slider	Common (0V)	N/C	⊥

Standard Wiring (CANopen Output):

Signal Type	Cable Color:	WH	BN	GY	GN	YE
CANopen	Connection Type	Common (0V)	+V	CAN GND	CAN High	CAN Low

Standard Wiring (2x Analog Output):

Signal Type	Cable Color:	WH	BN	GN	YE	GY	PK	BU	RD	Shield
2x 4-20mA [27A]	Connection Type	+V1	N/C	Signal1	N/C	+V2	N/C	Signal2	N/C	⊥
2x 0-10V [28C]	Connection Type	+V1	Signal1	Common1 (0V)	Signal 0V1	+V2	Signal2	Common2 (0V)	Signal 0V2	⊥
2x 1kΩ pot.[2PA]	Connection Type	+V1	Slider1	Common1 (0V)	N/C	+V2	Slider2	Common2 (0V)	N/C	⊥

Wiring Diagram:

Male Encoder View	Male Encoder View	Male Encoder View
Mating Cordset: RK 4.4T-*/S618	Mating Cordset: RKC 572-*/M/S3117	Mating Cordset: RKC 8T-*/S618

* Length in meters.

Accessories:

- See page H1, Connectivity, for cables and connectors



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

TURCK

Draw Wire Encoder DW60

Part Number Key: DW60 with Encoder

A	B		C		D1	D2	D3		E		F		G/H
DW	1000	-	60	-	A	A	A	-	7A	-	H1441	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
1500	1500 mm Steel Wire
2000	2000 mm Steel Wire
2500	2500 mm Steel Wire
3000	3000 mm Steel Wire
3500	3500 mm Steel Wire
4000	4000 mm Steel Wire

C	Housing
60	60 mm

D1	Wire Type
A	V4A, Ø 0.5 mm
B	V4A, Ø 0.7 mm
C	V4A, Ø 1.0 mm

D2	Linearity
A	0.5% to 1.0% (standard linearity)
B	0.25%
C	0.1%

D3	Housing
A	Open housing
B	Housing with perforated sheet metal cover
C	Closed housing

E	Voltage Supply and Output Type
7A	12-30 VDC, 4-20mA
27A	12-30 VDC, 2x 4-20mA
8C	12-30 VDC, 0-10 V
28C	12-30 VDC, 2x 0-10 V
PA	30 VDC max, 1 kΩ Potentiometer
2PA	30 VDC max, 2x kΩ Potentiometer
9D16B	8-30 VDC, CANopen, 16 bit
29D16B	8-30 VDC, 2x CANopen, 16 bit

F	Type of Connection
H1441	Axial 4-pin M12 Eurofast ¹⁾
H1451	Axial 5-pin M12 Eurofast ²⁾
H1481	Axial 8-pin M12 Eurofast ³⁾
CA	Axial Cable (2 m TPE)

¹⁾Only with output type '7A, 8C, PA'
²⁾Only with output type '9D16B, 29D16B'
³⁾Only with output type '27A, 28C, 2PA'

G	Special Temperature Rating
(Blank)	-4 to +185 °F (-20 to +85 °C)
N20	-40 to +185 °F (-40 to +85 °C)

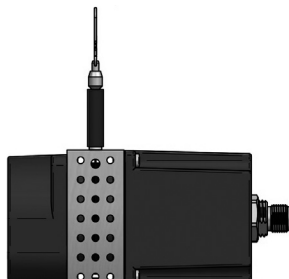
H	Special Wire Fastener
(Blank)	Snap Ring, Ø 17 mm
N74	Eyelet, Ø 20 mm
N75	M4 Thread

Housing types (the suitable housing type for every application)

Open housing [A]



Housing with perforated sheet metal cover [B]



Closed housing [C]



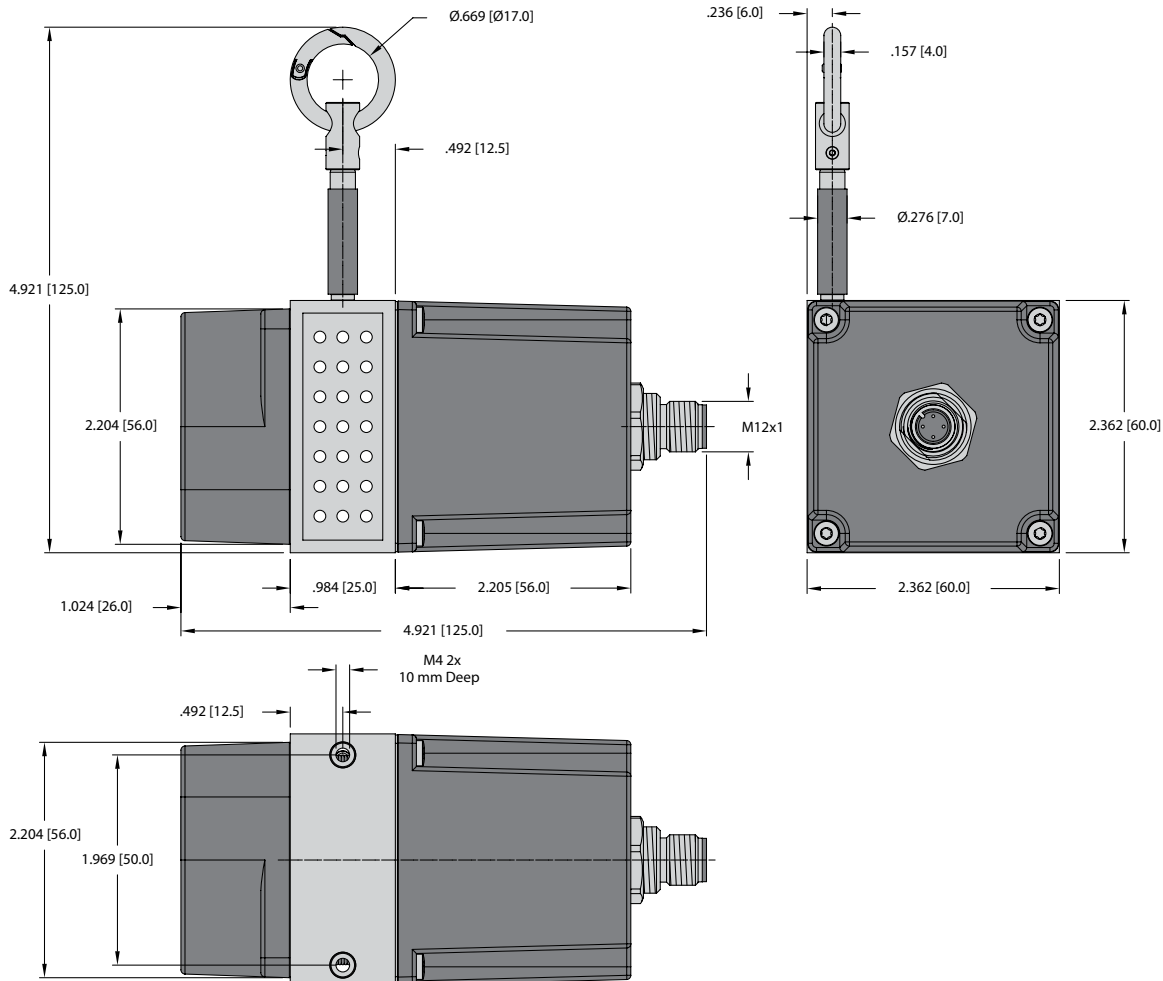
Draw Wire Encoder DW60

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We reserve the right to make technical alterations without prior notice

Draw Wire Encoder DW60

Dimensions: DW60 with Perforated Cover



Accessories:

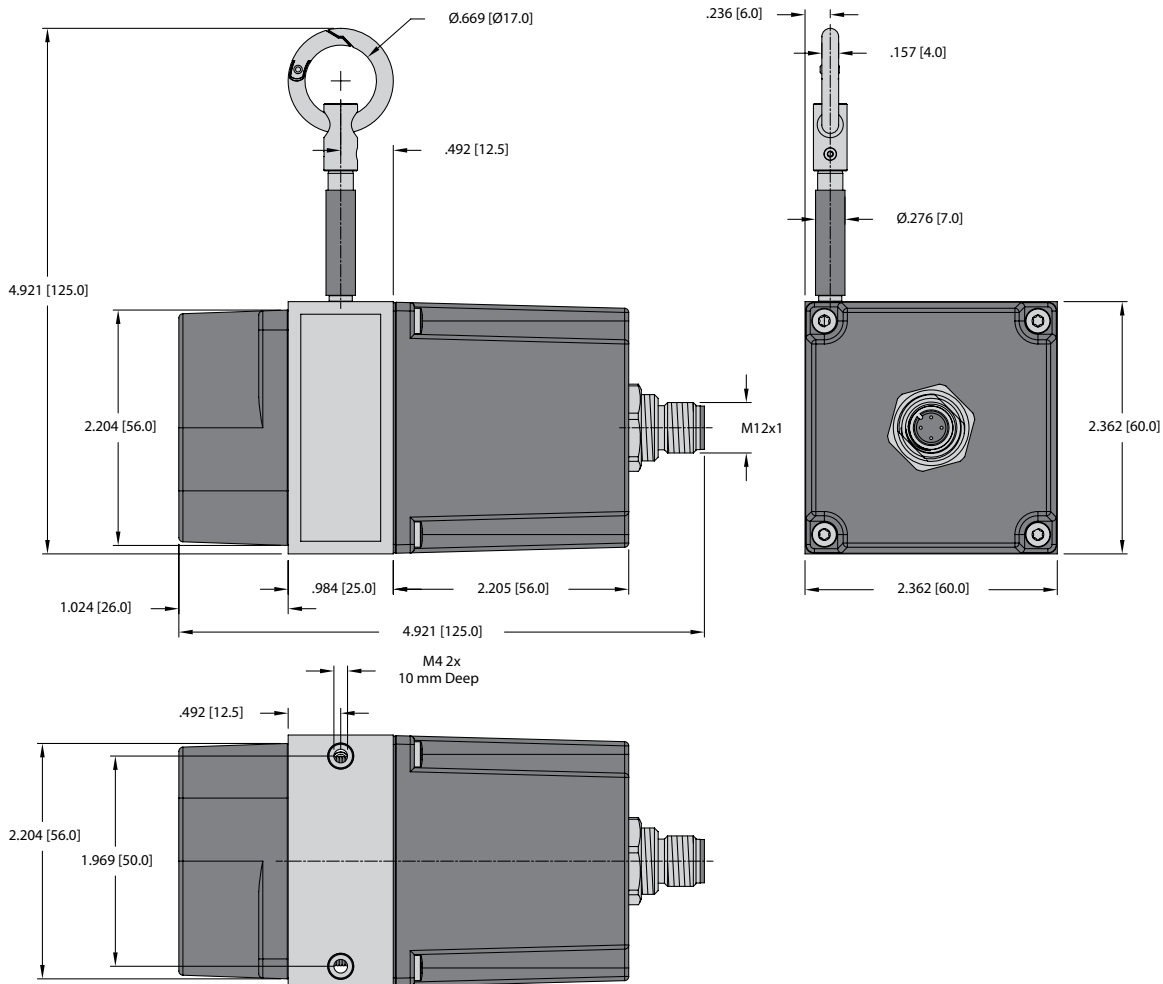
- See page H1, Connectivity, for cables and connectors

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW60

Dimensions: DW60 with Closed Housing



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Accessories:

- See page H1, Connectivity, for cables and connectors

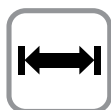
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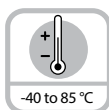
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Draw Wire Encoder DW120



Long service life



Wide temperature range
-40 to 85 °C



High protection level
IP69K



Redundancy



V4A

Robust

- Protection level up to IP69K and wide temperature range from -40 to 85 °C.
- The titanium-anodized aluminum housing and the stainless steel wires allow using the mechanics even in harsh conditions.
- Wire diameter (stainless steel, V4A) up to Ø1.5 mm - ideal for outdoor applications.



Advantage

- Redundant outputs (mA, V, R, CANopen).
- Linearity up to $\pm 0.1\%$ of the measuring range.

Versatile

- Measuring length up to 10 m.
- The right measuring wire and the right wire fastening for every application.
- Various constructions: open, closed housing or housing with perforated sheet steel cover.

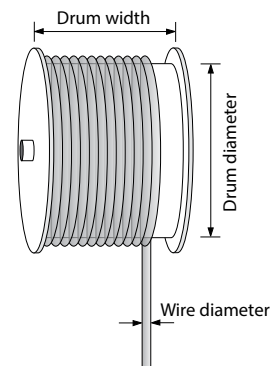
Technical Data (Draw Wire Mechanics):

Linearity:	$\pm 0.5\%$
Improved linearity:	$\pm 0.25\%$ or $\pm 0.1\%$
Resolution:	see electrical characteristics
Sensor element:	potentiometer
Output signal:	4 - 20 mA, 0 - 10 V, potentiometer, CANopen
Redundant output signal:	optional for: 4 - 20 mA, 0 - 10 V, potentiometer, CANopen
Connection:	radial M12 connector or radial cable outlet (TPE cable), standard length 2 m
Protection:	IP67, optional IP69K (only with cable outlet)
Humidity:	max. 90% relative, no condensing
Max speed:	9.84 ft/s (3 m/s)
Max acceleration:	164.04 ft/s ² (50 m/s ²)
Weight:	2.86 - 3.52 lbs (1300 - 1600 g) depending on the measuring range
Housing:	aluminum, spring housing PA6
Spring force:	1.57 - 2.92 lbs (7 - 13 N) depending on the measuring length

Measuring Wire Characteristics:

V4A, Ø0.5 mm	
Measuring range:	3-10 m
Breaking force:	62.94 lbs (280 N)
TK:	$16 \times 10^{-6} \text{ K}^{-1}$
V4A, Ø1.0 mm	
Measuring range:	3-8 m
Breaking force:	211.77 lbs (942 N)
TK:	$16 \times 10^{-6} \text{ K}^{-1}$
V4A, Ø1.5 mm	
Measuring range:	3-6 m
Breaking force:	424.88 lbs (1890 N)
TK:	$16 \times 10^{-6} \text{ K}^{-1}$

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

Linear Position Technology

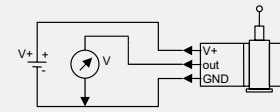
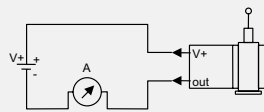
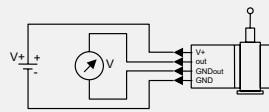
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW120

Electrical Characteristics (Analog Output):

Output circuit [Key Code]:	4-20 mA [7A/27A]	0-10 V [8C/28C]	1 k Ω , potentiometer [PA/2PA]
Output current:	max. 50 mA in case of a failure	max. 10 mA, min. load 10 k Ω	–
Max. current consumption:	–	22.5 mA (non load)	–
Power supply:	12 - 30 VDC	12 - 30 VDC	max. 30 VDC
Response time:	< 1 ms from 0 to 100% and 100 to 0%	< 3 ms from 0 to 100% and 100 to 0%	–
Resolution:	limited by the noise	limited by the noise	theoretically unlimited
Noise:	0.03 mA _{pp} = 6 mV _{pp} at 200 Ω	typ. 3 mV _{pp} , max. 37 mV _{pp}	depending on the supply voltage
Recommended slider current:	–	–	< 1 μ A
Reverse polarity protection:	yes	yes	–
Working temperature:	-4 to +185 °F (-20 to +85 °C) -40 to +185 °F (-40 to +85 °C)	-4 to +185 °F (-20 to +85 °C) -40 to +185 °F (-40 to +85 °C)	-4 to +185 °F (-20 to +85 °C) -40 to +185 °F (-40 to +85 °C)
Short circuit protected:	–	yes, sustained short-circuit protected	–
Temperature coefficient:	0.0079 %/K	0.0037 %/K	±0.0025 %/K

Connection diagrams:



Electromagnetic compatibility acc. to EN61326-1:2013

–

–

RoHS compliant acc. to EU guideline: 2011/65/EU

Interface Characteristics CANopen:

CAN specification:	Full CAN 2.0B (ISO11898)
Communication profile:	CANopen CiA 301 V4.2.0
Device profile:	Encoder, absolute linear, CiA 406 V3.2.0
Error monitoring:	Producer Heartbeat, Emergency Message, Node Guarding
Node ID:	Default: 7, adjustable via SDO
PDO:	1x TPDO, static mapping
PDO functions:	Event-triggered, time-triggered, Sync-cyclic, Sync-acyclic
Transmission rate:	Default: 250 kbit/s, 1Mbps, 800, 500, 250, 125, 50, 20 kbps adjustable via SDO
Bus connection:	M12 connection, 5-pin
Integrated bus terminating resistor:	120 ohms ready-to-activate via SDO
Bus, galvanic isolation:	no
Power supply:	8-30 VDC
Working temperature:	-4 to +185 °F (-20 to +85 °C) Optional: -40 to +185 °F (-40 to +85 °C)
Current consumption:	typ. 10 mA at 24 V, 20 mA at 12 V
Measuring rate:	1 kHz with 16 bit resolution
Repeat accuracy:	±0.5%, ±0.25% or ±0.1%(according to the selected linearity)
Resolution:	0.002% of the measuring range
Reverse polarity protection:	yes
Electromagnetic compatibility acc. to EN61326-1:2013	
RoHS compliant acc. to EU guideline: 2011/65/EU	

Accessories:

- See page H1, Connectivity, for cables and connectors

B94 B1027



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Draw Wire Encoder DW120

Standard Wiring (Analog Output):

Signal Type	H1141 Pin:	1	2	3	4	PH
4-20mA [7A]	Connection Type	+V	N/C	Signal	N/C	⊥
0-10V [8C]	Connection Type	+V	Signal	Common (0V)	Signal 0V	⊥
1kΩ pot.[PA]	Connection Type	+V	Slider	Common (0V)	N/C	⊥

Standard Wiring (CANopen Output):

Signal Type	H1151 Pin:	3	2	1	4	5
CANopen	Connection Type	Common (0V)	+V	CAN GND	CAN High	CAN Low

Standard Wiring (2x Analog Output):

Signal Type	H1181 Pin:	1	2	3	4	5	6	7	8	PH
2x 4-20mA [27A]	Connection Type	+V1	N/C	Signal1	N/C	+V2	N/C	Signal2	N/C	⊥
2x 0-10V [28C]	Connection Type	+V1	Signal1	Common1 (0V)	Signal 0V1	+V2	Signal2	Common2 (0V)	Signal 0V2	⊥
2x 1kΩ pot.[2PA]	Connection Type	+V1	Slider1	Common1 (0V)	N/C	+V2	Slider2	Common2 (0V)	N/C	⊥

Standard Wiring (Analog Output):

Signal Type	Cable Color:	BN	WH	BU	BK	Shield
4-20mA [7A]	Connection Type	+V	N/C	Signal	N/C	⊥
0-10V [8C]	Connection Type	+V	Signal	Common (0V)	Signal 0V	⊥
1kΩ pot.[PA]	Connection Type	+V	Slider	Common (0V)	N/C	⊥

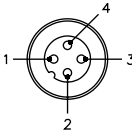
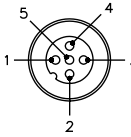
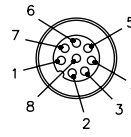
Standard Wiring (CANopen Output):

Signal Type	Cable Color:	WH	BN	GY	GN	YE
CANopen	Connection Type	Common (0V)	+V	CAN GND	CAN High	CAN Low

Standard Wiring (2x Analog Output):

Signal Type	Cable Color:	WH	BN	GN	YE	GY	PK	BU	RD	Shield
2x 4-20mA [27A]	Connection Type	+V1	N/C	Signal1	N/C	+V2	N/C	Signal2	N/C	⊥
2x 0-10V [28C]	Connection Type	+V1	Signal1	Common1 (0V)	Signal 0V1	+V2	Signal2	Common2 (0V)	Signal 0V2	⊥
2x 1kΩ pot.[2PA]	Connection Type	+V1	Slider1	Common1 (0V)	N/C	+V2	Slider2	Common2 (0V)	N/C	⊥

Wiring Diagram:

Male Encoder View	Male Encoder View	Male Encoder View
		
Mating Cordset: RK 4.4T-* / S618	Mating Cordset: RKC 572-*M / S3117	Mating Cordset: RKC 8T-* / S618

* Length in meters.

Accessories:

- See page H1, Connectivity, for cables and connectors

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW120

Part Number Key: DW120 with Encoder

A	B		C		D1	D2	D3		E		F		G/H
DW	3000	-	120	-	A	A	A	-	7A	-	H1141	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
3000	3000 mm Steel Wire
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire
6000	6000 mm Steel Wire
7000	7000 mm Steel Wire
8000	8000 mm Steel Wire
9000	9000 mm Steel Wire
10000	10000 mm Steel Wire

C	Housing
120	120 mm

D1	Wire Type
A	V4A, Ø 0.5 mm
B	V4A, Ø 1.0 mm ¹⁾
C	V4A, Ø 1.5 mm ²⁾

¹⁾For measuring range 3000-8000
²⁾For measuring range 3000-6000

D2	Linearity
A	0.5%
B	0.25%
C	0.7%

D3	Housing
A	Open housing, open wire guide
B	Housing with perforated sheet metal cover, open wire guide
C	Housing with perforated sheet metal cover, closed wire guide
D	Closed housing, closed wire guide

E	Voltage Supply and Output Type
7A	12-30 VDC, 4-20mA
27A	12-30 VDC, 2x 4-20mA
8C	12-30 VDC, 0-10 V
28C	12-30 VDC, 2x 0-10 V
PA	30 VDC max, 1 kΩ Potentiometer
2PA	30 VDC max, 2x kΩ Potentiometer
9D16B	8-30 VDC, CANopen, 16 bit
29D16B	8-30VDC, 2x CANopen, 16-bit

F	Type of Connection
H1141	Radial 4-pin M12 Eurofast ³⁾
H1151	Radial 5-pin M12 Eurofast ⁴⁾
H1181	Radial 8-pin M12 Eurofast ⁵⁾
C	Radial Cable (2 m TPE)

³⁾Only with output type '7A, 8C, PA'
⁴⁾Only with output type '9D16B, 29D16B'
⁵⁾Only with output type '27A, 28C, 2PA'

G	Special Temperature Rating
(Blank)	-4 to +185 °F (-20 to +85 °C)
N20	-40 to +185 °F (-40 to +85 °C)

H	Special Wire Fastener
(Blank)	Snap Ring, Ø 17 mm
N74	Eyelet, Ø 20 mm
N75	M4 thread

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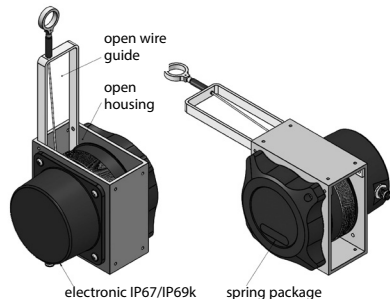


Draw Wire Encoder DW120

Housing types (the suitable housing type for every application)

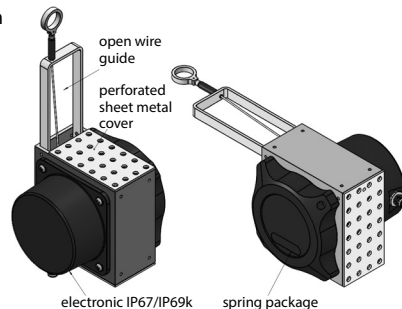
Open housing, open wire guide [A]

For use in the presence of fine dust and liquids.



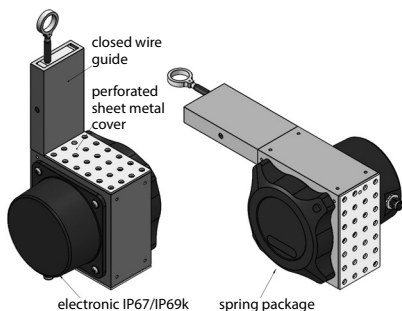
Housing with perforated sheet metal cover, open wire guide [B]

For use in the presence of dirt, particles size > 2 mm and liquids.



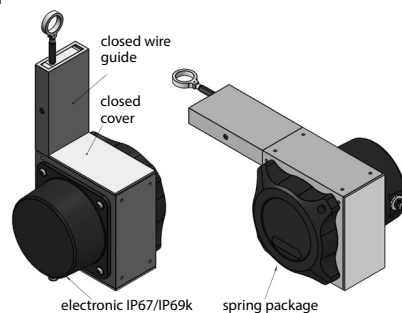
Housing with perforated sheet metal cover, closed wire guide [C]

For use in the presence of dirt, particles size > 2 mm and liquids.
Shock protection, wire cleaning device (in preparation).



Closed housing, closed wire guide [D]

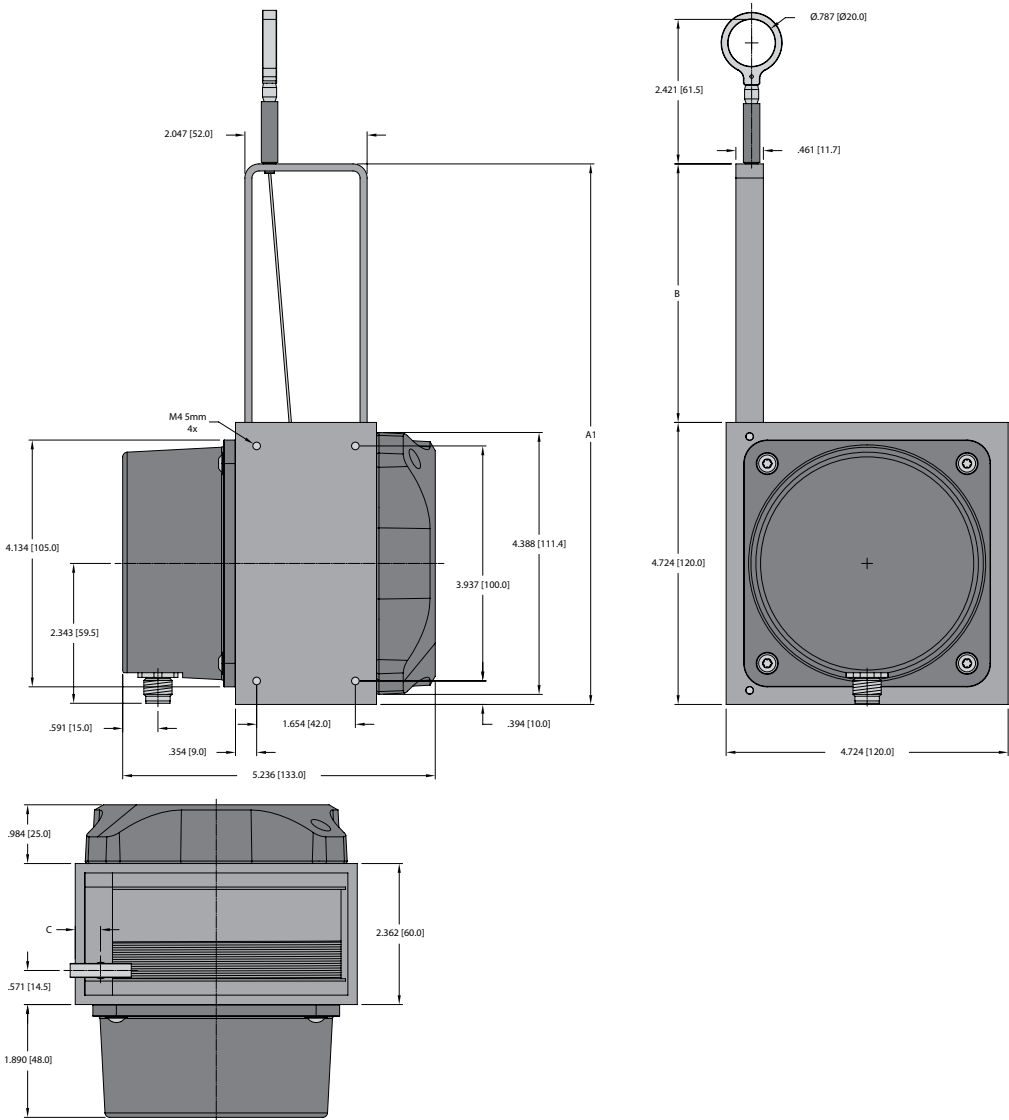
For use in the presence of sticky dust, cement, concrete, clay.
Shock protection, wire cleaning device (in preparation).



Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW120

Dimensions: DW120 with Analog Sensor, Open Wire Guide, Special Wire Fastener N74



Wire diameter Ø 0.5 mm - drum pitch circumference: 13.2 [335.2]

Measuring length	A1	B	C
3-10 m	9.06 [230]	4.33 [110]	0.42 [10.75]

Wire diameter Ø 1.0 mm - drum pitch circumference: 13.26 [336.8]

Measuring length	A1	B	C
3-5 m	9.06 [230]	4.33 [110]	0.42 [10.75]
6-8 m	12.6 [320]	7.87 [200]	0.48 [12.25]

Wire diameter Ø 1.5 mm - drum pitch circumference: 13.32 [338.3]

Measuring length	A1	B	C
3-4 m	9.06 [230]	4.33 [110]	0.42 [10.75]
5-6 m	12.6 [320]	7.87 [200]	0.48 [12.25]

Accessories:

- See page H1, Connectivity, for cables and connectors

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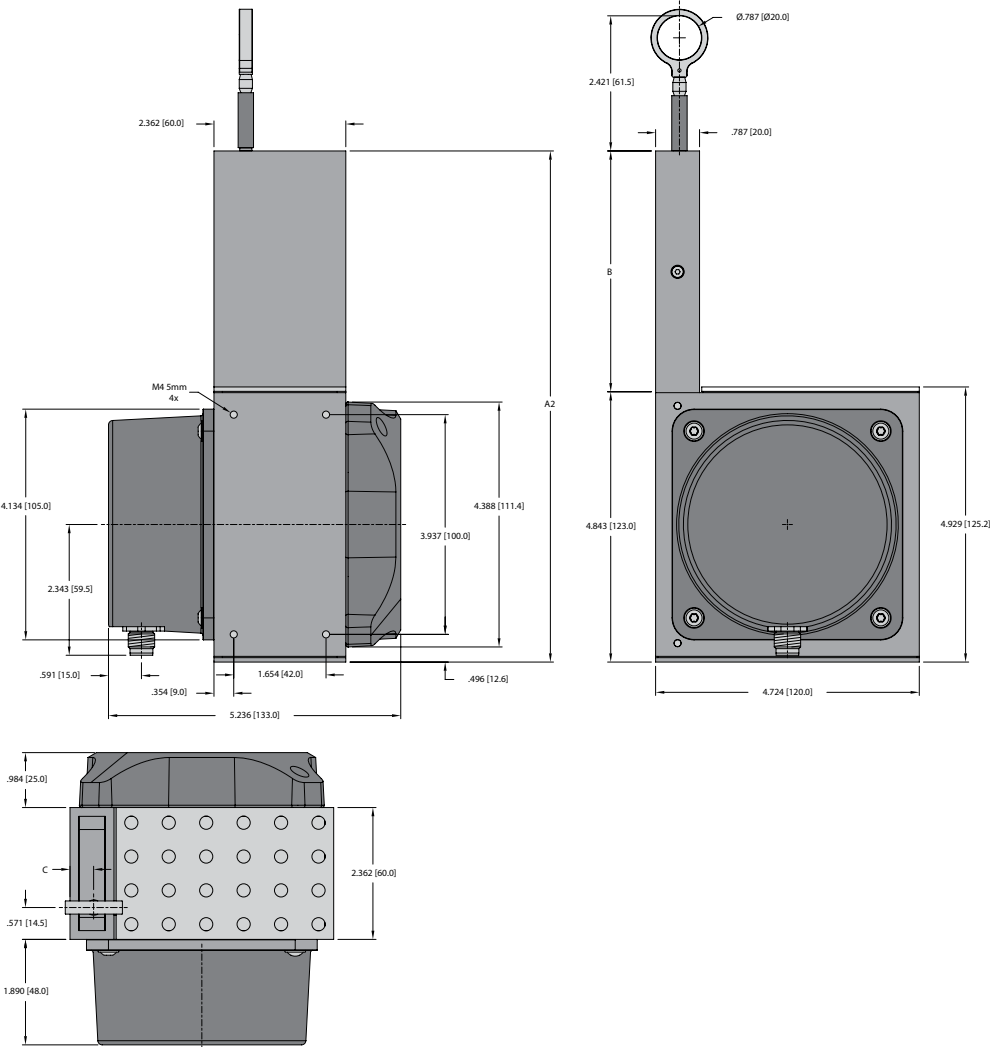
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Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW120

Dimensions: DW120 with Analog Sensor, Closed Wire Guide, Special Wire Fastener N74



Wire diameter Ø 0.5 mm - drum pitch circumference: 13.2 [335.2]

Measuring length	A2	B	C
3-10 m	9.17 [233]	4.33 [110]	0.42 [10.75]

Wire diameter Ø 1.0 mm - drum pitch circumference: 13.26 [336.8]

Measuring length	A2	B	C
3-5 m	9.17 [233]	4.33 [110]	0.42 [10.75]
6-8 m	12.7 [323]	7.87 [200]	0.48 [12.25]

Wire diameter Ø 1.5 mm - drum pitch circumference: 13.32 [338.3]

Measuring length	A2	B	C
3-4 m	9.17 [233]	4.33 [110]	0.42 [10.75]
5-6 m	12.7 [323]	7.87 [200]	0.48 [12.25]

Accessories:

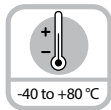
- See page H1, Connectivity, for cables and connectors



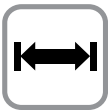
Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW75



Wide
temperature
range



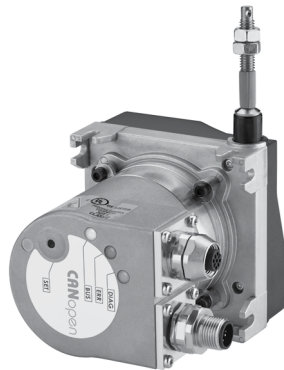
Long service
life



High protection
level

Robust

- Compact housing.
- High-strength stainless steel draw wire.
- Low friction design.
- Wide temperature range.



EtherCAT
Conformance tested

Analog
output

CANopen

SAE J1939
EtherNet/IP

Dynamic

- Traverse speed of 0.8 m/s.
- 3 m measuring length.

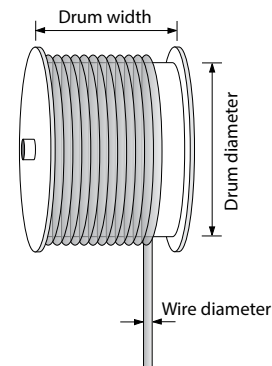
Versatile

- Suitable for various sensors/encoders:
Absolute, fieldbus, incremental and analog.
- Variable mounting possibilities.
- Flexible connection options:
Cable, connector, radial, axial.
- Scalable analog interface with
limit switch function.

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:	3,000 mm
Extension force:	Fmin 0.67 lbs (3.0 N)
Max. speed:	2.62 ft/s (0.8 m/s)
Working temperature:	-40 to +176 °F (-40 to +80 °C)
Repeat accuracy:	±0.15 mm
Linearity:	±0.35%
Weight:	approx. 1.10 lbs (500 g) (depending on the sensor/encoder used)
Materials:	housing: plastic/zinc die-cast wire: stainless steel Ø 0.9 mm, plastic coated
Protection (encoder only):	IP65

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

TURCK

Draw Wire Encoder DW75

Electrical Characteristics (Analog Output, Scaled to Measuring Range):

Analog output [Key Code]:	0-10 V [8D]	4-20 mA [7F]	Potentiometer [PB]
Output:	0-10 V	4-20 mA	10 KΩ
Supply voltage:	15-28 VDC	15-28 VDC	max. 48 VDC
Load:	max. 500 Ω	max. 500 Ω	
Operating temperature:	-40 to +176 °F (-40 to +80 °C)	-40 to +176 °F (-40 to +80 °C)	-40 to +176 °F (-40 to +80 °C)
ROHS compliant according to EU guideline 2011/65/EU			

Part Number Key: DW75 with Encoder

A	B		C		D		E	F		G		H
DW	3000	-	75	-	10	-	2B	2000	-	H1181	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
3000	3000 mm Steel Wire

C	Housing
75	75 mm

D	Encoder Type
10	RI-10, Incremental
28	RM-28, Absolute, SSI
29	RM-29, Absolute, CANopen, EtherCAT, PROFIBUS-DP, PROFINET IO
103	RM-103, Absolute, SSI
105	RM-105, Absolute, CANopen, EtherNet/IP, Modbus
118	RM-118, Absolute, SSI
121	RM-121, Absolute, CANopen, SAE J1939

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Pulse Rate/Resolution
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

H	Specials
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

Accessories:

- See page H1, Connectivity, for cables and connectors



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW75

Standard resolutions for draw wire with incremental encoder RI-10

Drum circumference (mm)	200	200	200
Pulses/revolution (ppr)	200	2000	4000
Pulses/mm	1	10	20
Resolution (mm)	1	0.1	0.05

Standard resolutions for draw wire with absolute encoder RM-118 or RM-121, (12-bit ST, programable via bus)

Drum circumference (mm)	200
Pulses/revolution (ppr)	4096
Pulses/mm	20.5
Resolution (mm)	0.05

Recommended standard variants (with incremental, absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DW3000-75-10-2B2000-H1181	RI-10T6S-2B2000-H1181	Push-pull with inverted signal	10-30 VDC	Radial M12 connector	2000 ppr	-
DW3000-75-118-3C12S12M-H1181	RM-118T6S-3C12S12M-H1181	SSI	10-30 VDC	Radial M12 connector	4096 ppr / SSI-Gray-Code	-
DW3000-75-121-9D38B-H1151	RM-121T6S-9D38B-H1151	CANopen	10-30 VDC	Radial M12 connector	CANopen encoder profile DS406 V4.0	-

Other variants (with absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DW3000-75-103-3C12S12M-H1181	RM-103T6S-3C12S12M-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DW3000-75-28-3C24B-H1181	RM-28T6S-3C24B-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DW3000-75-105-9D38B-B1M12/N46	RM-105T6S-9D38B-B1M12/N46	CANopen	10-30 VDC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DW3000-75-29-9D28B-R2M12/N46	RM-29T6S-9D28B-R2M12/N46	CANopen	10-30 VDC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DW3000-75-121-9F43B-H1151	RM-121T10C-9F43B-H1151	SAE J1939	10-30 VDC	1 x radial M12 connector	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B	-
DW3000-75-29-9A28B-R3M12/N46	RM-29T6S-9A28B-R3M12/N46	PROFIBUS	10-30 VDC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
DW3000-75-29-9C28B-R3M12	RM-29T6S-9C28B-R3M12	EtherCAT	10-30 VDC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
DW3000-75-29-9E28B-R3M12	RM-29T6S-9E28B-R3M12	PROFINET IO	10-30 VDC	3 x radial M12 connector	PROFINET encoder profile version 4.1	-
DW3000-75-105-9N32B-B3M12	RM-105T6S-9N32B-B3M12	EtherNet/IP	10-30 VDC	3 x axial M12 connector	EtherNet/IP	-

Part Number Key: DW75 with Encoder (analog, scalable with limit switch function)

A	B		C		D		E	F		G		H
DW	3000	-	75	-	116	-	7A	SALNS	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
3000	3000 mm Steel Wire

C	Housing
75	75 mm

D	Encoder Type
116	RM-116, Absolute

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Measuring Range
	Dependent on Encoder Selected ¹⁾

G	Type of Connetion
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

Accessories:

- See page H1, Connectivity, for cables and connectors

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Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

TURCK

Draw Wire Encoder DW75

Recommended standard variants (with analog encoder, scalable with limit switch function)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DW3000-75-116-7ASALWL-H1151	RM-116T6S-7ASALWL-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable without limit switch function ¹⁾
DW3000-75-116-8BSALWL-H1151	RM-116T6S-8BSALWL-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable without limit switch function ¹⁾
DW3000-75-116-7ASALNS-H1151	RM-116T6S-7ASALNS-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable with limit switch function ¹⁾
DW3000-75-116-8BSALNS-H1151	RM-116T6S-8BSALNS-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable with limit switch function ¹⁾

¹⁾Unscaled

Part Number Key: DW75 with analog sensor (scaled to measuring range)

A	B		C		D		E
DW	3000	-	75	-	7F	-	H1141

A	Type
DW	Draw Wire

B	Measuring Range
3000	3000 mm Steel Wire

C	Housing
75	75 mm

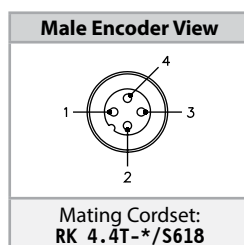
D	Voltage Supply and Output Type
7F	12-28 VDC, 4-20 mA
8D	12-28 VDC, 0-10 V
PB	48 VDC max, 10 KΩ, Potentiometer

E	Type of Connection
H1141	Radial 4-pin M12 Eurofast Connector

Standard Wiring:

Pin	Color	0-10 V	4-20 mA	10 kOhm
1	BN	V+	V+	V+
2	WH	Signal	N/C	Slider
3	BU	GND	Signal	GND
4	BK	GND Sig.	N/C	N/C

Wiring Diagram:



* Length in meters.

Accessories:

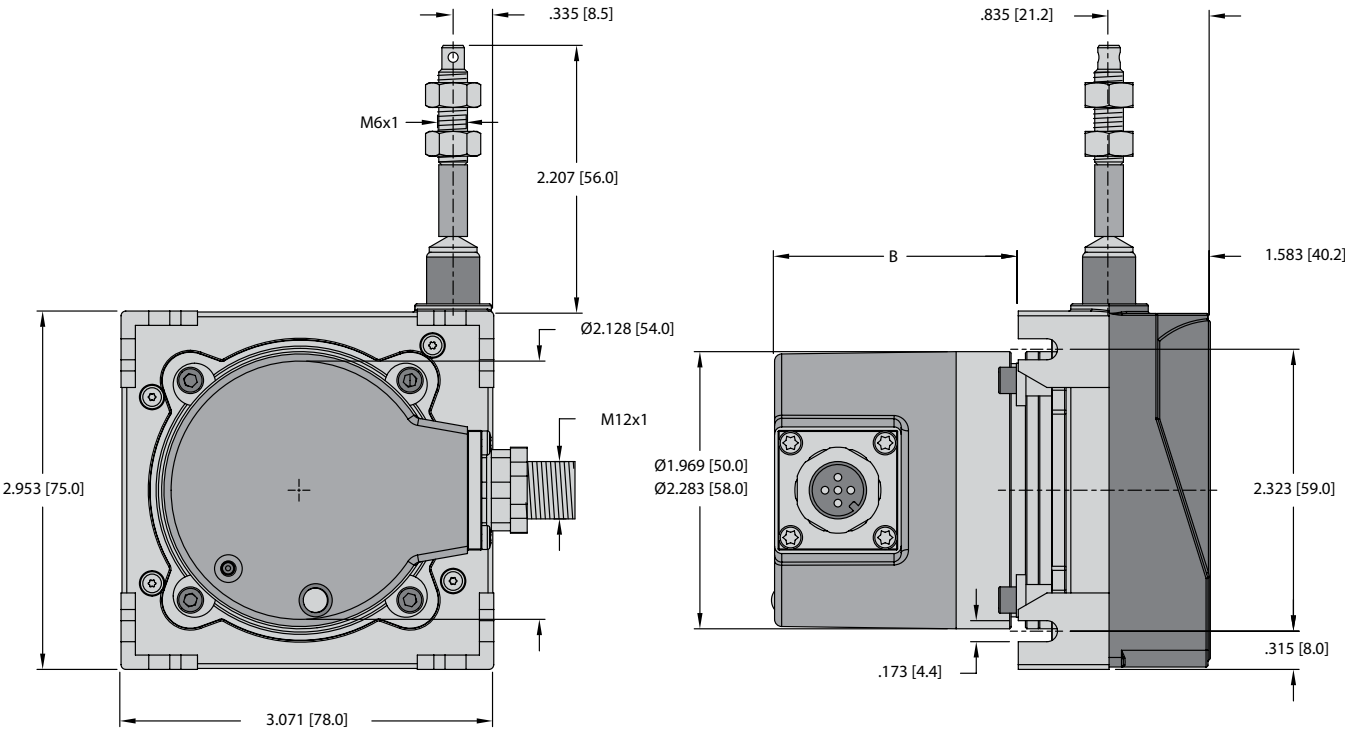
- See page H1, Connectivity, for cables and connectors



Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW75

Dimensions: DW75 with Encoder



Dimension B depends on the encoder used

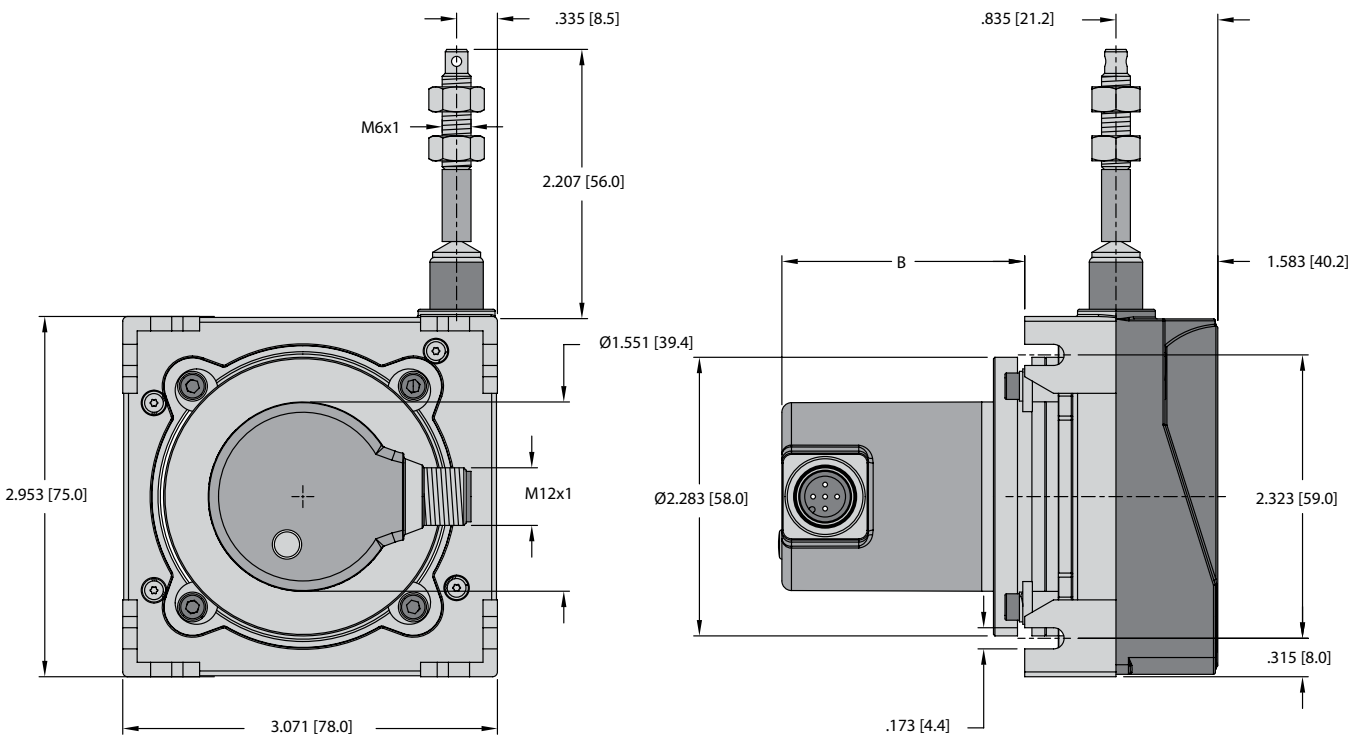
Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW*****-75-10-*****-*****	1.69 [43.0]
Absolute (RM-28)	DW*****-75-28-*****-*****	2.19 [55.5]
Absolute (RM-29)	DW*****-75-29-*****-*****	3.28 [83.2]
Absolute (RM-103)	DW*****-75-103-*****-*****	2.19 [55.5]
Absolute (RM-105) CANopen	DW*****-75-105-*****-*****	2.58 [65.5]
Absolute (RM-105) Ethernet/IP	DW*****-75-105-*****-*****	2.58 [65.5]

We reserve the right to make technical alterations without prior notice.



Draw Wire Encoder DW75

Dimensions: DW75 with analog sensor (scalable to measuring range)



Dimension B depends on the encoder used

Encoder	Draw wire assembly	B in. [mm]
Absolute (RM-116)	DW*****75-116-*****_*****	1.99 [50.55]
Absolute (RM-118)	DW*****75-118-*****_*****	1.99 [50.55]
Absolute (RM-121)	DW*****75-121-*****_*****	1.99 [50.55]

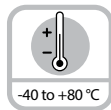
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Linear Position Technology

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW108



Wide temperature range
-40 to +80 °C



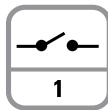
High protection level
IP 67



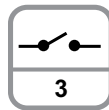
Shock/vibration resistant



Redundancy



Relay output



Switching output

Robust

- Measuring length up to 5 m.
- Different types of sensors (analog, incremental, CANopen, relay output, switch).
- Linearity up to $\pm 0.1\%$ of the measuring range.
- IP67 protection level and wide temperature range from -40 to +85 °C.



Versatile

- Integrated inclinometer.
- Redundant sensors.
- The suitable measuring length for every application.
- For even higher plant availability.

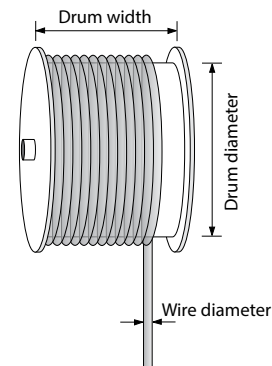
Advantages

- Cost, space and installation work saving.
- Simple selection and fast installation.
- High accuracy at economic prices.
- Reliability and long service life for outdoor applications.

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:	1.0 - 5.0 m
Measuring wire:	
	material 304 stainless steel, nylon coated
	diameter $\varnothing$ 0.9 mm
	$\varnothing$ 0.61 mm (ABZ incremental)
Wire fastening:	Eyelet
	internal diameter $\varnothing$ 8 mm
	outer diameter $\varnothing$ 15 mm
	height 2 mm
Max. speed:	1 m/s
Max. acceleration:	10 m/s ²
Linearity (entire measuring range):	
	analog $\pm 0.8\%$
	incremental (1 - 2 m) $\pm 0.1\%$
	incremental (3 - 5 m) $\pm 0.3\%$
	CANopen/relay $\pm 0.5\%$
Repeat accuracy (entire measuring range):	
	analog $\pm 0.3\%$
	incremental (1 - 2 m) $\pm 0.1\%$
	incremental (3 - 5 m) $\pm 0.15\%$
	CANopen/relay $\pm 0.1\%$
Retraction force:	0.44 lbs (2 N)
Extension force:	1.79 lbs (8 N)
Drum circumference:	245 mm
Housing:	poly carbonate reinforced with glass fibers
Protection:	IP67
Temperature range:	-40 to +185 °F (-40 to +85 °C)
Weight:	1.1 lbs (0.5 kg)
Stock resistance acc. to EN 60068-2-27:	30 g (300 m/s ²), 11 ms
Vibration resistance acc. to EN 60068-2-6:	10 g (100 m/s ²), 10-500 Hz

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



Draw Wire Encoder DW108

Electrical Characteristics:

Power supply:	9-30 VDC 5 VDC $\pm 10\%$ (Analog only) 12-30 VDC (Analog only)
Electromagnetic compatibility:	acc. to EN 61326-1, EN 61326-3-1
RoHS compliant acc. to EU guideline 2011/65/EU	

Analog sensor:

Output signal:	analog
Resolution:	12 bit

Incremental output:

Output signal:	AB (Z optional)
Resolution:	512 / 1024 ppr
Current consumption (non load):	max. 100 mA
Output current:	max. 50 mA
Circuit:	TTL

CANopen:

Output signal:	CANopen (DS301)
Resolution:	14 bit
Resolution inclinometer:	0.1°
Accuracy inclinometer:	$\pm 0.6^\circ$
Temperature drift inclinometer:	$\pm 0.01\%$ / °C

Relay output:

Output signal:	1x relay (Normally Open)
Maximum current:	50 mA
Hysteresis:	20 mm (factory setting)

Switch output:

Output signal:	switch
Maximum current:	0.5 A
Mechanical service life:	
without load	min. 1,000,000 switching operations (60 switching operations/ min.)
under load	min. 30,000 switching operations (30 switching operations/ min.)



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW108

Standard Wiring:

Analog Sensor Output:

Connection Type	+V	N/C	Common (0V)	Out 1	Out 2
M12 Eurofast	1	2	3	4	5

Incremental Output:

Connection Type	+V	Common (0V)	A	B	Z
M12 Eurofast	1	2	3	4	5
Cable	WH	YE	BN	GN	GY

CANopen Output:

Connection Type	Common (0V)	+V	CAN GND	CAN High	Can Low
M12 Eurofast	3	2	1	4	5

Relay Output:

Connection Type	TEACH	+V	Common (0V)	C	NO
M12 Eurofast	1	2	3	4	5

The switching point of the relay can be set by means of a button connected to pin 1 (Teach). To do so, position the draw wire mechanic at the desired switching point and then press the button once.

Switching Output:

Connection Type	NC1	NO1	C1	NC2	NO2	C2	NC3	NO3	C3	N/C	N/C	N/C
M12 Eurofast	1	2	3	4	5	6	7	8	9	10	11	12

Wiring Diagram:

+V	Power supply +VDC
0V	Power supply GND (0V)
Output1	Analog voltage output 1
Output2	Analog voltage output 2
A	Incremental output channel A
B	Incremental output channel B
Z	Incremental output channel Z
TEACH	Teach function input
C	Relay contact C
NO	Relay contact Normally Open
C1	Switching contact C1
C2	Switching contact C2
C3	Switching contact C3
NO1	Switching contact Normally Open 1
NO2	Switching contact Normally Open 2
NO3	Switching contact Normally Open 3
NC1	Switching contact Normally Closed 1
NC2	Switching contact Normally Closed 2
NC3	Switching contact Normally Closed 3

Analogue Output	Incremental Output	CANopen Output
Male Encoder View	Male Encoder View	Male Encoder View
Mating Cordset: RK 4.5T-*/S618	Mating Cordset: E-RKC 8T-930-*	Mating Cordset: RKC 572-*M/S3117
Relay Output	Switching Output	
Male Encoder View	Male Encoder View	
Mating Cordset: RK 4.5T-*	Mating Cordset: RKC 12T-*	

* Length in meters.

Draw Wire Encoder DW108

Part Number Key: DW108 with Absolute Encoder

A	B		C		D		E		F
DW	1000	-	108	-	9D14B	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire

C	Housing
108	108 mm

D	Voltage Supply and Output Type
9D14B	9-30 VDC, CANopen, 14-bit

E	Type of Connection
H1151	5-pin M12 Eurofast Connector

F	Specials
(BLANK)	No Options
N81	1 Inclinometer
N82	2 Inclinometers

Part Number Key: DW108 with Incremental Encoder

A	B		C		D		E		F
DW	1000	-	108	-	FL512	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire

C	Housing
108	108 mm

D	Voltage Supply and Output Type
FL512	9-30 VDC, TTL, 512 ppr, A&B Only
FL1024	9-30 VDC, TTL, 1024 ppr, A&B Only
FM512	9-30 VDC, TTL, 512 ppr, A/B/Z
FM1024	9-30 VDC, TTL, 1024 ppr, A/B/Z

E	Type of Connection
H1151	5-pin M12 Eurofast Connector ¹⁾
C	Radial Cable (2 m PUR)

¹⁾Must include 'N88' in Specials

F	Specials
(BLANK)	No Options
N88	Standard 5-pin M12 Wiring ²⁾

²⁾N88 must be included with 'H1151'

Part Number Key: DW108 with Analog Sensor

A	B		C		D		E
DW	1000	-	108	-	8F	-	H1151

A	Type
DW	Draw Wire

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire

C	Housing
108	108 mm

D	Voltage Supply and Output Type
7E	12-30 VDC, 4-20 mA
7G	12-30 VDC, 4-20 mA, Redundant
8F	12-30 VDC, 0-10 V
8G	12-30 VDC, 0-10 V, Redundant
HA	5 VDC, 0.5-4.5 V
HB	5 VDC, 0.5-4.5 V, Redundant
HC	12-30 VDC, 0.5-4.5 V
HD	12-30 VDC, 0.5-4.5 V, Redundant

E	Type of Connection
H1151	5-pin M12 Eurofast Connector

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW108

Part Number Key: DW108 with Relay Output

A	B		C		D		E
DW	1000	-	108	-	KA	-	H1151

A	Type
DW	Draw Wire

C	Housing
108	108 mm

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire

D	Voltage Supply and Output Type
KA	9-30VDC, 1x Relay(Normally Open)

E	Type of Connection
H1151	5-pin M12 Eurofast Connector

Part Number Key: DW108 with Relay Output

A	B		C		D		E
DW	1000	-	108	-	KB	-	H1121

A	Type
DW	Draw Wire

C	Housing
108	108 mm

B	Measuring Range
1000	1000 mm Steel Wire
2000	2000 mm Steel Wire
3000	3000 mm Steel Wire
4000	4000 mm Steel Wire
5000	5000 mm Steel Wire

D	Voltage Supply and Output Type
KB	9-30 VDC, 3x switching contact (Normally Open/Closed)

E	Type of Connection
H1121	12-pin M12 Eurofast Connector

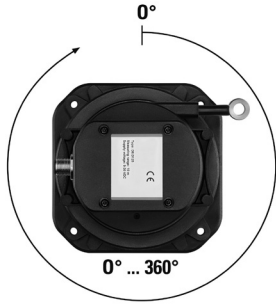
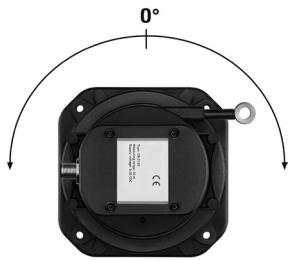
We reserve the right to make technical alterations without prior notice.



Draw Wire Encoder DW108

Technology in Detail

CANopen with inclinometer:

Setting possibility 360°	Setting possibility ±180°
	
angle: 0-360°	angle: ±180°

Redundant signals possible.

Setting possibilities:

- Switching between setting possibilities 180° and 360°.
- Switching between synchronous and asynchronous output.
- Change of direction of rotation (cw/ccw).
- Setting and resetting an offset.

We reserve the right to make technical alterations without prior notice.

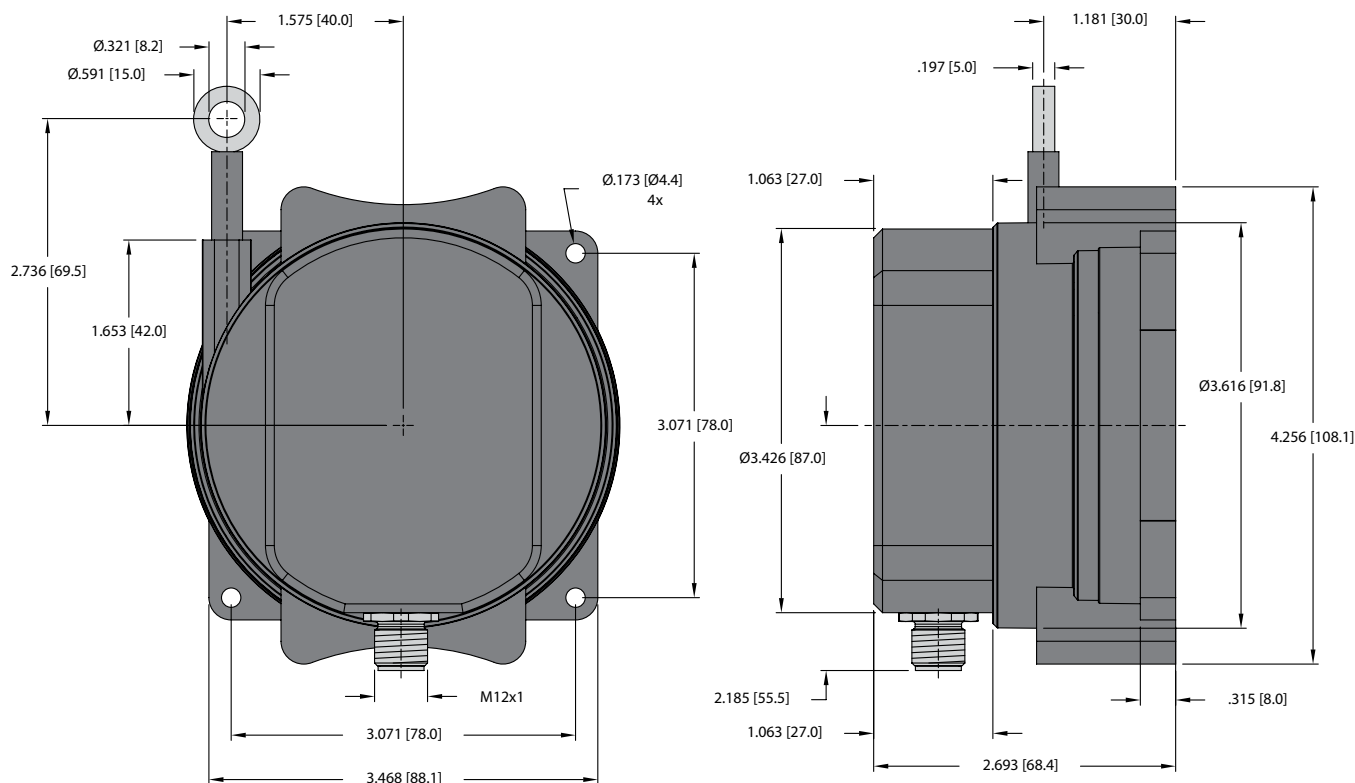
Linear Position Technology

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW108

Dimensions: DW108 with Analog Sensor



We reserve the right to make technical alterations without prior notice.

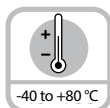


Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

TURCK

Draw Wire Encoder DW124



Wide temperature range
-40 to +80 °C



High protection level
IP 67



Shock/vibration resistant



Redundancy

Robust

- Measuring length 6-10 m.
- Different types of sensors (analog, CANopen).
- Linearity up to $\pm 0.5\%$ of the measuring range.
- IP67 protection level and wide temperature range from -40 to +85 °C.



Versatile

- Integrated inclinometer.
- Redundant sensors.
- The suitable measuring length for every application.
- For even higher plant availability.

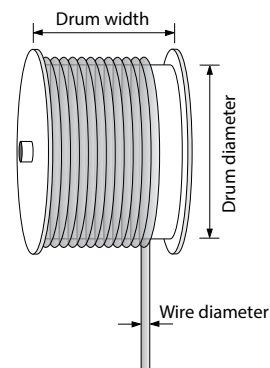
Advantages

- Cost, space and installation work saving.
- Simple selection and fast installation.
- High accuracy at economic prices.
- Reliability and long service life for outdoor applications.

Mechanical Characteristics (Draw Wire Mechanics):

Measuring range:	6 - 10 m
Measuring wire:	
material	304 stainless steel, nylon coated
diameter	0.9 mm
Wire fastening:	
internal diameter	Eyelet
outer diameter	Ø 8 mm
height	Ø 15 mm
	2 mm
Max. speed:	1 m/s
Max. acceleration:	10 m/s ²
Linearity (entire measuring range):	
analog	$\pm 1.0\%$
CANopen	$\pm 0.5\%$
Repeat accuracy (entire measuring range):	
analog	$\pm 0.5\%$
CANopen	$\pm 0.2\%$
Retraction force:	1.01 lbs (4.5 N)
Extension force:	2.02 lbs (9 N)
Housing:	poly carbonate reinforced with glass fibers
Protection:	IP67
Temperature range:	-40 to +185 °F (-40 to +85 °C)
Weight:	approx. 2.13 lbs (0.97 kg)
Stock resistance acc. to EN 60068-2-27:	30 g (300 m/s ²), 11 ms
Vibration resistance acc. to EN 60068-2-6:	10 g (100 m/s ²), 10-500 Hz

Operating Principle:



Construction:

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note:

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW124

Electrical Characteristics:

Power supply:	9-30 VDC 5 V DC $\pm$ 10% (Analog Only) 12-30 VDC (Analog Only)
Electromagnetic compatibility:	acc. to EN 61326-1, EN 61326-3-1
RoHS compliant acc. to EU guideline 2011/65/EU	

Analog sensor:

Output signal:	analog
Resolution:	12 bit

CANopen:

Output signal:	CANopen (DS301)
Resolution:	14 bit
Resolution inclinometer:	0.1°
Accuracy inclinometer:	$\pm$ 0.6°
Temperature drift inclinometer:	$\pm$ 0.01% / °C

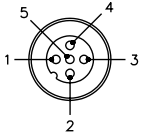
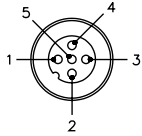
Standard Wiring (Analog Output):

Connection Type	+V	N/C	Common (0V)	Out 1	Out 2
Pin	1	2	3	4	5

Standard Wiring (CANopen Output):

Connection Type	Common (0V)	+V	CAN GND	CAN High	Can Low
Pin	3	2	1	4	5

Wiring Diagram:

Analog Output	CANopen Output
Male Encoder View 	Male Encoder View 
Mating Cordset: RK 4.5T-*/S618	Mating Cordset: RKC 572-*/M/S3117

* Length in meters.

Accessories:

- See page H1, Connectivity, for cables and connectors



Draw Wire Encoder DW124

Part Number Key: DW124 with CANopen and inclinometer

A	B		C		D		E		F
DW	6000	-	124	-	9D14B	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
6000	6000 mm Steel Wire
7000	7000 mm Steel Wire
8000	8000 mm Steel Wire
9000	9000 mm Steel Wire
10000	10000 mm Steel Wire

C	Housing
124	124 mm

D	Voltage Supply and Output Type
9D14B	9-30 VDC, CANopen, 14 bit

E	Type of Connection
H1151	5-pin M12 Eurofast Connector

F	Specials
(BLANK)	No Options
N81	1 Inclinometer
N82	2 Inclinometers

Part Number Key: DW124 with Analog Sensor

A	B		C		D		E
DW	6000	-	124	-	8F	-	H1151

A	Type
DW	Draw Wire

B	Measuring Range
6000	6000 mm Steel Wire
7000	7000 mm Steel Wire
8000	8000 mm Steel Wire
9000	9000 mm Steel Wire
10000	10000 mm Steel Wire

C	Housing
124	124 mm

D	Voltage Supply and Output Type
7E	12-30 VDC, 4-20 mA
7G	12-30 VDC, 4-20 mA, Redundant
8F	12-30 VDC, 0-10 V
8G	12-30 VDC, 0-10 V, Redundant
HA	5 VDC, 0.5-4.5 V
HB	5 VDC, 0.5-4.5 V, Redundant
HC	12-30 VDC, 0.5-4.5 V
HD	12-30 VDC, 0.5-4.5 V, Redundant

E	Type of Connection
H1151	5-pin M12 Eurofast Connector

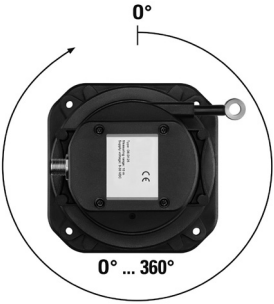
Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Draw Wire Encoder DW124

Technology in Detail

CANopen with inclinometer:

Setting possibility 360°	Setting possibility ±180°
	
angle: 0-360°	angle: ±180°

Redundant signals possible.

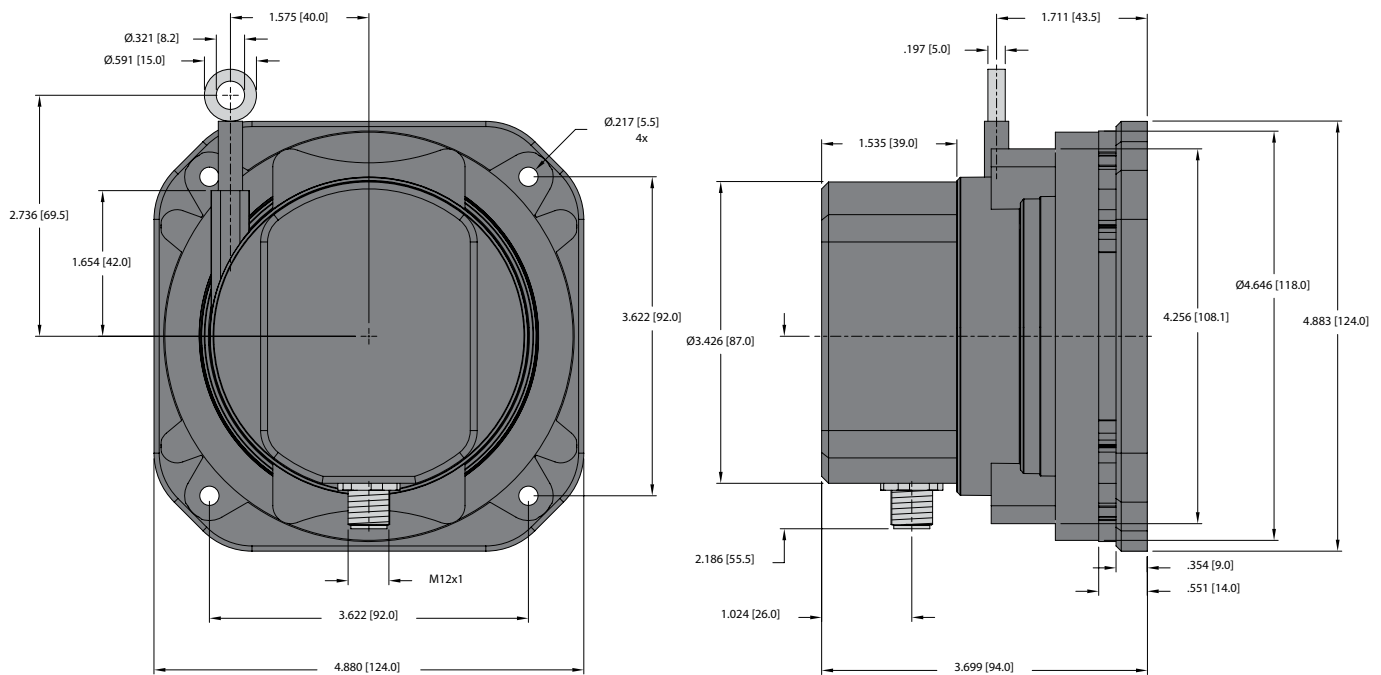
Setting possibilities:

- Switching between setting possibilities 180° and 360°.
- Switching between synchronous and asynchronous output.
- Change of direction of rotation (cw/ccw).
- Setting and resetting an offset.

We reserve the right to make technical alterations without prior notice.



Dimensions: DW124



We reserve the right to make technical alterations without prior notice.

Linear Position Technology

Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Standard Draw Wire Encoder DW125

Description

- Direct length measurement.
- High repeatability.



Compact

- Measuring lengths up to 6,000 mm.

Versatile

- Easy assembly.
- No additional guidance system.
- Wire guidance possible using guide pulleys.
- Multiple encoder outputs available.

Mechanical Characteristics of the Draw-Wire Encoder:

Measuring range:	up to 6,000 mm
Repeatability:	±0.15 mm
Extension force:	1.79 lbs (8 N)
Travel speed:	max. 9.84 ft/s (3,000 mm/s)
Required pull on spring:	min. 1.12 lbs (5 N) (on wire)
Drum circumference:	200 mm
Wire diameter:	parawire nylon 2.8 m: 1.05 mm, steel wire 6 m: 0.54 mm
Weight:	approx. 2.32 lbs (700 g)

Note:

If the maximum extension length is exceeded, the wire and transducer will be damaged.

We reserve the right to make technical alterations without prior notice.



Standard Draw Wire Encoder DW125

Part Number Key: DW125 with Encoder

A	B		C		D		E	F		G		H
DW	2800	-	125	-	10	-	2B	2000	-	H1181	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
2800	2800 mm Para Nylon Wire
6000	6000 mm Steel Wire

C	Housing
125	105 mm

D	Encoder Type
10	RI-10, Incremental
28	RM-28, Absolute, SSI
29	RM-29, Absolute, CANopen, EtherCAT, PROFIBUS-DP, PROFINET IO
103	RM-103, Absolute, SSI
105	RM-105, Absolute, CANopen, Ethernet/IP, Modbus
118	RM-118, Absolute, SSI
121	RM-121, Absolute, CANopen, SAE J1939

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Pulse Rate/Resolution
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

H	Specials
	Dependent on Encoder Selected ¹⁾
	¹⁾ Recommended encoders listed below

Accessories:

- See page H1, Connectivity, for cables and connectors

Linear Position Technology

Draw Wire Mechanics with Encoder or Analog Sensor

Standard Draw Wire Encoder DW125

Standard resolutions for draw wire with incremental encoder RI-10, drum circumference 200 mm

Encoder PPR	200	2000	4000
Pulses/mm	1	10	20
Resolution (mm)	1	0.1	0.05

Standard resolutions for draw wire with absolute encoder RM-118 or RM-121, drum circumference 200 mm

Pulses/revolution	4096
Pulses/mm	20.5
Resolution (mm)	0.05

Recommended standard variants (with incremental, absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxx-125-10-2B2000-H1181	RI-10T6S-2B2000-H1181	Push-pull with inverted signal	10-30 VDC	Radial M12 connector	2000 ppr	-
DWxxx-125-118-3C12S12M-H1181	RM-118T6S-3C12S12M-H1181	SSI	10-30 VDC	Radial M12 connector	4096 ppr / SSI-Gray-Code	-
DWxxx-125-121-9D38B-H1151	RM-121T6S-9D38B-H1151	CANopen	10-30 VDC	Radial M12 connector	CANopen encoder profile DS406 V4.0	-

Other variants (with absolute encoder)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxx-125-103-3C12S12M-H1181	RM-103T10C-3C12S12M-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxx-125-28-3C24B-H1181	RM-28T10C-3C24B-H1181	SSI	10-30 VDC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
DWxxx-125-105-9D38B-H1151/N46	RM-105T10C-9D38B-B1M12/N46	CANopen	10-30 VDC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxx-125-29-9D28B-R2M12/N46	RM-29T10C-9D28B-R2M12/N46	CANopen	10-30 VDC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
DWxxx-125-121-9F43B-H1151	RM-121T10C-9F43B-H1151	SAE J1939	10-30 VDC	1 x radial M12 connector	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B	-
DWxxx-125-29-9A28B-R3M12/N46	RM-29T10C-9A28B-R3M12/N46	PROFIBUS	10-30 VDC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
DWxxx-125-29-9C28B-R3M12	RM-29T10C-9C28B-R3M12	EtherCAT	10-30 VDC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
DWxxx-125-29-9E28B-R3M12	RM-29T10C-9E28B-R3M12	PROFINET IO	10-30 VDC	3 x radial M12 connector	PROFINET encoder profile version 4.1	-
DWxxx-125-105-9N32B-B3M12	RM-105T10C-9N32B-B3M12	EtherNet/IP	10-30 VDC	3 x axial M12 connector	EtherNet/IP	-

We reserve the right to make technical alterations without prior notice.



Standard Draw Wire Encoder DW125

Part Number Key: DW125 with Encoder (analog, scalable with limit switch function)

A	B		C		D		E	F		G		H
DW	2800	-	125	-	116	-	7A	SARNS	-	H1151	/	Specials

A	Type
DW	Draw Wire

B	Measuring Range
2800	2800 mm Para Nylon Wire
6000	6000 mm Steel Wire

C	Housing
125	105 mm

D	Encoder Type
116	RM-116, Absolute, Analog

E	Voltage Supply and Output Type
	Dependent on Encoder Selected ¹⁾

F	Measuring Range
	Dependent on Encoder Selected ¹⁾

G	Type of Connection
	Dependent on Encoder Selected ¹⁾

H	Specials
	Dependent on Encoder Selected ¹⁾

¹⁾Recommended encoders listed below

Recommended standard variants (with analog encoder, scalable with limit switch function)

Draw wire assembly	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
DWxxxx-125-116-7ASALNS-H1151	RM-116T10C-7ASALNS-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable without limit switch function
DWxxxx-125-116-8BSALNS-H1151	RM-116T10C-8BSALNS-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable without limit switch function
DWxxxx-125-116-7ASALWL-H1151	RM-116T10C-7ASALWL-H1151	Analog, 4-20 mA	10-30 VDC	Radial M12 connector	12 Bit / 4-20 mA	scalable with limit switch function
DWxxxx-125-116-8BSALWL-H1151	RM-116T10C-8BSALWL-H1151	Analog, 0-10 V	15-30 VDC	Radial M12 connector	12 Bit / 0-10 V	scalable with limit switch function

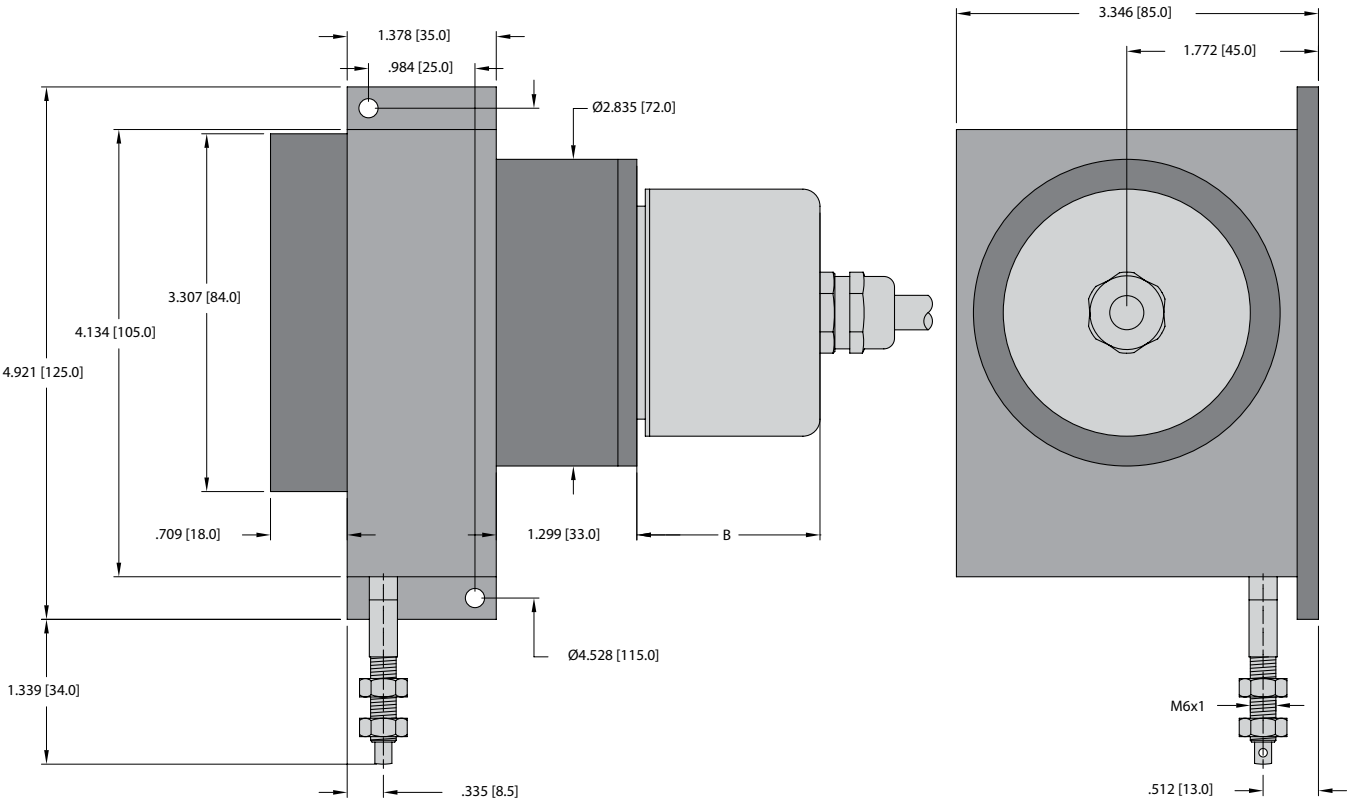
Accessories:

- See page H1, Connectivity, for cables and connectors

Linear Position Technology
Draw Wire Mechanics with Encoder or Analog Sensor

Standard Draw Wire Encoder DW125

Dimensions: DW125



Dimension B depends on the encoder used

Encoder	Draw wire assembly	B in. [mm]
Incremental (RI-10)	DW****-125-10-*****_****	1.46 [37.0]
Absolute (RM-28)	DW****-125-28-*****_****	1.95 [49.5]
Absolute (RM-29)	DW****-125-29-*****_****	3.04 [77.2]
Absolute (RM-103)	DW****-125-103-*****_****	1.95 [49.5]
Absolute (RM-105) [Ethernet/IP]	DW****-125-105-*****_****	2.34 [59.4]
Absolute (RM-105) [CANopen]	DW****-125-105-*****_****	2.76 [70.0]
Absolute (RM-116)	DW****-125-116-*****_****	1.96 [49.8]
Absolute (RM-118)	DW****-125-118-*****_****	1.96 [49.8]
Absolute (RM-121)	DW****-125-121-*****_****	1.96 [49.8]

We reserve the right to make technical alterations without prior notice.



Mini Measurement System Type WE-1



High rotational speed



Magnetic field proof



Short-circuit proof

Rugged

- Wide temperature range -4 to +185 °F (-20 to +85 °C).
- Robust strain relief on cable outlet thanks to multiple clamping.



Versatile

- Low power consumption despite high scanning rate.
- Broad input voltage range (8-30 V).
- Fix, connect, ready to go.

Compact

- 74 x 50 x 52 mm.
- Easy to install, one unit.



Mechanical Characteristics:			Electrical Characteristics:		
Measuring wheel circumference:	100 mm		Output circuit [Key Code]:	Push-pull [2A] (7272)	
Resolution:	Up to 0.1 mm		Supply voltage:	8-30 VDC	
Radial cable outlet:	2 m PVC cable		Power consumption (no load):	≤ 20 mA	
Speed max.:	2000 RPM		Permissible load/channel:	20 mA	
Protection:	IP64		Pulse frequency:	≥ 100 kHz	

Standard Wiring:

Connection Type	Case Ground	Common (0 V)	+V	A	Ā	B	B̄	Z	Z̄
Cable	Shield/Drain	WH	BN	GN	YE	GY	PK	BU	RD

Part Number Key: WE-1

A		B		C		D		E	F		G
WE	-	01	-	100	-	1	-	2A	100	-	C

A	Type
WE	Wheel Encoder, IP64

B	Encoder Type
01	RI-01, Incremental

C	Measuring Wheel Circumference
100	100 mm

D	Measuring Wheel Material
1	Knurled Aluminum
2	Rubber, Shure Hardness: 60

E	Voltage Supply and Output Type
2A	8-30 VDC, Push-Pull (w/ Inverted Signals)

F	Pulse Rate
	100, 200, 1000*
*Resolution = 100 mm circumference wheel is divided by pulse rate to determine resolution in mm	

G	Type of Connection
C	Radial Cable (2 m PUR)

Draw Wire Encoder Accessories

Various wire types and wire fastenings

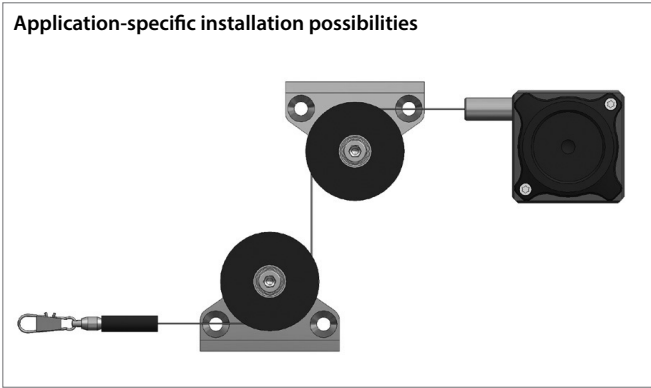
Wire types:

- 0.5 mm (304)
- 0.51 mm (316)
- 1.0 mm (316)
- 1.0 mm plastic-coated (316 = 0.81 mm, plastic 0.19 mm)
- 0.6 mm synthetic rope

Wire fastenings:

Clip M4 thread Eyelet

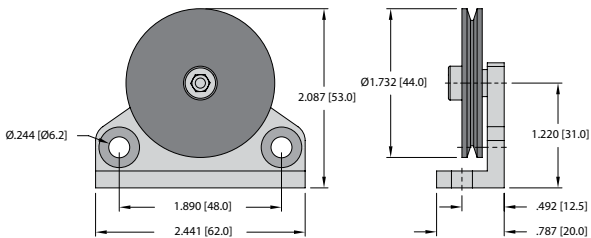




Part Number: RA-DW-SEC-2M Description: 2 m steel wire extension	Part Number: RA-DW-SEC-5M Description: 5 m steel wire extension	
Part Number: RA-DW-PEC-2M Description: 2 m parawire extension	Part Number: RA-DW-SEC-10M Description: 10 m steel wire extension	

Part Number:
RDR-1

Description:
Guide Pulley



Accessories:

- See page H1, Connectivity, for cables and connectors

Notes:

We reserve the right to make technical alterations without prior notice.

Linear Position Technology

Notes:

We reserve the right to make technical alterations without prior notice.

