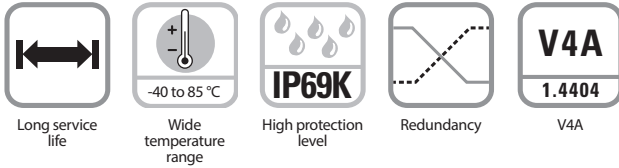


### Draw Wire Encoder DW120



#### 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 ±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.

Linear Position Technology

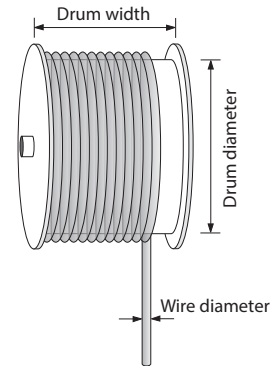
#### Technical Data (Draw Wire Mechanics):

Linearity:	±0.5 %
Improved linearity:	±0.25 % or ±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 <sup>2</sup> (50 m/s <sup>2</sup> )
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 x 10 <sup>-6</sup> K <sup>-1</sup>
V4A, Ø1.0 mm	
Measuring range:	3-8 m
Breaking force:	211.77 lbs (942 N)
TK:	16 x 10 <sup>-6</sup> K <sup>-1</sup>
V4A, Ø1.5 mm	
Measuring range:	3-6 m
Breaking force:	424.88 lbs (1890 N)
TK:	16 x 10 <sup>-6</sup> K <sup>-1</sup>

#### 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

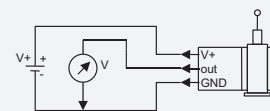
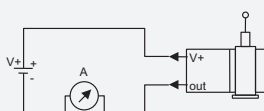
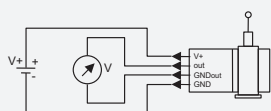
## Draw Wire Mechanics with Encoder or Analog Sensor

### Draw Wire Encoder DW120

#### Electrical Characteristics (Analog Output):

Output circuit [Key Code]:	4-20 mA [7A/27A]	0-10 V [8C/28C]	1 k $\Omega$ , potentiometer [PA/2PA]
Output current:	max. 50 mA in case of a failure	max. 10 mA, min. load 10 k $\Omega$	–
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 <sub>pp</sub> = 6 mV <sub>pp</sub> at 200 $\Omega$	typ. 3 mV <sub>pp</sub> , max. 37 mV <sub>pp</sub>	depending on the supply voltage
Recommended slider current:	–	–	< 1 $\mu$ 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	$\pm$ 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:	$\pm$ 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 EN61326-1:2013	
RoHS compliant acc. to EU guideline: 2011/65/EU	

#### Accessories:

- See page H1, Connectivity, for cables and connectors

### 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
<p>Analog Output:</p>	<p>CANopen Output:</p>	<p>2x Analog Output:</p>
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 <sup>1)</sup>
C	V4A, Ø 1.5 mm <sup>2)</sup>

<sup>1)</sup>For measuring range 3000-8000

<sup>2)</sup>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 <sup>3)</sup>
H1151	Radial 5-pin M12 Eurofast <sup>4)</sup>
H1181	Radial 8-pin M12 Eurofast <sup>5)</sup>
C	Radial Cable (2 m TPE)

<sup>3)</sup>Only with output type '7A, 8C, PA'

<sup>4)</sup>Only with output type '9D16B, 29D16B'

<sup>5)</sup>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)

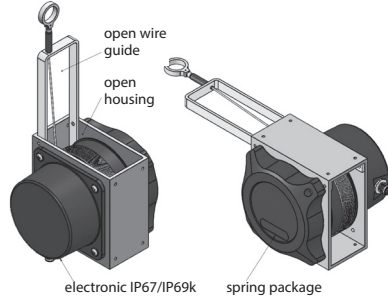
H	Special Wire Fastener
(Blank)	Snap Ring, Ø 17 mm
N74	Eyelet, Ø 20 mm
N75	M4 thread

### Draw Wire Encoder DW120

Housing types (the suitable housing type for every application)

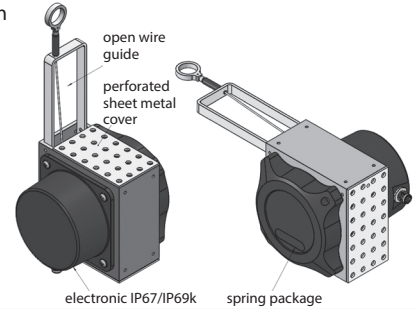
#### Open housing, open wire guide [A]

For use in the presence of fine dust and liquids.



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

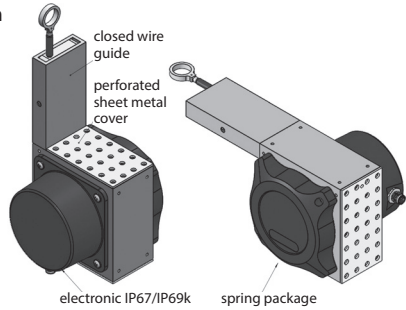
For use in the presence of dirt, particles size > 2 mm and liquids.



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

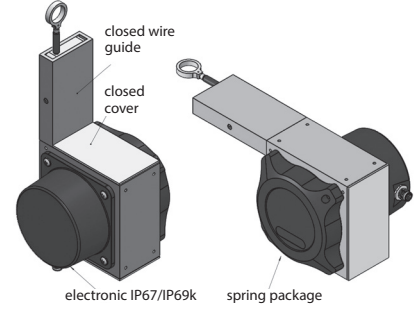
For use in the presence of dirt, particles size > 2 mm and liquids.

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).

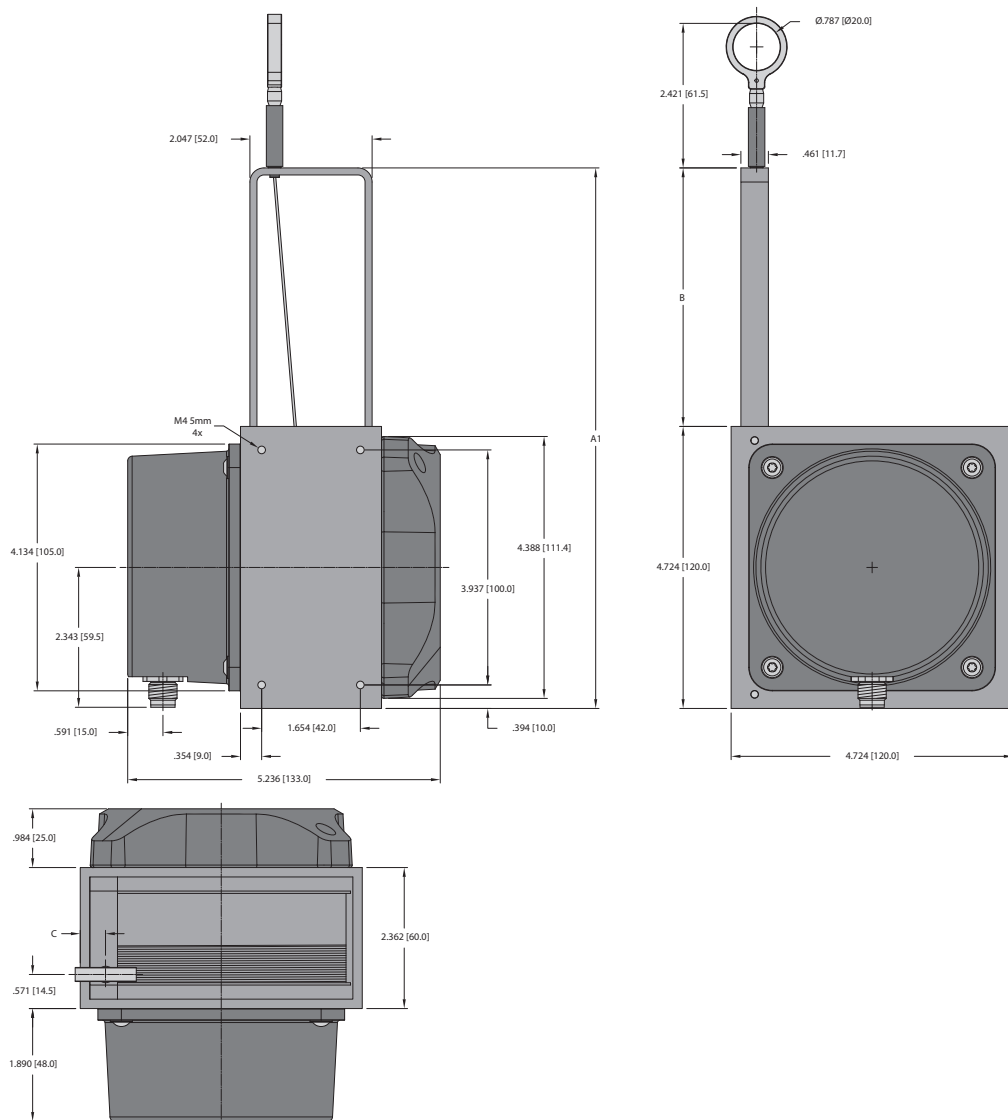


# Linear Position Technology

## 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  $\varnothing$  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  $\varnothing$  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  $\varnothing$  1.5 mm - drum pitch circumference: 13.32 [338.3]

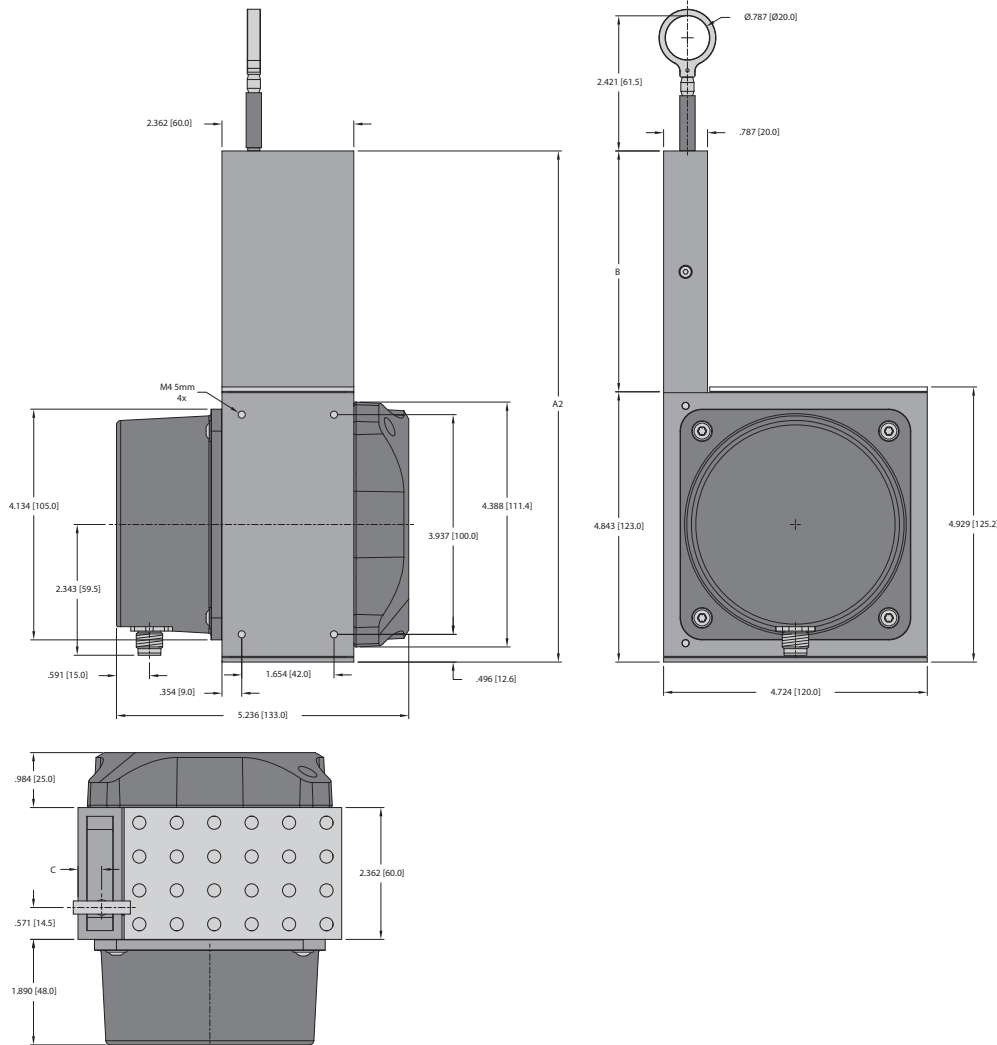
Measuring length	A1	B	C
3-4 m	9.06 [230]	4.33 [110]	0.42 [10.75]
5-6 m	12.6 [320]	7.87 [200]	0.48 [12.25]

#### Accessories:

- See page H1, Connectivity, for cables and connectors

### Draw Wire Encoder DW120

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



Wire diameter  $\varnothing$  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  $\varnothing$  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  $\varnothing$  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