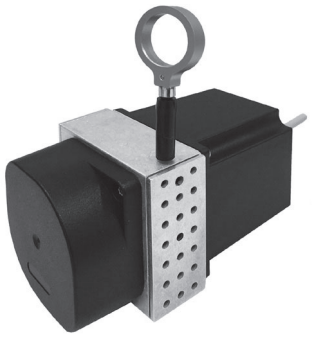
Draw Wire Encoder DW60

Long service life | Wide temperature range | High protection level | 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.**



RoHS compliant

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 ±0.1% of the measuring range.**

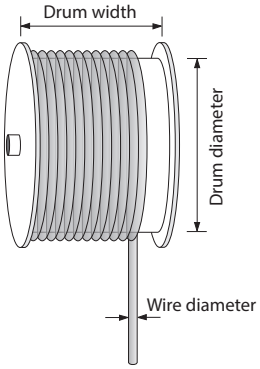
Technical Data (Draw Wire Mechanics):

Linearity:	±0.5%, ±1% (See Linearity Table below)
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:	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/s² [50.0 m/s²]
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 x 10^{-6} K^{-1}
V4A, Ø0.7 mm:		
	no.	1.4401
	Breaking force	48.56 lbs (216 N)
	TK	16 x 10^{-6} K^{-1}
V4A, Ø1.0 mm:		
	no.	1.4401
	Breaking force	107.5 lbs (478 N)
	TK	16 x 10^{-6} K^{-1}

Operating Principle:

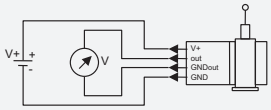
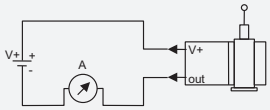
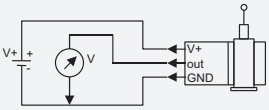


Construction:
The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

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 kΩ, potentiometer [PA/2PA]
Output current:	max. 50 mA in case of a failure	max. 10 mA, min. load 10 kΩ	–
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 µA
Reverse polarity protection:	yes	yes	–
Working temperature:			
standard	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)	-4 to +185 °F (-20 to +85 °C)
special option	-40 to +185 °F (-40 to +85 °C)	-40 to +185 °F (-40 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	±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:	1kHz 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 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	Ø [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	0.5	0.7
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	A	B
Standard Linearity	Key Code A	±0.5%			±0.5%			±0.5%		±1.0%	±0.5%		±1.0%	±0.5%		±1.0%	±0.5%	±1.0%	±0.5%	±1.0%
Improved Linearity ±0.25%	Key Code B	Y	Y	Y	Y	Y	Y	Y	Y	–	Y	–	–	Y	–	–	–	–	–	–
Improved Linearity ±0.1%	Key Code C	Y	Y	Y	Y	Y	Y	Y	Y	–	Y	–	–	Y	–	–	–	–	–	–

Y = Feasible – = not feasible

Accessories:

- See page H1, Connectivity, for cables and connectors

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	⏚

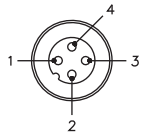
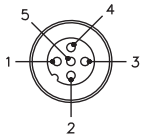
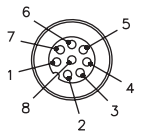
Standard Wiring (CANopen Output):

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

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 Potentometer
2PA	30 VDC max, 2x kΩ Potentometer
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)

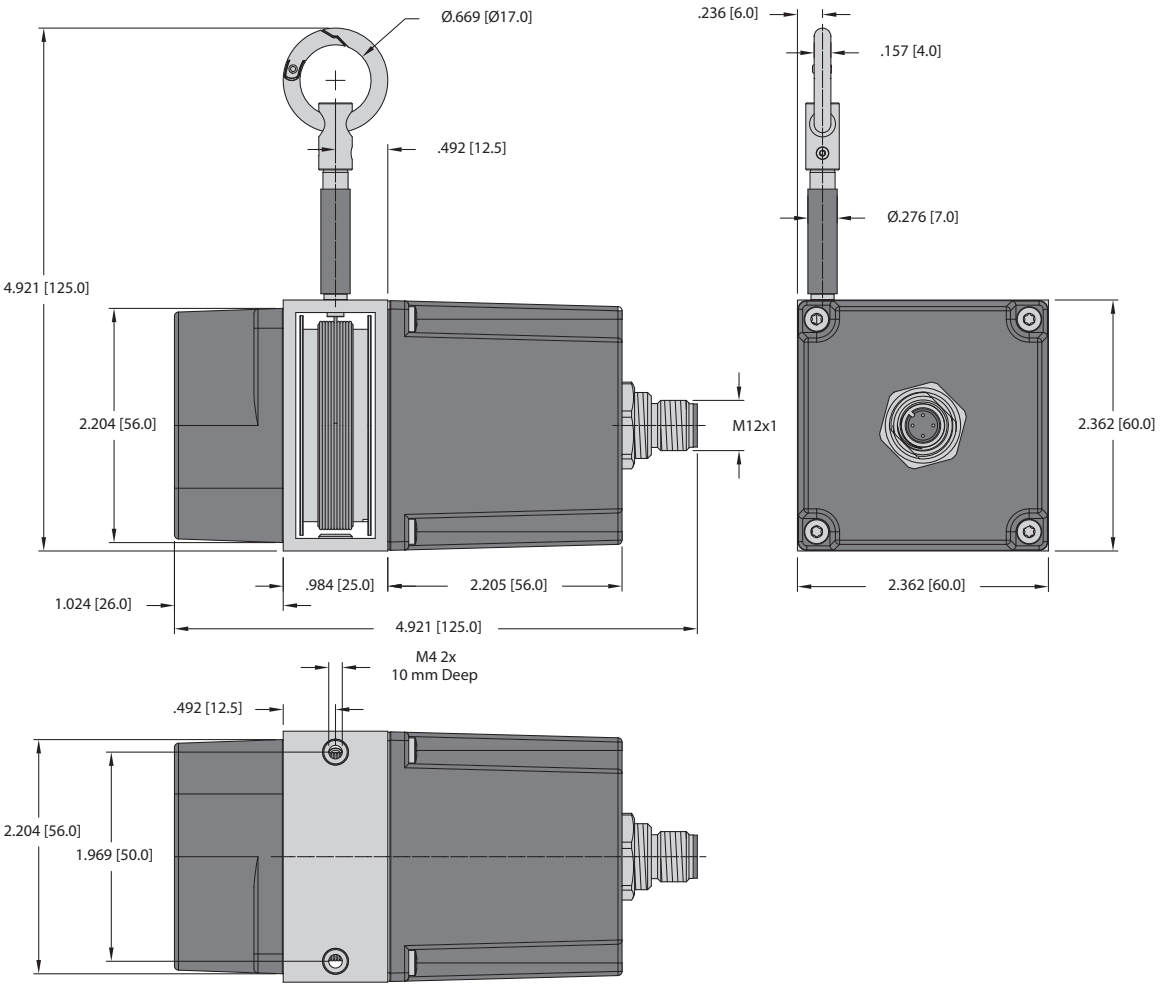
Open housing [A]

Housing with perforated sheet metal cover [B]

Closed housing [C]

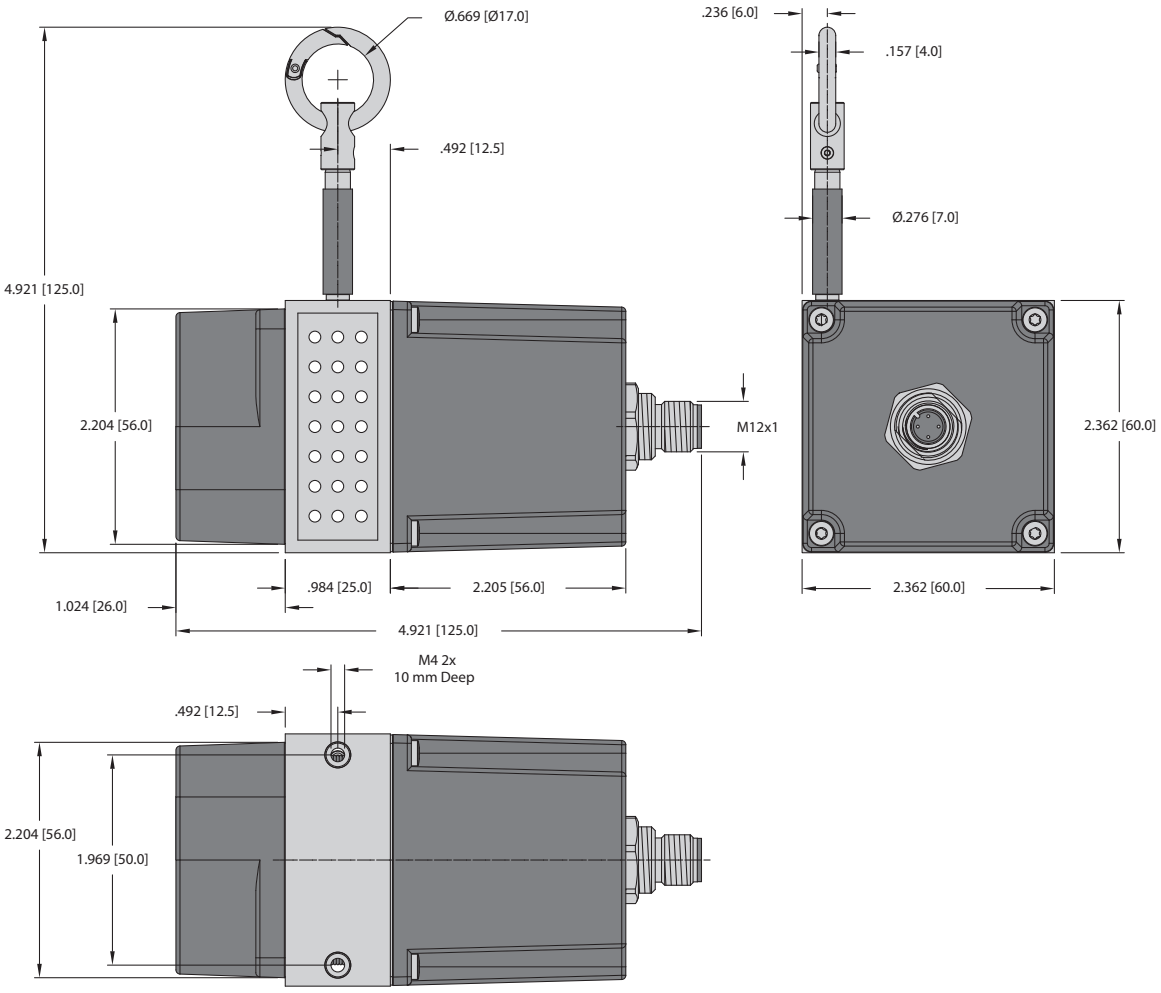
Draw Wire Encoder DW60

Dimensions: DW60 with Open Housing



Draw Wire Encoder DW60

Dimensions: DW60 with Perforated Cover

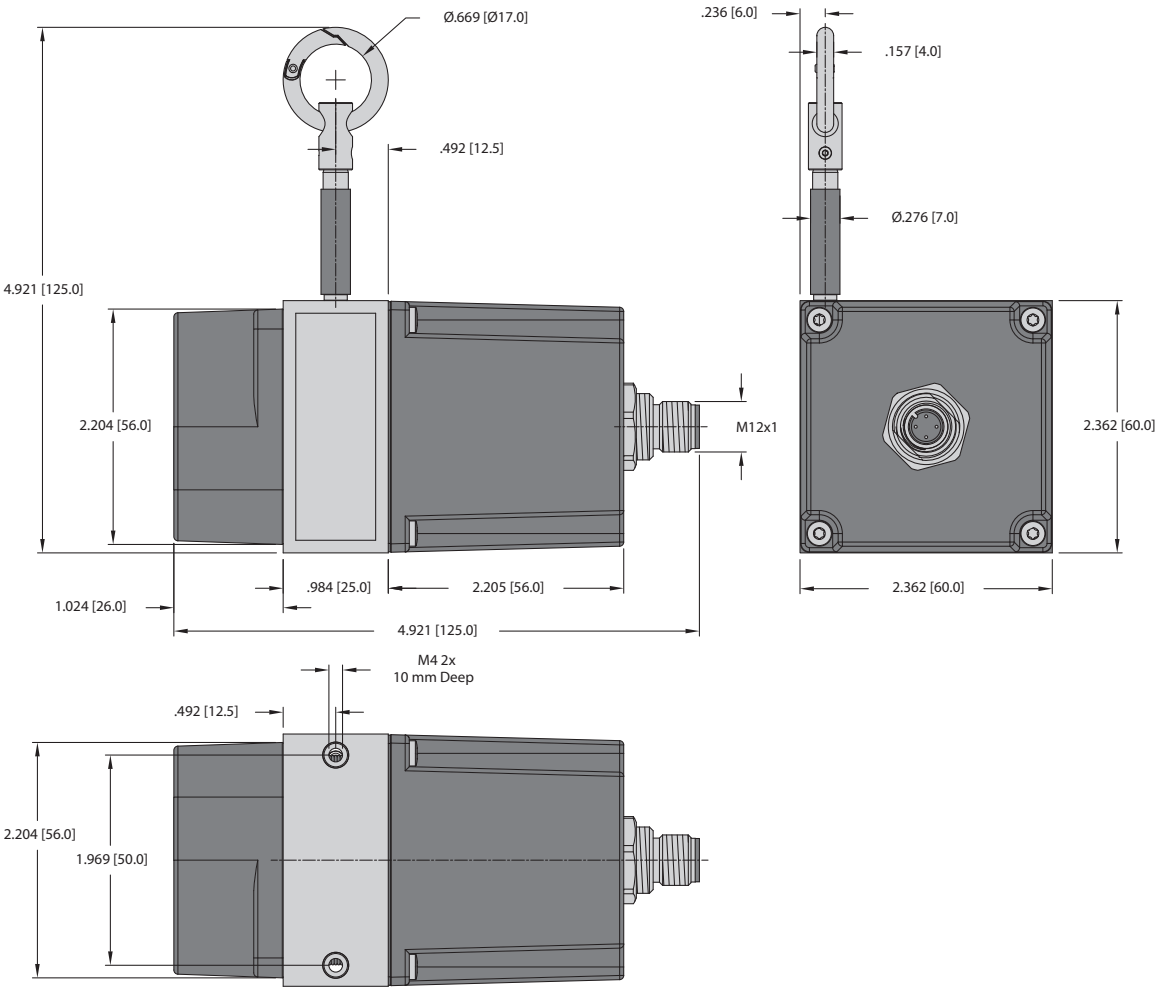


Accessories:

- See page H1, Connectivity, for cables and connectors

Draw Wire Encoder DW60

Dimensions: DW60 with Closed Housing



Accessories:

- See page H1, Connectivity, for cables and connectors