



2QEX-A

- Shaft Encoder - 2.5 inch or 2.65 inch square flange or Ø 58 mm servo flange
- Shaft: Ø 6 mm, Ø 8 mm, Ø 10 mm, Ø 1/4 inch, Ø 3/8 inch
- Resolutions up to 12,500 ppr
- Non-removable end cap - delivered with cable or MIL connector or ROTA connector
- ATEX, IECEX, EAC Ex certified

Electrical Specifications

Code:	Incremental
Resolution:	1 to 12,500 ppr (pulses per revolution)
Supply Voltage:	4.5 Vdc min. to 30 Vdc max. ** (at 45 mA max. - no load)
Output Voltage:	Low: 500 mV max. at 10 mA High: (V _{sup} - 0.6) at -10 mA (V _{sup} - 1.3) at -25 mA
Output Current:	30 mA max. load per output channel **
Frequency Response:	300 kHz max. **
Output Format:	Two channel (A, B) quadrature with Index (Z) and optional complementary (A-, B-, Z-) outputs
Phase Sense:	A leads B counterclockwise (CCW) from the shaft end of the encoder
Index:	Gated with Channel B low
Accuracy:	+/- 0.8 arc-min.
Outputs:	ASIC Push-pull and Differential OL7272 Push-pull and Differential Line Driver 26C31 Differential Line Driver 5V output (with 5V input)
Electrical Protection:	Output short circuit protected. Reverse polarity protected for ASIC outputs only. (not for OL7272 or 26C31 outputs)
Noise Immunity:	EN61000-6-2: 2005 (industrial environments) Electromagnetic compatibility (EMC) EN 61000-6-3: 2007 (residential, commercial, and light-industrial environments) for Electromagnetic compatibility (EMC)

**= It is recommended user not to combine max. Value for all 3 parameters

Mechanical Specifications

Material:	Housing: Aluminum Cap: Aluminum Shaft: Stainless Steel (AISI 303)
Weight:	Encoder: Approx. 350 gr (12.35 oz)
Bearing Life:	> 1.9 x 10 ¹⁰ revolutions at rated load
Shaft Speed:	6,000 rpm max.
Starting Torque:	< 0.01 Nm (1.4 oz-in) at 25° C
Mass Moment of Inertia:	4 gcm ² (5.66 x 10 ⁻⁵ oz-in-sec ²)
Shaft Loads:	Axial: 200 N (50 lbs) max. Radial: 250 N (56 lbs) max.

Environmental Specifications

Operating Temp.:	-40° to +70° C
Storage Temp.:	-40°C to +70°C -40°C to +60°C with Rota connector
Shock:	100 G / 11 ms
Vibration:	10-2000 Hz / 10 G
Bump:	10 G / 16 ms (1000 x 3 axis)
Humidity:	98 % RH without condensation
Enclosure Rating:	IP 64 / Nema 4 (approx.) - option IP 65 / Nema 4 (approx.) - option IP 66 / Nema 6 (approx.) - option IP 67 / Nema 6 (approx.)

Connection Options

Cable:	4x2x0,14 mm ² , 26 AWG, 4 twisted pairs; shielded See Table 3
Connectors:	6-pin Mil radial (optional cap) See Table 2 7-pin Mil radial (optional cap) See Table 2 10-pin Mil radial (optional cap) See Table 2 5-pin Rota radial (optional cap) See Table 4

Certifications

ATEX:	Certificate No.: ITS 08 ATEX 42972X R.1 II 3 G Ex nA IIC T4 Gc, II 3D Ex tc IIIC T100°C Dc -40°C ≤ Tamb ≤ +70°C *
IECEX:	Certificate No.: IECEX ITS 15.0035X Ex nA IIC T4 Gc, Ex tc IIIC Tmax.100°C Dc -40°C ≤ Tamb ≤ +70°C*
EAC Ex:	НАННО «ЦСВЭ» No. ЕАЭС RU C-DK.AA87.B.00266/19 2Ex nA IIC T4 Gc, Ex tc IIIC T100°C Dc X, -40°C < Tamb < +70°C *

* upper ambient of encoders fitted with ROTA connector restricted to a maximum of +60°C

Output waveform

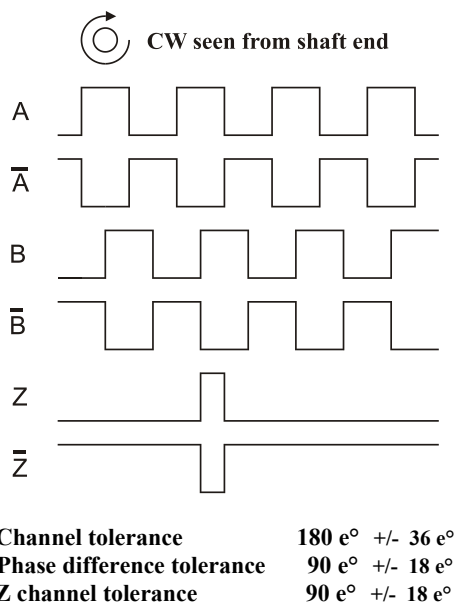


Table 1. Disk Resolutions (pulses per revolution)

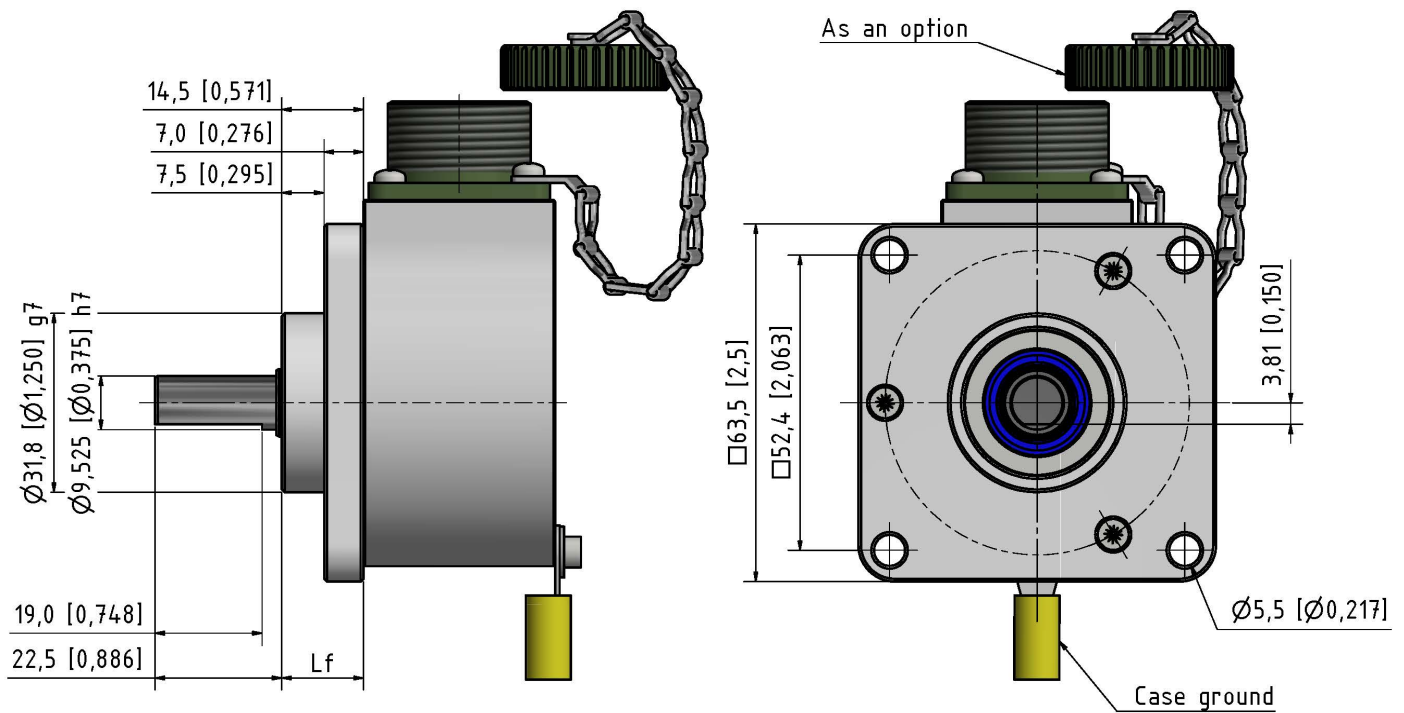
1	32	125	720	3072
2	36	150	800	3600
5	40	180	1000	4000
6	45	200	1024	4096
7	47	250	1131	5000
8	50	256	1200	8192
10	60	300	1250	9000*
12	64	360	1270	10000*
15	70	400	1500	12500*
16	75	455	2000	
18	80	500	2048	
20	90	512	2400	
25	100	600	2500	
30	120	635	3000	

Other options on request

Pulses per revolution,
min. 1 – max. 12.500

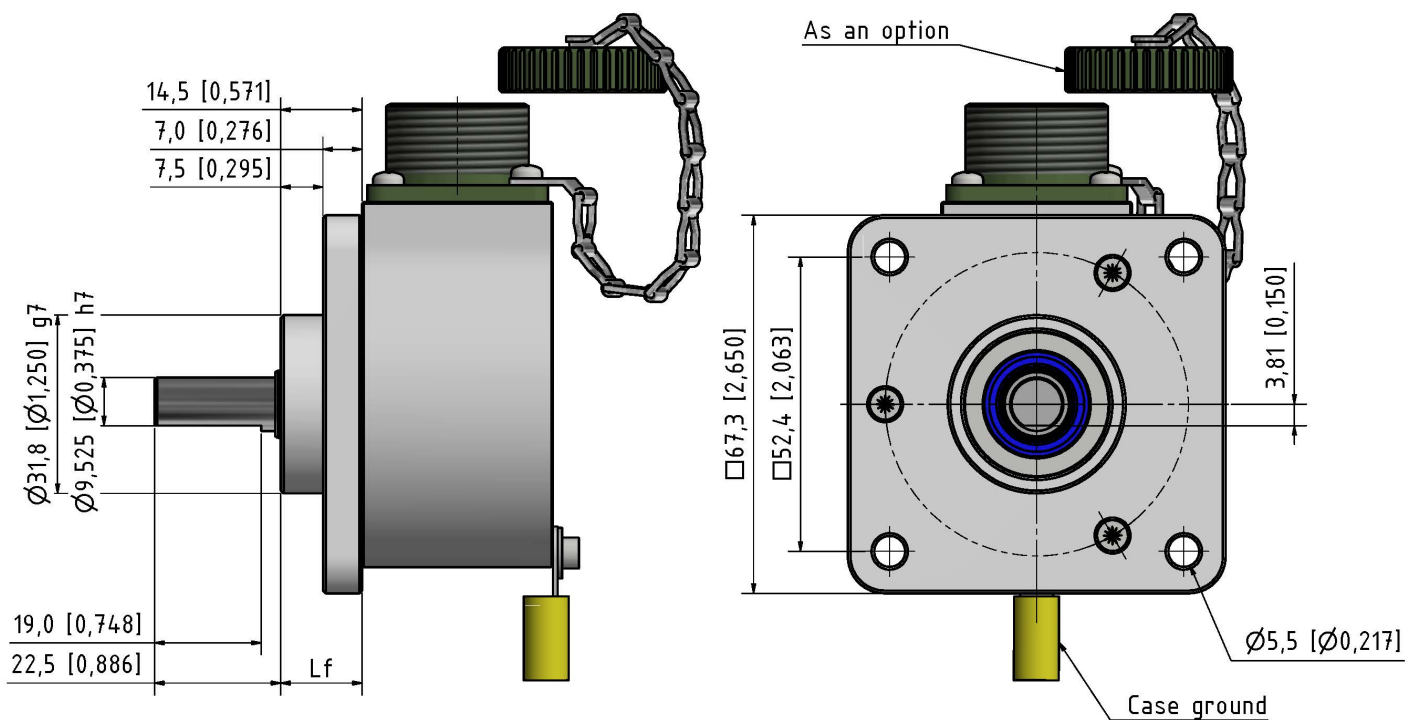
* Operating temperature: -20° C to 50° C

Face Mounts



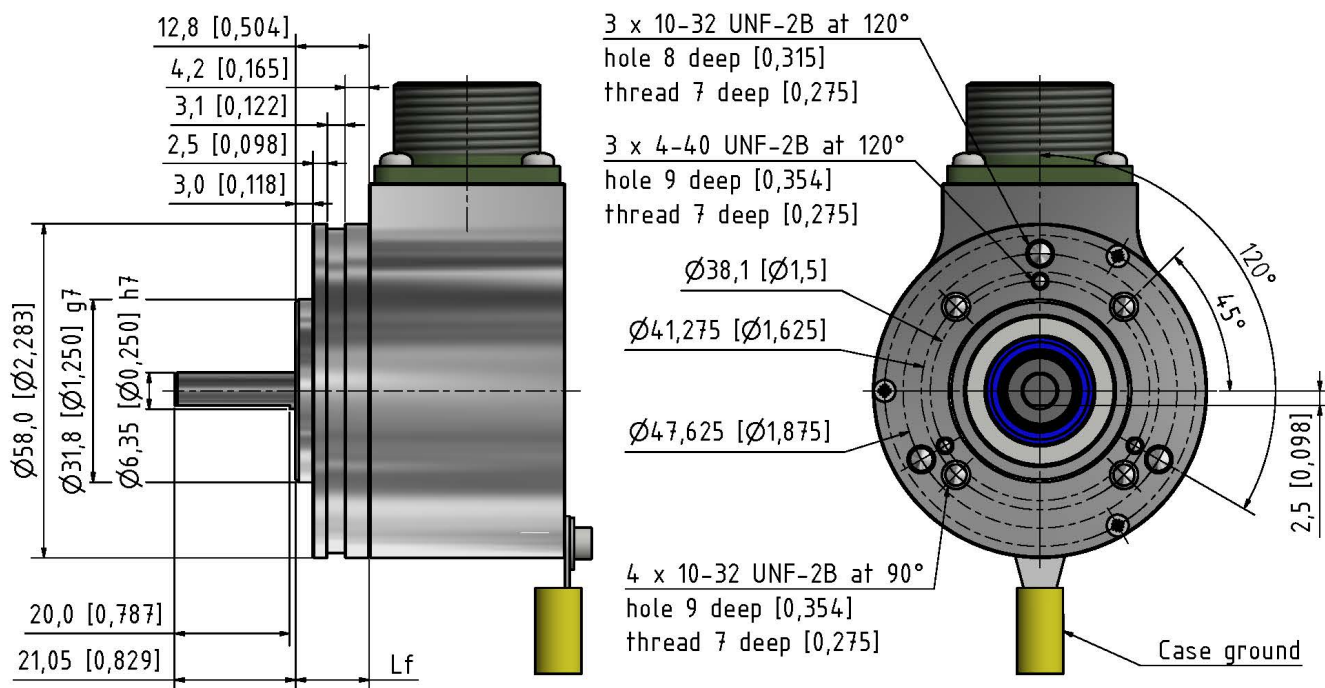
Face Mount A
 2.5 inch Square Flange

mm (inches)



Face Mount B
 2.65 inch Square Flange

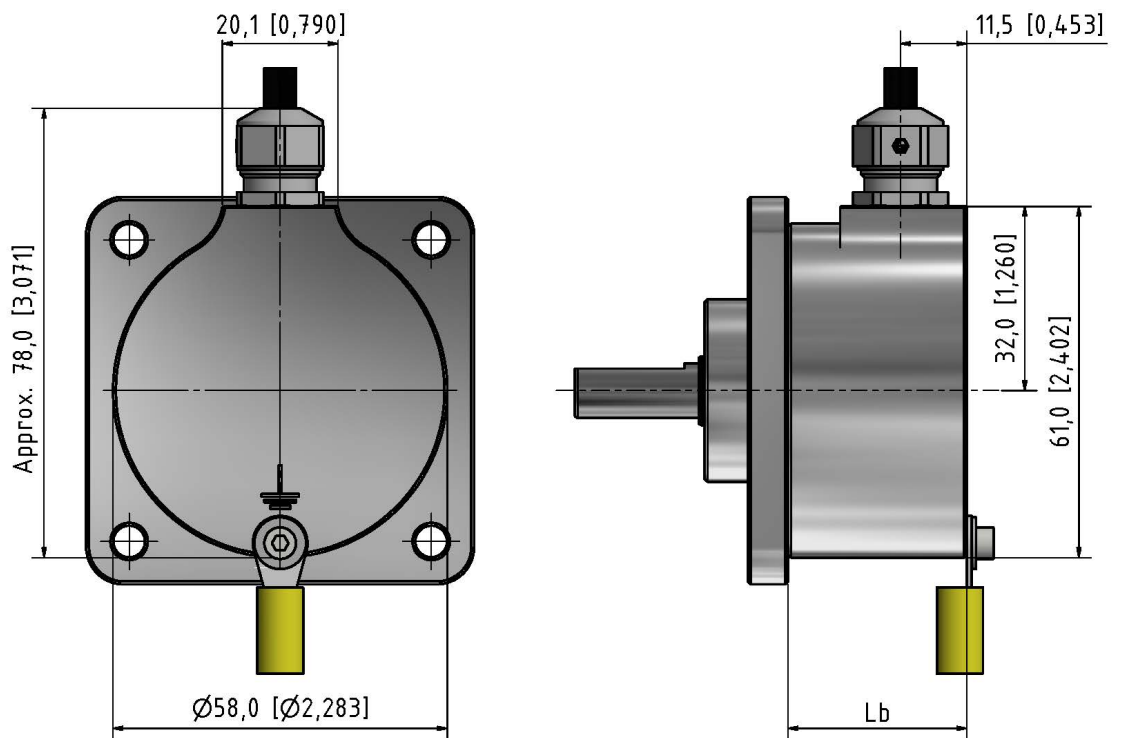
mm (inches)



Face Mount C
 $\varnothing 58$ mm Servo Flange

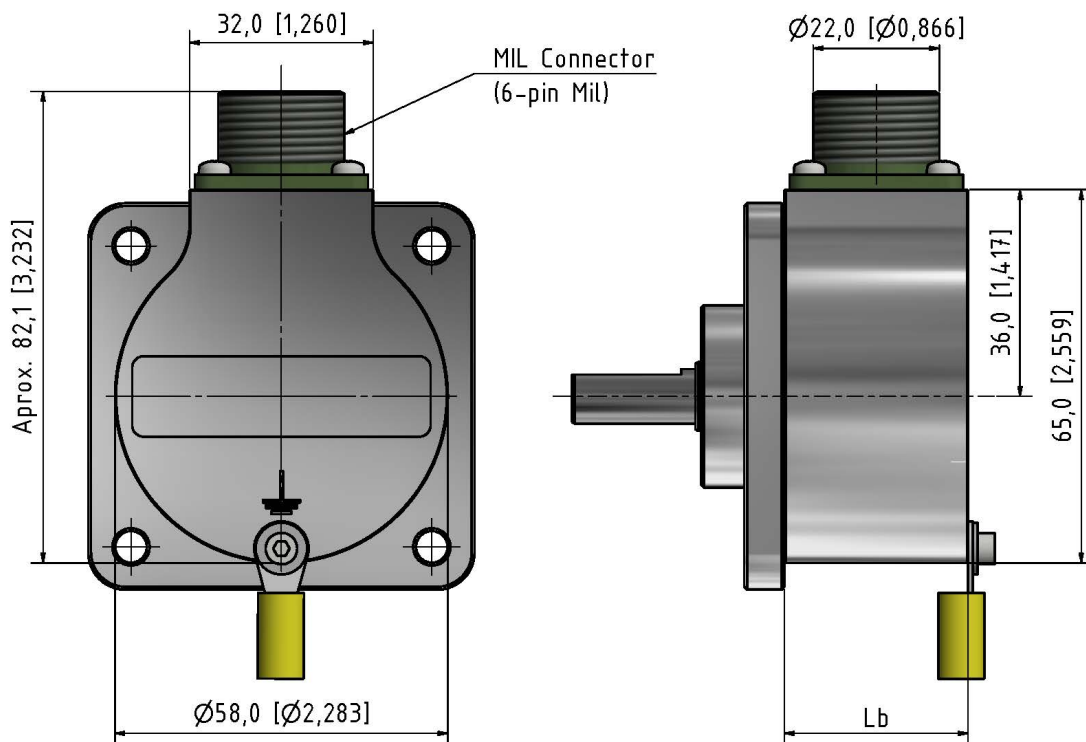
mm (inches)

Caps with Cable and Connectors (MIL and ROTA)



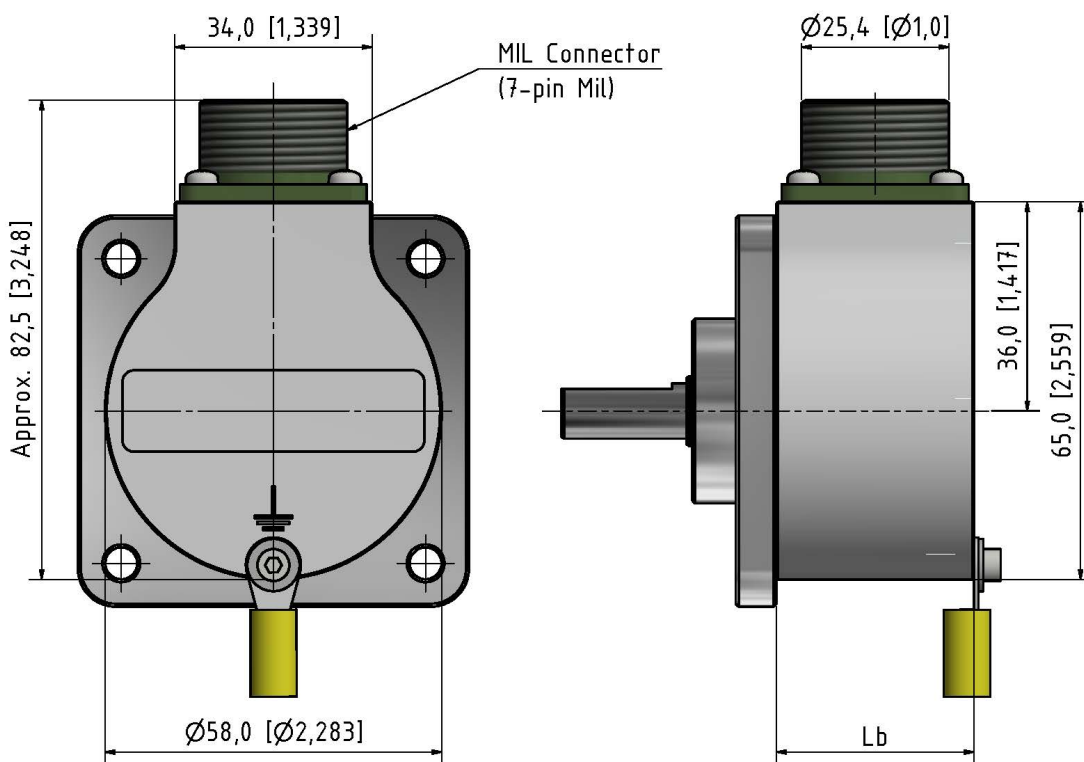
Side Standard Cable Gland Cap (SS)

mm (inches)



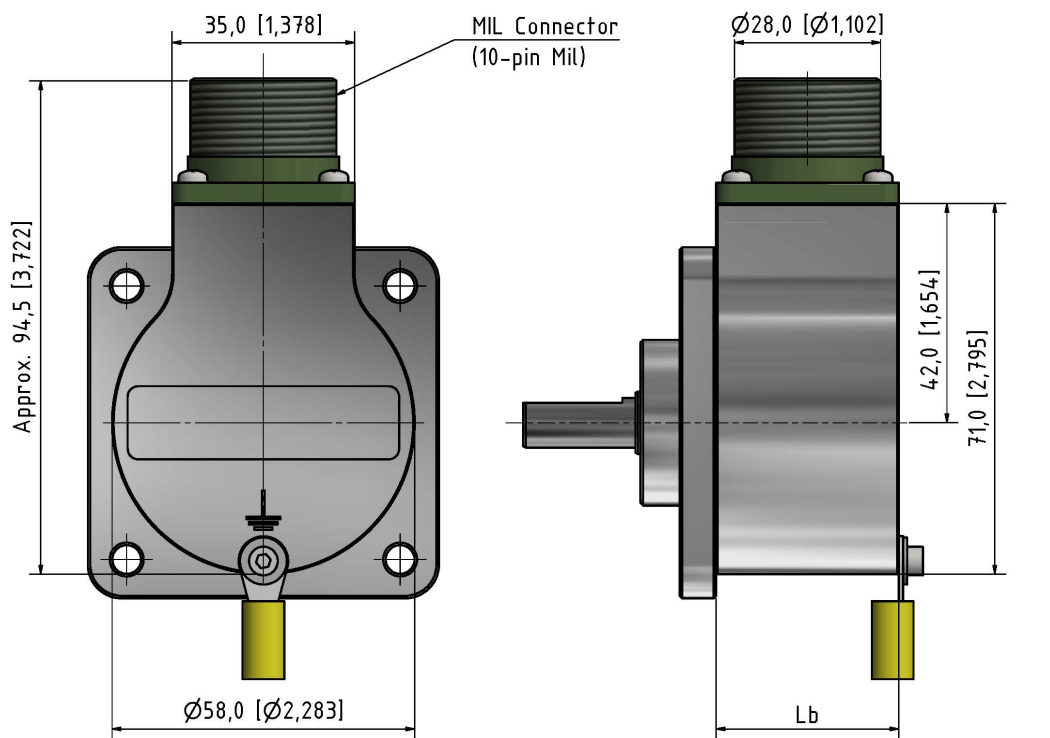
MIL Connector Cap (C6)
 6-pin Mil

mm [inches]



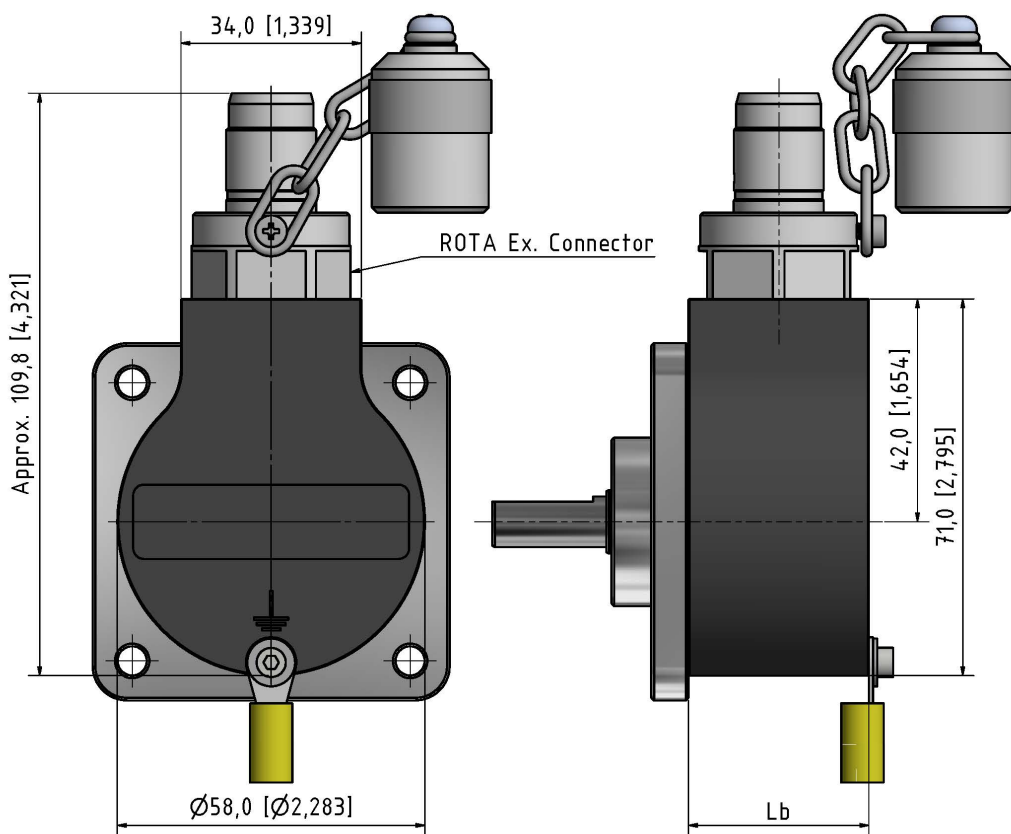
MIL Connector Cap (C7)
 7-pin Mil

mm [inches]



MIL Connector Cap (C10)
 10-pin Mil

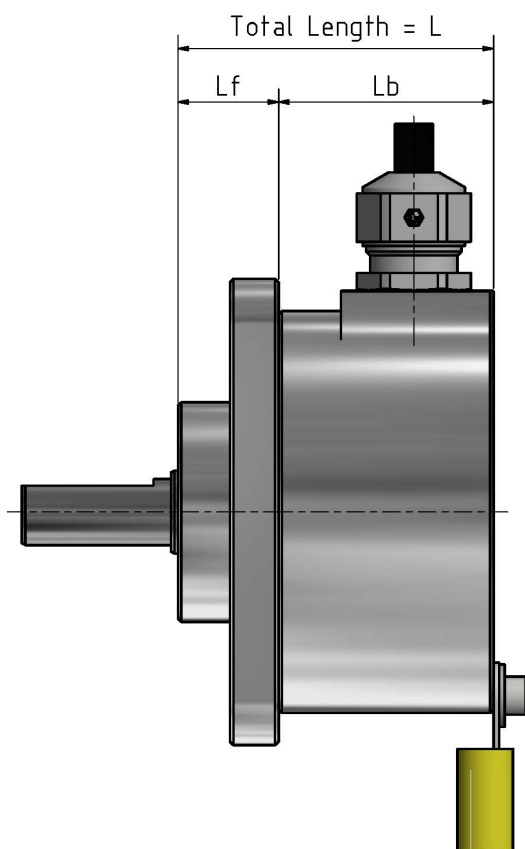
mm [inches]



ROTA Ex. Connector Cap (R5)
 5-pin ROTA Ex Connector

mm [inches]

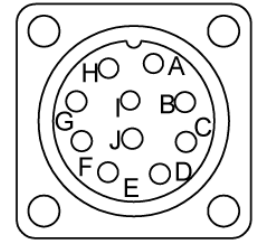
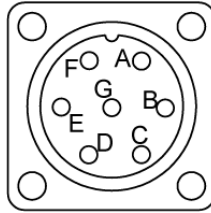
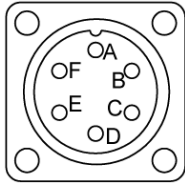
Encoder Length



Total Encoder Length $L = L_b + L_f$

Cap	Face mount A	Face mount B	Face mount C
SS	45,5 mm (1,79 in)	45,5 mm (1,79 in)	43,8 mm (1,72 in)
C6	46,5 mm (1,83 in)	46,5 mm (1,83 in)	44,8 mm (1,76 in)
C7	48,5 mm (1,91 in)	48,5 mm (1,91 in)	46,8 mm (1,84 in)
C10	49,5 mm (1,95 in)	49,5 mm (1,95 in)	47,8 mm (1,88 in)
R5	48,5 mm (1,91 in)	48,5 mm (1,91 in)	46,8 mm (1,84 in)

Cap + Face Mount = Total Encoder Length

Table 2. Output Terminations – MIL Connectors


Pin	6-pin Mil		7-pin Mil		10-pin Mil	
	Standard Output	Standard Output	Optional Standard Output *	Optional Differential Output *	Differential Output	Optional Differential Output *
Pin	Channel	Channel	Channel	Channel	Channel	Channel
A	GND	A	A	A	A	A
B	Vsup	B	B	B	B	B
C	Z	Z	NC	A -	Z	A -
D	B	Vsup	Vsup	Vsup	Vsup	Vsup
E	A	NC	NC	B -	NC	B -
F	Shield	GND	GND	GND	GND	GND
G		Shield	Shield	Shield	Shield	Shield
H					A -	NC
I					B -	NC
J					Z -	NC

* ID number required

GND = Circuit Ground Shield = Case Ground

Table 3. Cable Output

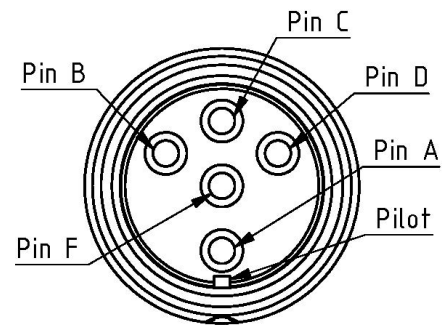
Channel	Standard Cable	
	Standard Output	Differential Output
Channel	Wire Color	Wire Color
A	Pink	Pink
A -	Gray*	Gray
B	Green	Green
B -	Yellow*	Yellow
Z	White	White
Z -	Brown*	Brown
Vsup	Red	Red
GND	Blue	Blue

* Gray, Yellow, and Brown are internally connected as Circuit Ground

GND = Circuit Ground

Shield connected to Case Ground

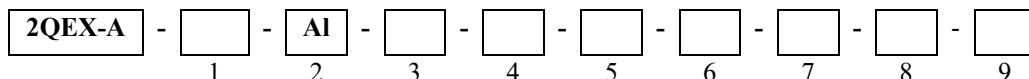
Cable: Shielded, 4x2x0,14 mm², 26 AWG, 4 twisted pairs;
 Yellow cable shoe: AWG 12-10

Table 4. Output Terminations – Rota Ex Connector


Rota Ex Connector Pin Assignment	
Pin	Signal
A	Shield
B	Channel A
C	Channel B
D	Vsup
F	GND

Ordering Code

Example: 2QEX – A – 1024 – AL – N – 3/8 – 20 – 67 – 00 – C7 – B



1. Pulse per revolutions

See Table 1.

2. Material

Aluminum..... **AI**

3. Output

Standard..... **N**
 Standard – open Collector NPN..... **NON**
 Standard – open Collector PNP..... **NOP**
 Differential..... **D**
 26C31 Line Driver 5V only..... **L**
 OL 7272 Line Driver..... **M**

4 & 5 Shaft dimensions

	<u>4.</u>	<u>5.</u>
3/8 inch x 22,5 mm (Flanges A, B)	3/8	x 22
8 mm x 20 mm (Flanges A, B)	8	x 20
10 mm x 20 mm (Flanges A, B)	10	x 20
10 mm x 28 mm (Flanges A, B)	10	x 28
1/4 inch x 20 mm (Flange C)	1/4	x 20
3/8 inch x 20 mm (Flange C)	3/8	x 20
6 mm x 15 mm (Flange C)	6	x 15

6. IP Rating

IP 64.....	64
IP 65.....	65
IP 66.....	66
IP 67.....	67

7. Cable Length

Standard cable is 1m..... **01**
 Specify length..... **XX**
 No cable..... **00**

8. Cable Takeout or Connector

Cable
 Side (Standard)..... **SS**
Connectors
 MIL - 6 pins..... **C6**
 MIL - 7 pins..... **C7**
 MIL - 10 pins..... **C10**
 ROTA - 5 pins..... **R5**

9. Flange

Flange A - 2.5 inch square..... **A**
 Flange B - 2.65 inch square..... **B**
 Flange C – Ø58mm servo..... **C**