



EX78 – Removable End Cap

- Shaft Encoder - Ø 78 mm
- Shaft: Ø 10 mm, Ø12 mm
- Dual Output – Absolute and Incremental
- New software version – 2PD (*see the ordering code*)
- Profibus DPV0 Functionality
- Resolution up to 31 bits
- Removable End Cap for on-site modifications
- ATEX, IECEx, North America Class I Div. 2, Ex db IIC and Profibus Trade Org. certified



Electrical Specifications

Code:	Absolute Binary and Incremental
Interface:	Profibus DP-V0 Supports the Profibus Profile for Absolute Encoders Vers. 1.1 class 1 and class 2
Resolution:	Max. 15 bits (32768) revolutions Max. 16 bits (65536) steps per rev.
Device Addressing:	Adjustable by rotary switches in the removable end cap and through the Change Station Address function over the Profibus interface
Address Range	1 to 126
Baud Rate	All standard Baud rates from 9,600 baud to 12 Mbaud
Update Rate	>1500 updates per second
Termination Resistors:	Built inside removable end cap Switchable on/off
Output	HTL Driver 9 to 30V input/output
Output Current	40 mA load per output channel
Output format	See. p.3
Phase Sense	A leads B (CW)
Index	Gated with Ch. A & B high 1/4 cycle
Max. frequency	150 kHz
Supply Voltage	9 V min. to 30 V max.
Current Consumption	80mA @ Vsup = 10 V (typical) 40mA @ Vsup = 24 V (typical)
Power consumption	< 1.2 Watts
Electrical Protection:	Reverse polarity protected
Noise Immunity:	EN 61000-6-2: 2005
Emitted Interference:	EN 61000-6-3: 2007

Mechanical Specifications

Material:	Housing: Aluminum or Stainless Steel Cap: Aluminum or Stainless Steel Shaft: Stainless Steel
Weight:	Aluminum: ~ 1600 gr (56,44 oz) Stainless Steel: ~ 3100 gr (109,35 oz)
Bearing Life:	> 1,9 x 10 ¹⁰ revolutions at rated load
Shaft Speed:	6.000 rpm (max.) IP 64 3.000 rpm (max.) IP 65/66/67/68
Starting Torque:	≤ 0,01 Nm at 25° C (no seal) ≤ 0,03 Nm at 25° C (with seal)
Rotor Mass Moment of Inertia:	42 gcm ² (5,95 x 10 ⁻⁴ oz-in-sec ²)
Shaft Loads:	Axial: 60 N (13,50 lbs) max. Radial: 80 N (17,98 lbs) max.

Environmental Specifications

Operating Temp.:	-40° to +70° C
Storage Temp.:	-40° to +70° C
Shock:	100g @ 11 ms
Vibration:	10g @ 10-2000 Hz
Bump:	10g @ 16 ms (1000 x 3 axis)
Humidity:	98 % RH without condensation
Enclosure Rating:	IP 64 / Nema 4 (approx.) IP 65 / Nema 5 (approx.) IP 66 / Nema 6 (approx.) IP 67 / Nema 6 (approx.) IP 68 (1hour/1 meter) / Nema 6P (approx.)

Certifications

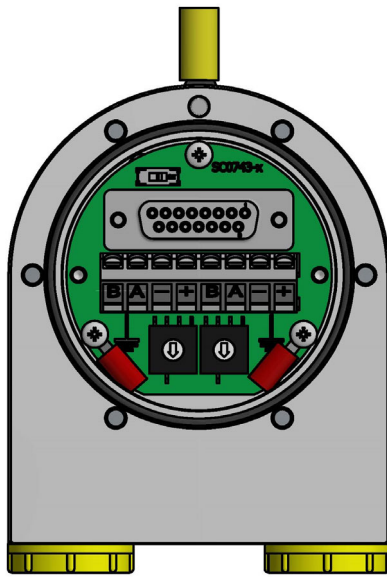
ATEX:	Certificate No.: ITS09ATEX16867X II 2 G Ex db IIC T5 Gb II 2 D Ex tb IIIC T100°C Db -40°C ≤ Ta ≤ +70°C
IECEX:	Certificate No.: IECEX ITS 10.0016X Ex db IIC T5 Gb, Ex tb IIIC T100°C Db -40°C ≤ Ta ≤ +70°C
North America:	Certificate No: LR1192-5 Class I Division 2 Groups ABCD T5, Class II Division 2 Groups FG, Class I Zone 1AEx db IIC T5 Gb, Ex db IIC T5 Gb, Zone 21 AEx tb IIIC T100°C Db, Ex tb IIIC T100°C Db, Tamb= -40 °C to +70 °C

Interface

Installation

The rotary encoder is connected by one, two or three cables. This depends on whether the power supply is integrated into the bus cable or connected separately. If the power supply is integrated into the bus cable, one of the cable glands can be fitted with a plug. Any unused cable outlets must be closed using a suitably certified - proof blind plug.

Profibus Output



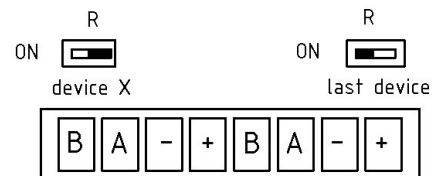
The Profibus-DP device address is set by user-friendly rotary switches in the connection cap. Allowed addresses are between 1 and 125. Each can only be used once.

The connection cap can easily be opened by removing the six screws in the cap.

The Termination Resistor is integrated into the connection cap. It must be switched to the ON position if the encoder is connected at the physical end or beginning of the bus.

The power supply has to be connected once (no matter which clamps). If the encoder is not the last device on the bus the power supply can be forwarded to the next device through the corresponding additional clamps.

The GSD file is necessary for installing the encoder. The GSD file and the detailed user manual can be downloaded from our homepage: www.scancon.dk



Terminal	Description
B (left)	Bus line B (Bus in)
A (left)	Bus line A (Bus in)
-	0V
+	9-30V
B (right)	Bus line B (Bus out)
A (right)	Bus line A (Bus out)
-	0V
+	9-30V

- **The internal earth connection** (red cable shoes) is 22-16 AWG.
La connexion à la terre interne (Borne rouge) est en 22-16 AWG.
- **The external earth connection** (yellow cable shoe) is 12-10 AWG.
La connexion de terre externe (Borne jaune) est en 12-10 AWG.
- **The terminal block** is intended for installation a cable with wire size:
 - a) solid 0,14 mm² – 2,5 mm².
 - b) Stranded 0,14 mm² - 1,5 mm²
 - c) stranded with ferrule 0,25 mm² - 1,5 mm².

The rated wire size is AWG 22-12.

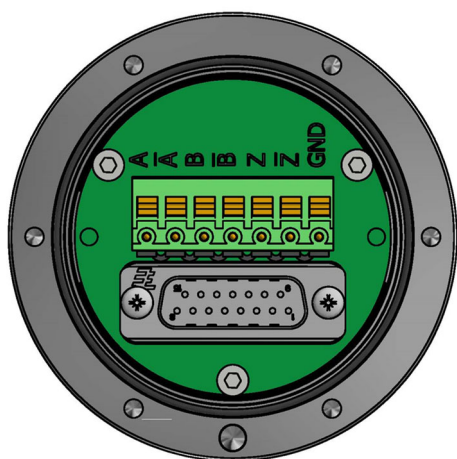
- **Le bornier** est conçu pour une installation d'un câble à la taille du fil:
 - a) rigide de 0,14 mm² - 2,5 mm²
 - b) souple 0,14 mm² - 1,5 mm²
 - c) souple avec embout 0,25 mm² - 1,5 mm².

La taille de fil nominale est AWG 22-12.

Incremental Output

The Incremental output consists of two channel (A, B) quadrature with an index channel (Z) as well as complementary (A-, B-, Z-) outputs.

The Incremental output terminal block is found on the encoder body cover, is **removeable** and with **push-in spring connection method**. This can be accessed once the connection cap has been removed.



Connections - incremental wires

A	$\bar{A}$	B	$\bar{B}$	Z	$\bar{Z}$	GND
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Terminal	Description
A	Channel A
$\bar{A}$	Channel A inv
B	Channel B
$\bar{B}$	Channel B inv
Z	Channel Z
$\bar{Z}$	Channel Z inv
GND	Circuit GND

The terminal block is intended for an installation of a cable with wire size:

- a) solid 0,2 mm² – 2,5 mm².
- b) flexible with ferrule 0,25 mm² – 1,5 mm².

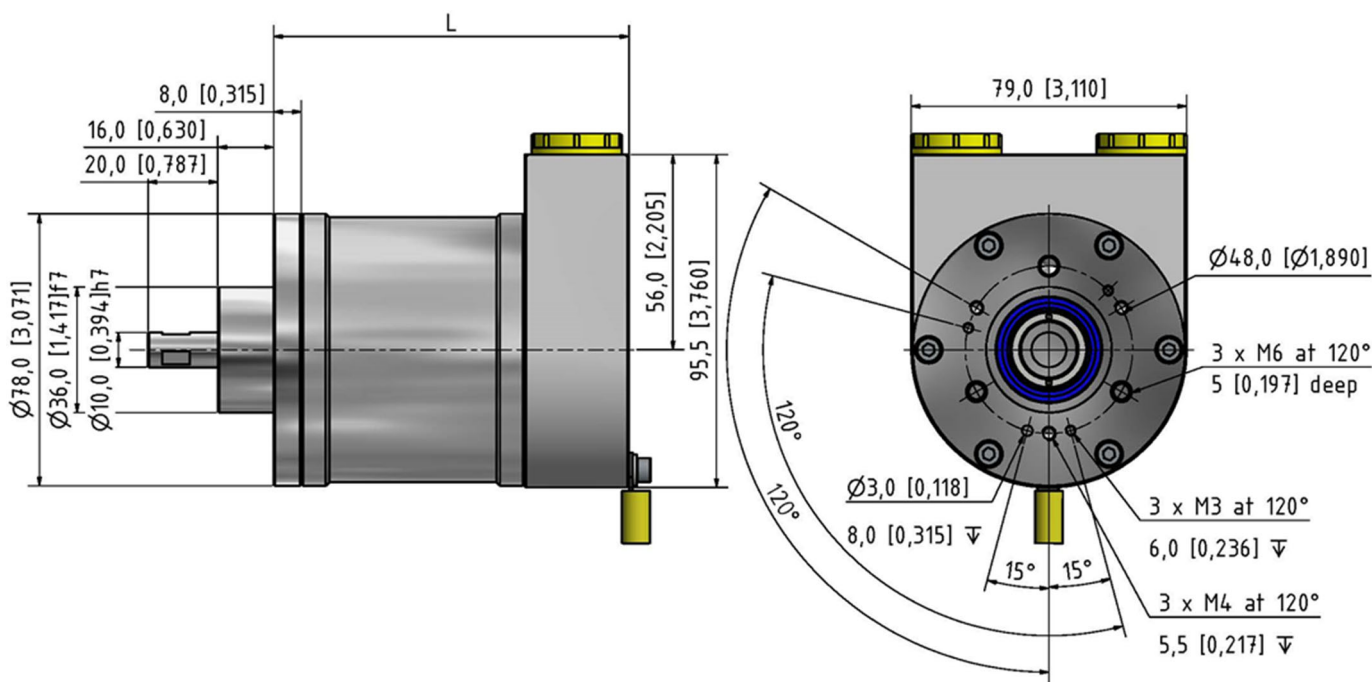
The rated wire size is AWG 26-14.

Le bornier est conçu pour une installation d'un câble à la taille du fil:

- a) rigide de 0,2 mm² - 2,5 mm²
- b) souple avec embout 0,25 mm² - 1,5 mm².

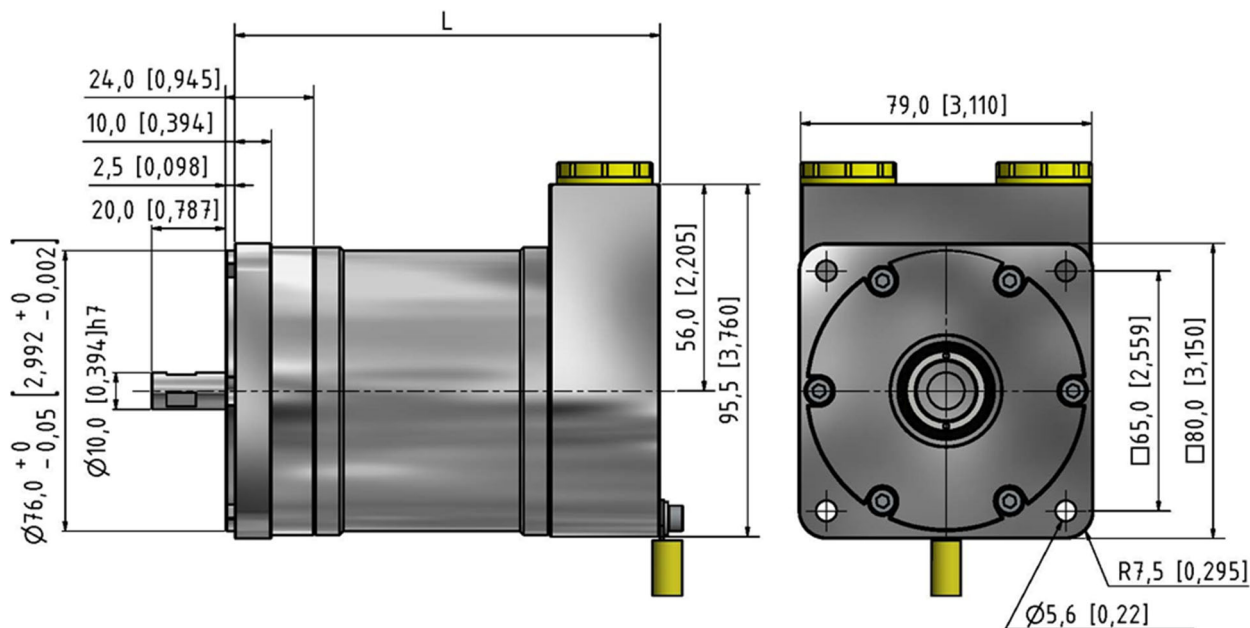
La taille de fil nominale est AWG 26-14.

Face mounts



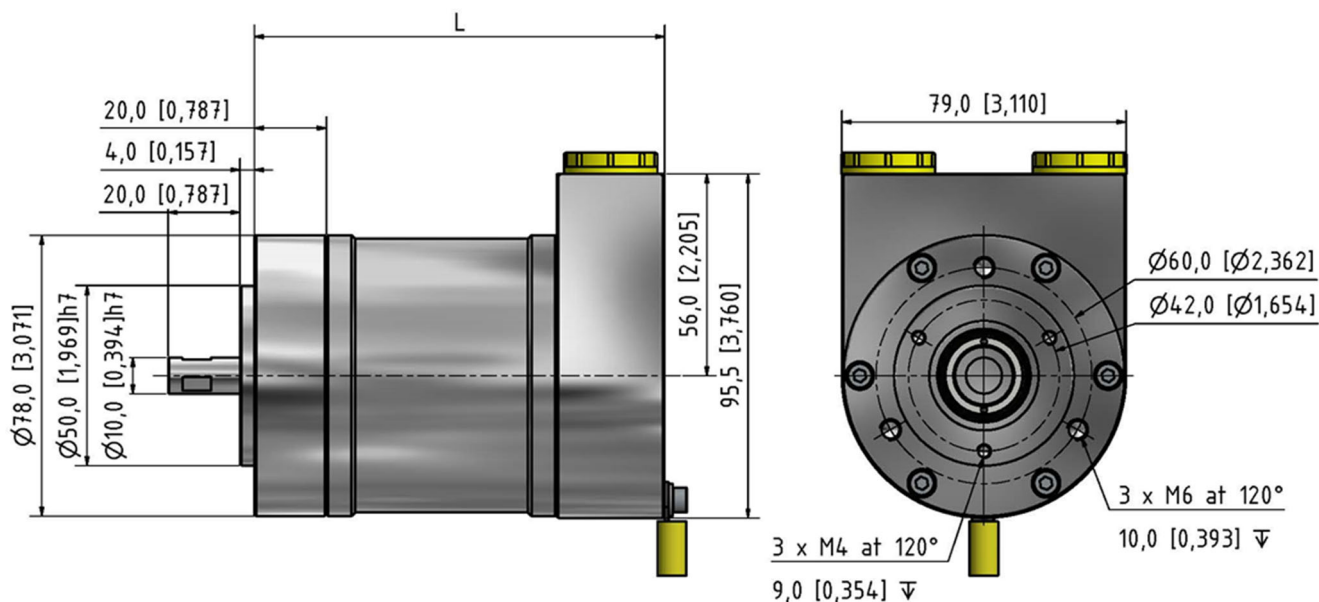
Face Mount C
Clamping Flange

mm (inches)



Face Mount Q
Square Flange
 SA option only

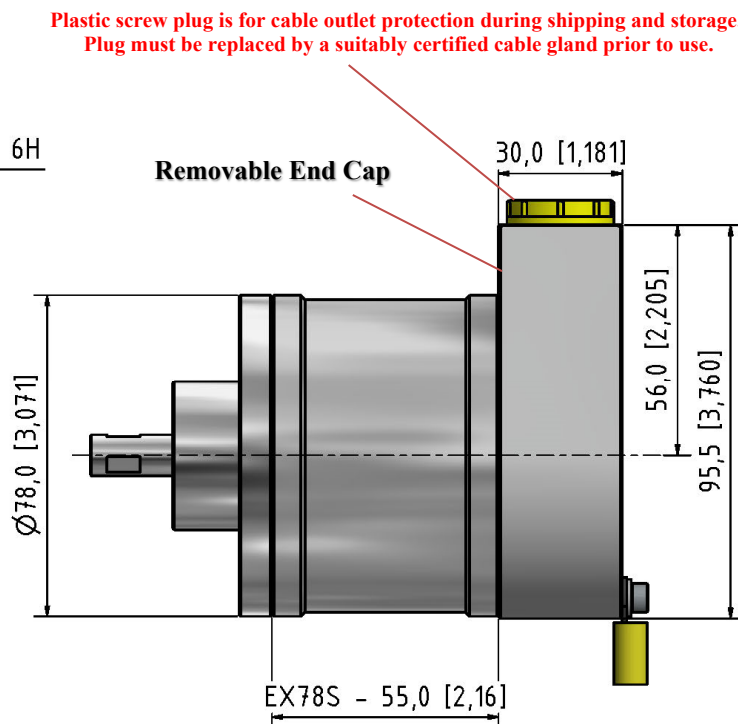
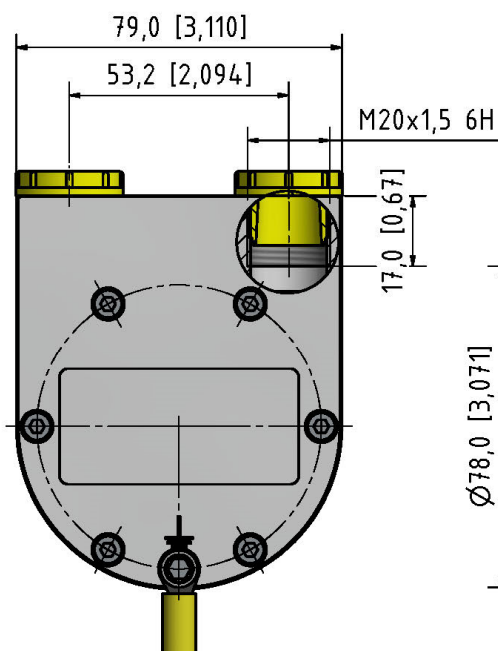
mm (inches)



Face Mount S
Servo Flange

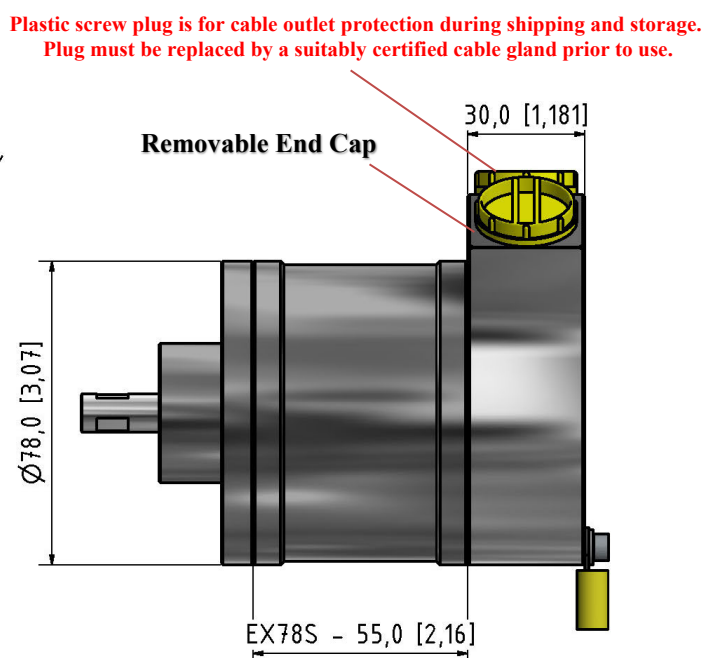
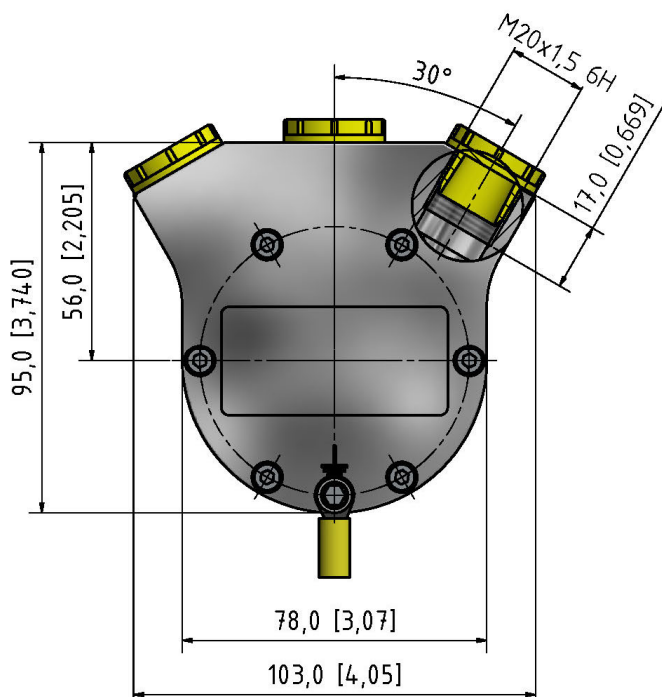
mm (inches)

End Caps with Cable Outlets



Side Standard End Cap (FZ)

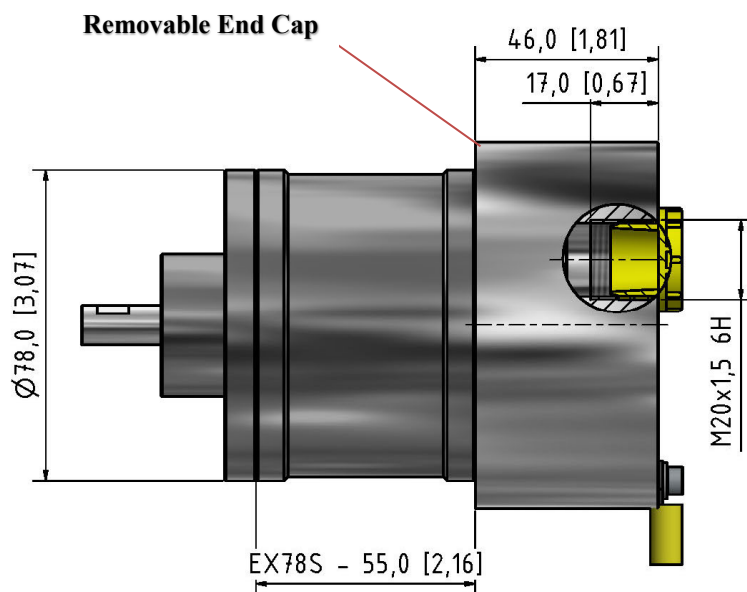
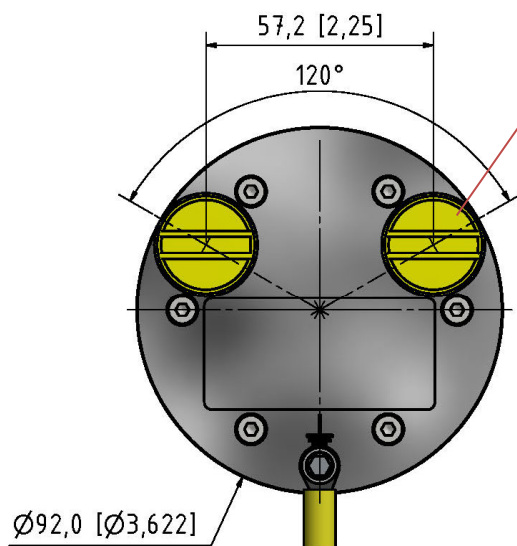
mm (inches)



Side Triple End Cap (FE)

mm (inches)

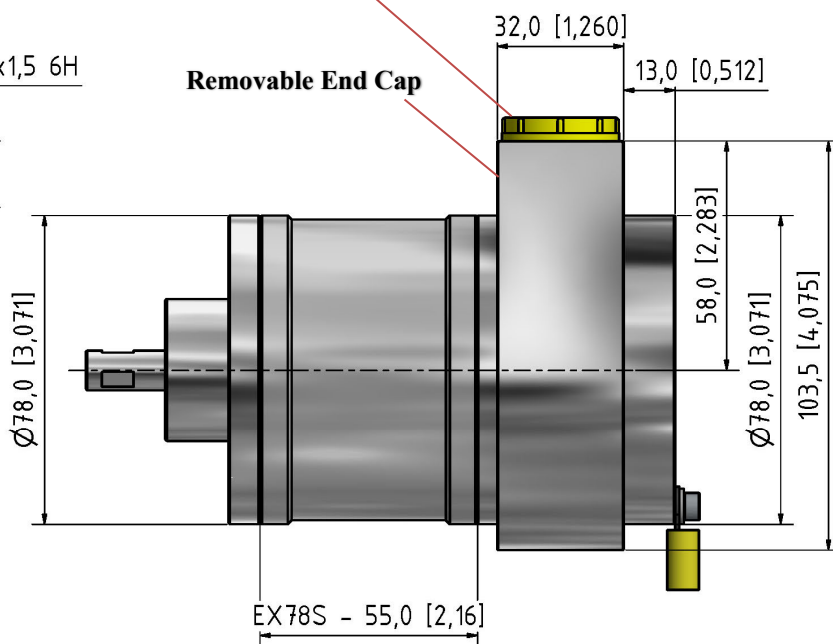
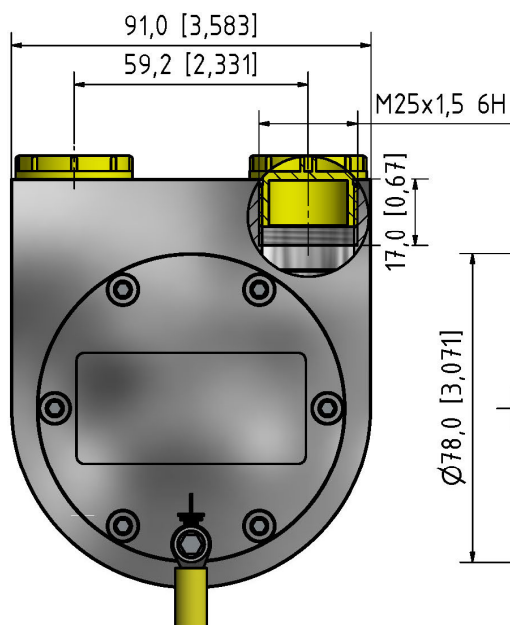
Plastic screw plug is for cable outlet protection during shipping and storage.
 Plug must be replaced by a suitably certified cable gland prior to use.



Back Round End Cap (FG)

mm (inches)

Plastic screw plug is for cable outlet protection during shipping and storage.
 Plug must be replaced by a suitably certified cable gland prior to use.



Side M25 End Cap (FI)

mm (inches)

Encoder Length
Housing S (55 mm) - Total Encoder Length

End Cap	Face Mount		
	Clamping Flange C	Servo Flange S	Square Flange Q
FZ	93 mm (3,66 in)	105 mm (4,29 in)	106,5 mm (4,68 in)
FE	93 mm (3,66 in)	105 mm (4,29 in)	106,5 mm (4,68 in)
FG	109 mm (4,29 in)	121 mm (4,76 in)	122,5 mm (4,82 in)
FI	113 mm (4,45 in)	125 mm (4,92 in)	126,5 mm (4,98 in)

End Cap + Face Mount + 55 mm = Total Encoder Length

Ordering Code

Example: EX78S – 2PD – 14 – 16 – A – AL – 6AB – 01 – 67 – 00 – FZ – C – 00

EX78S-2PD*	-		-		-	A	-		-			B	-		-		-	00	-		-		-	00
		1		2		3		4		5		6		7		8		9		10		11		12

1. Number of revolutions

Single Turn.....	00
Multiturn 12 bits (4096)	12
Multiturn 13 bits (8192)	13
Multiturn 14 bits (16384).....	14
Multiturn 15 bits (32768).....	15

2. Steps per revolution

12 bits (4096) (0.09°).....	12
13 bits (8192) (0.04°).....	13
14 bits (16384) (0.02°)	14
15 bits (32768) (0.01°).....	15
16 bits (65536) (0.005°).....	16

3. Composition

Aluminum	AL
Stainless Steel*	SA

* AISI 316

4. Incremental Output

HTL Driver.....	6
<i>9 to 30V input – 9 to 30V output</i>	

5. Incremental PPR

512 ppr	A
1024 ppr.....	B
2048 ppr	C
4096 ppr	D
8192 ppr	E

6. Code

Binary.....	B
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7. Shaft (diameter x length)

10 mm x 20 mm 2 flats, 8mm length	01
12 mm x 25 mm 2 flats, 8 mm length	02
10 mm x 20 mm 1 flat, 15 mm length	03

8. IP Rating

IP 64	64
IP 65	65
IP 66	66
IP 67	67
IP 68*	68

*1 meter/1 hour

9. Cable

No cable.....	00
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10. Cable Outlets

Side Standard 2 outlets	FZ
Side Triple 3 outlets.....	FE
Back Round 2 outlets.....	FG
Side M25 threaded 2 outlets.....	FI

11. Flange

Clamping flange	C
Synchro flange	S
Square SA option only.....	Q

12. Accessory

No accessory.....	00
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*) Firmware version **01D** has been replaced by firmware version **2PD**. The two versions are not directly interchangeable as version 2PD will require a changed GSD file. Version 01D is only available on request by replacing 2PD with 01D in the ordering code. Technical Manual and GSD file for both versions can be found on Scancon's website.